Psychosocial well-being at the workplace...

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Empowering psychosocial well-being at the workplace:

How communicating micro-breaks can contribute to structuring breaks and creating social awareness.

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SUMMARY

In the search for what well-being at the workplace is and what it hinders a connection between burnout-related symptoms, work culture and micro-breaks is found. This research does not try to solve burnout, though it tries to provide relief in stressful work life with a perspective on cultural, behavioural, and organisational change.

Psychosocial Well-Being

More and more (young) working adults in the Netherlands experience burn-out-related stress symptoms. Although the focus of office environments is more focused on vitality, this trend keeps rising. Stress translates into both mental and physical complaints and can ultimately result in absenteeism.

Office and Employees

General office equipment such as ergonomic chairs and desks are designed and do a good job, but other new furniture focused on well-being, such as a nap bed, appear not to catch up. Products that focus on awareness of well-being turn out to not be sustainable or even intrusive. Employees on the other hand seem to be burdened by occupational pressure while most people are like-minded when it comes to prioritising well-being over work.

Micro-Breaks and Social Interaction

Micro-breaks are necessary for keeping a steady energy level and most importantly required during stressful periods with high workloads. During micro-breaks, it is recommended to move around to get blood circulation flowing. With a safe social context, taking breaks is normalised and awareness is created among colleagues.

Product Solution

The product solution is a simplified communication tool with only one purpose, communicating micro-breaks. The tool consists of a little display and are all connected. Every workplace or employee has such a product and by connecting it to your work computer or telephone, micro-breaks can be communicated with people in the same team. Different kinds of breaks can be communicated, depending on the team and facilities of the company. When team members are invited to participate in a micro-break they can simply accept, decline, or ignore the invitation.

Goal

The product aims to bring structure to taking breaks in a work environment and provides reminders during busy and stressful periods. In addition, the solution supports social interactions to lower the threshold for taking breaks. Ultimately to create a healthy working atmosphere in various environments.

Results

The results of the project are promising. The proof of concept is reflected well by the desirability, viability and feasibility of the product.

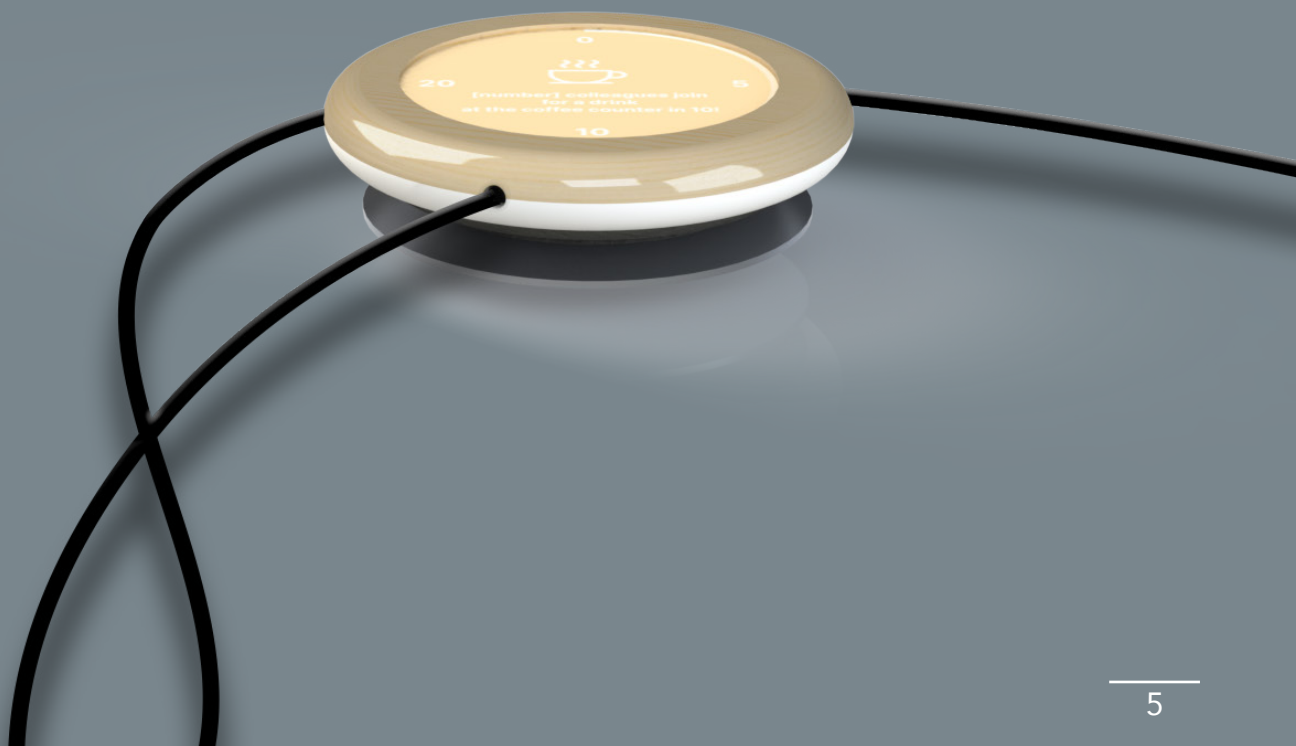
Desirability
Users believe that the concept provides social awareness in the workplace.

Viability
Intrusive traits of the product are minimised and the experience of the product is focused on control and autonomic decision-making to aim for sustainability.

Feasibility
A physical and digital prototype are created and tested with the users.

However, more iterations regarding the final concept should be done before entering the market. Research focusing on the implementation of the product in the office environment could support the findings of this project. How is the device connected to the relevant employees and team(member)s?

Overall, the concept contributes to an increase in micro-breaks and social interactions.



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1 INTRODUCTION

Offices have changed significantly over time. From enclosed individual offices to bullpens and a 'bürolandschaft' in the fifties, back to more closed cubicles in the sixties, and again back to more open-planned offices in the nineties. In the seventies, modern office equipment got its form because of a focus on ergonomics, while in the zeroes digitalisation shaped the office environment. Employees have a lot of freedom nowadays and remote work is perfectly normal. COVID accelerated the tendency to work from home but came with some difficulties, as it hurt social interaction and, in some cases, motivation, concentration, and productivity (Van Den Heuvel et al., 2021). As a reaction, the future shows that the emphasis within office planning is more directed toward the well-being of employees. For instance, hybrid working seems to have a limited effect on the average office surface (Buitelaar et al., 2017). The biggest shift is noticeable in the use of the office. Although the new way of working leads to savings in workplaces an increase is seen in the need for concentration, social and relaxation areas (EIB, 2012: 21). In other words, the office space that has become available is turned into a more vitalising work environment.

In contrast to the focus on well-being, research shows that the figures on burnout complaints among working people in the Netherlands are rising and will continue to rise in the coming decade. This negative trend emphasises the need for well-being from a wider perspective. General shortcomings of skilled and healthy personnel concern the social issues today. According to CBS (2022) and UWV (2022), there is still a shortage of personnel in virtually every profession. Together with an ageing population, it has become important for companies to attract, develop, and retain the best people and keep them healthy.

For this project, well-being at the workplace, what it hinders, and a connection between burnout-related symptoms, work culture and micro-breaks are examined. This project does not try to solve burnout, though it tries to provide relief in stressful work life with a perspective on cultural, behavioural, and organisational change.

1.1 ASSIGNMENT

Royal Ahrend is in search of vitalising workspaces, where sustainability is an integral part of the solution. The designed product solution should endeavour to optimise employee experiences, focusing on stimulating physical, psychological, and social well-being in workspaces. The design language of Ahrend follows the rules of 'less is more' and the furniture must comply with the Cradle-to-Cradle principles for the designs to be timeless. The original design brief can be found in Appendix A.

The assignment is to find a new, non-intrusive and effective way of promoting the awareness of employee well-being by stimulating positive behaviour. The outcome should aim to increase the vitality of the workplace and focus on the issues pointed out by the studies that are done in this project.

Problem Definition

The overarching theme of the project can be defined as the 'well-being' of employees. Well-being can be subdivided into physical, psychological, and social well-being. The challenge is to bring about a positive shift in the workplace environment, to keep employees healthy and their energy on level.

To keep productivity and energy balanced, it is important to be aware of occasional changes in the work environment and to take time for recovery after exertion. The awareness of well-being is not always present, and guidelines can be hard to follow due to an imbalance of priority between work and well-being.

The most difficult obstacle for this project is designing a product solution that is sustainable in use. Current products focusing on bringing structure to the workplace regarding breaks and well-being are often perceived as intrusive or do not stimulate intrinsic motivation. A personal or socially encouraged will to bring about change can be the guide to improved well-being.

Project Structure

To structure the project roughly a double diamond method is used, see Figure 1. The first two phases are about analysing the issues that employees face in office environments and narrowing down one specific obstacle towards a vision. The last two phases involve ideating, conceptualising, prototyping, and testing. Designing is central throughout the entire project and small iterations are constantly made.

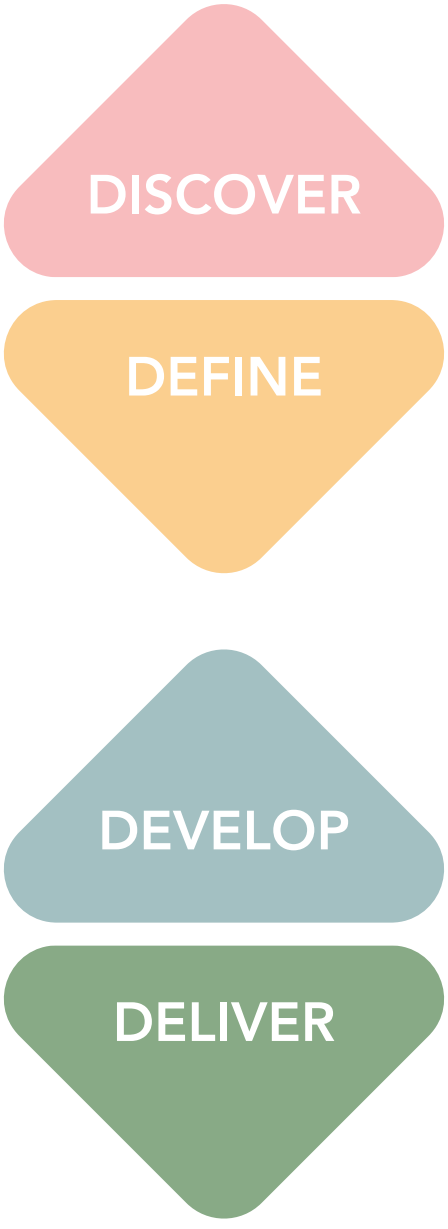


Figure 1, Double Diamond design method consisting of four main phases.

Approach

The objective of this project is to find the crux of employee well-being in the office environment. Therefore, four research questions are drawn up and subdivided into four phases, see Figure 2. By 'research through design' the goal is to find a product solution to the problem and research gap which are discovered and defined during the first 'diamond'. The philosophy is that by diverting and converting and continuous iterations finally a well-balanced product will arise.

STUDY 1	STUDY 2	STUDY 3	STUDY 4
What factors/triggers affect the psychosocial well-being of employees?	What are specific by employees experienced office issues that hinder the psychosocial well-being of employees?	How is the communication of micro-breaks experienced in several different office settings?	How is the application of communicating micro-breaks in a physical product experienced in practice?

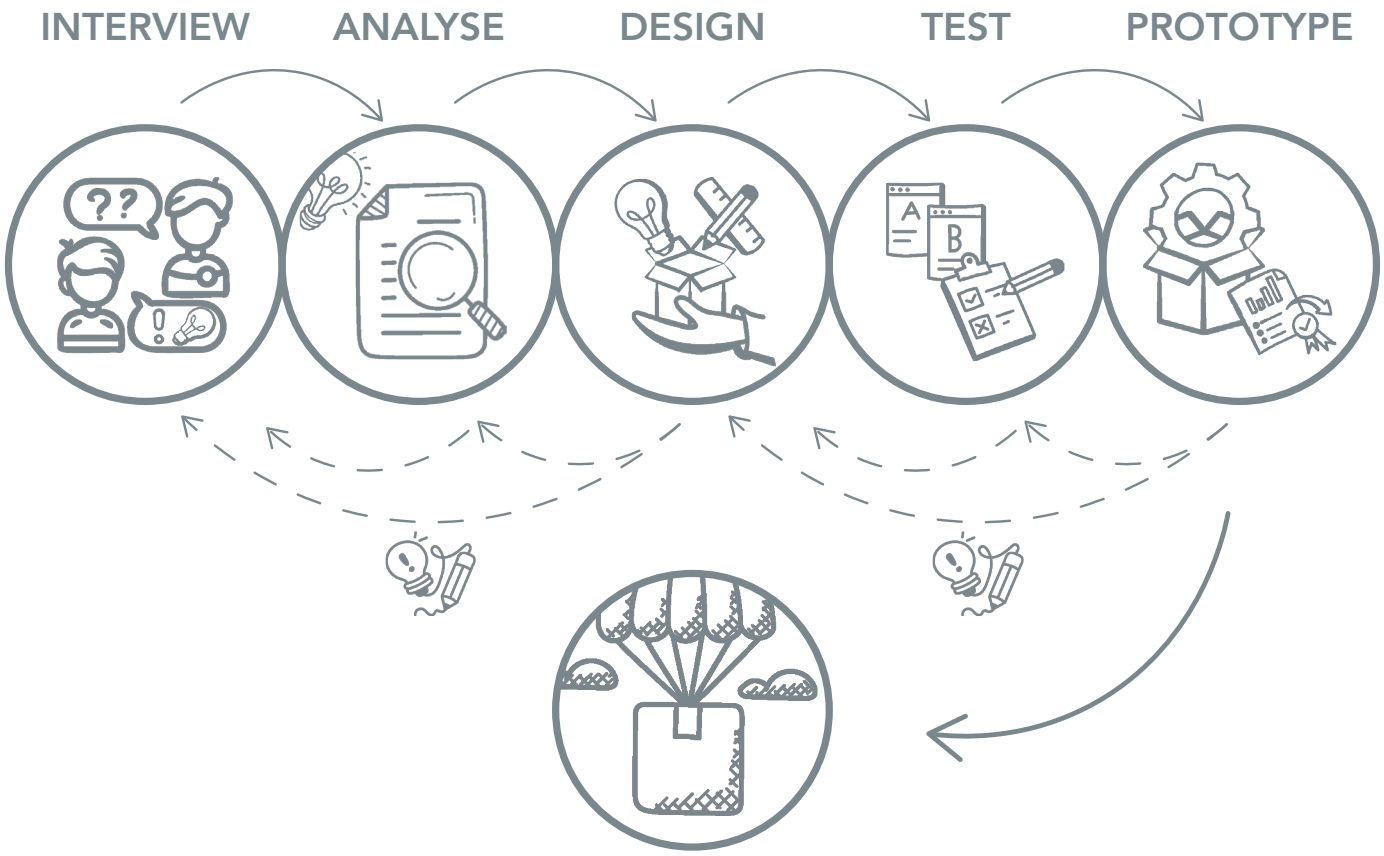


Figure 2, Research questions are shown next to the iterative process of designing.

Triangulation

In a nutshell, history and trends are analysed through extensive literature review and consulting experts, suspicions and obstacles are exposed by speaking to people and visiting workplaces, and concepts are tested for usability through user testing, and surveys. Via this approach, triangulation within this project is achieved, see Figure 3. Throughout the project and at the end feasibility, desirability and viability of the product are checked to strive for innovation and change.

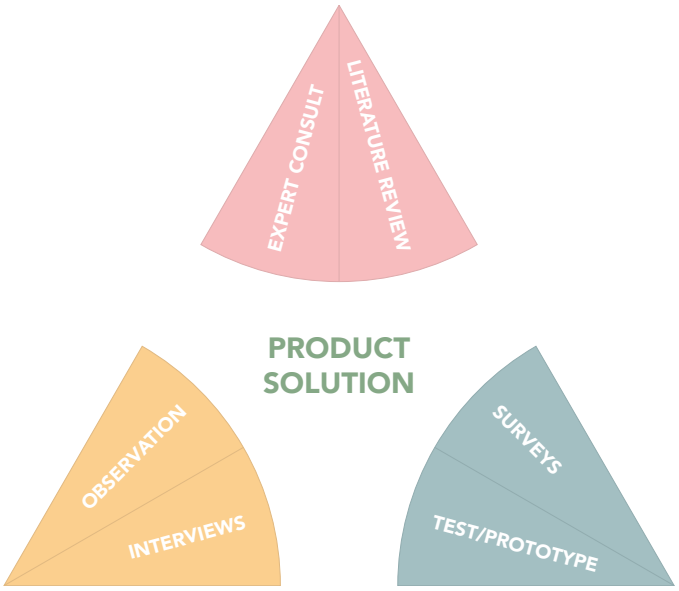


Figure 3, Triangulation.

2 DISCOVER

In the 'discover' phase the broad context of the subject is analysed. The overarching theme is occupational health, more specifically, employee well-being in an office environment. Before well-being is discussed, first psychosocial workload is thoroughly reviewed. Therefore, scientific sources and professionals, such as occupational health and safety strategists and sociologists, are consulted. After, the office, the office employee, recovery breaks and the market are discussed. During this first phase, several office employees are interviewed to come to an understanding of the context: its trends and its needs.

2.1 PSYCHOSOCIAL WORKLOAD

Psychosocial Workload, PSW, can be a difficult term to grasp. It is anchored in the Working Conditions Act in the Netherlands. According to, employers are obliged to implement a policy regarding PSW. Employees themselves share responsibility for this. The employee is obliged to take care of his safety and health and that of the other persons involved to the best of their ability. Manners at work or a high workload can lead to stress and, eventually, cause physical, psychological, and social complaints. This is called psychosocial workload. Compliance with rules does not necessarily mean employee well-being is not a concern anymore, on the contrary.

STRESS

According to Le Fevre et al. (2003), a problem arises from the term stress itself. 'Stress' was not used to describe a set of physiological responses until 1964 (Selye, 1964). Originally, stress was an engineering term to describe a force applied to an object that resulted in a deformation of that object. Le Fevre (2003) argues a more accurate term would be 'strain', which refers to the response inside an object to the external stressor. So, stress is an external force, and strain is the response to those external forces.

Occupational Stress

An influential psychological theory of stress in the occupational environment is that of Karasek and Theorell (1990), the demand-control-support model. According to that research, occupational stress occurs in a situation when the job demand is higher, and the experienced job control and support are lower. Where less control and support are experienced, there is more risk of physical and psychological strain because of stress (Karasek & Theorell, 1990).

In more recent research by Bluyssen (2011), stress may cause an imbalance between the body and brain depending on how the body and mind cope with it, see Figure 4. The model shows that more factors are responsible for physical and psychological strain. In this research, it is stated that exposure to stressors occurs mainly through the human senses. Although the senses are perceived individually, the body incorporates them combined. Therefore, all interactions must be considered when stress is evaluated (Bluyssen et al., 2011).

Stress factors are complex, , and strain often does not originate from a single cause. Over time it may result in physiological, physical, and psychological changes (Bluyssen et al., 2011), for instance, burnout. When looking at both models, strain can be presented as a balanced scale metaphor, see Figure 5. When the challenges that employees face outweigh the resources they have at hand, stress becomes dangerous. In other words, the distribution of resources and challenges is not equal.

According to the model of Karasek (1990), challenges would include work pace, availability, time pressure, effort, and difficulty. Bluyssen also takes personal factors such as characteristics into account. Resources include space for management options such as the freedom that employees have to organise their work but also the capabilities they have at hand. The challenges and lack of resources represent the stressors in the work environment.

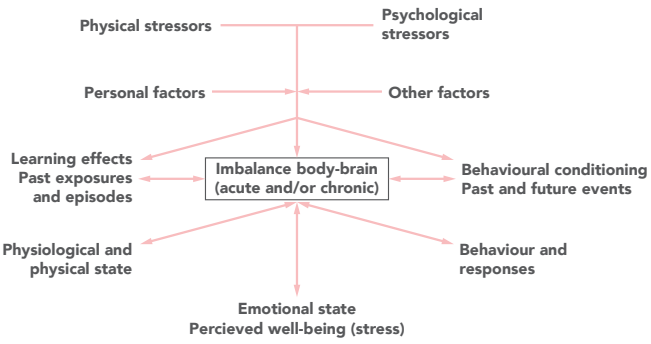


Figure 4, Imbalance of the human systems (Bluyssen et al., 2011).

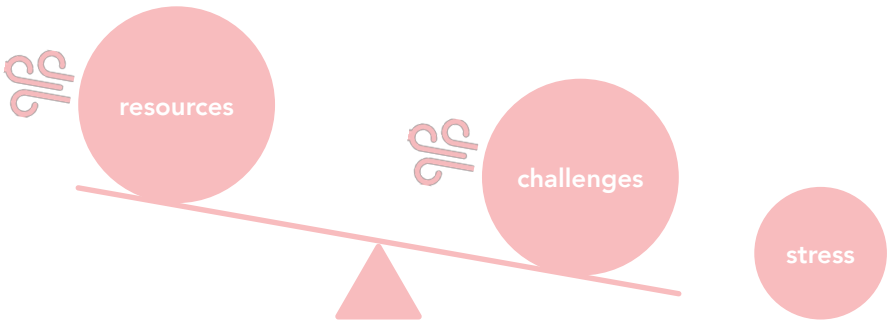


Figure 5, Balanced scale metaphor: stress occurs when challenges outweigh resources.

Motivation and Personal Growth

A previous model by Karasek (1979), see Figure 6, shows that besides a risk of psychological and physical strain, there is also a possibility for motivation. The motivation to develop yourself can arise from a well-balanced work environment. The term job strain is often used in the field of occupational health psychology to reflect poorer psychosocial or physical health.

In the extended model of Bakker and Demerouti (2017), see Figure 7, demands refer to the size of the workload and resources refer to the physical, psychological, social, and organisational resources that are available to satisfactorily perform the job. A high workload and low level of resources are related to job strain (Bakker & Demerouti, 2017). In the exhaustion process of a human, when more energy is required than can be supplied, the possibility of damage grows. When resources and challenges are in balance it can result in personal growth, see Figure 8.

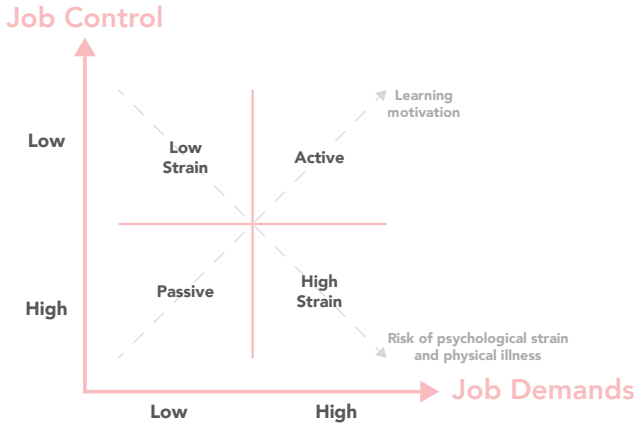


Figure 6, Job Demands Control model (Karasek, 1979).

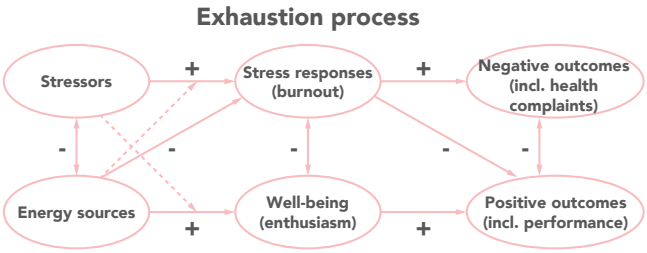


Figure 7, Job Demands-Resources model (Bakker & Demerouti, 2017).

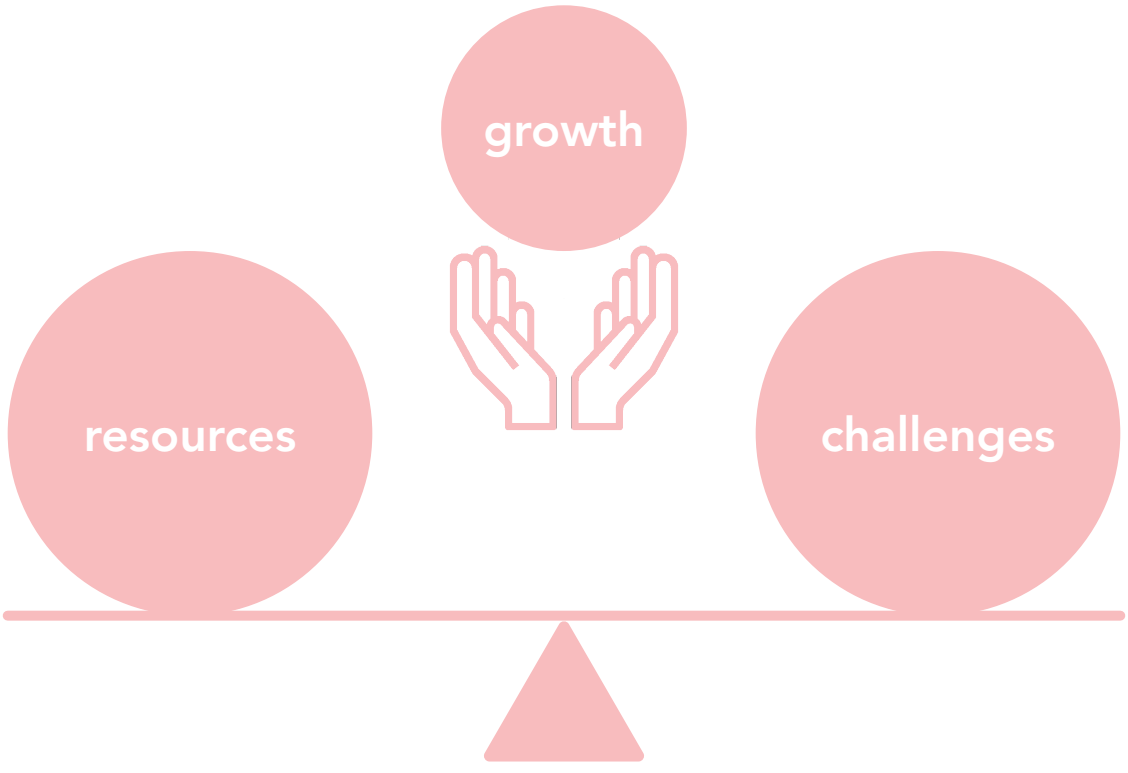


Figure 8, When resources and challenges are balanced it creates space for personal growth.

Good Stress and Performance

The Job Demands Control model suggests that a bit of stress also boosts performance. Studies also state that stress is utilised to perform and that, therefore, it does not always come unwished. An extreme example of this is the fight, flight or hide reaction of humans and animals. When stress threatens, the brain stem and limbic system respond with an immediate reaction. According to Yerkes and Dodson (1908), an optimum exists and when it is exceeded, i.e. stress levels become too high, it can have negative consequences. This can be best explained by the Stress-Performance Curve (Yerkes & Dodson, 1908) as shown in Figure 9.

To some extent, stress can raise performance, but when too much stress is present the level of performance drastically drops. Selye (1975) distinguished distress from eustress in his research. Where eustress is the positive cognitive response to stress that is healthy or gives one a feeling of fulfilment or other positive feelings (Selye, 1975).

In more contemporary research, a note to this perspective is added. According to Le Fevre (2003), this view could lead to inappropriate management of stress in organisations. The positive sides of stress are mainly focused on productivity, not well-being. When looking back at the JDC model of Karasek (1979), there is a correlation between demand and control which can result in personal growth. Strain is lurking when control is low. According to Bluyssen (2011), stress is an imbalance between the body and brain, i.e. control fades away. Concluding that stress is not a desired factor for increasing well-being, but a safe, encouraging, and supporting environment is.

"We conclude that the concept that some stress is good and enhances performance should be rejected in favour of more useful and accurate concepts." - (Le Fevre et al., 2003)

In the paper of Corbett (2015), this conclusion is supported. It states that long-discredited models of stress and performance can potentially and harmfully influence management practices (Corbett, 2015).

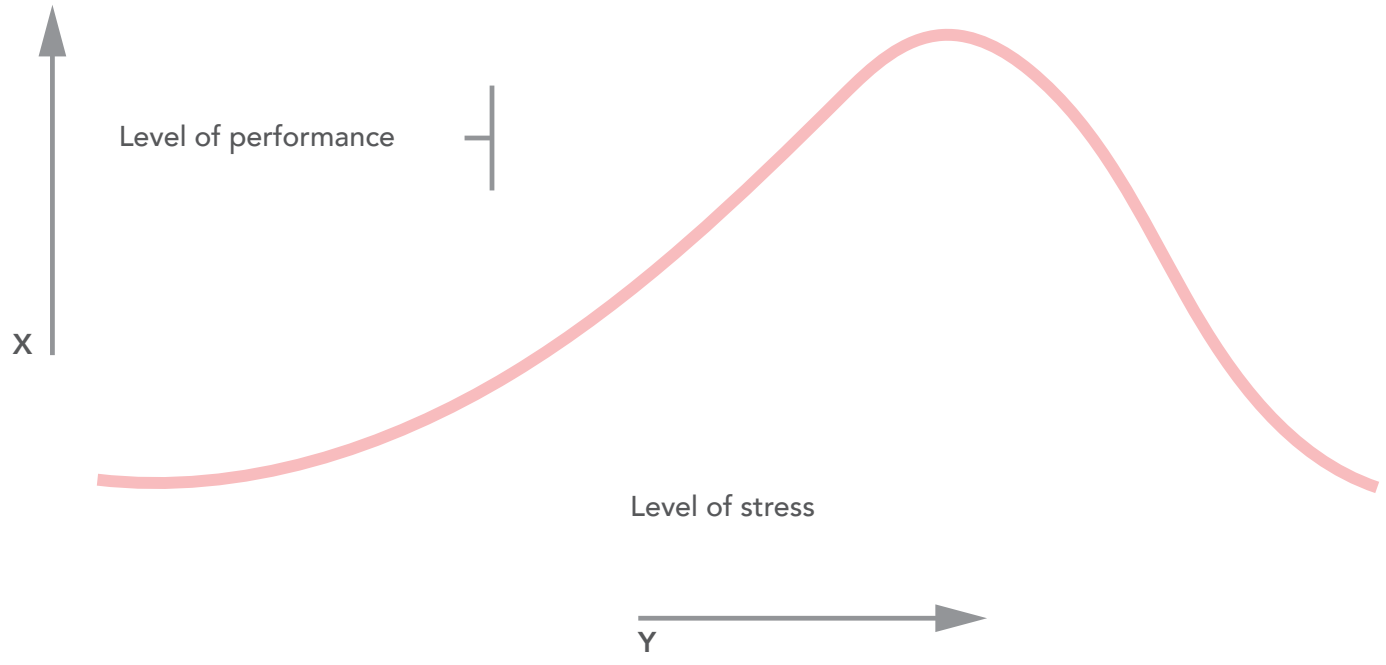


Figure 9, The level of stress against the level of performance according to Yerkes & Dodson (1980).

Current Trends

Within the Netherlands, a trend is noticeable in the growth of office-related stress symptoms. Since the economic recession, the percentage of people with stress symptoms among all working people has grown (CBS, 2015) and today mostly young working adults between the ages of 18 to 35 face these problems (TNO & CBS, 2023).

As demographics show, see Figure 10, a significant part of the occupational Dutch society experiences burn-out-related symptoms. In 2023 almost a fifth of the working people in the Netherlands experience burn-out symptoms, among young working adults between the ages of 18 and 35 this is even a quarter and research suggests that it will rise to a third of young working adults in 2027, see Figure 11. Next to that, around a quarter of the long-lasting absenteeism is related to burnout and a third of the employees express that their organisation does not take sufficient measures to reduce work stress.

Within this significant part of society, women and young men are critical groups and people with a degree in higher education report more symptoms. According to TNO (van Veen et al., 2023), work is cited as the number one cause of stress among young adults. Other themes are 'financial pressure and housing', 'meaning and personal development', 'social pressure', and 'social factors'. The most important factors of work-related stress are high workload, difficulty in saying no, generation gap, always having to be available, disturbed work-life balance, imposter syndrome, and competitiveness.

Figure 10, Percentage of working people in the Netherlands with burnout-related symptoms (TNO & CBS, 2023).

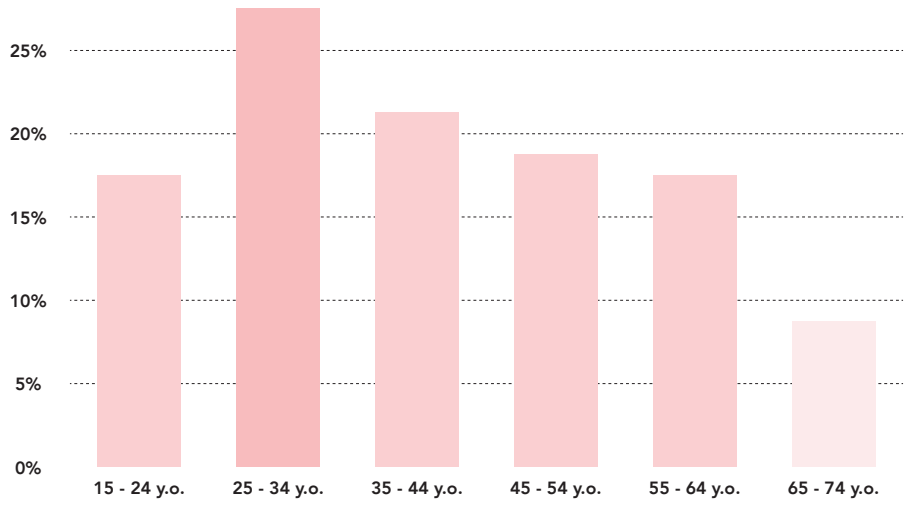


Figure 11, Employees with burnout complaints by age in 2022 (CBS & TNO, 2023).

Burnout

According to the World Health Organisation (n.d.), burnout is a syndrome resulting from chronic workplace stress that has not been successfully managed. It is characterised by three dimensions. When people have:

1. *a feeling of energy depletion or exhaustion;*
2. *increased mental distance from their job, or feelings of negativism or cynicism related to their job;*
3. *and a sense of ineffectiveness and lack of accomplishment.*

Burn-out refers specifically to phenomena in the occupational context. Impaired psychological well-being is one of the most prominent causes of reduced job involvement and absenteeism from the workplace (Harnois & Gabriel, 2000).

The reaction triggered by stress is not only mental. Stress is both a mental and physical process. The brain plays an important role in this matter as it sends signals to all kinds of body parts, see Figure 12. It is important to recognise the process and causes of stress, to recognise stress signals, to prevent stress and to take actions for reduction.

Nowadays, in addition to burnout, a distinction is also made between bore-out and brown-out. According to research by Werder and Rothlin (2007), a bore-out is a form of extreme boredom at work and a consequence of quantitative underload, i.e. employees have too little to do, or qualitative underload, i.e. too little challenging work. A brown-out stands for the loss of purpose at work and lack of attention. Symptoms of both conditions are comparable to burnout: fatigue, stress, loss of self-esteem, anxiety, sleeplessness and depression (Baumann, 2018).

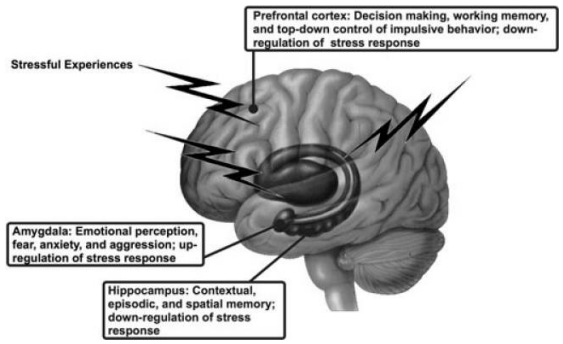


Figure 12, Role of the brain during stress.

Burnout Related Symptoms

A clear distinction must be made between burn-out and burnout symptoms. People can experience burnout symptoms without ever having a burn-out. Often people are not directly aware of the symptoms they experience. The Dutch Society of General Practitioners (2018) sums up possible symptoms that are related to burnout as physical fatigue (an exhausted feeling), mental fatigue (difficulty concentrating and faulty memory), restless sleep, irritability, inability to tolerate crowds or noise, crying easily, worry, and a haunted feeling. As stress is both a mental and physical process, it could also lead to headaches, dizziness, chest pain, palpitations, and stomach or abdominal pain (Thuisarts.nl, 2018). Such and other signals that are related to stress can be divided into four categories (WHO, 2019; Mind, n.d.), as shown in Figure 13.

PSYCHIC

- Insecurity
- Fatigue
- Decreased concentration
- Worry

EMOTIONAL

- Emotional (sad)
- Fear
- Anger
- Irritation

PHYSICAL

- Increased heartbeat
- Fast breathing
- Fatigue
- Change in appetite
- High bloodpressure
- Dizziness
- Sweating

BEHAVIOURAL

- Irritable
- Cynism
- Haste
- Increased stimulant use
- Tense
- Neglect

Figure 13, Signals of stress.

Stressors and Triggers

According to the National Working Conditions Survey of TNO and CBS (2023), almost half of the workers in the Netherlands experience a lack of autonomy. This increases stress as people have the feeling that the hustle and bustle is happening to them and that they have no influence on it (TNO & CBS, 2023). Other variables, besides poor autonomy, that could explain an increase in experienced stress are emotional burden at work, dissatisfaction with the salary, poor work-life balance, and long-term work at a computer screen (Houtman et al., 2020). Known triggers related to burnout are wanting too much at once, too much has beenc asked for a long time (high workload), circumstances are bad (e.g. financial debts or relationship problems), (too) little support from your environment (Thuisarts.nl, 2018). Exemplary causes are categorised as shown in Figure 14.

Figure 14, Categorisation of possible stressors and triggers which lead to burnout-related symptoms.

CONCLUSION

Stress should not be a driving force but should be seen as an evil that hinders personal growth, well-being, and a vital group dynamic. Stress can be very person-dependent, but there are clear universal and widespread triggers of stress. By making everyone more aware, a difference can be made. A good balance in the workplace is necessary to repress burnout complaints, see Figure 15.

Stress happens naturally.

It is natural to feel stressed in challenging situations. For most people, stress reduces over time as the situation improves or as they learn to cope emotionally with the situation. Stress becomes a problem when it is hard to regulate or dangerous when it becomes chronic.

Job strain is becoming problematic.

Young working adults experience more and more burnout-related symptoms as they feel societal pressure. Although companies and governments focus more on well-being nowadays, statistics are still increasing. Often people are not directly aware of symptoms themselves.

Occupational stress must be avoided.

Providing resources to those in the work environment can help those who are in need. The feeling of autonomy and control are great factors in stress-related affairs. Many employees experience too little in their daily work.

Stress is energy drainage.

It is important that employees 'schedule' a moment of rest. Not only after hard work or a moment of stress but structurally, most importantly in stressful periods. Burnout can be described as emotional fatigue or exhaustion, the inability to regulate the personal energy balance (properly). In combination with distancing from work and/or reduced personal competence, it concerns obligations (work or private) as a stressor which can affect deeper into the organisation.

Create awareness and understanding.

By supporting people in the work environment and giving back a sense of control stress symptoms can be decreased. It is important to recognise the causes of stress and stress symptoms, and foremost to prevent stress and take actions for reduction so employees do not have to fully cope by themselves.

Figure 15, Well-being measured by the balance of resources and stressors.

2.2 WELL-BEING

What exactly is well-being? How is it measured? What does it consist of? And how is it related to work? Although workload and work stress have more implications than just well-being - think of financial consequences, time, and productivity – it is at the core of the human being at stake. Society is used to think about health and care in a very economical way. Why not see our health as a value in itself? To attempt to design for preventive health, in particular, the prevention of occupational diseases is endorsed.

WELL-BEING AT THE WORKPLACE

Well-being is subjective to individuals and is about what they feel and experience in their daily lives. It is about how the minds and bodies can comprehend and respond to those feelings and experiences. Well-being and health are closely related and can often be used as synonyms. Because these definitions are so intertwined it is important to note what it means in the context of this research. Well-being can reference both a person or community; the state of being healthy or happy. Often is spoken about physical, psychological, or emotional well-being. Health is about the state of the body in which it functions fully and efficiently.

Individual Well-Being

According to the 'human model' of Bluyssen (2011), see Figure [HM], well-being depends on how the body and mind cope with acute or chronic stress. Based on the research of Colenberg (2023), well-being influenced by workplace design is divided into three categories. The designed environment can affect physical, social, and psychological well-being (Colenberg, 2023).

To relate to the model of Karasek (1979) control is a significant factor in individual well-being. It states that a combination of high job demands and low job control results in job strain and a combination of high job demands and high job control results in more well-being.

However, to be able to be in control the mind and body must have the tools to cope with certain situations. Coping is the set of intentional, goal-directed efforts people engage in to minimise the physical, psychological, or social harm of an event or situation (Lazarus, 1999). A more specific classification is 'active coping'. In general, active coping refers to the utilisation of psychological or behavioural efforts that are characterised by an attempt to use human resources to deal with a problem situation (Zeidner & Endler, 1996). According to De Rijk et al. (1998), the conceptualisation by Karasek (1979) neglects the individual characteristics of employees.

Job Satisfaction

Another part of well-being is happiness. Research often refers to happiness as a combination of pleasure, engagement and meaning. This is also applicable to the happiness of employees at work, see Figure 16. In the research of Vella-Brodrick (2008), these three orientations are examined for contributing to subjective well-being. Sociodemographic and personality traits seem not to affect the outcome (Vella-Brodrick et al., 2008).

Designed Environment for Well-Being

The designed environment can contribute to coping with stress and promoting well-being. In Appendix B products affiliated with the well-being and happiness of employees are analysed and categorised. A complete discussion can be found in Chapter 2.5.

Figure 16, Three dimensions of happiness.

Monitoring Well-Being at Work

The subjective approach to well-being examines how people evaluate their lives themselves. The objective approach to well-being examines the objective components of a good life. Since stress, well-being and burnout are more present in research and policy, several manuals for measuring well-being are written. In the International Statistical Classification of Diseases and Related Health Problems (ICD) such standardisation is also included, like the Maslach Burnout Inventory.

The Maslach Burnout Inventory (MBI) is a psychological assessment instrument comprising 22 symptoms of occupational burnout. With this method, the nature of burnout can be understood for developing effective interventions. In this instrument, five scales are distinguished: (emotional) exhaustion, depersonalisation, personal accomplishment, cynicism, and professional efficacy. (Maslach et al., 1996)

The Osipow Occupational Stress Inventory assesses occupational stress. With this method, the nature of stress can be understood for developing effective interventions. In this instrument three scales are distinguished: occupational role, personal strain, and personal resources. (Osipow, 1998)

The Job Stress Survey identifies sources of stress in the workplace. This stress index assesses the overall level of stress based on the subscales that measure components of occupational stress associated with the job itself (i.e., job pressure) and with supervisors, colleagues, or organisational structure (i.e., lack of organisational support). In addition to providing information about specific work-related stressors, the model can also be utilised to identify sources of occupational stress that affect individual employees or groups of employees. (Spielberger & Vagg, 1999)

The Petty Work Ethic Questionnaire focuses on work culture. The work ethic embraced by supervisors may not coincide with those of the workers they manage. The behaviour of managers directly affects the work climate and the performance of employees, thus well-being. In this instrument, four factors are distinguished: interpersonal skills, initiative, being dependable, and reversed items. (Petty & Hill, 2005)

When the assessments and surveys are analysed, they can be categorised. Three main focuses are distinguished: personal relation to stressful events (characteristics), sources of stress in the workplace environment (interior and dynamics) and the work culture of an organisation (social aspect and support).

Working from Home

The number of hours working from home has increased significantly over the past five years, post-COVID. One in three employees regularly can decide for themselves where or when to work and where 2.6 hours per week was the average time to work from home in 2019, it has almost tripled to 7 hours per week in 2023 (TNO, 2023). Working from home, or hybrid working is becoming more and more popular. But there are also challenges. Possible risks of working from home are a diffuse separation of work and private life, overwork, lack of structure and social isolation (SCP, 2020). Because of that burnout clinics recommend teams to work at the office on agreed days. It seems that people have come to value face-to-face contact with colleagues more during the pandemic (Rubin, 2020).

Other recommendations are to take a vacation (and preferably get away from your work environment). If you work from home, also put on your work suit. In the evening on the couch, you wear something different. Take a walk during lunch, dare to ask for help, set boundaries, disconnect for a while, and create a team feeling. Due to hybrid working, fewer encounters with colleagues at the coffee machine or in the hallway happen. As a result, the connection with each other has become less.

Social Interaction

Research shows that there are conversational benefits of social interaction to reduce stress in work environments (Clark, 1993). Social interaction can also be utilised as support and is seen as a coping mechanism for stress.

CONCLUSION

A lot of knowledge about employee well-being is available. Throughout the years, a lot of research about both subjective and objective well-being in the work environment has been done. All inventories and assessments are to detect stress and intervene, only at a time when it is (partially) too late. A structural and sustainable solution to stress is often still lacking. Prevention of stress is the best cure. Both employees and managers must be better informed to directly act and become more aware. The designed environment acts as a stabiliser for all employees to cope with daily work struggles in their own way.

Well-being is...

...a healthy state of the employee but can also relate to the healthy state of group dynamics at the workplace. Moreover, it is about a well-functioning working environment. A distinction must be made between physical, social, and psychological well-being, see Figure 17. However, all three must be addressed to successfully implement new products regarding employee well-being.

A shifted focus on well-being.

It is interesting to see how those assessments have changed over time. The MBI and Opisow are mostly focused on personal interventions, while the Job Stress Survey changes its perspective to what creates stress because of the workplace environment. Petty pushes it even further and searches for stressors in the organisational structure and culture.

Social interaction is important.

Social cohesion is going down because of hybrid working. A focus on social interaction is important to vent stress, cope with work-related problems and as a respite from work-filled thoughts.

Figure 17, Three dimensions of well-being at work in the designed environment.

2.3 RECOVERY MOMENTS

Fatigue and exhaustion are the main burnout-related symptoms. It is also a logical progression of effort and commitment. It comes with stress, and it is therefore important to recover consequently. What factors play a role in keeping the energy levels in balance and what should both employees as managers and organisations be aware of?

BREAKS

Symptoms and implications of stress and burnout-related complaints have a lot to do with vigour. It can drain the energy levels of employees after which (irreversible) exhaustion lurks. Stressful moments cannot always be avoided, which is why it is extra important to recover in time after such moments.

Micro-Breaks

Short breaks during work can be used to recover from or prevent exhaustion, especially after specific energy-draining moments such as meetings but are also important during the rest of the day. It is important that the time spent during these breaks, short breaks of less than ten minutes, is not work-related in an attempt to recover from energy and attention depletion (Bennet et al., 2020).

It is important to note that these micro-breaks exist next to formal work breaks and impact psychological resources and recovery experiences. The research of Bennet (2020) shows that micro-break conditions can help employees recover from psychological drainage, i.e. energy and attention, and get back to their baseline. Overall, it seems that there is a strong influence of micro-breaks on the well-being of employees.

A lot of research focuses on recovery outside of work hours. This also shows in the work ethics of Dutch employees, see Chapter 2.6. With micro-breaks on the other hand, attention is paid to at-work recovery. Although the centre of attention in this research is employee well-being it is also interesting to note that micro-breaks have a positive effect on job performance (Kim, 2018).

Micro-Break Activities

A lot can be done during micro-breaks. Every activity imaginable during micro-breaks, just should not have anything to do with work.

According to research by Kim (2018) relaxation, socialisation, and cognitive microbreaks have a positive effect at work but breaks for nutrition-intake did not show significant effects. Also, employees seem to benefit in terms of energy from focusing on the positive aspects of their jobs and showing proactive social behaviour at work (De Bloom, 2015).

Overall, recovery processes during work are closely connected to well-being and performance at work.

Sedentary Behaviour

According to the NEA (2022), National Working Conditions Survey, inhabitants of the Netherlands are European champions in sitting. Of all the Dutch citizens 26% sit for at least 8,5 hours a day (TNO & CBS, 2023). Most of the sitting time happens during work. Around 47% of the working people sit for 6 hours a day or longer at work.

A sedentary lifestyle has negative effects on the body. Movement is important to get blood circulation through the muscles. Breaks can be the perfect moment to get the blood flow running.

Prophylactic Ergonomic Working

Next to laws and regulations, the Ministry of Social Affairs and Employment (2023) has stated some tips to create a better environment for health. Ergonomics is important for a safe and healthy workplace, but the effect is also determined by circumstances that employees and managers have control over, such as (ZSW, 2023):

- take regular breaks;
- sufficient variety in the work;
- regular further training, a refresher course in safe and healthy working;
- accessible point of contact for employee questions;
- a good physical condition;
- do exercises to relieve muscles and shoulders;
- the correct posture when sitting or standing for long periods.

Movement

A study done by shoe company New Balance and Wellness & Prevention, Inc., showed improvement in engagement and energy levels of employees after introducing 'MOTION'. Motion is an experiment in workplace well-being, centred around strategic movement to study the impact of small and frequent amounts of physical activity on associated energy levels, cognition, and engagement throughout the day. Breaking up sedentary time with standing, walking, or other light-intensity activities has a positive effect on improving mood, productivity, and energy gain (J&J, 2013). Suggestions towards an ideal working pattern are often made in the literature. A clear model that shows a division of an eight-hour workday is Hedge's 3S's ideal work pattern (2016), see Figure 18.

The model describes a total of 7.5 hours in which ideally a working person has five hours of sitting, two hours of standing, and half an hour of moving. Eight hours of work minus half an hour lunch break. It is important to note that the five hours of sitting should not be uninterrupted; at least 16 sit-to-stand transitions must be implemented (Hedge, 2016). Other recommendations of Hedge (2016) are:

- Do computer work while sitting.
- Use a height-adjustable and downward titling keyboard for the best work posture.
- Every 20 minutes stand for 8 minutes and move for 2 minutes. (The absolute time isn't critical but about every 20-30 minutes take a posture break and stand and move for a couple of minutes. Simply standing is insufficient.)
- Vigorous exercise, e.g. jumping jacks, is not necessary to get the benefits; walking around is sufficient.
- Build a pattern of creating greater movement variety in the workplace (e.g. walk to a printer, or water fountain, stand for a meeting, take the stairs, walk around the floor, park a bit further away from the building each day).

Figure 18, Hedge's 3S's ideal work pattern (Hedge, 2016).

CONCLUSION

In the prevention of occupational diseases, there is one simple thing to remember: take a break sometimes and move.

Restore energy balance by taking a break regularly.

Burnout-related symptoms are energy depletion, i.e. exhaustion, i.e. fatigue, and breaks have been proven to help restore the energy balance. A short break of 2 to 10 minutes every 20 to 30 minutes helps to keep the energy level steady, see Figure 19. It might seem like a lot, but when often a short break is taken the energy level keeps more balanced. It is harder to restore from full exhaustion than to keep track of the energy balance by taking a break occasionally.

Also, in stressful periods.

The most important is to keep taking breaks regularly during stressful periods. This might be harder but keeping the structure in taking breaks can help prevent that breaks are forgotten.

Non-work related.

A micro-break from work is not a break from work in case it involves work. It can be hard to do so in a work environment. Products and colleagues can help and support one another to actively take a break occasionally. Keeping a clear goal of taking a break can help to can help to distance yourself from work and rest. Examples of different micro-break activities are shown in Figure 20.

Keep moving.

By moving, preferably walking, the blood flows through the body. It is necessary to refill. Using height-adjustable tables and creating a pattern in movement variety is a good way to start.

Relaxation

- **Sit or relax (in lounge)**
- Daydream
- Nap

Nutrition intake

- **Drink coffee or tea**
- **Snacking**
- Get water

Social

- **Chatting with colleagues**
- Texting
- Phoning

Cognitive

- **Games (such as chess)**
- Reading
- Surfing the internet

Physical

- **Stretching**
- **Walking around**
- **Games (such as table tennis)**
- **Run**

Figure 19, Micro-break activities categorised with the options which are possible in a team context highlighted.

Figure 20, A sketched representation of energy over time.

2.4 THE OFFICE

The offices in the Netherlands reflect trends in the Western world. A lot of ideas came overseas from the United States or a bit closer, from Germany or the Nordics. However, the Netherlands have a distinct work ethic which results in typical preferences, norms and values which are connected to the design of offices.

A BRIEF HISTORY OF THE OFFICE

The office has changed a lot and rapidly over the past century. New visions were introduced which were later completely swept off the table and now sometimes are partly introduced again. Every vision has its positive and negative side effects. It is important to learn from those to provide a healthy future for the office.

Timeline

To understand the evolution of the office better, a timeline is made from just after the World War until today, see next pages. Also, a quick view of the future is sketched. On the next pages, only the characteristics in the form of bullet points are shown. A more elaborate explanation of those periods can be found in Appendix C.

Image Source: Unsplash

Image Source: Unsplash

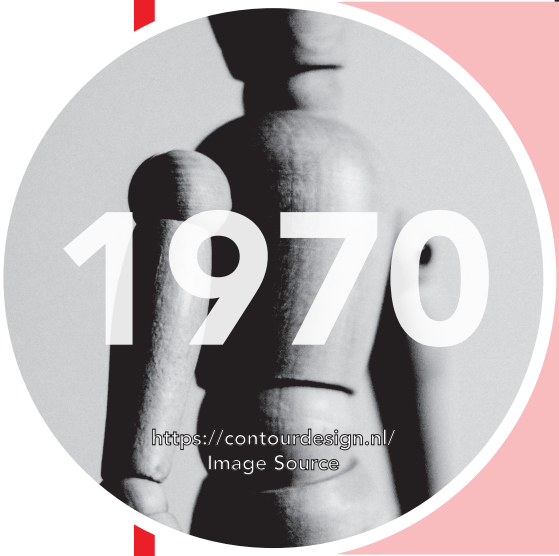
Office Landscape

- From bullpen offices to bürolandschaft.
- Use of irregular geometry and organic circulation patterns.
- The key concept of the system is that all staff members participate in the open plan.
- Planning around organisational processes.
- Spaces are broken up with screens and plants.
- Privacy is accomplished with dividers and the placement of furniture.
- Areas filled with plants to improve concentration and productivity.

Cubicle Farms

- Advantages of office landscape, but with greater privacy, density, and storage capacity.
- Formed into the sea of cubicles due to standardisation and space efficiency.
- Robert Propst invented the Action Office I.
- Introduction of flexible, semi-enclosed workspaces.
- Varying heights that allowed freedom of movement and flexibility providing the best work position for the task.

Ergonomics



- Introduction of the typewriter.
  - Beginning of rapid changes in office technology.
- Modern ergonomics focuses on how the body functions and how a working environment can be adapted to the natural movements of the human body.
  - The opposite is an outdated approach.
- R. Propst invented the Action Office II.
- In the office, the emphasis is on the design of the office space and office furniture.
- In factories the focus is on varying physical working positions, correct lifting techniques and associated tools.

Open Plan Offices

- Open-planned offices won companies over by their ability to increase the surface area of the workspace at a low cost.
- R. Propts renamed his furniture line to just 'Action Office' and called it the world's first open-plan office system.
- Hot-desking.

Computers

- Computers and the internet become the norm.
- People are connected in another way of communication.
- Work is done differently.
- Hoteling or 'office hotel' and coworking come up.
- Space management is improved.
- A way of hot-desking but spaces can be reserved and different companies share an office space.
- Mostly popular among freelancers.

New Way of Work

- The arrival of the computer and the internet shifted the way of working.
- The two most common forms of the NWoW that can be distinguished are working from home and shifting working hours.
- The 'old way of working' is not abolished.
  - Traditional organisational characteristics such as hierarchy, well-defined work processes and clear rules often still prove to be very functional.

- 'Any time, anywhere.'
- 'Manage your own work.'
- 'Unlimited access and connectivity.'
- 'My size fits me.'

Remote Working

- The barrier-free office comes of age, giving people a variety of places to work.
- Fully remote, no office, companies arise.
- Industry 4.0 is making its debut.
- Working from other countries or even continents.

Well-Being

- A negative trend arises.
  - More burn-out-related symptoms among young working people.
- Offices have more of a living room feel to them.
- Prevention is better than cure.
- Society pays a high price for health-related costs.
- A shift in a management perspective, to place productivity and efficiency in second place after employee well-being.

Holistic Approach

- A holistic view of employee wellbeing.
- A 4-day work week.
- AI is deployed to prevent occupational diseases.
- Well-being is the number one priority.
- Productivity and efficiency go up.
- Management is better educated.
- Tools for awareness and understanding of occupational well-being are released for both employees and management.
- The office gets a new function.
  - The difference between work done from home and work done in the office grows.

Learn from the Past

Now, in the change of the office over time can be seen how the offices visually looked, how the layout of those offices was planned and the thought behind these views of how offices (should) work. For example, offices once became more open, then more closed, whereafter again more open. But what were the positive and negative sides of these theories? Why did it change so often? In the coming pages, the potential and risks of each period are discussed.

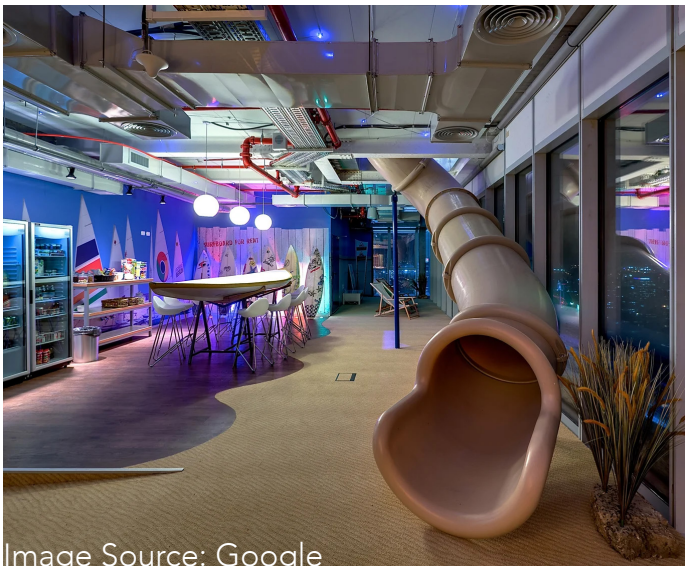


Image Source: Google

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Image Source: Google

Office Landscape

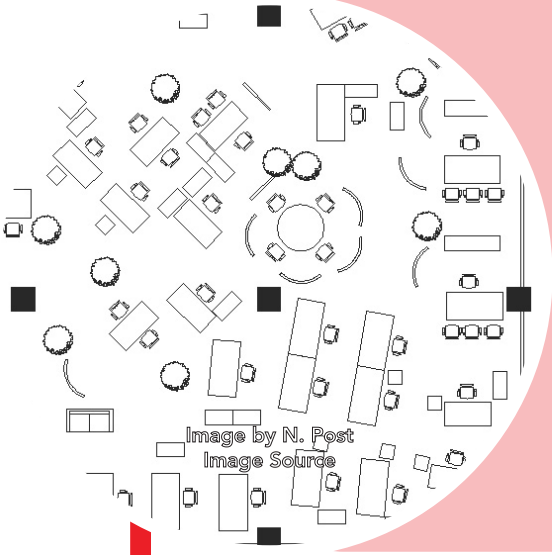


Image by N. Post
Image Source

Potential

- Communication and collaboration, because of the non-hierarchical environment.
- Affordability, because no permanent partitions or walls are needed.
- Adaptability, because partitions made it very easy to deal with changes.

Risks

- Employees can feel uncomfortable, because lack of privacy.
- Employees can feel anxiety, because of the ease of being monitored by managers.

Cubicle Farms

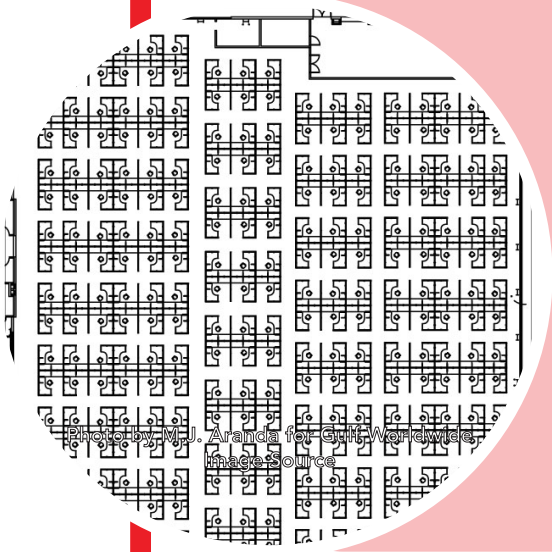


Photo by M.J. Aranda for Gulf Worldwide
Image Source

Potential

- Privacy, because cubicles provide a sense of personal space.
- Noise reduction because a physical barrier absorbs sound and reduces distractions.
- Fewer distractions.
- Clear hierarchy.

Risks

- Discourages team collaboration and communication, because visual barriers take more effort for employees.
- Less transparent, because of physical barriers.

Ergonomics

Photo by Herman Miller company
Image Source

Potential

- More user- and task-centred.
- Healthier.
- With health comes productivity.

Risks

- More expensive.
- Aesthetics.
- The office needs to be designed in a different way and the way things are done needs to be rethought.

Open Plan Offices

Photo of Action Office by Herman Miller co.
Image Source

Potential

- Easier communication.
- Flexibility of office setup.
- Visually pleasing.

Risks

- Lack of privacy.
- Distractions.
- Anxiety.
- Non-inclusive, it does not take everyone and all personalities into account.

Computers

Photo by Kensington company
Image Source

Potential

- Quick and long-distance communication for everybody.
- Information is accessible to everyone.

Risks

- Repetitive Strain Injuries (RSI).
- Different designs and functions are needed for the office.
- Retraining employees.

New Way of Work

Photo by A. Distel for Unsplash
Image Source

Potential

- More trust in employees.
- More flexible workspaces.
- Autonomy.

Risks

- Employees abuse their given freedom.
- No personal workspaces.
- A 'new vision' often becomes outdated.
  - Specifically designed offices become outdated.
    - Harder to change.

Remote Working

Photo by K. Mahl for Unsplash
Image Source

Potential

- Flexibility in work and residential location.
- A feeling of increased autonomy.
- Less office space.
- Flexibility in time management.
- Safe environment.
- Financial benefits.

Risks

- Lowered social cohesion or loneliness
- More difficult to achieve career growth.
- Complications because of unclear communication of rules or wrong expectations.
- Working more, harder to 'unplug'.
- Staying motivated.
- Difficult collaboration, more meetings.

Well-Being

Photo by LifeSpan company
Image Source

Potential

- Prevention is better than cure.
- Eventually, companies benefit from healthy employees.
  - Lower costs.
- More attractive to job seekers.

Risks

- Well-being is prioritised over productivity.
- Initial risk of high costs.
- Misuse.

FUTURE

Photo by Ahrend company
Image Source

Potential

- Happier employees.
- Vital companies.
- Healthier societies.

Risks

- ...

Reflection

Organisations and employees are becoming more well-being conscious. However, it can be argued that well-being is still not at the centre of attention. Even today often is thought about well-being from an economic perspective (World Design Embassies, 2023). A definition of well-being encompassing all employee-related struggles remains absent. Bergefurt (2023) recently tried to holistically explore the relationships between personal and perceived physical workplace characteristics and mental health within the office setting. Ten indicators of mental health at work are marked out: stress, mood, well-being, concentration, productivity, fatigue, sleep quality, burnout, engagement, and depression.

How is this related to the physical work environment? In research related to both well-being and the designed workplace, several distinct features come up. The features can be clustered into control, furniture, greenery, layout, light, and noise (Colenberg et al., 2021). In discussion with experts, one important feature misses in this list. Climate can have a great influence on health within the interior office space.

The physically designed office also shows different levels within the work environment. In all cases there must be an individual workplace, a place for teams to gather, a social aspect and in some cases the office is also extended outside of the office building.

CONCLUSION

To summarise the future of the office two important changes could be made. A holistic approach to well-being should be the norm and the physical workplace should be seen as a resource for well-being.

A living room feeling.

The function of the office has changed over time. The interpretation of the office is changing because of hybrid working but the importance of the office remains. The work that is done at home possibly differs from the new function the office obtained. With this new perspective, a suitable environment must be created for everyone. The working environment should offer more, inclusive and promoting office equipment. It is important to note that this does not mean transforming offices into playgrounds. All employees have their preferences which the environment should serve.

The designed environment.

A future-proof product solution is focused on employee well-being and designed for one, a combination of or all pillars of the designed environment. See Figure 21.

Prioritise employee well-being.

Nothing is more important than well-being. Productivity should not be leading, because good well-being is the basis for it. If there is more focus on that the rest will take care of itself; intended results of managers will be achieved. Product solutions can offer tools and methods to supplement personal coping mechanisms.

Management has a key role.

To successfully manage employees the workload of managers must be reduced too. Furthermore, good management requires training and education. Lastly, more awareness and understanding must be created. This can be done by tools or products and by being more on the work floor among the employees to listen and experience.

Figure 21, Pilars of physical design for well-being and context levels of the work environment.

2.5 THE MARKET

Since the advent of modern ergonomics and stress research, there has been more focus on employee well-being. After the invention of the Action Office, many more products have been produced that pursue the goal of healthy employees and a vitalising environment. Still, people seem to experience a lot of stress. How come so and what can we learn from the past?

PRODUCTS, METHODS, AND THEORY

There is a rise in burnout-related symptoms, coping with stress is about energy regulations and micro-breaks can be an effective way to do so. Six pillars in the designed environment exert their grip on physical, social, and psychological well-being. Together with job satisfaction a complete picture of employee well-being is sketched. Appendix B shows a table with all kinds of products with an intended focus on well-being. A lot is focused on social furniture and physical rest. A gap is noticeable in products which provide meaning. The products with a clear intention of personal well-being unrelated to work are clustered and used in market research.

Market of Products with a Focus on Employee Well-Being

This project is a search for a product solution that promotes well-being correctly. Various methods are possible. In the search for existing products addressing employee well-being, a range is noticeable from active to passive and from individual to collective. For example, active tools are applications that tell when to have a break and passive tools are basic furniture products. Nudging is somewhere in the middle. Individual-focused products are, for example, the nap bed and lounges are more collectively focused.

In Figure 22 below the products are clustered by their approach to addressing well-being. All the products are also discussed with interviewees, which can be found in the user research in Chapter 2.6.

Within the designed space for employee well-being, many products focus on actively and passively persuading the individual to take care of themselves. Less is thought about the collective and when designed for group dynamics it is often lounge areas or meeting setups. In contrast, there is a growing consensus in research that organisations must change the workplace and not just the worker (Fleming, 2024).

Figure 22, Products with a focus on employee well-being unrelated to work.

Methods with a Connection to Employee Well-Being

Besides the physical design surrounding, a range of tools and methods are developed for workplace well-being. A lot of these methods focus on structuring and balancing work – and breaks.

Pomodoro Technique

The Pomodoro technique is a form of time management. Limiting the time, one is willing (and allowed) to spend on a particular activity, in advance is key. The technique uses a simple kitchen timer to mark off periods of 25 minutes of concentrated work on a task, see Figure 23. These 25 minutes are then followed by a three-minute break, after which a new period of 25 minutes can be started. After the fourth time, a longer break of 15 to 30 minutes may be taken. This method mainly focuses on productivity rather than well-being; however, it can provide support and reminders for breaks. It is relevant to the energy level and keeping a balance during workdays.

Shut Up & Write!

This method is based on the Pomodoro technique but focuses more on group work. The idea of the transition between concentrated work and breaks is the same but with an addition of the agreement between colleagues to be quiet during the work period. After the hard work, there is a moment for a social and collective break to recharge.

Flowtime

Flowtime is designed to take advantage of periods when one is highly productive and can stay focused and engaged. This period is referred to as flow and occurs when the level of challenge and the level of ability are balanced, and productivity is high. The idea is that there is no pressure at times when focus is low. It is a nice approach to well-being because pushing limits is counterproductive when stress limits become too high and energy levels too low.

Mindfulness

Mindfulness simply means being fully aware of the current experience. You can translate the word 'mindfulness' as 'observance' or 'attention'. According to TNO (Torre, 2023), the effect of mindfulness training on, for example, perceived stress, well-being, and concentration is positive. This method fits into the category of personal intervention but can be useful when organisations, in addition to training, encourage employees to organise work in such a way that mindfulness is part of it.

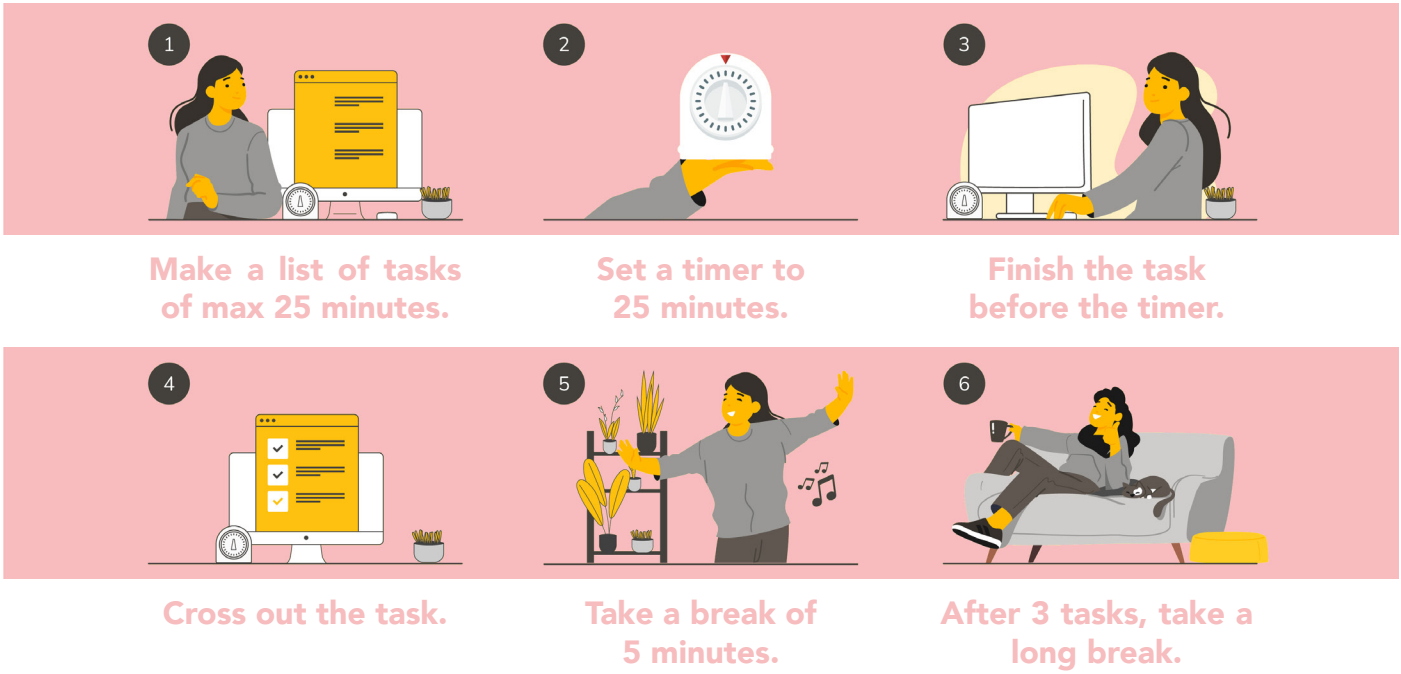


Figure 23, A possible way to structure intermissions during work according to the pomodoro technique.

Research by Design with a Focus on Employee Well-Being

Many lessons can be derived from previous research. All themes that the project covers are extensively discussed in the chapters before. To pinpoint what should be avoided and what should be implemented in the ideating and conceptualising phase, closely related product solutions are specifically highlighted beneath.

Sustainability and Personal Interventions

An interesting case is that of the Pause Buddy (Keyson & Doff-Ottens, 2009). This research also focuses on office-related stress which in, the long run, can turn into burnout-related symptoms such as fatigue. Keyson and Doff-Ottens (2009) also state that many existing approaches focus on the physical side of monitoring employee well-being and less on timely social interaction pauses to reduce stress. In the concept, a device is suggested that triggers people unobtrusively into taking social breaks. The device is taking the lead in stating the need to take a break to create awareness among colleagues.

A recent study by Adar et al. (2022), researched three ways to reduce sedentary behaviour and focused on social support, awareness as a reminder and task-based solutions. Negative experiences such as feeling monitored and losing a sense of autonomy can be critical for the sustainability of a product. Control is a significant factor for the user to maintain a certain behaviour long-term (Adar et al., 2022).

A more recent study adds that individual-level interventions are not providing appropriate resources in response to job demands, because they do not engage with working conditions (Fleming, 2023).

In conclusion, a user could feel distanced from products such as the pause buddy as it is a product that tells you what is good and what you should do. The tool against sedentary behaviour focuses more on awareness rather than convincing the user to complete a task but is still very much a personal intervention. In a future product, these findings should be taken into consideration. The users must be, or feel, in control over deciding when to act.

Complementary Research

The self-determination theory (Ryan & Deci, 2000) can be a solid base for designing sustainable products focused on habit formation to promote well-being. The theory focuses on whether human behaviour is self-motivated. Human motivation comes from natural psychological needs. According to the self-determination theory, autonomy is one of the three basic psychological needs and lack can result in products failing when they try to address behavioural change.

Another related theory is the social practice theory (Smolka, 2001). Simply put, social practices are about everyday practices and how they have formed into habits within society. Humans are generally socially oriented. New societal habits are not easily implemented, and it can be hard to steer for cultural change. In a holistic approach to well-being, the importance of community and individual growth are emphasised and by providing a safe environment individuals could navigate their journey.

These two theories might seem contradicting but are both important factors in to change. Common ground of the theories can be presented in a situation where an environment is created for individuals to feel free to do and it is socially accepted. A sense of autonomy could pave the way towards improving well-being.

CONCLUSION

A lot of existing products and tools focus on individual interventions or passive social interaction. A gap lies in product solutions that actively make employees and managers more aware of well-being without being intrusive.

Actively address the collective.

Social awareness should be used as a tool for change. People act as a group and easily pick up group behaviour. This perspective on change has more effect than individual interventions. Furthermore, social cohesion is at risk due to contemporary trends such as hybrid working. By which products in office environments can make a difference.

Steer for engagement and meaning.

Social awareness should be used as a tool for change. People act as a group and easily pick up group behaviour. This perspective on change has more effect than individual interventions. Furthermore, social cohesion is at risk due to contemporary trends such as hybrid working. By which products in office environments can make a difference.

Sustainability is crucial.

Research shows promising concepts that focus on promoting well-being, but the market lacks socially focused active solutions. One of the hardest things in products that try to actively address well-being is durability. Capitalising on intrinsic motivation and a socially supportive goal is necessary to implement change.

Provide the users with a feel of decision-making.

It is important to give the user a feeling that they make the decision themselves. Design for positive employee well-being should be focused on working conditions, for example, change in work culture and social pressure.

2.6 THE EMPLOYEE

A lot is spoken about the working (young) adults in the Netherlands. How they experience stress, when they are happy and what the best environment is for them to work in. But how do they reflect upon the problems pointed out by research and designers? What obstacles do they personally face in their daily jobs and what helps them relax or energise? To get a picture of what employees nowadays experience, several people in different sectors are interviewed.

USER RESEARCH

To create a complete picture of the (young) working adult in the Netherlands the interviews will cover the topics of stress, burnout, (micro-)break, products, office, and ethics. Furthermore, a quick-and-dirty experiment is done to confirm the hypotheses derived from the interviews.

I – Interviews and Observation

An expert in the field of psychosocial workload was consulted before the interview. Hence, important topics were identified and questions formulated.

Objective and Research Questions

The interviews are conducted to gain knowledge of the main project topics - stress, well-being, micro-breaks, and the designed office environment - in relation to the employee. The goal is to find overlapping obstacles in the daily work routine that lead to negative experiences in terms of well-being. Observation during and after the interviews is used to get a feel of the environment and create a general picture. Together the findings offer a base for further development of ideas and concepts.

- What are specific, by employee experience, office-related issues that hinder the psychosocial well-being of employees?
- Why are or aren't available products in the office environment used by employees?

Methods and Participants

The questions of the interviews focused on both qualitative and quantitative data. The complete interview can be found in Appendix D1. For the observation, the participants were asked to provide a guided tour while expressing their feelings about the designed environment. In addition, I was allowed to work in the offices for the remaining day to get a glimpse of the topics that were discussed. The participants were both young working adults as working adults and work in various environments. A list of participants can be found in Appendix D2.

Procedure, Setup and Equipment

The interviews were conducted in a quiet room at the relevant offices. The questions were printed, together with a table to fill in the general workday of the participants and the product cards to rank, see Figure 24. The interviews were recorded with a dictaphone application and transferred to SURFdrive. After the interview, the participants gave a tour. With the allowance of the company, photos were taken of the environment. For the rest of the day, a work spot was provided. Observations were noted in a booklet. A flowchart of the interview, a consent form, and an ethics checklist can be found respectively in Appendix D3, D4 and D5.

Results

The results show different personality-based views on previously mentioned themes but also a lot of similarities, or obstacles, to well-being. The generally experienced results are analysed and clustered further in this chapter.

Figure 24, A typical selection of prefered, well-being improving, products in the office. Unwanted - wanted.

II – Office Experiment

The most experienced obstacle according to the interviewees, is a self-imposed social hesitation to take a break while others, colleagues, are working. Actual collegial or managerial expectations do not always match the ruling work culture. A clear and concise approach to taking breaks among employees could be the outcome. The hypothesis is tested by giving several participants one task as explained below.

Objective and Research Questions

The objective of the experiment was to look at whether employees find themselves more at ease in taking breaks when it is a common goal of all the team members and directed from a managerial level. To test the hypotheses research questions were drawn up.

- Are more breaks taken when it is communicated that taking as many breaks as possible is the daily task?
- How do office employees experience taking breaks;
  - …knowing there is a common set goal?
  - …knowing the rest do so too?
  - …knowing the manager agrees?
- Do the participants experience relief from work and social pressure?

Methods and Participants

The experiment involved a task-based approach and a common goal set among the participants. In addition, the participants were asked to fill out a survey about their experiences. The list of questions, a list of participants and the checklist for the experimet can be found respectively in Appendix E1, E2 and E3.

Procedure, Setup and Equipment

Before the test, a pilot was performed to determine a feasible number of breaks, see Figure 25. The test was planned for two days. On the first day, the participants were individually given a checklist, see Figure 26, and were asked to count their micro-breaks during the workday. On the second day, new checklists were handed out among the same participants but this time with a collective goal. On this occasion, the team manager spread the message to try taking all the twelve breaks on the checklist or more. At the end of workday two the participants were asked to fill out a survey.

Results

According to the participants, the approval of taking breaks was experienced as pleasant. Unfortunately, they also expressed complaints. The goal and deadline, i.e. end of the workday, turned into stress as the employees were unable to complete the task. In conclusion, mutual understanding about taking breaks does improve the number of breaks taken and provides a sense of freedom. However, a task-based approach leads to losing the sense of control.

From the interviews in Chapter 2.6, it became clear that there is a social barrier to well-being. Managers and colleagues share a responsibility to create a safe space for well-being. The experiment focused on taking micro-breaks along with a collective goal and approval from a managerial level. The hypothesis is partly met as the participants felt more comfortable prioritising their well-being when expectations were discussed.

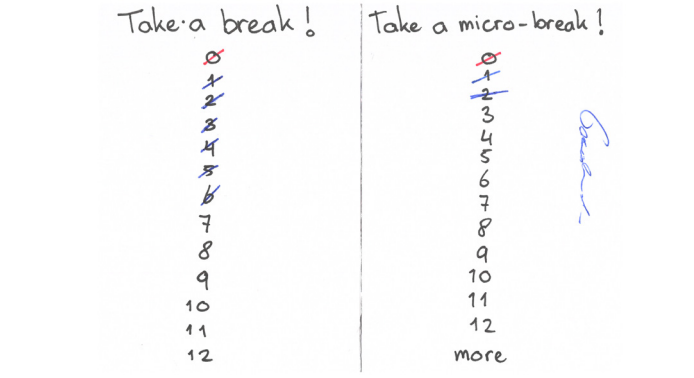


Figure 25, Pilot checklist with on the right the checked breaks only counting and left when a goal was set.

Figure 26, The front of the checklist.

Average Office Workday

During the interviews, the participants were asked to describe an average workday and stressful moments they have encountered at the office. Based on the interviews, observation and experiment obstacles have been identified. A general overview is made and is shown on the coming pages.

Arrive

The day begins with looking for a spot to work that day. How empty or crowded the office is that day will only become clear the moment they walk in.

Obstacles

- When a bit late having to hurry.
- Finding a spot to sit and work.

(Desk) work

After finding a spot it is time to get the stuff out of their bag, sit down and make the spot to their likings. Often they will grab a coffee or tea before they start working.

Obstacles

- Finding out that it is really crowded and there is little room to sit.
- Having no second screen.
- Adjusting the seating.
- Colleagues who come to aks and talk about non-substantive matter.

Online meeting

On and off their will be online meetings. Around the office there are smaller rooms for one or two persons which are suitable for making those calls or have a one-on-one chat.

Obstacles

- People who make phonecalls in the shared space.
- Small one person phonebooths.
- Wanting to walk during calls.
- People who keep phonebooths or group rooms to themselves.

‘Offical’ break

It depends if they bring their own food or not. They gather in the cantine but often also go for a walk, just to relax or to get some foor. During official breaks mostly together.

Obstacles

- Having to go with the flow of the rest of the colleagues.
- Social dilemmas.
- Politics.
- Not having a nice and cosy dinner table like home.

(Desk) work

Some switch desks, some leave their stuff behind all day and only go to a phonebooth when they have a call.

Obstacles

- People who interrupt.
- Noise.
- If only work is done what could have been done at home.
- Colleagues who come to talk about non-work related matter.

Physical meeting

It is often disscused with team-memberds to be at the office or not. Therefore, there will sometimes be physical meet-ings in the designated rooms.

Obstacles

- Meeting rooms are too static.
- Layout of the room does not offer for everyone to be involved.
- Meeting rooms are not made to do a meeting partly physical and partly online.

Relaxation

Some offices offer special areas for relaxation with stuff like football of pingpong tables. More common is little corners in the office with comfortable chairs and cheerful colors.

Obstacles

- Finding it difficult to relax when the rest is working.
- Distinction between relax area and work area.
- Ad hoc situations.
- Vulnerability.

Leave

Working hours are not precisely from 9 to 5 anymore, but often with a margin of about an hour. Some people feel freely to go and leave when they want while others 'go with the flow'.

Obstacles

- Not staying for to long.
- Leave the work behind.
- Unclear managers.
- Toxic work culture.

E-mail & phonecall

Most people agree that outside of work hours is for private life but often e-mails are answered, even during the weekends, and in some cases even colleagues call when needed.

Obstacles

- 'Simply' not to answer.
- 'Simply' to shut off work cell-phone and close mailbox.
- Addressing people about unde-sirable behavior.
- Leaving work at the workplace.

Reflection

On average the interviewees seem to experience sufficient autonomy in their jobs. When digging further for obstacles, underlying control problems emerge. Not being able to choose a break yourself due to social pressure, unwanted visits from colleagues, and the need to prove yourself are 'self-created' barriers. When asked further, it turns out that everyone is generous and understanding towards others, but strict with themselves.

Dutch Work Ethics

In the Netherlands, working is seen as a moral duty (Halman et al., 2005) and has its origins in the Protestant work ethic. Nowadays you do see a change in what people expect from work. Young working adults feel more pressure because of societal changes and problems (TNO, 2023). Work is not the only priority as a lot of societal issues arise, which require a lot of energy. A generation gap appears. Different expectations between older and younger employees regarding working hours, loyalty to the employer, and sacrificing yourself for work reside.

Image Source: Interview by Gijs Wels

Performance Pressure

All interviewees experience some form of performance pressure. Performance pressure is the pressure people feel to meet certain expectations. What risks employees face in the workplace is about more than just safety, occupational hygiene, ergonomics, or health. The Working Conditions Act in the Netherlands prescribes that you must also include the psychological workload (PSA) in your risk analysis.

Behavioural Design

The interviews point out that the problems of employee well-being lay deeper than just personal characteristics. The awareness of surrounding colleagues and the feeling of absent managerial understanding create a work culture where it is hard to focus on well-being. The behavioural design space framework by Nielsen et al. (2021) points out several key factors: to design for support (e.g. guidelines, tools, and methods), design for understanding, design for motivation, and design for social context (e.g. interaction and community).

Image Source: Observation Gijs Wels

CONCLUSION

Communication about expectations seems to be difficult while many have generally the same beliefs about work ethics. Self-made work pressure and expectancy are obstacles to overcome. How can awareness and understanding be implemented to steer for behavioural change?

Control.

Although the participants seem to experience sufficient autonomy in their daily work, they all complain about little control over non-substantive matters. Like taking breaks, relaxing, video calls while walking, etc. On top of that, products which seem to have the quality of reducing stress or bringing structure are not likely to be used. Self-made group pressure and vulnerability are the most persistent obstacles. Managers and organisations have a great responsibility in the matter. They can steer for behavioural design and change of work culture. These are key factors in employee well-being.

Stressors and relievers.

During the interviews, in Chapter 2.6, a lot of examples came up that increase or decrease stress according to the participants. In Figures 27 and 28, the most common stressors and relievers are written down clustered. The answers in bold are unanimously stated and agreed upon by all respondents. In the answers, a distinction was noticeable between personal, collegial, and managerial stressors and relievers.

Figure 27, Stressors in the office environment.

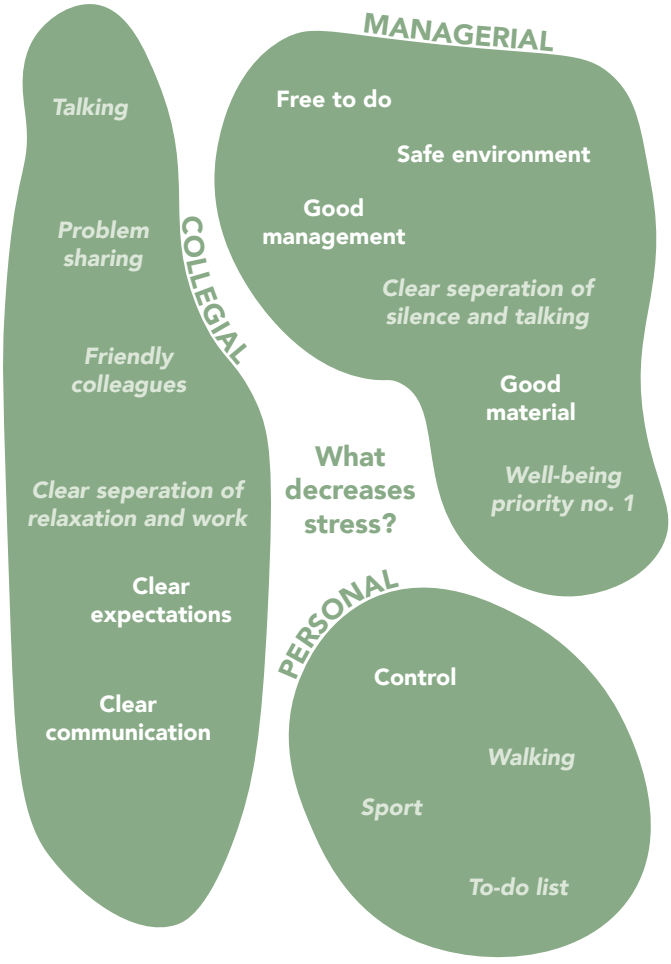


Figure 28, Relievers in the office environment.

3 DEFINE

The define phase is all about setting boundaries to a design scope. Creating a clear vision, a target group, and criteria to develop further ideas and concepts.

3.1 TOWARDS DESIGN

THE CONTEXT

Many products that claim to positively influence the well-being of employees are aimed at a personal or social level. Research only shows that interventions aimed at the individual do not or hardly work. Hence, an important underexposed design direction is helping managers and managing employees. With an eye to the future and a holistic view of well-being, change is in the hands of those in control. If an adaptive tool is found to measure the current situation, an employee, colleague, or manager can take active and targeted action.

Well-being at Work in the Current Context

To design for well-being at work it is necessary to first define and layer down what it is, see Figure 29.

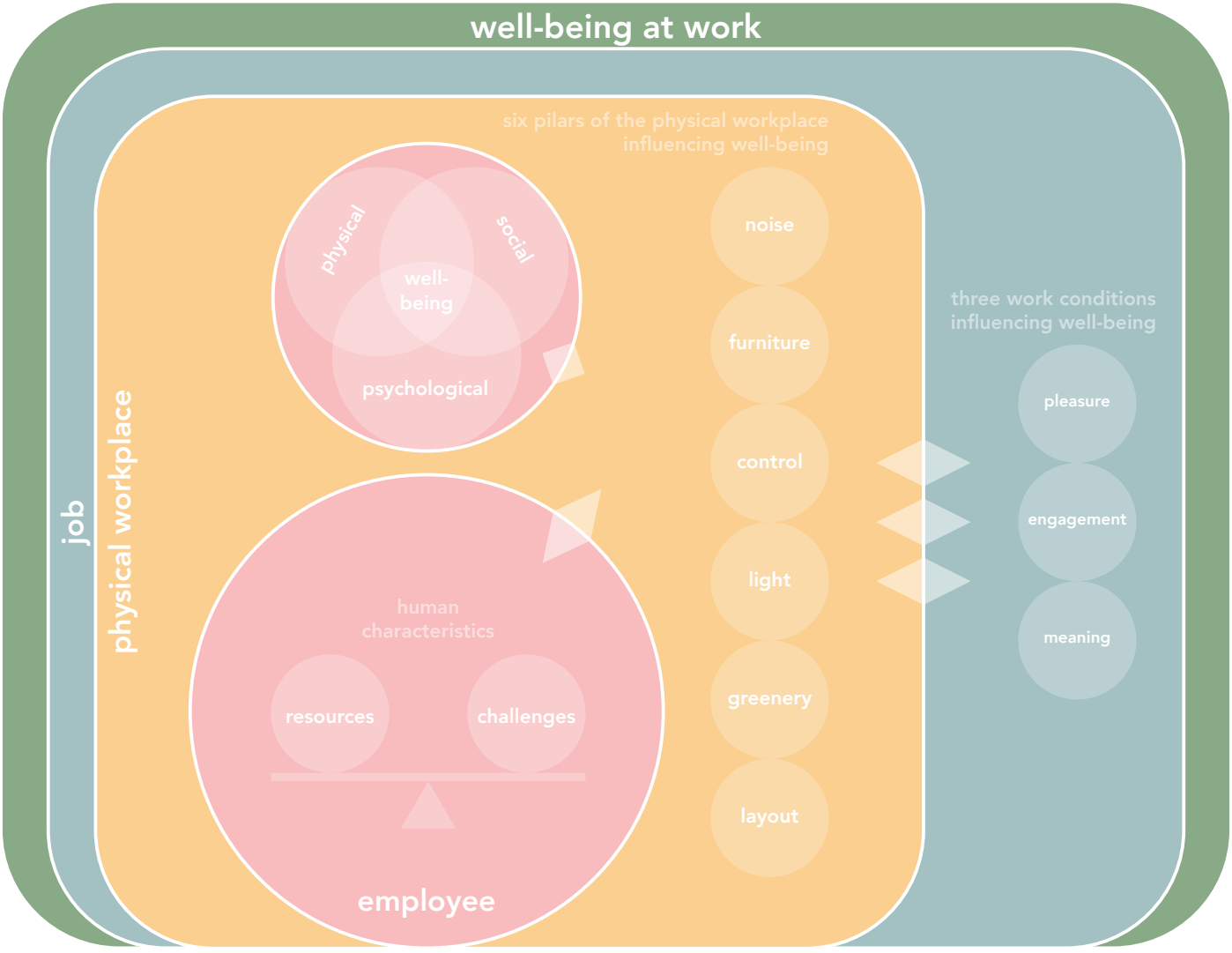


Figure 29, Well-being at work layered down in three aspects.

Well-being in the workplace at its core revolves around the individual employee. The employee is placed in a physically designed environment which is reliant on the respective job. Together the layers are interrelated, describe the overall well-being at the workplace and can be seen as a three-dimensional representation, see Figure 30.

The designed environment can influence the well-being of an individual employee by extending their resources (i.e., natural lighting). The other way around the designed environment is also dependent on the state and properties of the individual (i.e., introverts versus extroverts). The six pillars which can be designed are noise, furniture, control, light, greenery, and layout which must be considered in the subsequent steps to arrive at a design concept. The pillars are also reliant on the job itself, which is controlled by colleagues, managers, and organisational structure (i.e., proper leadership or autonomy). Reversed, job satisfaction can also be influenced by the designed environment and individual characteristics (i.e., co-workspace or courage).

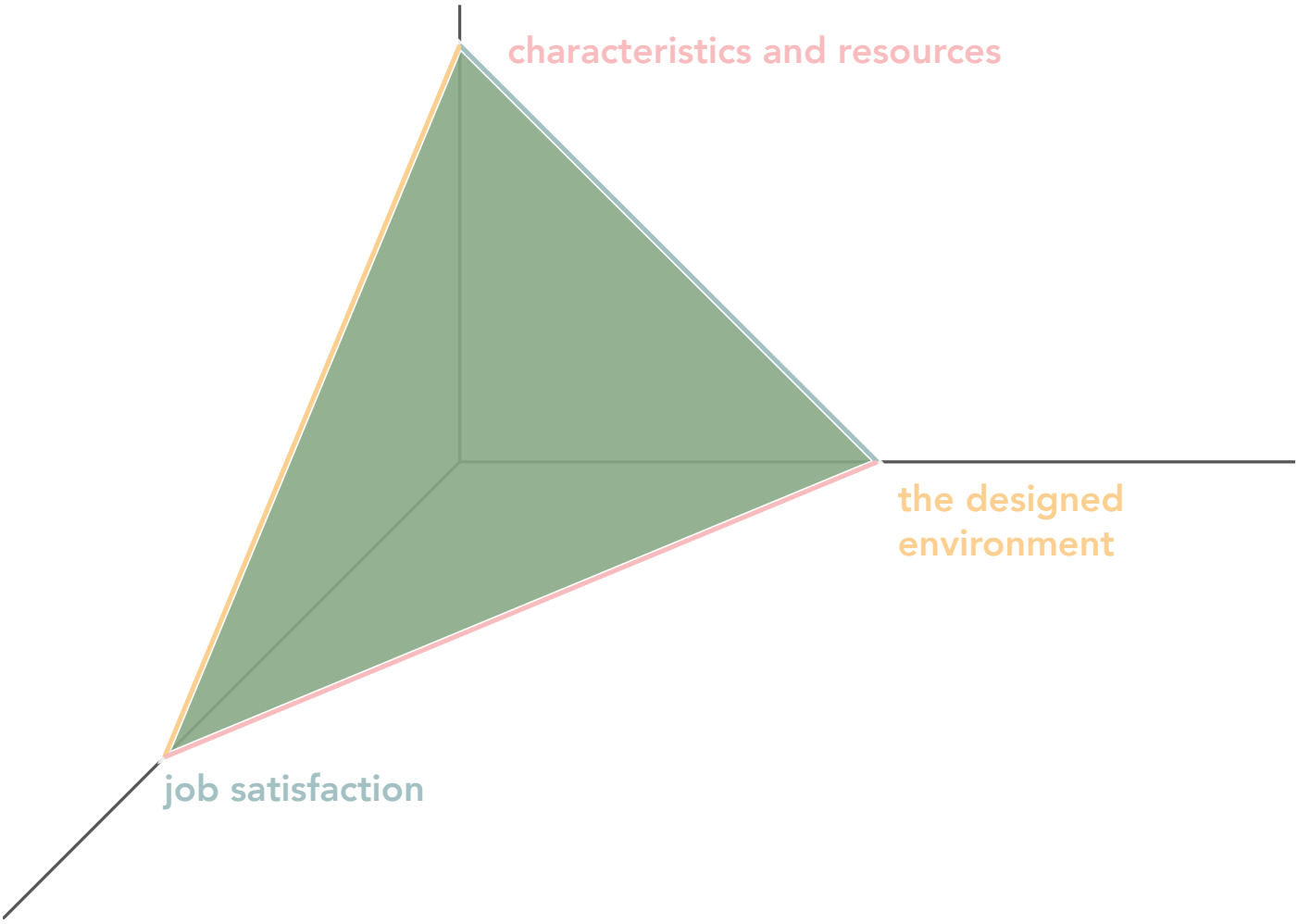


Figure 30, Well-being at the workplace is the surface area between the three aspects.

Ideal Work Pattern in the Current Context

The correlation between breaks, routine and well-being seems significant. From literature and existing methods, a complete pattern is deducted, see Figure 31. Focused on physical health it is generally accepted for one working hour to consist of approximately 20 minutes sitting, 8 minutes standing, and 4 minutes stretching or walking. With psychological and social well-being in mind, there should still be room for a micro-break every 20 to 30 minutes. For a micro-break being a break of 2 to 10 minutes, the part not working in the pattern, see Figure 21, can be seen as a great amount of time (it is a significant part of a working day) for some people or it is at least not coherent to current work culture.

Figure 31, The ideal work routine for further development of ideas.

Initiate Change in the Current Context

The roots of the problems around stress and burnout-related symptoms are related to behaviour and work culture. To set a shift in motion the model, as shown in Figure 32, can be seen as a starting point.

Research shows that interventions on a personal level only, e.g. mindfulness, do not positively affect well-being (Fleming, 2023). The interviews revealed that, among other things, the collegial relationship or expectations prevent employees from doing what feels good for their well-being. In the end, managers have a great responsibility to coordinate the employees with well-being in mind and not in retrospect. Thus, bluntly said, a lack of tools, awareness, and understanding stands in the way of well-being.

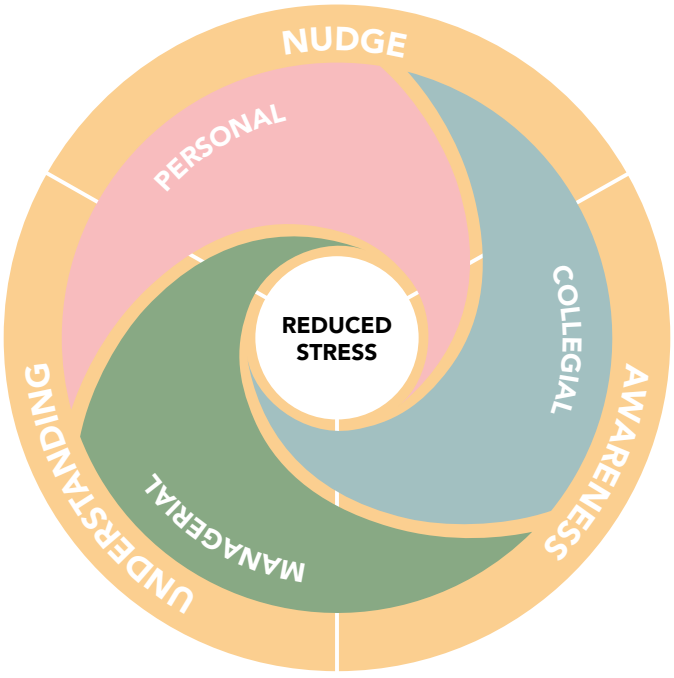


Figure 32, The organisation is divided into three sections together with three design focuses it is able to initiate change in reducing stress.

Physical Environment in the Current Context

Analysed office buildings, organisations and employees all differ. However, they also share similarities. The office workspace is divided into layers and reveals opportunities and boundaries for design, see Figure 33 and Figure 34.

The 'break-out' zone is defined as a place where micro-breaks can be enjoyed without the intervention of work, mainly focused on social interaction and movement.

Figure 33, Zones of the physical office.

Figure 34, The physical work floor is divided into three sections together with three design focuses to initiate change.

Target Audience in the Current Context

In the analysed context the following key characteristics are appointed:

1. Young working adults in the Netherlands (age 18 to 35);
2. Working in office environments;
3. Of which a significant time is spent behind desks (computers);
4. And hold an independent working position (work is partly done individually).

A persona is shown on the next page.

In the analysed context offices and organisations are described as:

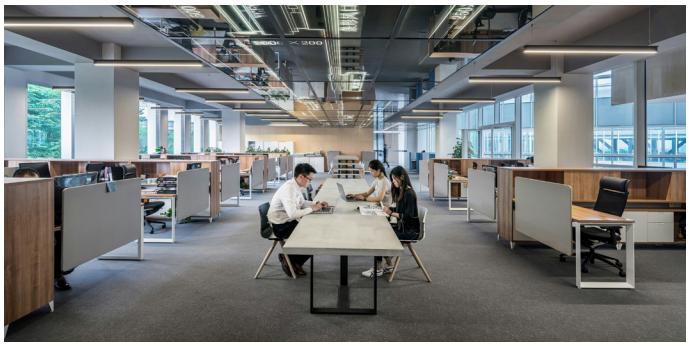
1. Hybrid working is the norm (desk sharing);
2. A mix of young adults and adults;
3. Small to large enterprise (>10 to >250 employees);
4. An interest in vitalising work environments for the well-being of employees.

An atmospheric impression is shown below.

PERSONA

Hi, I am Jan.

Jan is a young Dutch working adult who lives in Amsterdam. He rents a small apartment with his girlfriend, but they are looking for a house to buy because they are thinking of children. They both work during the week and at the weekends they like to socialise with friends, but they are also involved in a protest movement which strives for a more sustainable and greener society.



Profession

Jan studied at a Dutch college where he got his Bachelor but eventually graduated from the university. Now, he works as an IT guy at a big telecom company, i.e. office worker. He works full-time, so 36-40 hours a week, just like his girlfriend and most of his friends.

Company

The telecom company is a large enterprise, with over a thousand employees. Their main market is the Netherlands and for the moment they do not aspire to expand internationally. For a decade or so they have focused on the wellbeing of employees. Still, they experience high employee absence due to burnout and employees often complain about work pressure.

Goals

Since Jan graduated his focus has been on making a career. However, he tries to maintain a healthy work-life balance because happiness and well-being are quite important to him.

Challenges

Unfortunately, he also experiences high work pressure and stress symptoms. The cause of this is various. Periodic understaffing, personal characteristics and private matters all play a part. Furthermore, as the company allows hybrid working, he travels to work by train three times a week and on the remaining days he works from home.

Future

What he sees as his biggest personal challenge is saying no and feeling freer to put his health in the first place. Although the company is focusing on well-being, Jan finds it hard to express his physical and mental condition to others. The feeling of having to work while others are sometimes taking over. This is something he wants to work on but feels neglected by colleagues and managers.

DESIGN DIRECTION

Now the current context is set, a path towards the future must be paved. At the start of the research, a goal was set. How can technology provide office employees with a tool or a product to positively influence well-being and behaviour? This is narrowed down to a vision and three design directions.

Vision

In a rapidly changing, i.e. industry 4.0, and fussed world a shift towards well-being at the centre of occupational duty is requisite. With a focus on solely personal stability, the increase of burn-out-related symptoms will not vanish. To gain more awareness and understanding a structural change in work culture is necessary. The view on productivity should shift to a perspective on healthy and social management. Currently, this shift is taking place, though the focus does not yet produce the desired results.

Three aspects withing the vision are important to achieve a shift in work culture and behaviour, see Figure 35.

'To increase well-being and lower stress, employees and managers should be provided with a product that uses social awareness to promote micro-breaks in order to make a shift in work culture and behaviour.'

Figure 35, Three directions are set to start ideation during the 'develop' phase.

THE FUTURE

During the conducted interviews in Chapter 2.6, the participants spoke about longings in the workplace environment to create a healthy working atmosphere. A full collection of the employee criteria can be found in Appendix F. Opportunities for further research lie in design to...

» *… increase the awareness of own or collective stress.*
» *… lower the threshold to make use of micro-breaks.*
» *… increase the understanding of health-related issues caused by work.*
» *… hand managers tools to effectively manage their employees.*

Criteria

All criteria are translated to product requirements and divided into wishes and demands.

Whishes

Integration
1. Integration in the office environment should be relatively simple.
2. Adoption by employees should be easy.

Usage
3. Total daily interaction should not pass the recommended daily break time.
4. The product should avoid work-related matters.
5. The product should be available to use during the whole workday.

Method
6. The method should be unintrusive.
7. The product should promote active micro-breaks.
8. The product should encourage social interaction.
9. The solution should focus on all three forms of well-being.
10. The solution should focus on all three levels of change.

Experience
11. Users should experience an improved feeling of autonomy and control.
12. The solution should bring about awareness and understanding.
13. The solution should include a combination of pillars of the designed workspace.
14. The product should not be distracting at a personal desk.
15. The product should pleasantly attract attention.

Demands

Integration
1. Integration in the existing office environment must be possible.
2. Adoption by employees in daily routine is a fit.

Usage
3. The product must use understandable symbols and use-cues, easy-in-use.
4. The product must be unavailable outside of generally accepted working hours.
5. The product must be sustainable, in terms of usage.

Goal
6. Psychosocial well-being must be the main starting point and leading factor.
7. The product must promote micro-breaks.
8. The product must reduce social barriers.
9. The solution must focus on a collegial level of change.
10. The solution must bring about awareness.
11. The solution must include one of the pillars of the designed workspace.
12. The solution must include transferring (measuring and providing) information.

Experience
13. The product must be ignorable.
14. Design must be satisfying.
15. Users must feel in control of the product.
16. The product must be accepted at a managerial level.

Boundary Conditions

Six topics were discussed in the Discover phase, see Chapter 2. Conclusions were drawn at the end of each subchapter. The main takeaways are captured in eight boundary conditions.

The intended product solution shall...

1. ... focus on **prevention** of stress symptoms. (Chapter 2.1)
2. ... focus on keeping **energy levels** balanced. (Chapter 2.1)
3. ... promote **social awareness**. (Chapter 2.2)
4. ... promote **micro-breaks** in the work environments. (2.3)
5. ... encourage to prioritise **well-being** through the designed environment (Chapter 2.4)
6. ... aim for **habit** fromation by adressing the **collective**. (Chapter 2.5)
7. ... provide a sense of **control** to **young working adults** in the Netherlands. (Chapter 2.6)
8. ... create a bridge between the **social and personal** workspace.

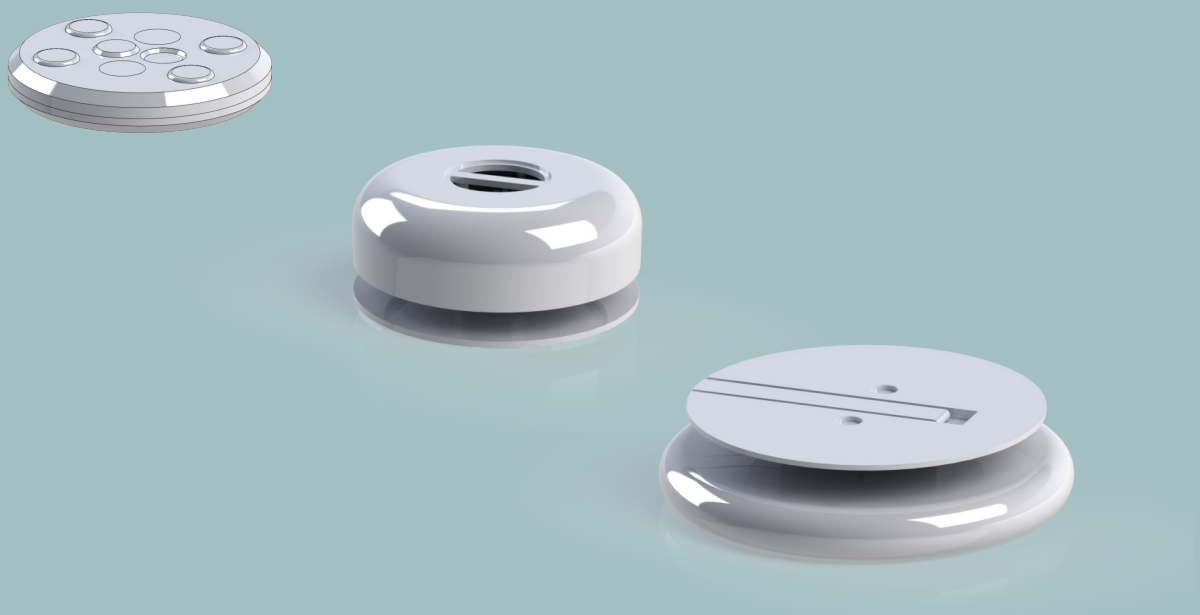
Design for Experience

With the focus on design as written down in the boundary conditions a sustainable solution must be found by meaningful design. Meaning is the implication of a hidden or special significance. When something is meaningful, it is: serious, important or relevant. In design, this means that it provides significant value to the user and will last longer than just owning a new device. Approaches to

By designing for change a design becomes part of a user's routine - adoption/integration - but at the same time adds quality and value.

4 DEVELOP

Now that the context is narrowed down the phase of generating ideas is discussed. Several iterations are done. Starting with brainstorming, with a team consisting of employees from Ahrend. Ideas are tested and reviewed leading towards a concept. The concept is again tested and refined, ultimately, showcasing a final product in the last phase Deliver, Chapter 5.



4.1 IDEATION

The scope is still quite broad at this point. The problem definition of the original assignment is narrowed down to providing a tool or product that promotes micro-breaks by making people aware and involving the collective. Ultimately, three ideas emerge from generating many ideas. All ideas are compared to criteria and one idea is then taken into validation.

DEVELOPING IDEAS

To generate as many ideas as possible, based on the vision and design criteria, an individual session was followed by a group brainstorming. All ideas were compared to criteria to find the most suitable combinations. Based on the literature research, interview and experiment in Chapter 2, ideation was split into three design areas and is described below.

Design Areas

To start ideating, the vision is divided into design areas. The essence is to create awareness of breaks and to give breaks meaning. The areas are formulated on the right using the 'how can you' method and sketches were drawn, see Figure 36. These areas form the basis of the brainstorming explained on the next page.

1. How can you be reminded to take a break occasionally?
2. How can you grow understanding among others to take a break occasionally?
3. How can you get rest provided by physical products?

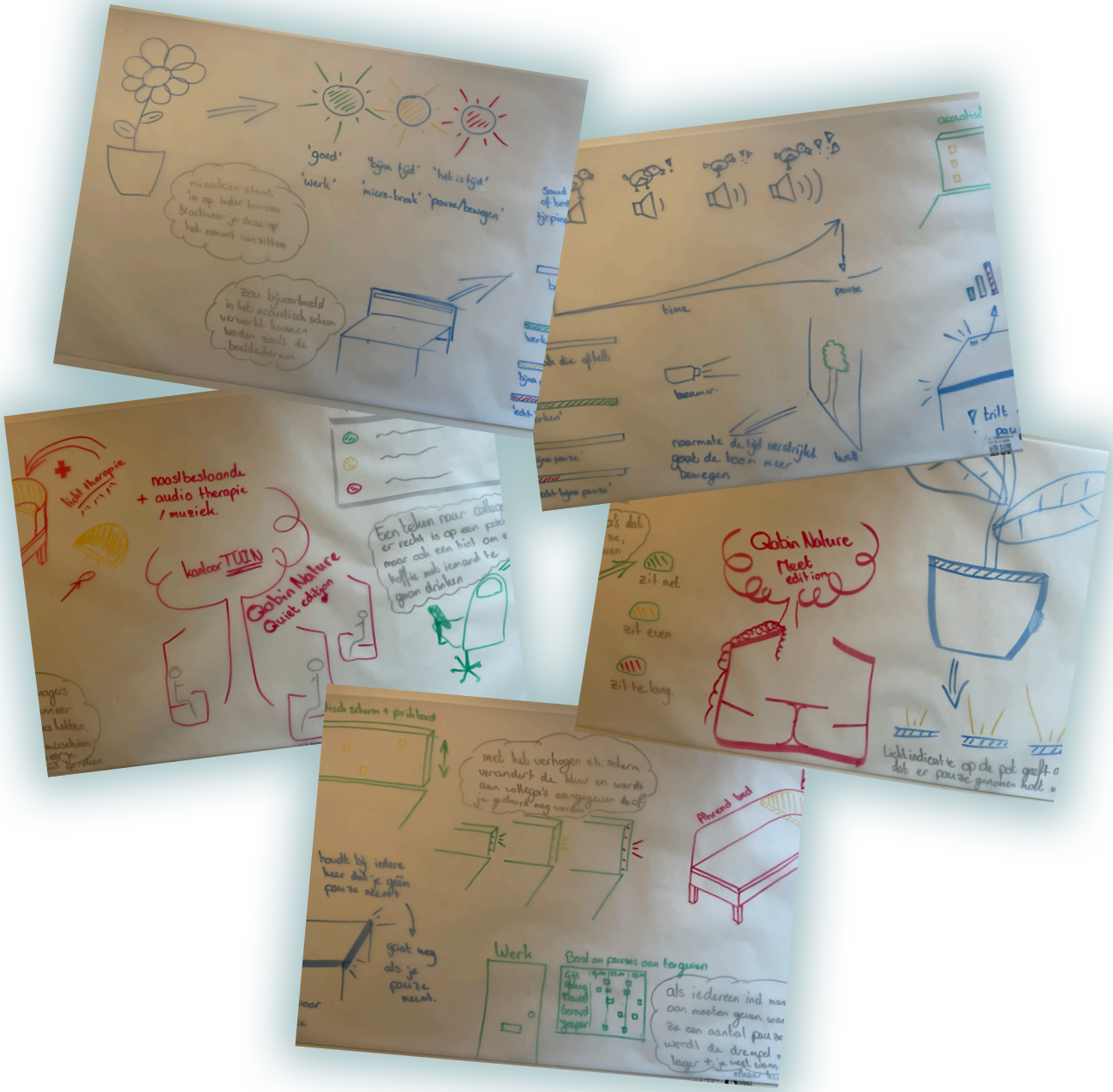
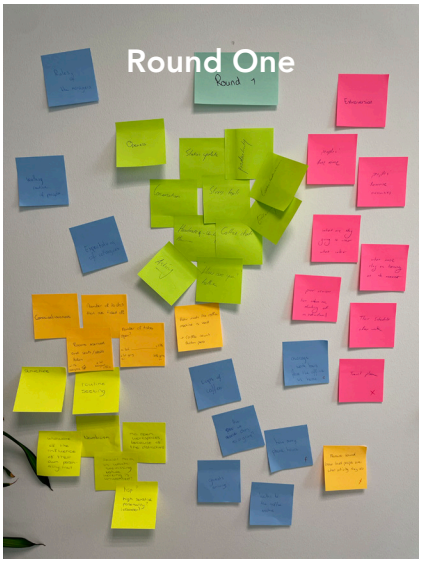


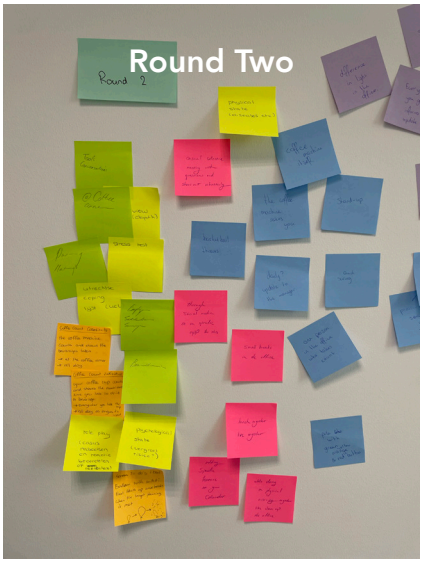
Figure 36, Selection of sketches that were generated during the individual ideation.

Brainstorming

The brainstorming builds on ideation, described on the previous page. With a group of six people, a quick design process was performed. In the process, we first diverged by coming up with all kinds of solutions conceivable. Secondly, we converged towards multiple design directions. The group consisted of two Ahrend employees – innovation department – and four graduates of which two were industrial design students and two applied psychology students. The mix of professional backgrounds provided a good breeding ground for generating ideas.

The brainstorming session was built up in four rounds. First, three questions were asked in three separate rounds: 'What can be measured?', 'How can be measured?', and 'How can information be provided?' In the second part of the brainstorming, the participants were asked to combine three answers, one of each round, and think of a concept in groups of two. In addition, the participants were asked to think of the essence, benefits, and social character. The full presentation can be found in Appendix G1.





What can be measured?

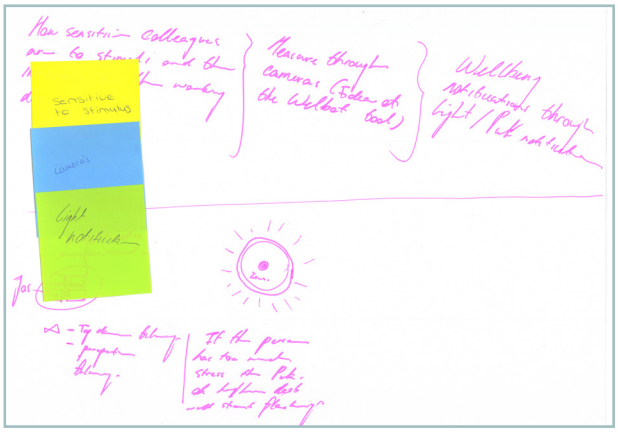
How can be measured?

How can be provided?

To create awareness among employees [*insert measurement*] is measured in the office environment with the use of [*insert tool*] and provided to colleagues in the form of [*insert output*].

Idea One

Stress Alarm

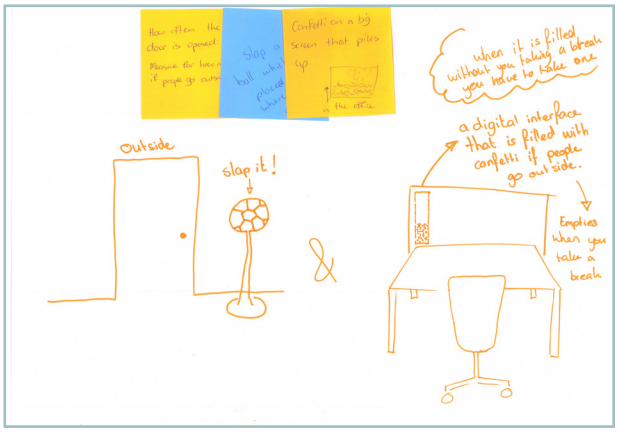


A stress sensor at individual workplaces sends a signal or notification to colleagues when stress levels become too high.

1. Sensitive to stimuli.
2. Cameras.
3. Light notification.

Idea Two

Break Counter

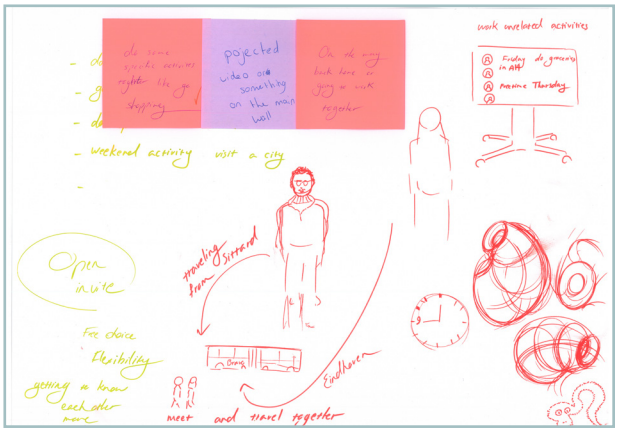


A product that records the breaks that are taken and provides this information at individual workplaces.

1. How many times a door is opened is a measurement of how many people go outside.
2. Hit a ball that is next to the door.
3. At the desks a display is integrated that shows a pile of confetti building up until the person at the desk takes a break.

Idea Three

Personal Colleagues Board



A digital team board in the centre of the office that displays breaks, hobbies, personal planning outside of work, and more of colleagues.

1. Personal or specific activities that can be done with multiple people.
2. Information is projected on the main wall.
3. During a break, a walk, on the way home.

Weighted Criteria

All the ideas, of each round, which were thought of during the brainstorming are individually compared to the set criteria for possible further development, the outcome can be found in Appendix G2. The outcome of the brainstorming, three main ideas, are tested against weighted criteria to decide for testing and conceptualising.

The second idea, see Figure 37, has the most similarities with the set criteria and, therefore, measuring and distributing knowledge about breaks will follow in the form of little tests.

		Idea One	Idea Two	Idea Three
25%	Promoting micro-breaks	0	1	0
20%	Creating awareness	1	1	1
15%	Unintrusive method	-1	0	0
10%	Low level for maintenance	1	0	-1
10%	Easy to understand	1	1	1
5%	Use by the collective	1	1	1
5%	Social activity	0	0	1
5%	Safe for privacy	-1	0	-1
5%	Nudges for interaction	1	1	0
		+35	+65	+15

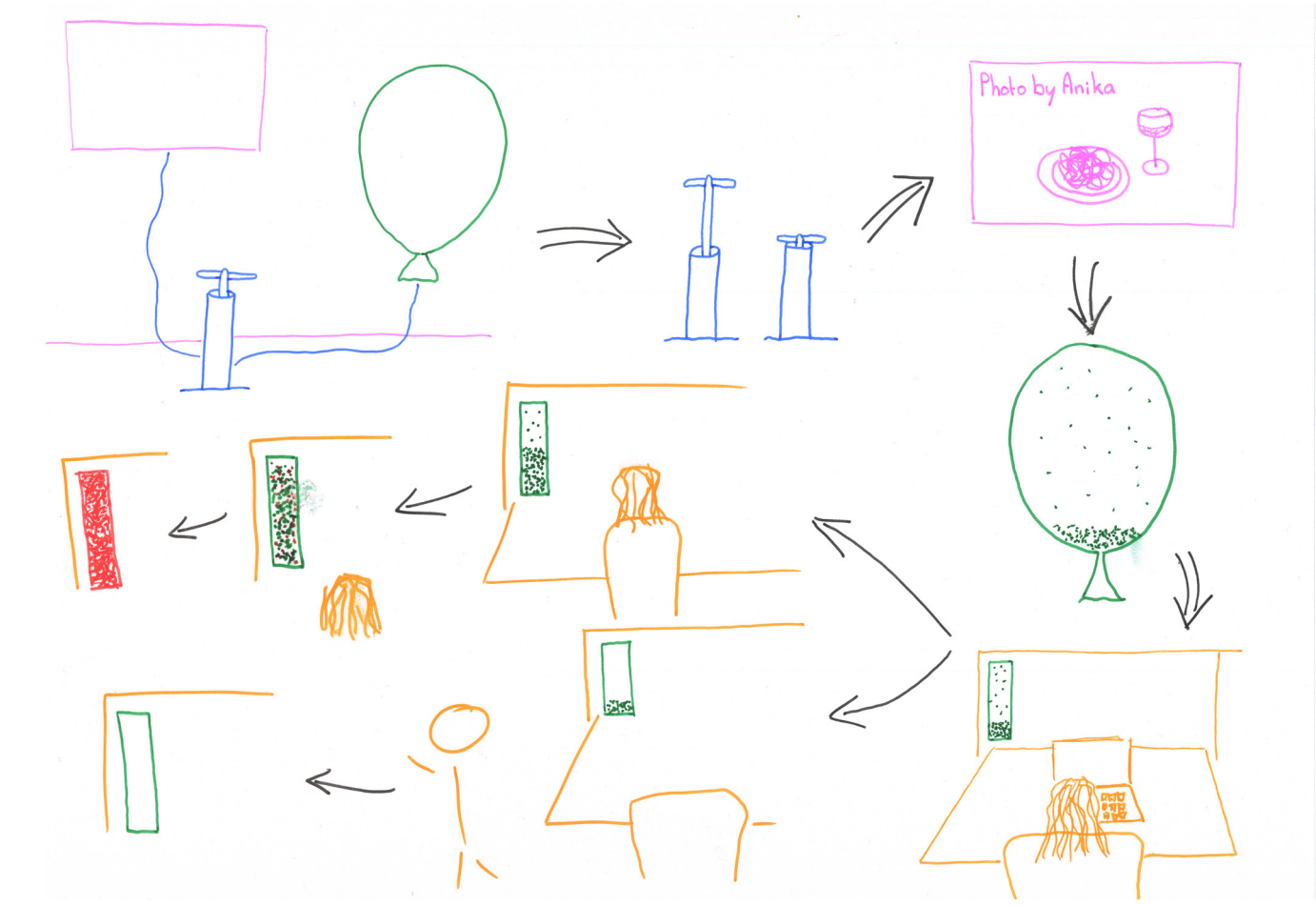


Figure 37, A variation of the second idea.

CONCLUSION

The concept direction is set. Ideas need to be tested to move toward a more constructive design. Starting with smaller 'quick-and-dirty'-tests to validate ideas. After those a concrete concept plan can be evaluated in larger and more substantive studies.

Concept Direction

To start testing the measuring of breaks and passing down the information of breaks the idea was broken down into two parts 'measuring' and 'providing'. For the measuring part all of the brainstorm ideas were analysed by the criteria, see Appendix G2. For the sake of time the most suitable combination of 'where', 'what', 'how', 'when' and 'why' was chosen to test the idea further, see Figure 36. Iterations on the implementation have been added and shaped the product along the way.

For the proving part the most suitable combination of 'where', 'which medium', and 'how displayed', was chosen to test the idea further, see Figure 37.

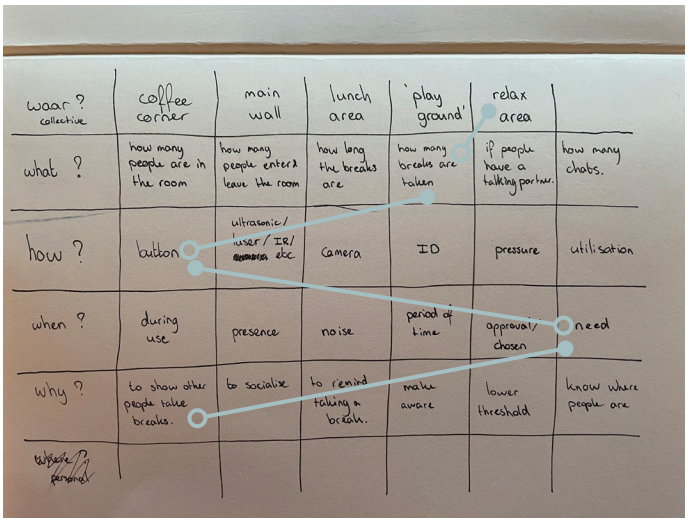


Figure 38, Combination of ideas for the providing part.

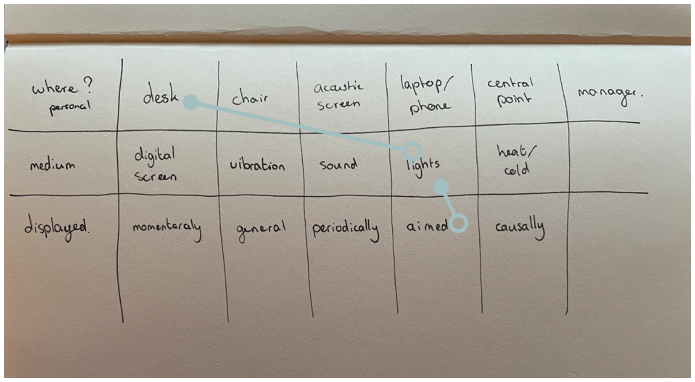


Figure 39, Combination of ideas for the measuring part.

4.2 VALIDATION

Before selecting the final direction of the concept, the main idea of communicating breaks is tested to determine how users experience it and what would provide the optimal base for further investigation.

VALIDATE IDEAS

To validate the presumptions of the ideas in Chapter 4.1 a user study was conducted where participants were gathered in a formal working environment to observe group dynamics. The communication of breaks and communication by desk light were tested on two consecutive mornings. To determine the final direction, the positive and negative features of the ideas were evaluated in group form with all the participants. An overview of the methods and the results of each test are presented. Once the concept has been formed, a more substantive assessment follows in a multi-day trial.

Test Environment

Both tests were conducted in the same environments, see Figure 40 below.

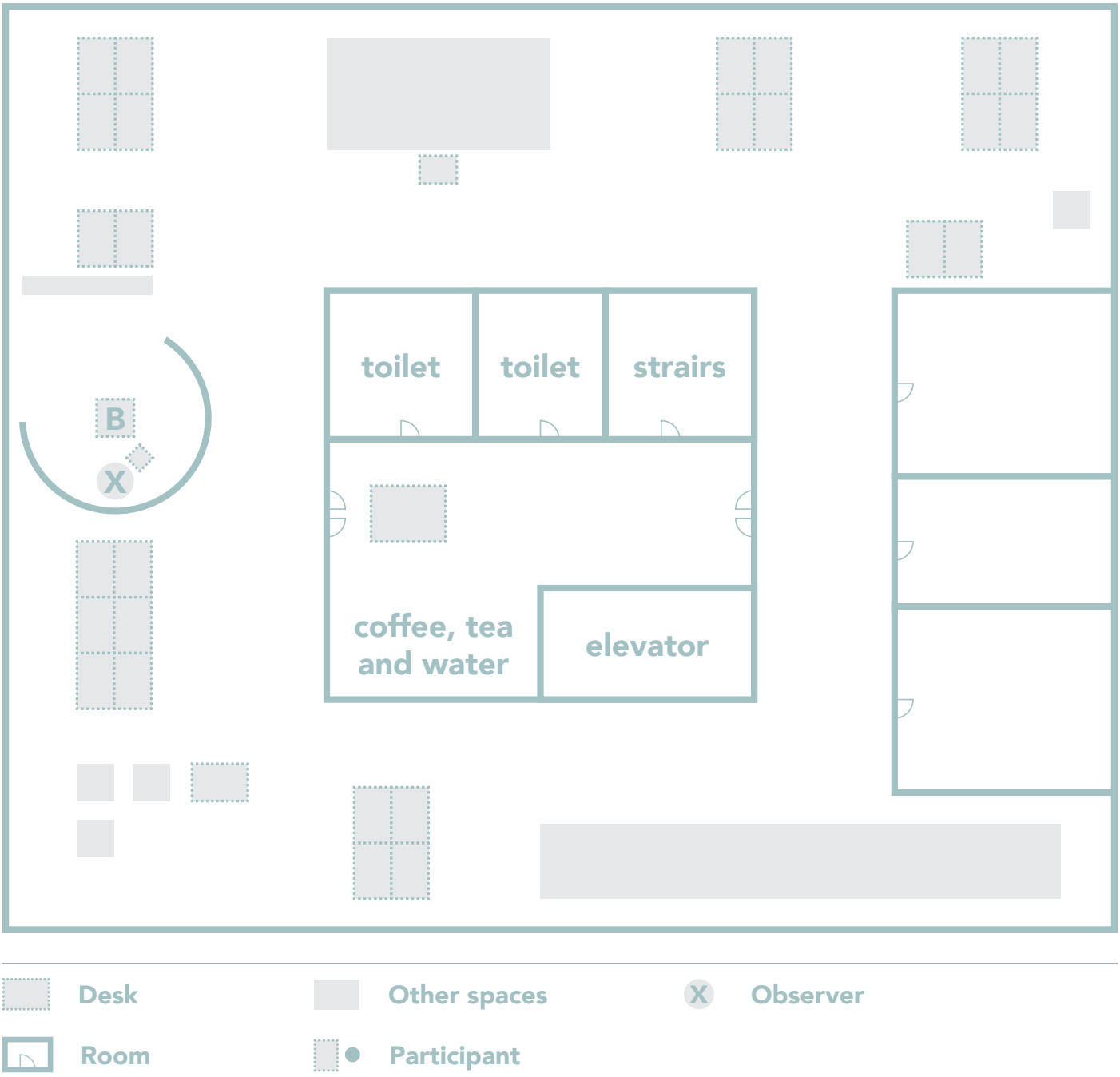


Figure 40, The office environment during the WhatsApp and Desk Lights tests.

Test I - WhatsApp

The idea of communicating micro-breaks is built on the assumption that employees feel freer to take breaks if colleagues do so too, see Chapter 1.5. A task-based approach seemed not to be the solution and, therefore, the new idea hypothesises that communicating breaks could lead to a reduction in social pressure and an increase in micro-breaks. To evaluate the communication of micro-breaks the test was set up, the consent form can be found in Appendix H1.

Objective and Research Questions

The goal of the test is to observe what happens when employees communicate their micro-breaks to each other and what their experiences are.

- Do employees feel freer to take breaks when colleagues communicate their micro-breaks?
- How do employees experience it to tell colleagues about a break they are going to take?

Methods and Participants

Observation is used during the test to look at how colleagues communicate their breaks in a messaging app and to look at responses to the messages. The group of participants consist of ten young adults, see Appendix H2 for list.

Procedure, Setup and Equipment

On the previous page a map of the office is illustrated, see Figure 40. As an observer, I took place where the 'X' is on the map.

To evaluate the communication of micro-breaks between colleagues a messaging app is used, called WhatsApp. Beforehand a group chat was made in the app including all participants as colleagues and me as an observer. The participants had to take their places as they normally would and start working as on a normal workday. The participants were asked to report all micro-breaks for one morning with their colleagues in the group chat. At the start of the test the participants were also asked to meet at a central point if someone was interested in joining someone else on their break. In this case, the coffee corner was a logical spot to choose, because of the lack of other break-out zones. Coincidentally, this location was also at the very core of the office. By observing the participants in the office and evaluating the chat new insights were obtained into how colleagues communicate their breaks and how they respond. At the end of the morning, the participants gathered for a group discussion from which opportunities and obstacles came to light which were clustered.

Results

WhatsApp is not the appropriate method for communicating micro-breaks. However, it was interesting to observe what people do when they are asked to do so. The key outcomes are:

+ Interesting to see was how the participants communicated about their breaks as;
+ They sometimes started a conversation or;
+ Asked/Spoke about specific activities rather than 'just' breaks, see Figure 41.

! The phone was often overseen because of the placement but also because;
! The participants experience a mobile phone around their workspace as distracting and therefore;
! Have formed a habit of not putting the phone directly in sight.

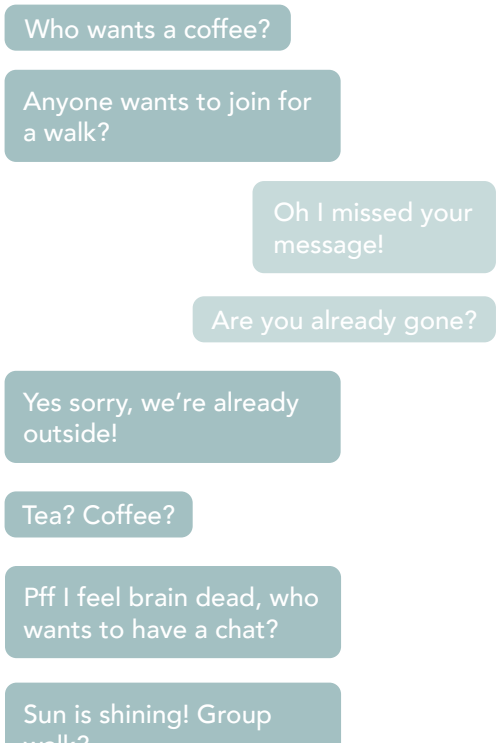


Figure 41, A selection of messages sent during the test.

Test II - Wizard of Oz Desk Lights

How the communication of micro-breaks was implemented in the previous test had its faults. The expressed experiences were nevertheless promising. To test the positioning of a button, to communicate micro-breaks, a central place in the office was appointed as a break-out zone and a button was installed. All the desks were provided with remote-controlled lights. A consent form can be found in Appendix I.

Objective and Research Questions

The objective of the research was to find out how employees respond to a light indication at their desks. In addition, the goal is to find out if a set break-out zone is a suitable spot for a communicative button. Therefore, the following research questions are drawn up:

- How do employees experience communication of breaks through desk lights?
  - o Do users notice the lights?
  - o Does a light provide enough information for the user?

- How do employees experience the button in the break-out zone by which breaks can be communicated?
  - o Is the placement of the button well-chosen?
  - o Are more buttons needed?

Participants

The group of participants was the same as in the previous WhatsApp test, see page 75, and consisted of 10 young adults.

Methods and Participants

The participants were observed the moment one of them chose to initiate and communicate a break. It was necessary to control the desk lights with a remote, to simulate a working communicative device. The UX method called 'wizard of oz' was used. It involves pretending that the product works on its own, but there is actually someone behind it controlling it. Therefore, I as an observer could directly watch the reactions of the participants. Afterwards, a group discussion was held to bring positive and negative experiences to light.

Equipment

The test existed of two parts. A button was set up using an Arduino circuit with one pushbutton and LED and ten remote-controlled lights were placed on a printed sheet of paper with brief instructions, see Figure 42.

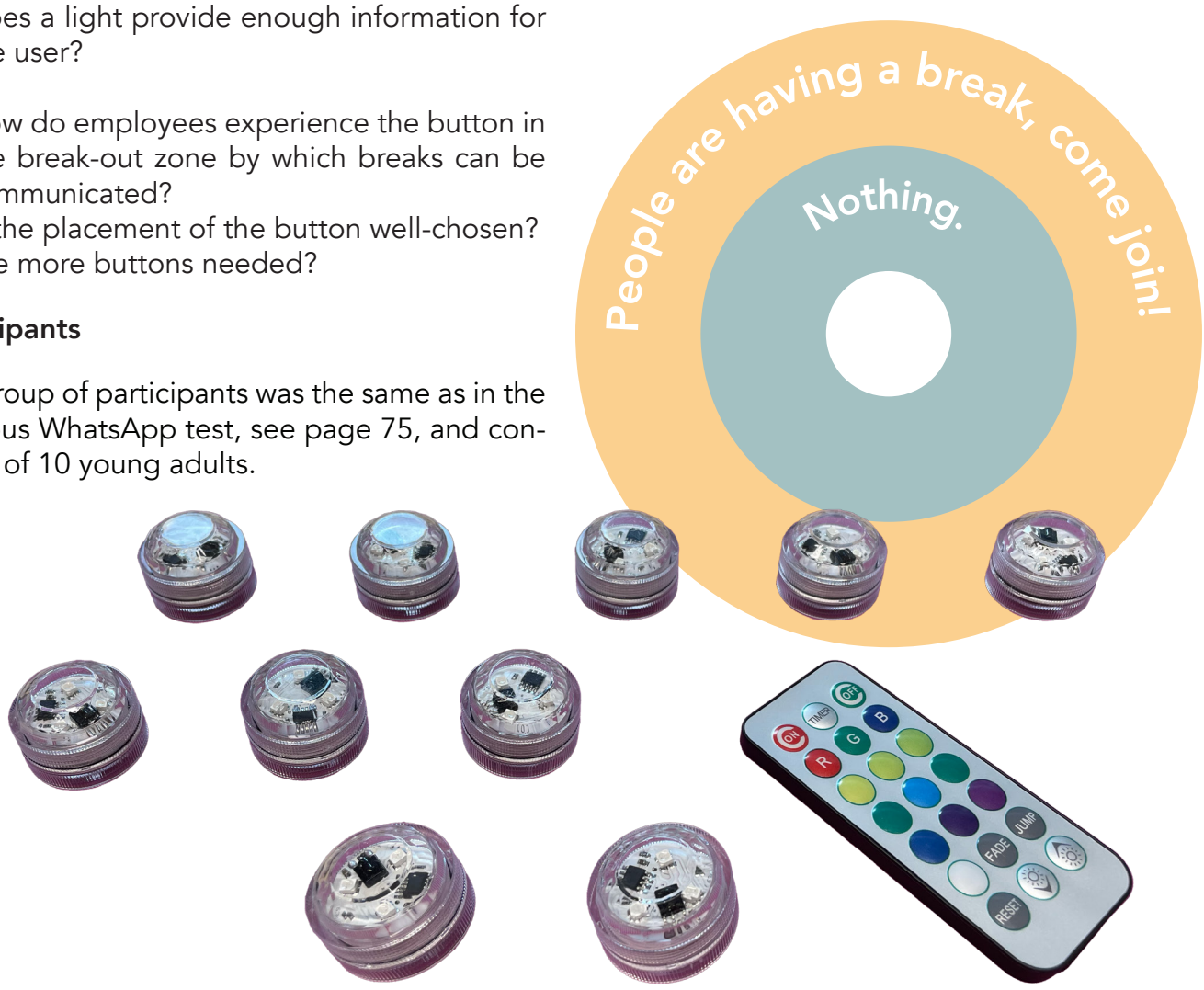


Figure 42, Ten small desk lights, the remote control (to turn the light on/off or change colour) and printed instructions.

Setup

The first part of the setup is the button located in the break-out zone, see Figure 43. The Break-out zone is in this case a round bench which all participants can use to chat with each other while being removed from the work environment. The closed part of the bench is aimed towards the office and the open part towards the window. This creates a great sport for a micro-break. The second part is located at the desks of the participants. A light is placed on the sheet with instructions in the corner of every desk, see Figure [X]. The participants were allowed to find a spot to work themselves. They could choose from one of the tables in the open space of the office which is shown in Figure 40 on page 74.

Figure 43, Test setup of the Wizard of Oz testing method with desk lights.

Procedure

On page 74 a map of the office is illustrated, see Figure 40. As an observer, I took place where the 'X' is on the map. A button was placed where the 'B' is on the map. Before the experiment started the participants were gathered at the observation spot.

In consultation with the participants, a round, amphitheatre-like, bench was chosen as the break-out zone. The button was placed in the middle. The participants were asked to report micro-breaks by pressing the positioned button and taking their break in the break-out zone. When their break had ended, they had to press the button again and leave the zone. Every time the button was pressed I, as a 'wizard', walked around the office to turn the lights on or off on the desks with a remote control. If the lights were on it meant that a colleague was taking a break, and when the lights were off the break-out zone was empty.

By observing the participants in the office and having a group discussion afterwards new opportunities and obstacles came to light.

Results

In the group discussion the following positive experiences and points of attention were made clear by the participants:

+ A communicated micro-break felt like a kind invite by colleagues.
+ The lights were experienced as very pleasant.
+ The lights make aware of breaks and are experienced as an improvement in awareness
+ The communication of breaks lowers the social threshold.

! Lights went off quickly.
! The participants had a desire to react to the invites.
! The participants wanted to communicate their breaks beforehand.
! The lights were not noticeable for every participant and every participant had a different preference for the positioning of the light.
! The question arose, 'What if nobody comes to your initiated break?'

CONCLUSION

The direction of direction of the conceptualising phase will be about communicating breaks through a physical product from appointed positions in the physical office. After testing some basic features, new insights came to light which altered the vision slightly.

Key Takeaways

To select the final direction, the positive and negative features of the ideas were evaluated in group form with all the participants. The main takeaways of the test results are presented to determine which features should be included in the final concept.

The location of the product is important. The product should be adjustable to the preferences of each user. Four specific places should be kept in mind:

- Desk
- Laptop screen
- Second screen
- Acoustic screen

Re-evaluation of Criteria

After testing and discussing the experience with the participants, the vision is changed slightly. By narrowing down the vision, the coming tests can be more focused and of value.

Communication of feedback is a desired feature. The products should have an answering functionality. This is important for the users who initiate a break to know whether people are joining or not. It is also desired by the receiving party to be able to react and let colleagues know that they are joining. Feedback communication is important to reduce uncertainty.

Lights are simple and effective, yet they need clear and bonding meanings that connect to people their senses.

"My vision is to normalise micro-breaks in the workplace by providing a tool to structure and communicate micro-breaks to reduce stress from social pressure and form a micro-break habit."

4.3 CONCEPTION

In this phase, the ideas are combined into a base concept so that by testing and making iterations the design can ultimately arrive at a complete product.

FROM TEST RESULTS TO CONCEPT

The basic idea of the concept is to communicate micro-breaks to colleagues from both the social zone and the personal zone to attract team members to join and make them aware of taking the time to recharge themselves.

Features

For this concept, all the research is used to find a well-balanced solution for social pressure-related stress.

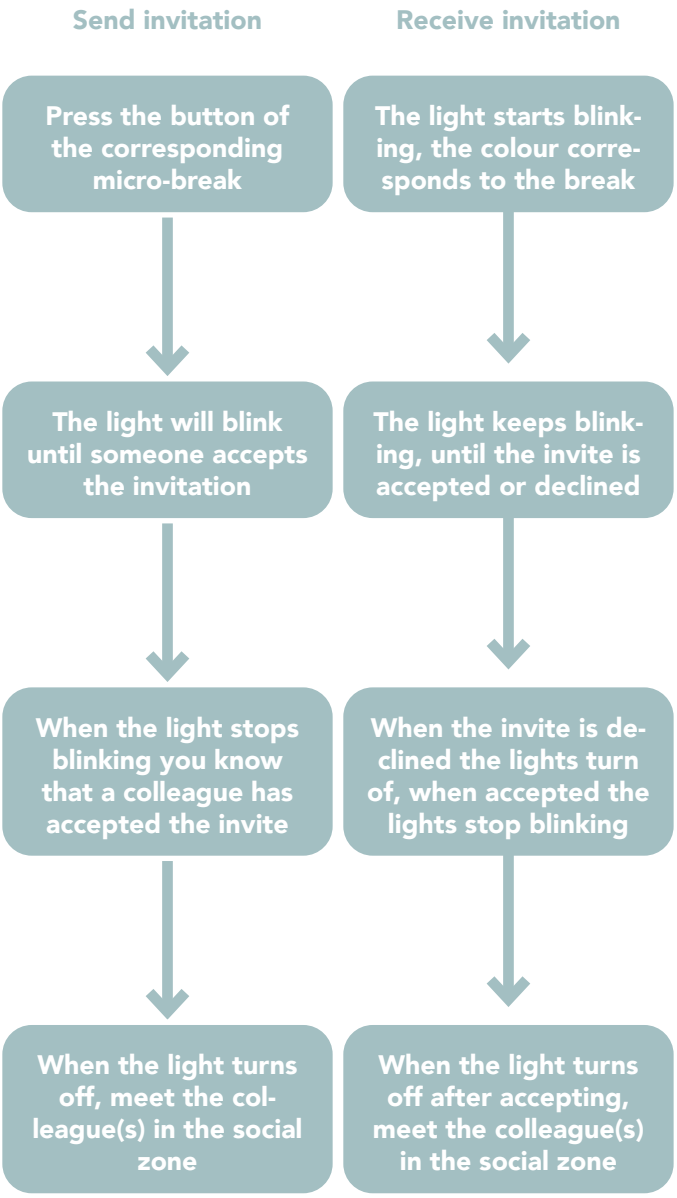
In the **social zone** and **personal zone**, a device will emerge. The device in the social zone only has one button and is used to notify colleagues at their desks that someone is taking a break. At the desks, the device has more buttons which represent different kinds of **micro-breaks**. When one of the buttons is pressed, all the colleagues get an invite for that specific kind of break. It is not mandatory to **engage** the break, two buttons to decline or accept the invitation are also present on the device so that the employee will always be in **control**. An invitation for a break can also be seen as a reminder and, therefore, promotes **awareness**. By participating in the break hopefully, **energy levels** will be kept balanced to **prevent** exhaustion symptoms and to enhance physical and psychosocial **well-being**.

Scenarios

After the first quick tests, observing and discussion several scenarios emerged which are sketched out on the next pages. The scenarios involve the different kinds of breaks, various positionings in the office, and declining and accepting.

Use Flow

To simply explain the usage of the product the flowchart beneath shows the procedure. In the following phase, this will be highlighted more when tests are done.

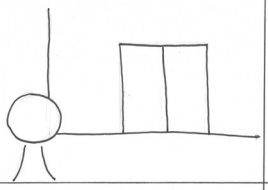


A Workday of Jan

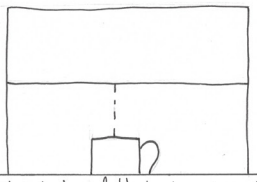
Scenario 1

09:30

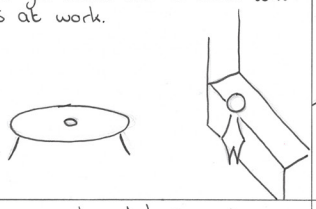
Jan likes to start his day a bit later than the rest...



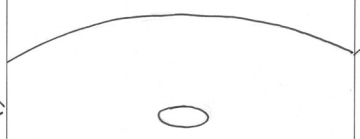
before he starts he grabs a cup of coffee.



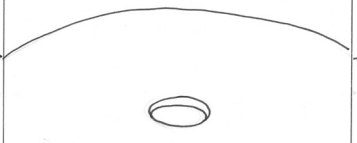
The break-out room is empty and Jan would like to know who is at work.



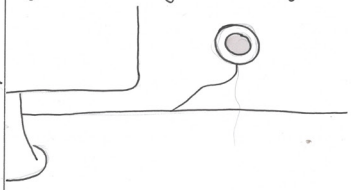
At the main table there is a button to let people know that you're having a break.



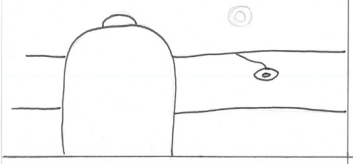
Jan presses the button. And the button lights up.



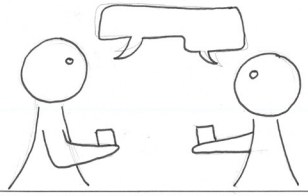
At the desks of that department lights turn on, just white lights.



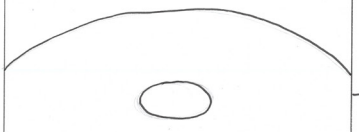
Someone at a desk is working since 08:30h and would like to join the break.



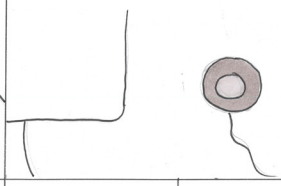
They meet in the break-out room and have a little chat.



When they leave they turn off the light so everybody knows that they've left.



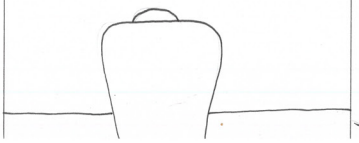
The lights at the desks turn off.



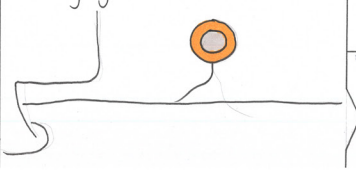
Scenario 2

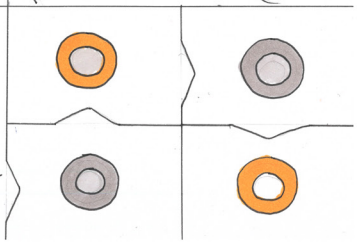
10:30

Jan is working hard at his spot, on his own.

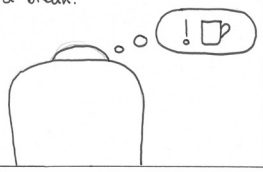


When suddenly the light starts blinking yellow.

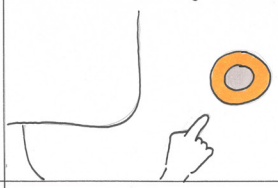




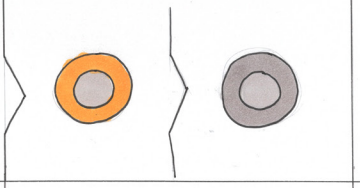
Jan was working focused for some time now and forgot to take a break.



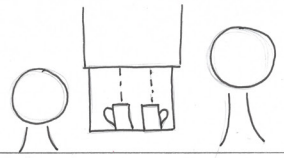
He presses the button to let know that he will join the break.



The light now stops blinking at the desks and will turn off in 5 min.



They both meet at the coffee machine in the break-out room.

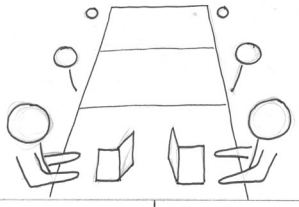


Scenario 3

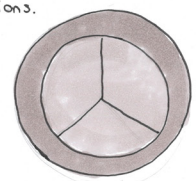
11:45

Jan is hungry and wants to go to the supermarket to get lunch.

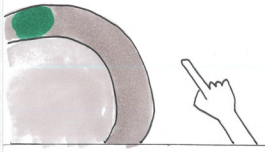
But, everybody is still working...



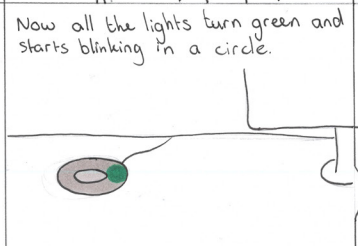
The lights can be controlled from the desks too and have different functions.

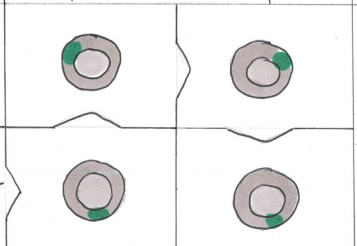


The 'go for a walk'-option is pressed by Jan.

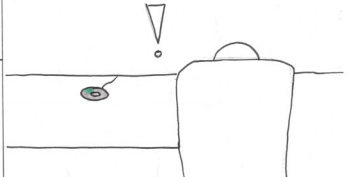


Now all the lights turn green and starts blinking in a circle.

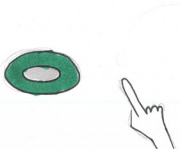




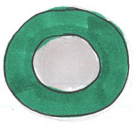
Someone notices the light and wants to join.



They press the button...

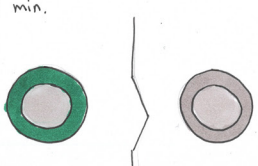


and it stops blinking, now Jan knows someone wants to join.



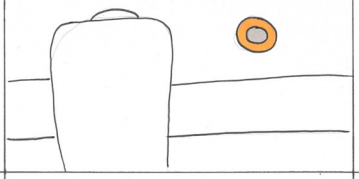
They meet at the break-out room and go outside

The light will turn off after 5 min.

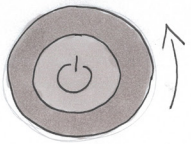


Scenario 4

14:00



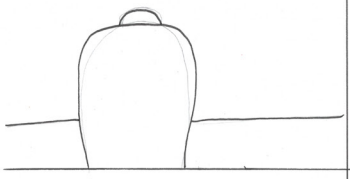
Jan is working hard when the light starts blinking.



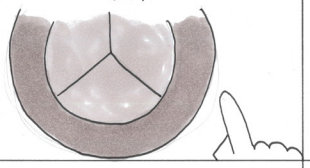
Jan turns off the device.

Scenario 5

15:00

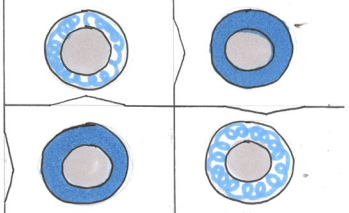


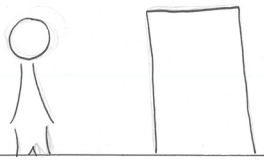
Jan now has worked continuously since his lunch break.



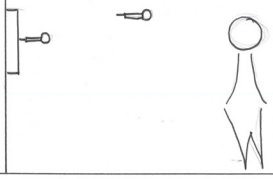
He really needs a break and lets the people of his department know that he will.

The light now starts glowing at all desks.



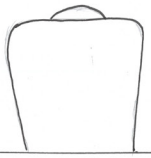


Jan walks to the break-out room.

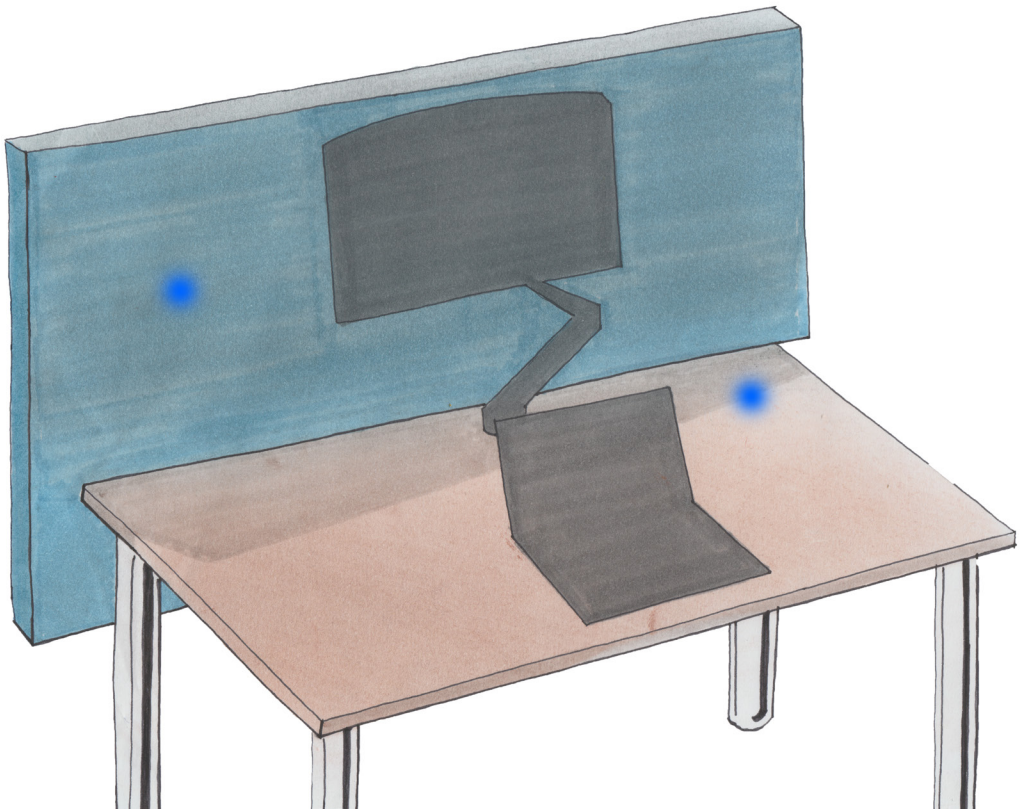


He throws some darts.

Nobody has arrived to join him, so Jan decides to go back to his desk.



At least he had his break!



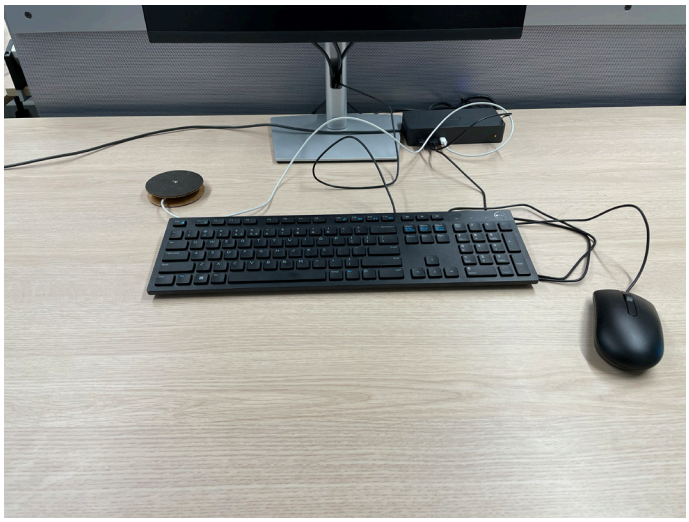
Mock-Up

During the first tests, it became clear that all participants had different preferences when it came to the placement of the device. A simple hand-size mock-up was made to get a better look, with the participants, of where the device is desired to be positioned...

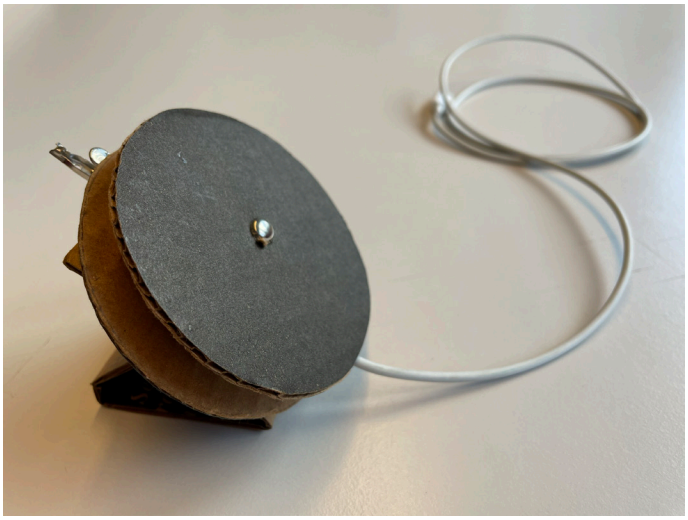
...at a laptop.

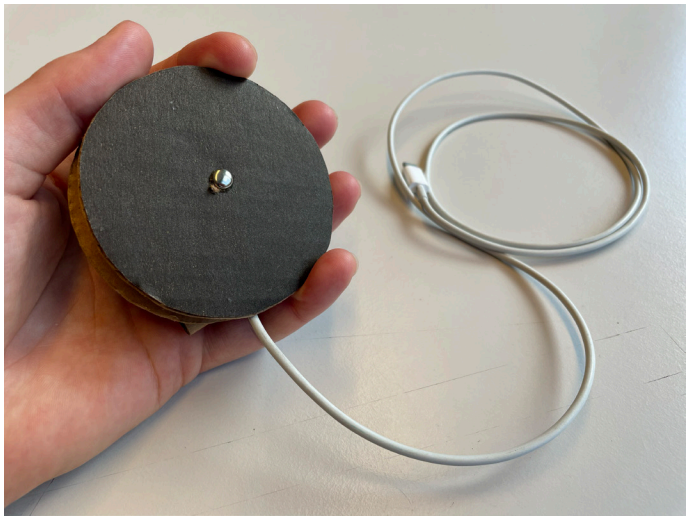
...at an acoustic screen.

...at a monitor.



...at a desk.





CONCLUSION

The direction of direction of the conception phase will be about communicating breaks through a physical product from appointed positions in the physical office. After testing some basic features, new insights came to light which altered the vision slightly.

Colour Coding

The concept idea must now be tested with the simple use of lights. The way it is implemented in the workplace of the employee is purely for testing the idea behind the concept. The final concept will possibly take on a completely different form.

With the light the communication of four different types of breaks is tested:

- To drink
- To conversate
- To walk
- To relax (game if possible)

Central Control vs. Personal Control

There is still some uncertainty around the placement of the communicative tool or product. Whether it is located at the individual desks or in a central break-out zone. Control of the communication from various points in the office must be examined.

Form follows Function

The elaboration of the design and positioning of the product must also be examined. This can happen gradually and each test should provide new iterations and visions for this design.

Objective for Research

In the test the focus must be on the following research questions:

- Does the functionality of the lights contribute to an improvement in the use of micro-breaks?
- Does promoting social interaction help to be more focused on (each other's) well-being?
- Does the concept idea lower the threshold for those who find it harder to take breaks?

The domain focuses on social and psychological well-being, and more in-depth on the perception of stress-related symptoms. The focus of the tests must be on young adults among the working population in the Netherlands, based on burnout-related research by TNO and CBS (2023). The age groups are:

- Young adult: 18-35 years old
- Adult: 35+ years old

4.4 USER BEHAVIOUR

The behavioural aspect has been separately evaluated because of its importance to the project. The focus is on shifting work culture and working toward a holistic view of employee well-being. It is important to evaluate how individuals experience the office, how group dynamics change, and how habits form.

FUNCTIONALITY AND BEHAVIOUR

To test the functionality of the concept, observe behaviour and note down experience tests were performed. Consecutive tests were carried out, each time highlighting a new part of the concept. Functionality, in this context, means the communication of micro-breaks. Behaviour is about how the participants respond to the information and group dynamics.

Test Structure

Break-out zones are spaces without a specific pre-agreed purpose that serve randomly occurring needs. These spaces are ideal for micro-breaks because of their non-work-related character. For example, after a meeting, a group of people can "break out" at a lounge set, rather than gathering around one of their desks.

For the coming tests, it is important to set a specific place, beforehand, that will function as the break-out zone for the remaining workday. Outside of the test environments, there may be several break-out zones within the office. Figure 44 shows a schematic representation of the different layers of the office.

The tests are structured so that, after every test, the shortcomings are considered and examined in successive tests to make small iterations continuously, see Appendix J. This way all tests build on the previous one. For every test, a break-out zone is selected in consultation with the participants.

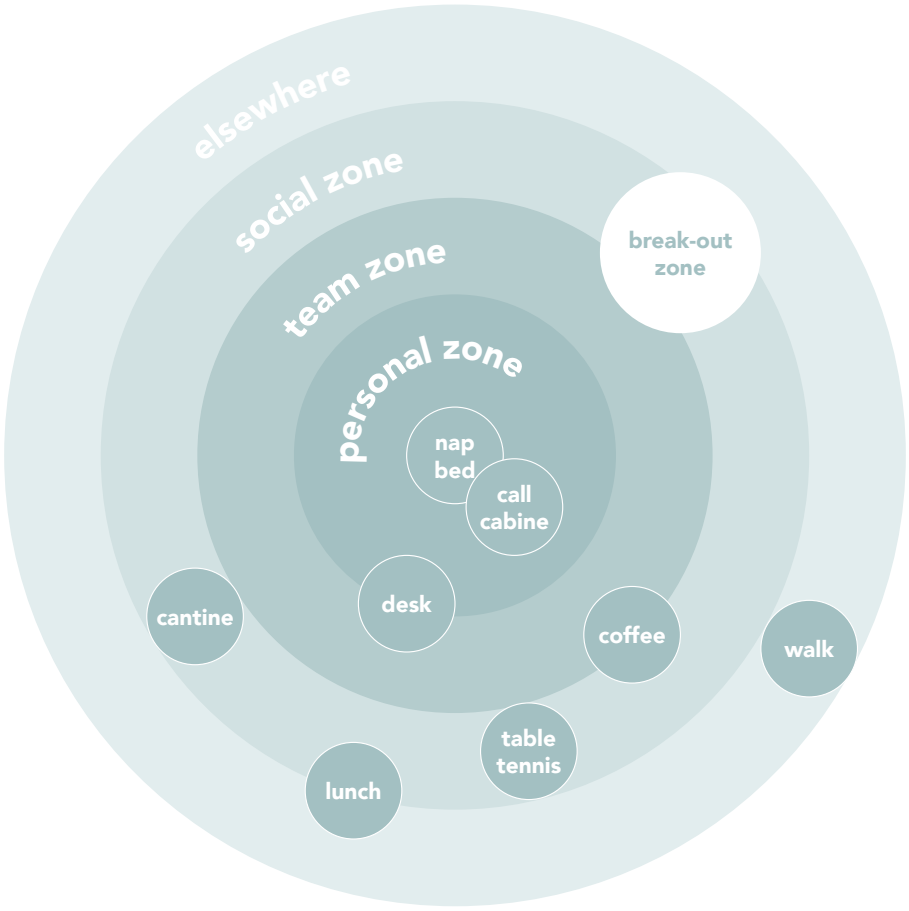


Figure 44, Office zones are illustrated with break-out zone and other examples.

Test III - Smart Light

After validating ideas, in Chapter 4.2, the focus was on further evaluating the behaviour of employees and the group dynamics along with the communication of micro-breaks. The consent form and ethics checklist can be found in Appendix K1 and K2 respectively.

Research Objective

The goal of the test is to evaluate the experience of communicating different kinds of breaks and the experience of getting control of the communication tool. At the base of the test is another goal which focuses on the number of breaks that are taken when they are communicated.

Research Questions

To test specific functionalities of the concept research questions are set:

- Are, in total, more breaks taken when they are communicated between colleagues?
  - Have the correct different micro-breaks been named?
  - Is the control over communication in the personal zone perceived as pleasant?

Methods

Observation is used to examine the movements of the participants. With a qualitative survey, the experiences of the participants are evaluated. Based on the results, adjustments are made to the test where necessary for further testing in various settings.

Participants

The participants consist of a group of 11 young working adults. No physical limitations are known that could hinder the test, such as colour blindness. A list of participants can be found in Appendix K3.

Equipment

To execute the test smart lights and lamp sockets are necessary, see Figure 45. The smart lighting needs to be connected via WiFi and the lamp socket needs a plug socket above desk height. During this test, all desks were equipped with a plug socket. To be sure there were extension cords included in the equipment. To control the smart lighting a mobile phone was necessary to download the 'Home Life' application.

Figure 45, Office zones are illustrated with break-out zone and other examples.

Layout

In test IV another environment will be tested. Therefore, the office layout is an important factor in the test. For this test, the environment is an open office with a limited view of other colleagues, see Figure 46. The office does have some closed office spaces, but these are generally not used to work in. Sometimes, the closed spaces are used for team meetings, client reception or brainstorming sessions. The office is rectangular, and all desks are widespread. Whenever an employee has a call or a meeting with two to four persons the space-in-spaces, i.e. cabins, are used.

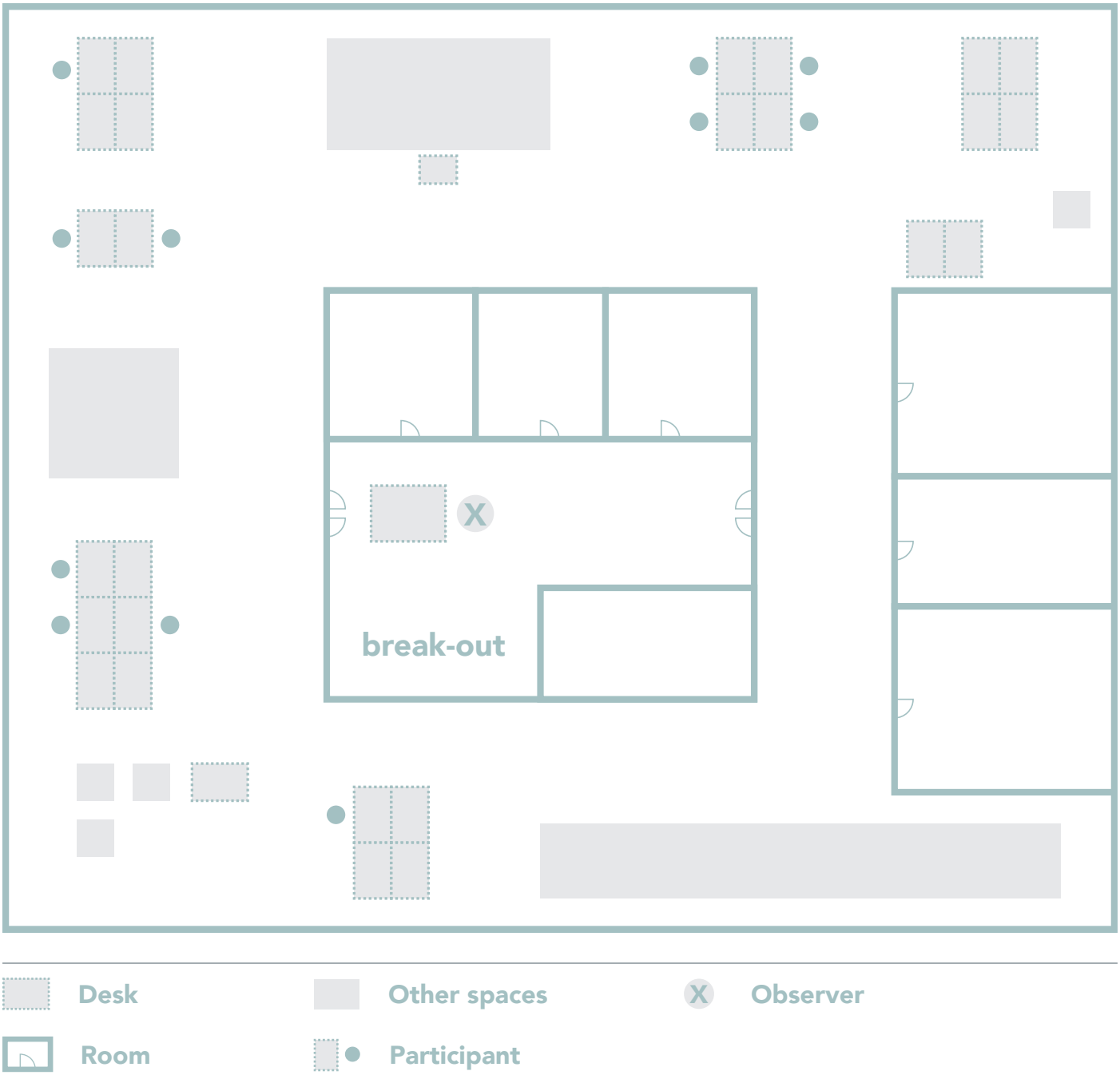


Figure 46, Map of the office in Test III - Smart Light.

Setup

All the participants were given a personal smart light bulb and light socket. The lights were installed at each desk of the participants and could be moved whenever necessary. All the lights were placed in the same position, as is shown in the picture below, in a power socket in the corner of the desk. Unfortunately, only ten light bulbs were available. Therefore, two participants had to share one of the lights. To make the light visible for both participants an extension cord was used, see Figure 47. The extension cord could also be used by participants in case they preferred another spot at their desk.

Figure 47, Smart light bulb in the right corner of the desk.

The colours of the lamps were adjustable with the mobile phone application 'Home Life'. A distinction was made between three different micro-break activities. Green was used to communicate a walk, blue to communicate a chat and yellow for a drink, see Figure 48.

Figure 48, Smart light bulb in three different colours, according to the different micro-break activities.

The 'Home Life' application is shown in the picture below, see Figure 49. The app had two screens the users had to go through. The first screen is a home screen for the group of light bulbs. Whenever the bulbs are inactive, the light is also not shining in the app. When the ON-button is pressed the colour screen appears. Now the user can choose one of the colours by adjusting the wheel.

Figure 49, The Home Life application with on the left the home screen and on the right the colour screen.

A phone with the app openly displayed was placed inside the break-out zone, see Figure 50. Restricted access was given to the users on the phone, so only the Home Life applications could be used.

Figure 50, On the left the extension cord used for placing the light bulbs and on the right the break-out zone as selected by the participants and used to place the phone open showcasing the app.

Procedure

Before the participants had to actively be part of the test a day of observation was planned to examine the movement and group dynamics without any tools. Then, the group of participants was observed two days in a row.

Day 1

Observation of the participants without the use of the product is necessary to map the movement and note down how many breaks are taken and with how many people the breaks are taken. Therefore, the observation was done from where the X is in Figure 46. This is a central place where people go for micro-breaks, the social zone. From this point, all the micro-breaks were noted.

Day 2

The next day desk lamps were installed within every personal zone of the participants. A control for the lamps was placed at the same position as the observation happened. The task of the day was whenever someone had a micro-break to turn on the lights with the control in the social zone. Three distinctive colours were used to distinguish the kinds of micro-breaks. Green for a walk, blue for a conversation and yellow for a drink. All the movements, kinds of breaks and number of breaks were noted.

Day 3

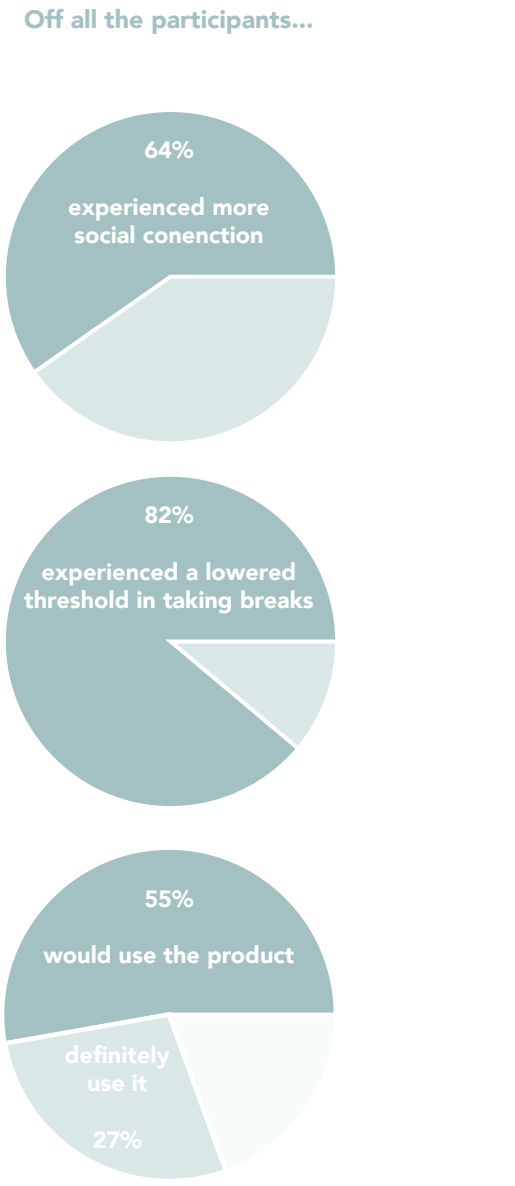
The last day of testing was similar to the second day, but the control over the lights was given to the participants. This way they could turn on the lights from their personal zones. Again, all the movements, kinds of breaks and number of breaks were noted.

Results

The amount of breaks, group size and kind of breaks were tracked throughout the days, see Figure 51. When the results are compared a rise of almost 100% is seen in the number of breaks. In the end, none of the participants took a break alone. Good to mention is that all the days the weather was about the same, grey sky, a little cold, but almost no rain. The experiences of the participants regarding social connectivity and desirability were also positive. A complete overview of the survey can be found in Appendix K4.

- The user experience is not yet optimal because of the use of smart lamps.
- The way of communicating has a habit curve, in the beginning participants feel a bit akward about using the lights.
- Might not be as needed for more extravert people.

+ More breaks are taken when they are communicated.
+ More often breaks are taken in larger groups than without a communication tool.
+ Not having to disturb others.
+ Lowers the theshold of taking breaks
+ Change in work rhythm noticeable.



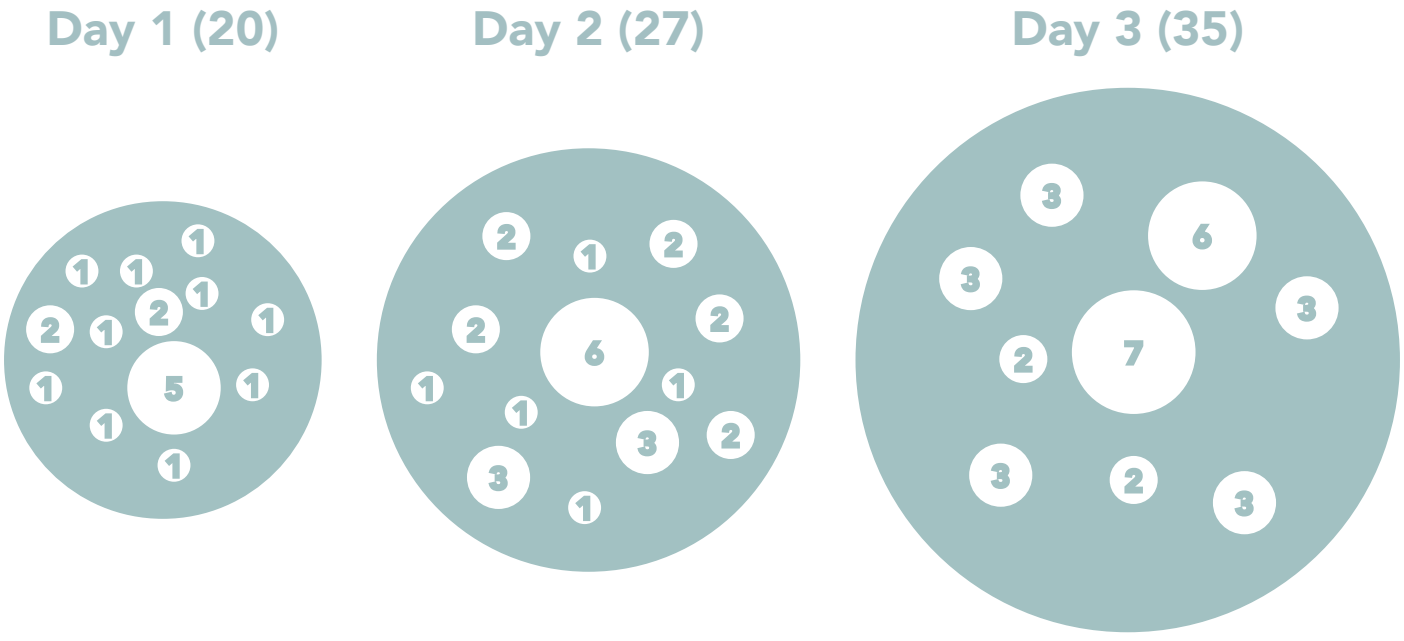


Figure 51, The amount of breaks and the group size of which they were held per test day.

Interim Prototype

Based on the first three tests, Chapter 4.2 and 4.4, a partly functional prototype is built to examine the steps that are taken in the process of communicating breaks, see Figure 52. The prototype consists of four buttons to distinguish four kinds of breaks: drink, chat, walk, and relax. A preset timer of three minutes is included to give colleagues a little leeway in preparing for the break.

The prototype is built with 3D-printed parts, an Arduino Uno and a lot of wiring, see Figure 53. The colour indication is simulated with four different kinds of LED: green, blue, yellow, and red. A fifth LED, a white one, is added and attached to a separate button which is located outside of the casing to resemble the button placed in the break-out zone.

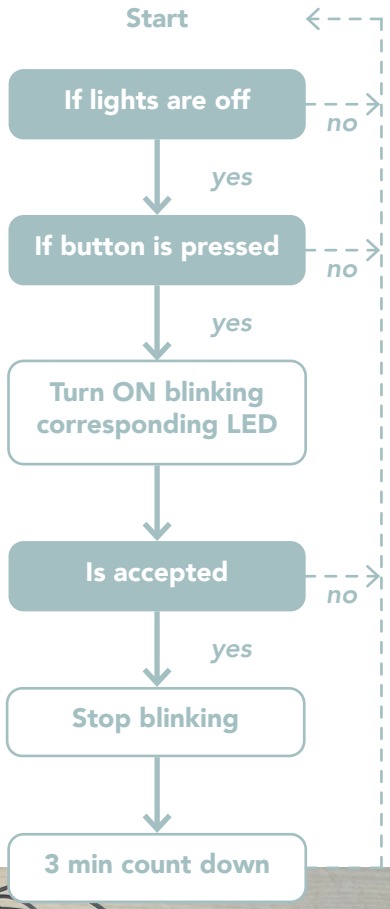


Figure 52, The partly functional prototype.

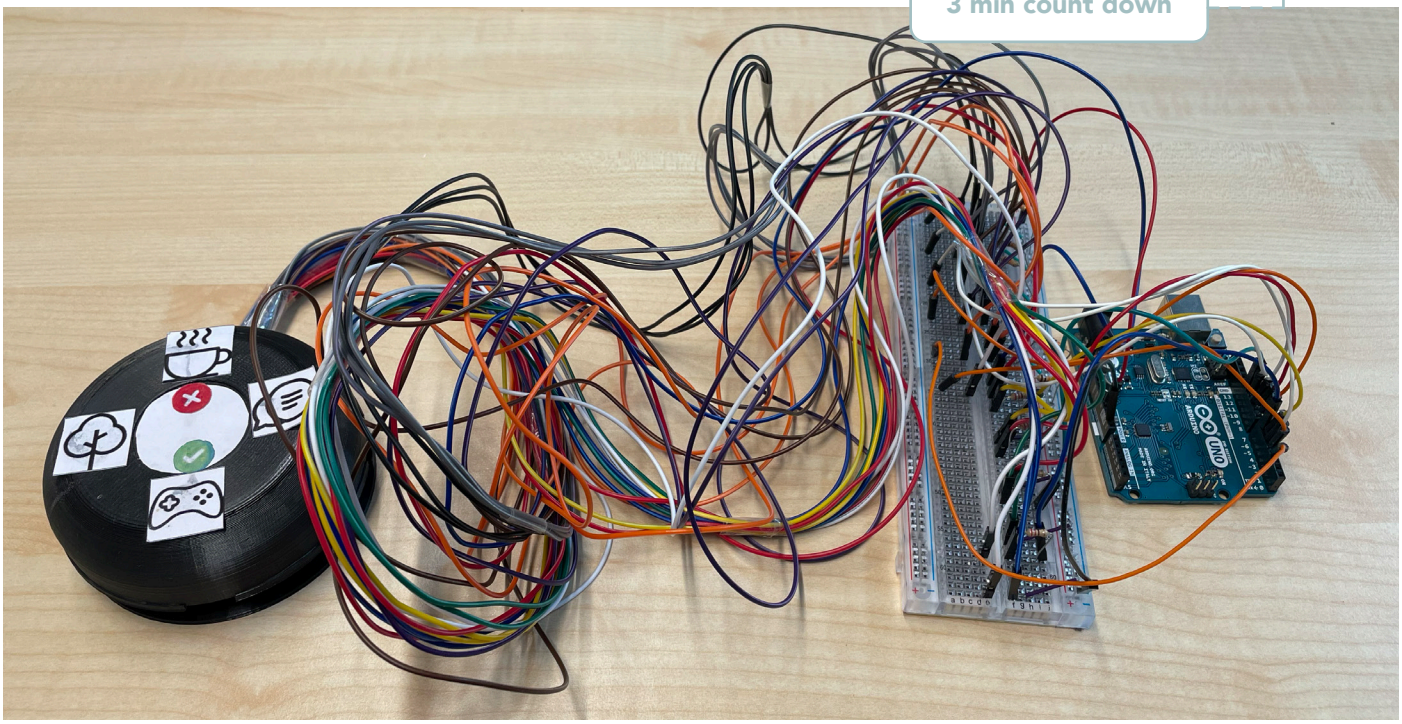


Figure 53, The prototype is connected to an Arduino Uno via a breadboard.

Test IV - Different Environments

A fourth test, and a second test with smart lights, was initiated to look at how employees respond to the communication of micro-breaks in other environments. The consent form and the ethics checklist are the same as the ones from test III and can be found in Appendix K1 and K2.

Research Objective

The goal of the test is to evaluate the experience of communicating different kinds of breaks in another setting than Test III. In addition, the implementation of a time notification, or countdown, was investigated. At the base of the test is another goal which focuses on the number of breaks that are taken when they are communicated between colleagues.

Research Questions

Before the test, several research questions are drawn:

- Is the communication of micro-breaks positively perceived in a more compact office setting?
  - What is the experience of the participants with a 5-minute time notification of the communicated micro-breaks?
  - What is the overall experience of the participants when it comes to communicating breaks?
- How do the participants perceive the design of the interim prototype?

Participants

The participants consist of a group of 10 (young) working adults. A full list of participants can be found in Appendix L1. Besides the office, the team is also distinguished from the group in the previous test. A majority of the group is adult, so above 35 years old. In addition, the colleagues are often on the road to visit clients and, therefore, have a team day planned every other Thursday.

Methods

Observation is used to examine the movements of the participants. Afterwards, a quantitative survey is used to map out the experiences of the participants. To objectively evaluate the experience, a semantic scale is used based on Norman's three levels of design (2004). The survey is divided into reflective, behavioural and visceral parts. The three different parts stand respectively for the intellectually induced reactions, expectation induced reactions and perceptually induced reactions.

Equipment and Setup

The setup was almost the same as in test III, page 87. In some of the tables, the power sockets were sunken in the desktop, or no power sockets were available at all. Therefore, extension cords were brought onto the tables to create a similar scene, see Figure 54. In addition, the interim prototype was brought to showcase to the participants.

Figure 54, Extension cords to bring the lamps up to the desks of the participants.

Layout

An important factor of the test is the layout of the office, see Figure 55. The office is rectangular, and the desks of the relevant department are located close to each other. The team members do not own a desk as all the desks in the office building are set to hybrid working. However, the concerned employees often work at the same desk as the part of the office is specially designated for them. The eight desks do not provide for the sixteen members of the team but usually, not all of them are there either. When the full team is present some must sit elsewhere presumably out of sight.

Procedure

Prior to the test, the prototype was showcased. The functionality of the concept was explained by showing the different features, possible scenarios and a quick try-out. The prototype was left near the participants so they could recall the features of the concept when they forgot. Then, the group of participants was observed two days in a row whilst working with the smart lights.

Day 1

The test continues where the previous one left off, only with one adjustment. A time, or countdown, was added to the communication of the micro-breaks. The task of the participants was to turn on the light 5 minutes before they wanted to have the break. After 5 minutes the lamp would turn off and this was the sign to go, meet and have the break.

Day 2

On the second day, the participants told me they did not experience the 5-minute timer well. This was also noticeable during observation. Therefore, the timer was set to 2 minutes in consultation with all the team members.

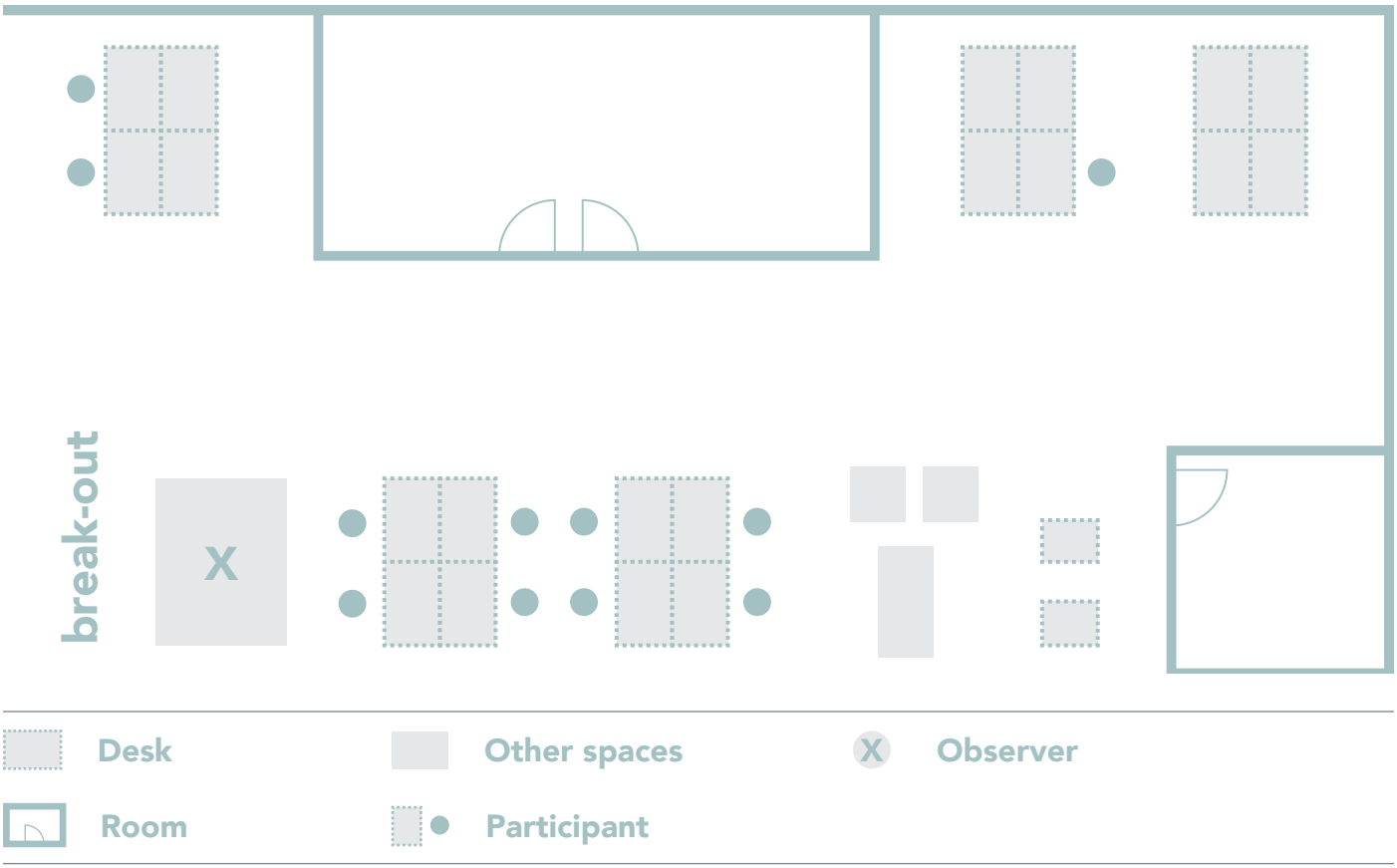


Figure 55, Map of the office in Test IV - Different Environments.

Results

Unfortunately, the observatory results of the test group are less positive than in test III, see page 91. The group was very chaotic and always talking. Although the lights were used every time, they were also shouting each action making the lights redundant. Because the team only gathers once every two weeks, they were social-oriented and enthusiastic.

All in all, testing another environment provided valuable data. A base is set for the next test that focuses on improving the experience through a new design. The participants of this group expressed their negative experiences with the intuitive, structured and feedback part of the concept, see Figure 56. The scaling supports identifying whether the UX problem and goals are met. The goals include that the product should provide structure, encourage social interaction and create awareness. A complete overview of the survey and results can be found in Appendix L2 and L3 respectively.

\+ The lights were a great outcome because the department area offered too little space for the entire team.

– The product is very team/department dependent. This group consisted of very extroverted and energetic people.

– The time indication is important. The participants had to wait because they could not decide the timer themselves. More control is needed to realise a better product.

Off all the participants...

100%

indicate that they do not spend 10 percent of the working day on breaks.

(45m of 7.5 hours)

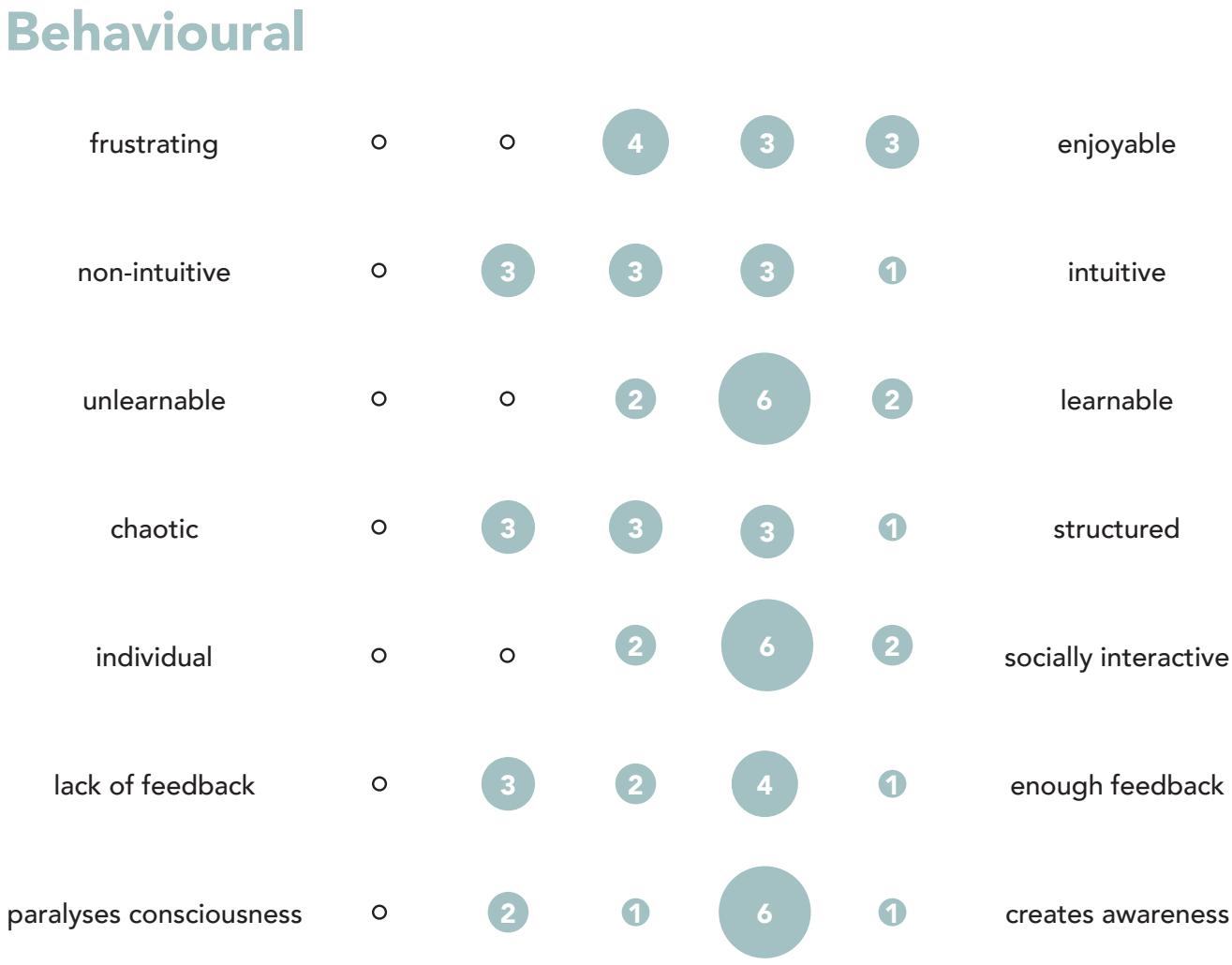


Figure 56, Answers of the survey based on a semantic scale focusing on the behavioural level of Norman's UX theory.

4.5 USER EXPERIENCE

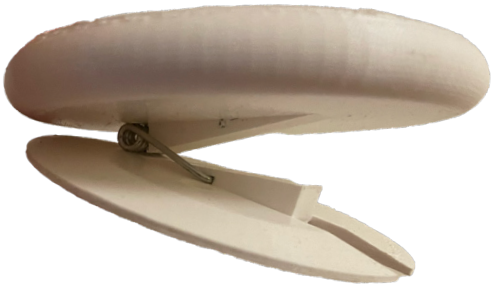
The experience of the project is holistically studied in the coming research. The concept has been fulfilled based on the research in the previous chapter and will be brought to a final design in the coming chapter through research by design.

DESIGN AND APPLICATION

The communication of micro-breaks is tested using smart lights. The base is set for designing an interface for the device. The coming phase builds upon all the findings in the previous studies in Chapters 4.2 and 4.4. In discussion with all the participants of the studies, new criteria have been developed for a new prototype. Most importantly, light indications have been replaced by a display, icons and words.

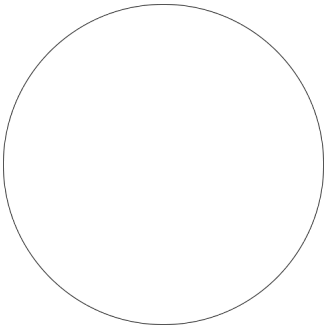
Physical Design

The physical design focuses on combining a display with nonintrusive device positioning. The features that allow users to place the device wherever preferred are an adjustable slit, a hook and a smooth heavy base.



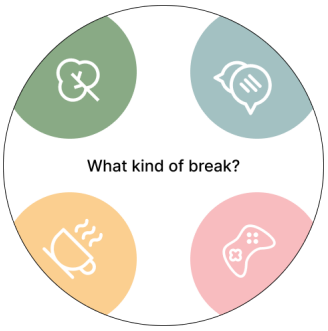
Interface

The interface of the design focuses on stronger communication of the various breaks. Light indication only was too little to effectively and sustainably be utilised. Users expressed expectations that are better translated in a digital design. The core experience of the interface is shown below along with commentation on the most valuable steps. The final research, which can be found on the next page, focuses on this design. The participants will walk through the same steps as explained below.

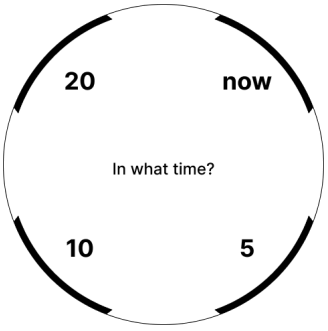


The starting screen that the users will see is white. The design focuses on a non-intrusive design. In addition, any alterations in the information displayed will be more noticeable.

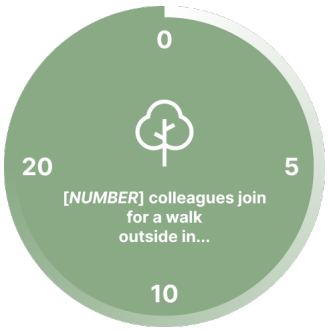
When users need a break, they can indicate this on their initiative by going through the interface. The product provides information about the last break participated.



The user can choose from different types of breaks, depending on the office they are in. How this is structured in the application must be explored before finalising the design.



The user can also choose from a time indication. For now, four possible time indications are set. It can be explored if the user should be allowed to choose a specific time when preferred.



Once the steps have been completed, the user will see the countdown screen based on the choices made in the steps completed. For other users, a notification will appear on the white screen, which can be seen on the right side of the page.

Test V - Interface

To test the new design a user test is completed. Initially, testing the functionality - being connected to other devices - would be separated from testing the product. Ultimately, a working prototype was created halfway through the test. As a result, one group focused mainly on the interface and the other groups on the complete design. The consent forms can be found in Appendix M1 and M2.

Research Objective

The goal of the test is to evaluate the experience of the interface and its new appearance. Together with new features: determine time indication, accept or decline, and positioning. The test includes a separate device with a digital display and interactive interface, later in the test also live and connected. The division of breaks, time notification, and ignore system are kept in the design. At the base of the test is another goal which focuses on the number of breaks taken when they are communicated.

Research Questions

To fully substantiate this study the following research questions are set:

- How is the communication of micro-breaks perceived by going through the setup interface?
  - Is the interface understood by users without any help, after an explanation?
- Is the new design of the product experienced as pleasant?
  - Is the new design an improvement compared to the previous one, see Chapter 4.4.

Methods

Observation is used to examine the movements of the participants. The same quantitative survey as in test IV is used to compare the experiences of the designs and look for improvements or impairments. The questions will again focus on Norman's theory and the three levels of design: reflective, behavioural, and visceral. The second part of the survey focuses on the attractiveness of the design and is measured by using Attrakdiff. The method focused on four aspects of user experience: attractiveness, pragmatic quality, and hedonic quality stimulation and -identity. Using multiple methods and comparing designs the full experiences of the participants regarding the design are evaluated.

Equipment

The participants were asked to use their phones to test the interface as a separate device. However, the interface must be tested without the interference of, for example, incoming messages. When a participant had to use their phone during the day, they were provided with a mobile device. In addition, a stand was provided to simulate the positioning of the design, see Figure 57.

Figure 57, Stand.

Participants

Three groups from three different departments and two other organisations participated in the test. In total 10 people, both working adults and young adults, participated in the study. A list of participants can be found in Appendix M3.

Setup

The setup was slightly different according to the group, see the Figures below. The test works the same otherwise. Each participant received a device to use at a workplace of their choice. As an observer, I took a spot with a good overview of everyone as far as possible. The devices were set to restricted access to display the interface and nothing else.

Layout

The layout of the offices differed according to the groups, see Figures 58, 59 and 60. The first test is slightly different from the last two because of some insights from the first test. This affected the layout in a way that the participants could move further away from each other but will be further explained on the next page. The main characteristics are explained per group to picture the differences between each test group.

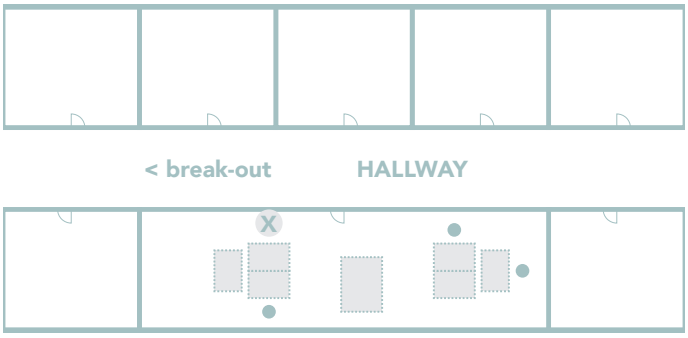


Figure 58, Office layout first group; 3 participants.

Group 1

The first group was a small communications department and a close team. An entire office was available for the department with six desks and a high communal table in the middle. This group worked with a non-connected interface and had to speak their actions on the display loudly so everybody could hear.

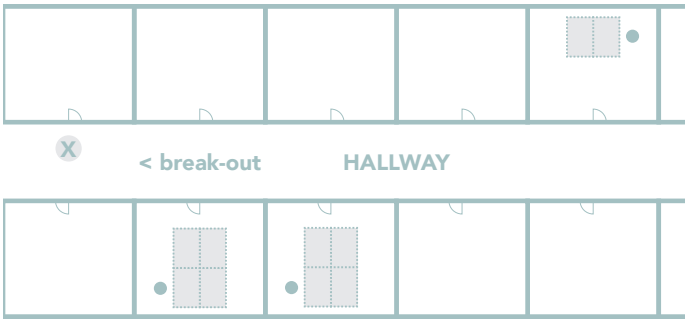


Figure 59, Office layout second group; 3 participants.

Group 2

The second group were colleagues from the same floor but different departments. Each participant worked in a different closed office space. They knew each other but sporadically had a break together. This group worked with a connected interface they could use in silence.

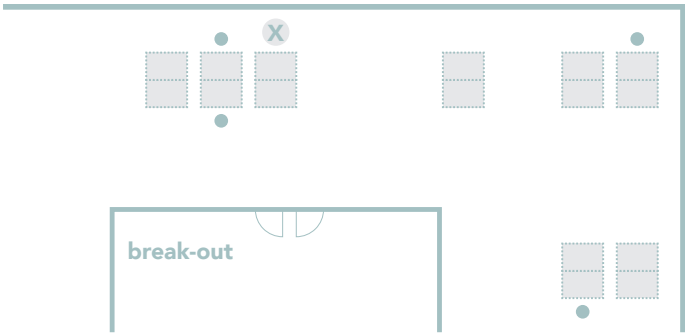


Figure 60, Office layout third group; 4 participants.

Group 3

The second group were also colleagues from the same department but worked very independently. They knew each other but sporadically had a break now and then but nothing special. The office was open and large. This group worked with a connected interface they could use in silence.

Procedure

The tests were planned for a full workday per participating group. Each day started with a twenty-minute introduction to the test and a product explanation. A mutual break-out zone was discussed in case of different views and questions were answered.

The participants were asked to proceed with their remaining workday as normal. Only extra, to communicate their micro-breaks by using the digital interface. Two different interfaces changed the course of actions slightly.

Figma Interface Prototype – not connected

For the first group, the interface shown on page 98 was displayed on the devices. The devices were not connected. Therefore, the participants were asked to run through the interface out loud. For example, 'I want to have a break. I want to have a walk. I want to have a walk in 10 minutes.' The other participants were asked to respond with decline, accept or ignore. The observation was done from a desk nearby so that everything could be closely monitored. By observing the use of the device from a close distance and being able to register every action the digital interface could be turned into a connected web application.

Web Application Prototype – connected

The web app was made using HTML, CSS, JavaScript, PHP, and MySQL. The website had a look-a-like interface like the Figma interface and a register and login function to connect a database. Simply put, the site registers the buttons pushed by the participants. When a combination of one of the four types of breaks and a certain amount of time is registered, the other members will receive a notification in the form of a full screen popping up. A countdown will then be set in motion which is available for everyone who initiates or accepts the break. When the countdown ends, the data is reset.

The participants are registered beforehand and not one of the tested features. It is of value to have made this aspect because in a future design the device will be assigned to either a person, team or room.

To show the difference between the interfaces, both the Figma and website are displayed in Figure 61.

Figure 61, The Figma interface is shown on the left in the phone stand and on the right the web application is displayed.

Results

On the third day of the test, the product came into its own. A difference in enthusiasm about the product between young adults and adults seems inevitable. Participants express their beliefs in the concept in the feedback during and after the test but some concerns too. However, a positive observation happened during the test with the second group. The participants explained how they normally do not take breaks together, but how this application had brought them closer. This was also emphasised by the first group working on the same floor. The first team explained that they did not know any of their surrounding colleagues. Yet, they see them every day. A communicative tool could enhance social cohesion.

Semantic Scale

To assess improvement in design a semantic scale is used, see Figure 62. The same survey and scaling are used as in test IV to compare the designs. The results are positive and supports identifying whether the UX goals are met. The goals include that the product should give the user control over their situation, a feeling of autonomy and a non-intrusive design. The complete results can be found in Appendix M5.

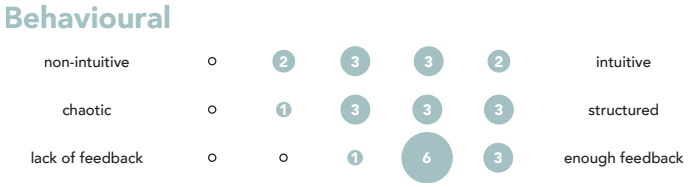


Figure 62, Semantic scale on behavioural properties.

Attrakdiff

In addition, Attrakdiff is used to assess the appearance of the new design, see Figure 63. It scored well on the qualities that go together with the criteria set in Chapter 3. The results of AttrakDiff show that UX goals have met design criteria such as undemanding, clearly structured and integrating design. The complete results can be found in Appendix M5.

Main Takeaways

The design still falters a bit here and there due to technical limitations. The design and functionalities are set to focus on building.

+ Anonymously communicating breaks can complement social cohesion.
+ The product works well in a broad office environment, where colleagues can be out of sight.
+ The tool is also used during team meetings. As a timer and reminder for breaks (during meetings which are longer than 30 minutes).

– Besides accepting, declining or ignoring an invite, a reaction to the time is desired. For instance, if someone suggests 10 minutes the ability send 15 minutes as a response.
– The working prototype still needs further development before it will work properly.

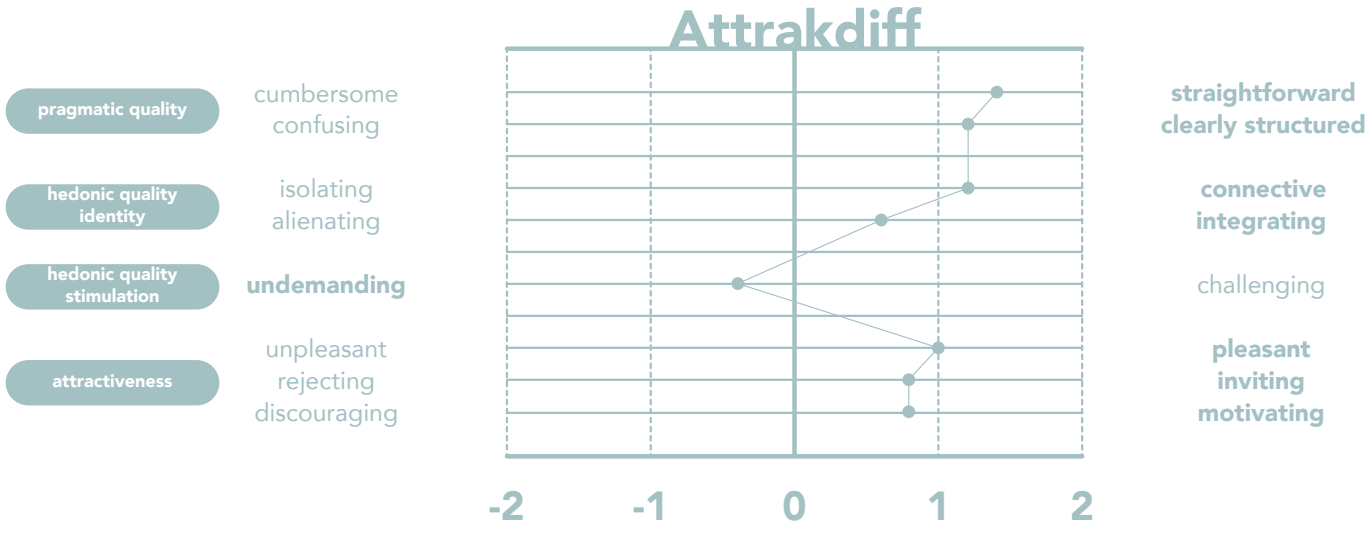


Figure 63, Attrakdiff.

Reflection

The results of the five tests in Chapter 4 show an increase in the number of breaks and improved awareness. In the beginning, the participants described the way of communication as a bit 'awkward' but when they got used to it, they described it as 'fun' and 'enjoyable'. When the product was used for a second day in a row habituation was noticeable. Different kinds of personalities and teams are a challenge, or opportunity, for the product. More extroverted people perceived the products as sometimes unnecessary, but introverts as welcoming and experienced the communication as a friendly invitation.

Group Dynamics

The different compositions of people brought different dynamics. The group of participants in the first test consisted of only young working adults, whereas the group of the second test mainly were working adults. In the third test, a great variety of people was present. It was noticeable how the young adults had a more playful approach to the product and that the adults had a more wait-and-see approach. Awareness of different personalities among colleagues exposed opportunities for positive influence, see Figure 64. Many participants expressed how they were now more aware of people they did not know well. Ultimately, breaks are important for everybody and a healthier approach to work can be established together. Differences were also noticeable in persons who do not want to be disturbed while the other constantly chats or how some people find it easy to make contact and others need a little push. These differences can complement each other when communicated and the tool proposed in this project can support them.

Concluding

The product solution should not focus on fulfilling one purpose. Its multi-purpose character is shown in bringing people together, structuring breaks, and timers during meetings. Therefore, it is important to look carefully at how a person is connected to the product through an account and who receives notifications from whom. It must now be investigated whether the product will become a personal property, or for everyone to use and whether, for example, it is aimed at colleagues from a team or everyone who is on the floor that day.

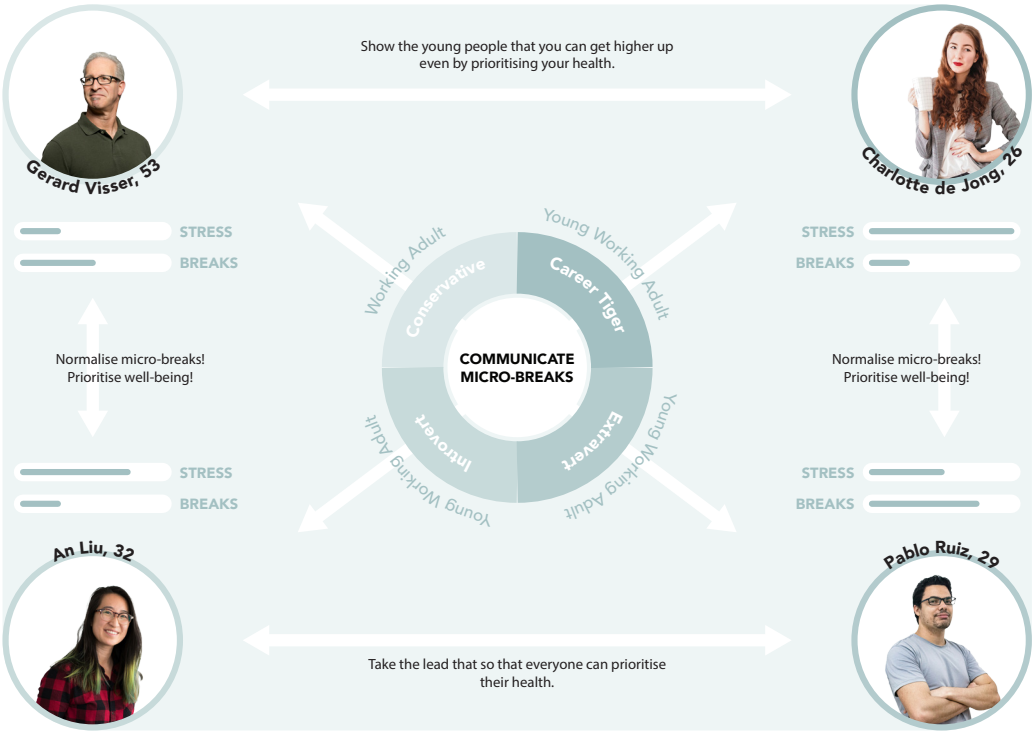


Figure 64, Different kinds of personalities and age groups bring different dynamics and opportunities.

5 DELIVER

After extensively designing, testing, and iterating the time has come to finalise its shape. The aesthetics will match that of the design language of Ahrend and a production plan is written.


A team member invites you
for a walk
in [NUMBER] minutes!
press the tree to agree
slide to ignore
MacBook Pro

5.1 MAKING ENDS MEET

The desirability for a shift in workplace culture came forward in the literature research, the interviews and the tests performed in Chapter 1. Substantiation followed in Chapter 4, where tests were used to constantly evaluate the experiences and wishes of the users. Confirmation for viability also came from the tests in Chapter 4. Users indicate that the product is simple to use and inviting. However, the product still needs to be further developed to ensure success. Feasibility is partly proven based on the prototypes made. Both physical and digital prototypes prove that the product is within reasonable parameters. However, one step is still missing and that is the actual design with complete instructions for use. In the coming Chapter, I will dive into finalising the design.

AHREND DESIGN LANGUAGE

The vision of Ahrend is to create vitalising workspaces, where sustainability is an integral part of their strategy. They notice that the working environment has changed and endeavour to design products that optimise employee experiences, focusing on stimulating physical, psychological, and social well-being, and productivity in workspaces. The design language of Ahrend follows the rules of 'less is more' and their furniture must comply with the Cradle-to-Cradle principles for the designs to be timeless. The products that are analysed can be found in appendix N.

Material

Recurring materials in many of Ahrend's designs are aluminium, wood, and textile. Aluminium is used for the base to provide strength and sturdiness. Beech is the most common wood used in their products, often chipboard or plywood. Products are finished with fabric to provide a soft touch.

Form

Form follows function. The designs are simplistic and sleek. A lot of attention has been applied to easy assembly. The forms are straight, geometric and have a rounding with a small radius.

Functionalities

Adjustability to various anthropometrics is key for Ahrend. Personalisation is added to provide the users with a personal experience. Often their products can be equipped with optional functionalities such as power sockets, lighting, and charging stations.

Appearance

Ahrend products have a calm, friendly and reliable character. Typical for the office environment.


DO
MORE.

FINAL DESIGN

Ahrend's design language is directly translated to the design of the micro-break communication device with a calm and natural appearance and solid base, see Figure 65. The feasibility of the design has been rigorously tested using 3D printed models and handmade and digital prototypes. The dimensions and materials of the design are a recommendation and should be further investigated before production.

Materials

The top casing is made of laminated beech and the bottom casing of ABS. The choice of wood is based on sustainable and extrinsic considerations. ABS was chosen to keep the electronics safe and to guarantee their functionalities. The base of the product is made of aluminium for a solid stand. This bottom ensures that the product will not fall over and can be positioned according to personal preference. Another functionality of the aluminium base is protection against the risk of falls. The risk of breaking the display is high because the product is moved and used by everyone. Making the base slightly heavier will prevent the device from falling with the screen downwards.

Figure 65, Final product render.

Positioning Features

The design focuses on the four most important places in the workspace to position the device, according to the studies performed in Chapter 5. Tabletop, laptop screen, second screen and acoustic screen.

The bottom of the product has a smooth and heavy base to securely place it anywhere on the tabletop. There is also a hook hidden in the bottom, see Figure 66. When pulled out, the device can be hung over a wider screen or acoustic screen. For slimmer surfaces, the product can also be secured like a clothes peg. In the latter case, rubber pads have been applied to protect the devices, see Figure 66.

Figure 66, The product can be positioned in the workplace according to personal preference.

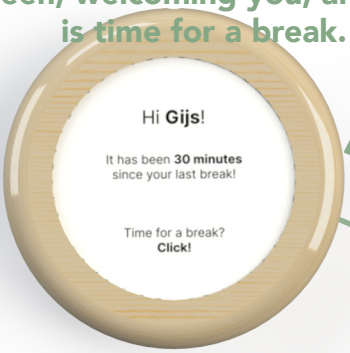
Use Flow

The core screens of the product's interface are explained below. For a full flowchart of the interface see Appendix N.

The product must be plugged into a personal work device to turn on and be connected and otherwise, the screen will be black.

When the product is plugged in, the device will automatically connect to your account and will show a white index screen.

When you touch the screen it will display the home screen, welcoming you, and asking if it is time for a break.



Touching the screen again will display the pause selection menu. The device will ask what kind of break you plan to have.

After choosing one of the options the time selection menu appears. The device will ask at what time you plan to have your break.

When a type of break and time indication are chosen, the device will display a countdown and how many colleagues will join.

Colleagues receive an invitation that they can accept, decline or ignore. After accepting the countdown will also be displayed.

Exploded View

1. top casing
» beech

2. connection cord to USC-C
» .

3. display
» LED touch display 2,1”

4. electronics
» .

5. bottom casing
» ABS

6. top screen saver
» rubber

7. magnet (1/2)
» .

8. casing screw (1/3)
» steel

9. casing screw (2/3)
» steel

10. spring
» steel

11. casing screw (3/3)
» steel

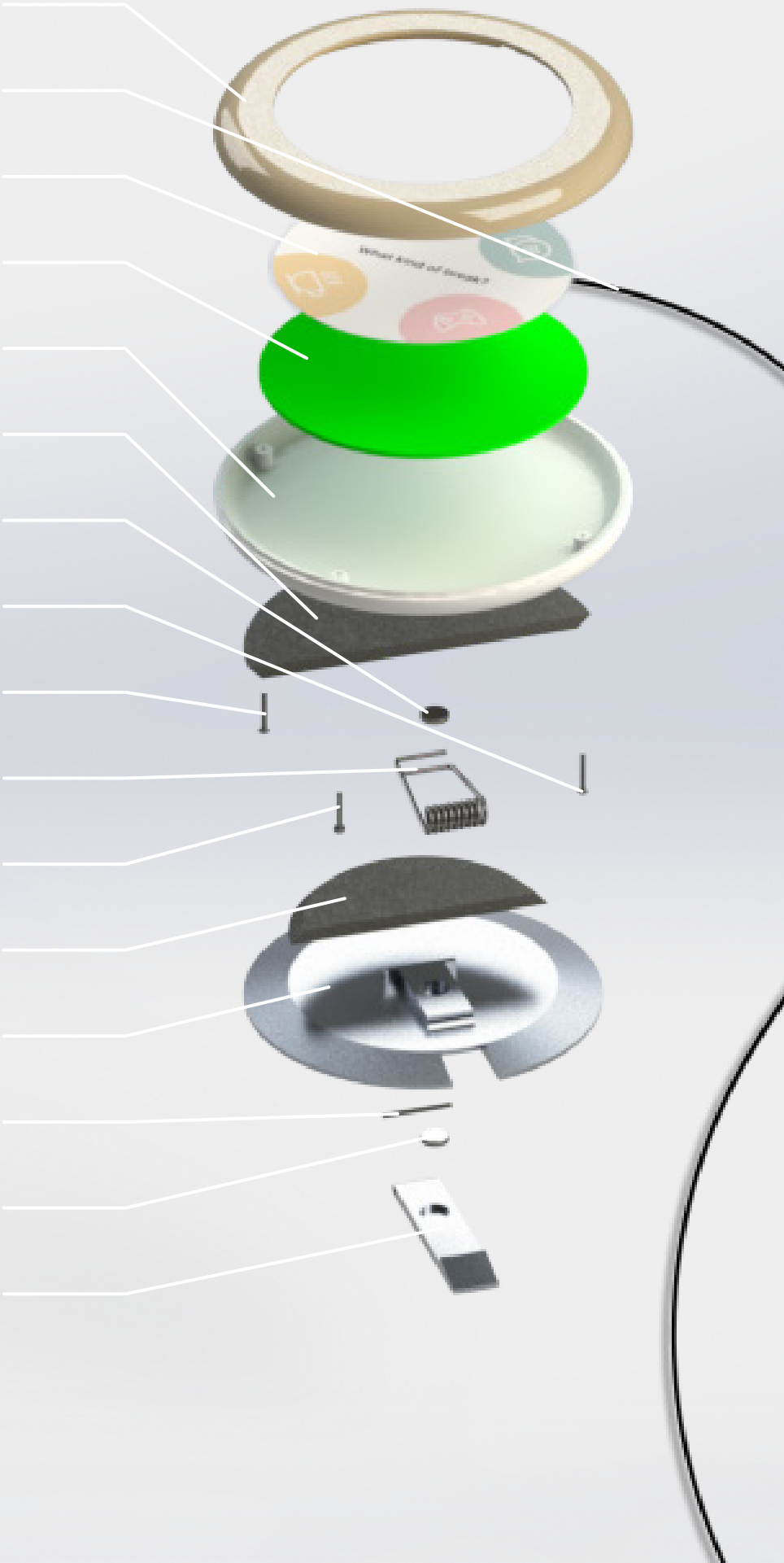
12. bottom screen saver
» rubber

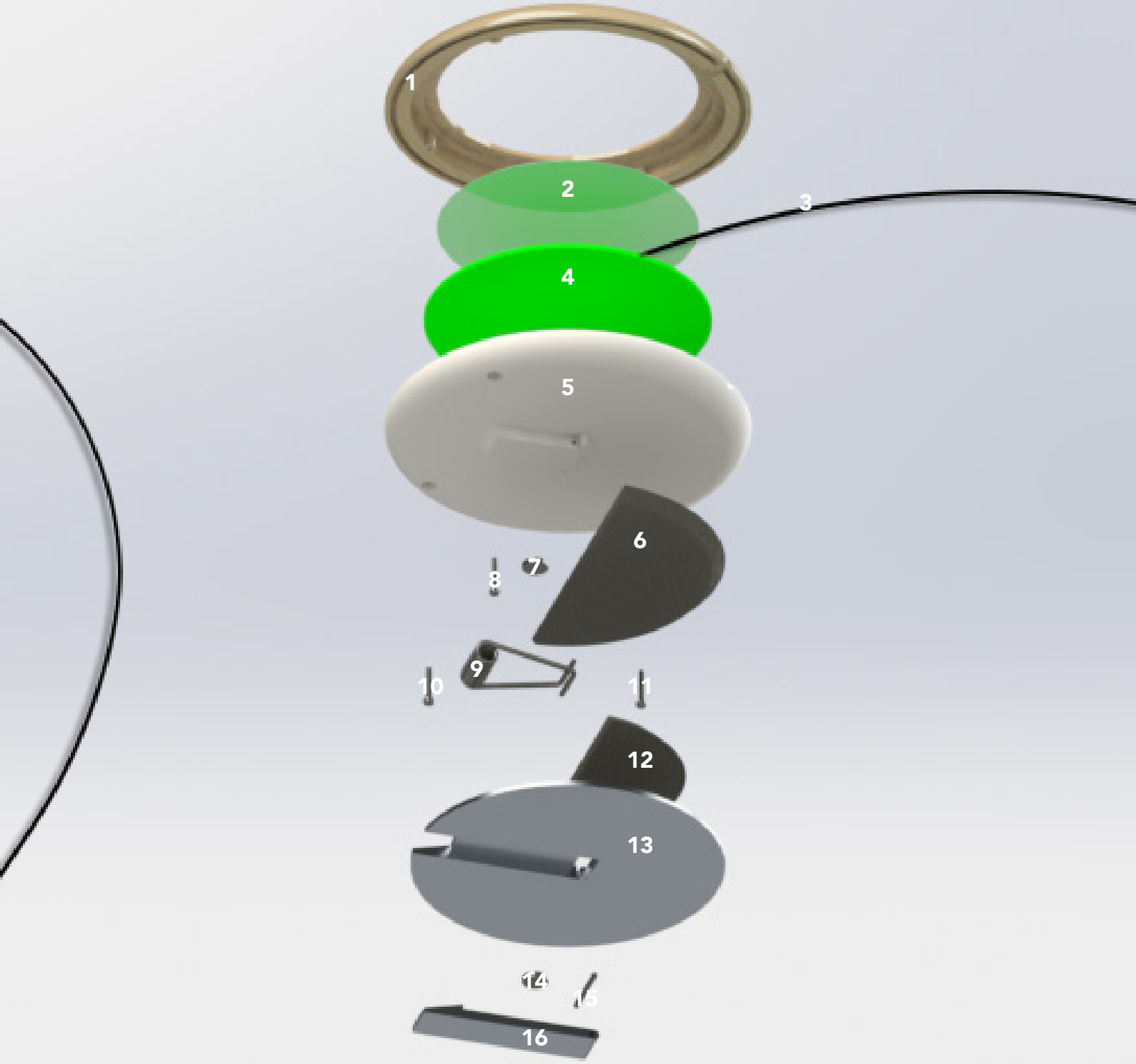
13. base
» aluminium

14. hook pin
» steel

15. magnet (2/2)
» .

16. placement hook
» aluminium

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Production

The product and housing have been completely fine-tuned and recreated using 3D printing. The parts, as displayed in the exploded view on the previous page, are printed to examine the dimensions. The dimensions of the design are correct. However, in the final design, the materials were chosen differently than PLA. A subsequent study must conclude production methods to make the device. A mock-up of the final design is built and walked through personally, see Figure 67. The functionality of the positioning is partly tested in the final test in Chapter 4 with the phone holder and examined during test III with the cardboard mock-up but did not have the final design.

The implementation of electronics is further investigated with the use of a Raspberry Pi and a round-touch display. A casing is designed for the Raspberry to imitate the design and provide a feeling and experience of the final design, see Figure 68. The interface is displayed on the screen without connected functionality.

Figure 67, Printed parts of the final design.

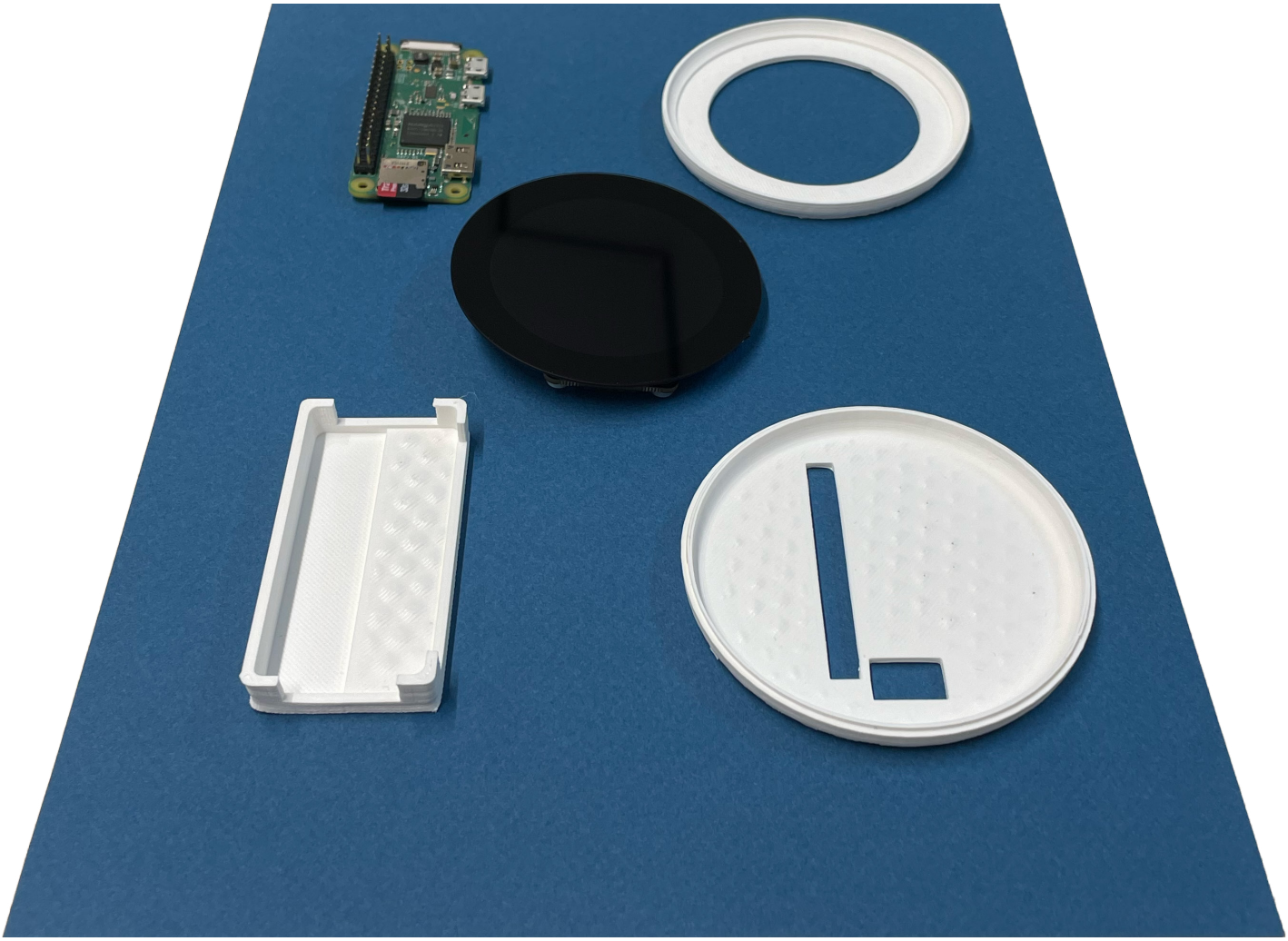

Figure 68, Raspberry Pi imitation of the final design.

Feasibility

The design is complete, and all the parts have been thought out, see Figure 69. The application is simulated and has proven functionality. A Raspberry Pi and a round touch display are built to imitate a functioning device, see Figure 70. To a certain extent, the results of the project show the possibility of putting the product into production. However, research still needs to be done into implementing employee data in the products to achieve connectivity.

Figure 69, Printed parts of the final design.

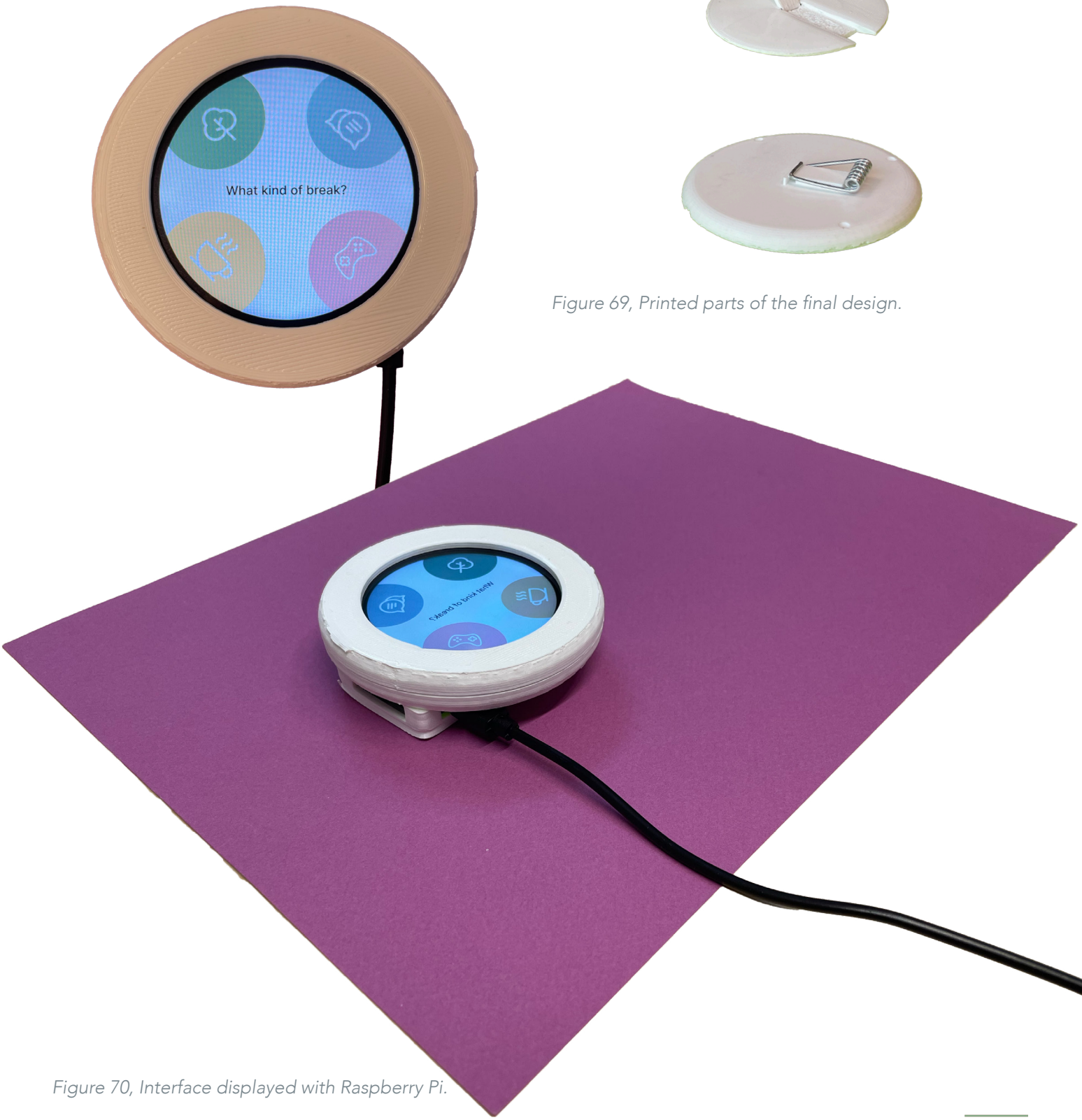

Figure 70, Interface displayed with Raspberry Pi.


REAL
ARTISTS
SHIP

REFLECTION

After months of hard work, the project paid off. A final concept, including design, is delivered. There is still room for additions. For this reason, I will make some recommendations to continue the project or set up something similar in the future.

Recommended Future Development

The step towards the market is yet missing. The project focused much on the core functionality of the concept, communicating breaks. For further research, evaluating the product's production and implementation is recommended. Using company data for accounts should be explored for the product to flow seamlessly into the user's work.

Although a large part of the studies focused on the behaviour of employees, the results show variations between test groups. The studies are limited to three different office environments but none could accommodate fully participate in the test. During the test half of the employees were working with the concept product whilst the other half was working without. It is recommended to find suitable office environments where every employee is involved and the product can come into its own. Time has to be put into finding larger corporations with various teams to research the sustainability of the product it is important to test for longer periods.

During the project, the concept was tested with phones. Earlier in the process it came to my attention that phones are experienced as a distraction and not always desirable around the workplace. Therefore, the tests were designed in a way that the phones were only used to fulfil the purpose of imitating the concept device. Unfortunately, it still resembles a phone and for future research, it is recommended to build (simple) connected functional prototypes to imitate an honest experience.

Furthermore, an international focus could be valuable to implementing the product. The product is tested only within a Dutch office context but accompanied by international employees. Internationally burnout-related symptoms are a societal issue and there is little reason to believe the idea would not work elsewhere.

Personal Experiences

At the start of my graduation thesis, I had set goals. My objective was to design valuable additions to the office and its workers based on researched trends within the environment. I wanted to focus on the user experience aspect of design and create a coherent story. Most of all, I wanted to be happy and satisfied with my thesis, product and concept.

And I'm quite happy. I think I've touched the limits of half a year of hard work, but I always see room for improvement. Although the design process is a period of moving in all kinds of directions, I can still grow in structuring and planning projects. I like to dream and explore many sides of the story, but sometimes it is important to focus on a particular topic rather than everything. A moment in which became painfully clear that I was on the wrong track was when my test turned out not to work in some environments. A couple of times during my project I had to change or test last minute. I was afraid that this wouldn't allow me to test everything. I focused on what I consider to be the most important parts of the project and think I have highlighted them well.

I've experienced the independence during my project as refreshing, but at some point, I longed for some team members. Not only to brainstorm with but also to socialise with and to of course to take breaks with. It is quite funny that with all the knowledge that I gathered during the past months, I caught myself doing what I preached not to do, i.e. not taking breaks in times of stressful periods. That is one of the pitfalls of working alone, the safety net provided by social awareness suddenly disappears. In the end, I was happy to use my product in the environment that I worked in. To easier come into contact with colleagues that I don't know well but see every week.


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6 GLOSSARY

- **Agile working:** bringing people, processes, connectivity and technology, time and place together to find the most appropriate and effective working method.
- **Break-out zone:** spaces without a specific pre-agreed purpose that serve randomly occur-ring needs. They are comfortable places where employees can be, for a short period, in a small group or alone to conversate or reload without having to return to a workplace in the open work environment.
- **Burnout:** the final stage of long-term (often over many years) exhaustion, ignoring stress and tension complaints. Chronic physical and mental fatigue.
- **Fatigue:** persistent stress causes tension complaints and as a result, the person's performance suffers.
- **Group dynamics:** a system of behaviour and psychological processes within or between social groups.
- **Individual well-being:** a combination of a person's physical, psychological, and social health.
- **Intrinsic motivation:** doing something inherent to satisfaction rather than for external re-ward.
- **Job strain:** poorer mental or physical health.
- **Micro-break:** a break between 2 and 10 minutes in which something non-work-related is done. Such as coffee breaks, walk breaks, conversations, etc.
- **Objective well-being:** examines the objective components of a good life.
- **Office:** a room or building which is furnished and used as a place for work.
- **(Work)pressure:** the amount of work that must be "properly" carried out in the allocated time. (Work) pressure is a cause of (work) stress.
- **Physical well-being:** (the ability to maintain) a good quality of life in which most daily activities can be done without fatigue or physical stress.
- **Prophylactic working:** preventive working, the care you receive/take to stay healthy and reduce your chances of getting sick.
- **Psychological well-being:** (the ability to maintain) a good quality of life which consists of autonomy, environmental mastery, self-acceptance, a sense of purpose, and personal growth.
- **Psychosocial workload:** If employees do not feel well at work, this can lead to work stress, for example, due to a high workload or unwanted behaviour.
- **Sedentary behaviour:** sitting or lying down during various activities, including time spent sitting at work.
- **Social pressure:** or peer pressure, is a form of pressure exerted consciously or unconsciously by a group. Under this pressure, someone may exhibit different behaviour than if the person were alone. Norms play an important role.
- **Social well-being:** (the ability to maintain) a good quality of life which consists of building and maintaining healthy relationships and having meaningful, authentic interactions with others.
- **(Work)stress:** too much tension in the working situation or private life.
- **Subjective well-being (SWB):** refers to how people experience and evaluate their lives and specific domains and activities.

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APPENDIX A

» *Design Brief of this graduation project by Gijs Wels.*

Personal Project Brief - IDE Master Graduation

TU Delft

How technology can promote employee well-being. — project title

Please state the title of your graduation project (above) and the start date and end date (below). Keep the title compact and simple. Do not use abbreviations. The remainder of this document allows you to define and clarify your graduation project.

start date 13 - 11 - 2023 — 15 - 04 - 2024 end date

INTRODUCTION **

Please describe, the context of your project, and address the main stakeholders (interests) within this context in a concise yet complete manner. Who are involved, what do they value and how do they currently operate within the given context? What are the main opportunities and limitations you are currently aware of (cultural- and social norms, resources (time, money,...), technology, ...).

Offices have changed significantly over time. In the sixties, cubicles were introduced, and in the nineties, open-plan offices became the norm while digitalisation arose, as shown in Figure 1. Employees have a lot of freedom nowadays, and since the zeros, remote work is perfectly normal. COVID accelerated the tendency to work from home but came with some difficulties, as it hurt social interaction and, in some cases, motivation, concentration, and productivity (Van Den Heuvel et al., 2021) which can result in higher costs. As a reaction, the future shows that the emphasis within office planning is more directed toward the well-being of employees. For instance, remote or hybrid working seems to have a limited effect on the number of offices on the market. For years now there has been about the same average office surface (Buitelaar et al., 2017). The biggest shift is noticeable in the use of the office. Although the new way of working leads to savings in workplaces an increase is seen in the need for meeting rooms, concentration areas, and social meeting and relaxation areas (EIB, 2012: 21).

For this project, several different stakeholders are identified. One could say that the foremost stakeholder, in this case, is Ahrend because they try to address other companies, who benefit from it. In particular, the Workplace Vitality Hub, of which Ahrend is part, and its goals, agenda and importance need to be taken into consideration too. The reason the founding partners - Fontys, imec, TNO, TU/e, HTCE and Twice - established this hub is to bring about a positive turning point in the well-being of working people through (digital) technology. Not only research through design is conducted but they also try to find design guidelines or philosophies to apply to a broader spectrum of (workplace) design. Other notable stakeholders are the customers and users as well as the context these customers operate in. Finally, the TU Delft and I are stakeholders in this project.

To emphasize the need for well-being from a wider perspective, it is also necessary to consider: increases in obesity, diabetes, healthcare costs, clogging of healthcare and general shortcomings of skilled and healthy personnel. According to CBS and UWV, there is still a shortage of personnel in virtually every profession. Together with an ageing population, it can be concluded that everything must be done for companies to attract, develop, and retain the best people and keep them healthy. By understanding this well, Ahrend can ensure the right product/service combination for its customers.

The vision of Ahrend is to create vitalising workspaces, where sustainability is an integral part of their strategy. They notice that the working environment has changed and endeavour to design products that optimise employee experiences, focusing on stimulating physical, psychological, and social well-being, and productivity in workspaces. The design language of Ahrend follows the rules of 'less is more' and their furniture must comply with the Cradle-to-Cradle principles for the designs to be timeless.

Within the design brief, time constraints and sample size are important limitations to think of, as only 20 weeks are scheduled for the entire project. Cultural differences can be of influence too as mostly a Dutch office culture will be within reach. The knowledge and help of Ahrend can hopefully offer trustworthy data to minimise limiting the scope.

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introduction (continued): space for images

Chen, G. (2023, 27 juli). Office space timeline: Past, present, and future [INFOGRAPHIC]. Hubble. https://hubblehq.com/blog/office-space-timeline-past-present-future-infographic

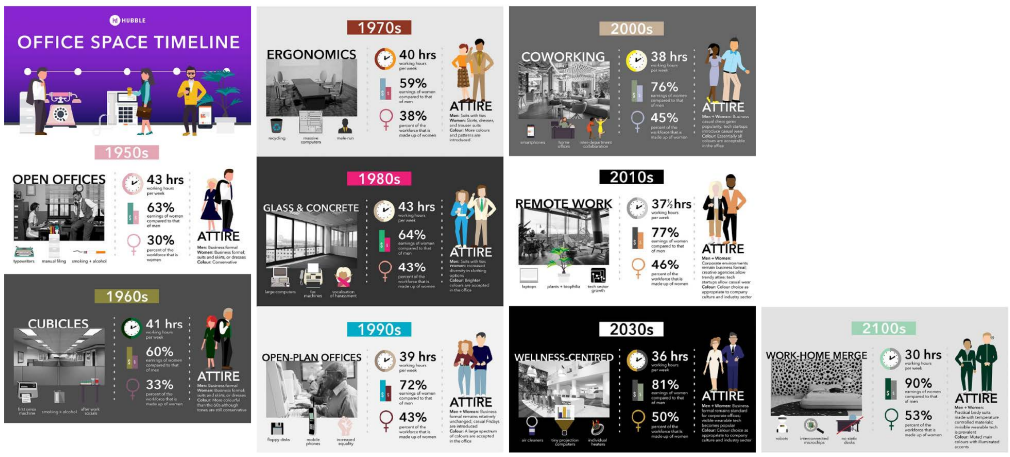


image / figure 1: A change in offices over time. (Chen, 2023)

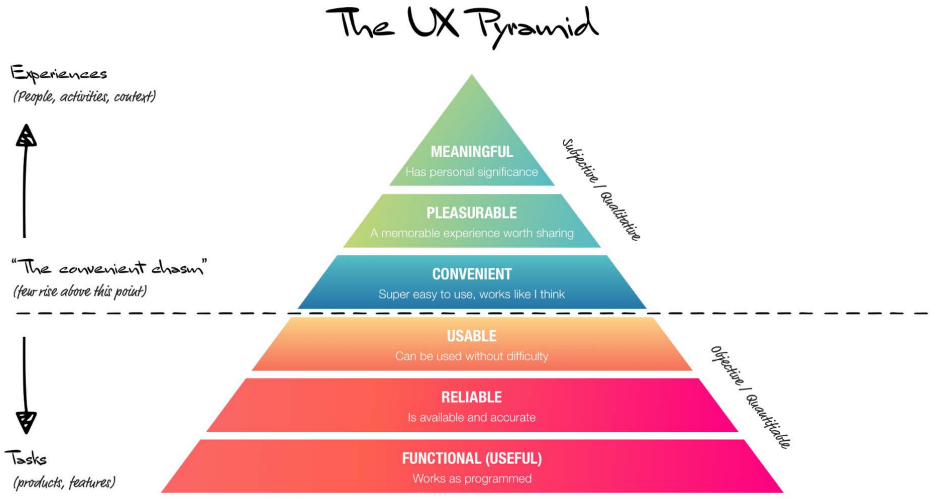


image / figure 2: The UX pyramid.

PROBLEM DEFINITION **

Limit and define the scope and solution space of your project to one that is manageable within one Master Graduation Project of 30 EC (= 20 full time weeks or 100 working days) and clearly indicate what issue(s) should be addressed in this project.

Ahrend manufactures office furniture but also provides interior design for offices and furniture as a service. The Workplace Vitality Hub at the High Tech Campus in Eindhoven focuses on improving employee well-being through (smart) technologies.

The overarching theme of the problems described in the introduction can be defined as the 'well-being' of employees. Well-being can be subdivided into physical, psychological, and social well-being. The challenge of it is to bring about a positive shift in the workplace environment. To keep employees healthy and their energy level steady it is important to be aware of the importance of occasional changes in the work environment and to take time to recover after exertion.

The awareness of what is best is not always present. Also, guidelines can be hard to follow due to an imbalance of importance between work and well-being. However, the body needs to recover now and then, after both physical and mental exertion, to stay healthy and focused. To achieve a positive effect on the body, products can help to trigger employees in the right direction. The question is how to keep such methods non-intrusive, helpful, effective, and possibly adaptable.

The core challenge of the project is to explore, by research through design, what users want and need in a future interior where the office is seen as a central meeting place with diverse physical workplaces. The UX pyramid is shown in Figure 2, as models can be used to assess user experience. The scope is focused on companies, in a Western European setting, which have a desire to improve workplace behaviour among their employees. This will be addressed by designing future furniture concepts with Ahrend in mind as a client and researching product solutions that promote employee well-being in a scientific context.

ASSIGNMENT **

State in 2 or 3 sentences what you are going to research, design, create and / or generate, that will solve (part of) the issue(s) pointed out in "problem definition". Then illustrate this assignment by indicating what kind of solution you expect and / or aim to deliver, for instance: a product, a product-service combination, a strategy illustrated through product or product-service combination ideas, ... In case of a Specialisation and/or Annotation, make sure the assignment reflects this/these.

The assignment is to find a new, non-intrusive and effective way of affecting the well-being of employees by stimulating positive behaviour to increase the vitality of the workplace. The outcome should offer a product that aims to solve the issues pointed out by the study.

- What are specific office problems that hinder employee well-being?

As shown on the next page, the assignment consists of two 'diamonds'. The first step of the process is research. The focus of the research is a Dutch or West-European context. This domain is considered to examine the shifting definition of the office and how it is/should be used. Orientation of the subject includes: what is well-being, what affects well-being, the contemporary office, workplace behaviour, and market research. The goal of the analysis is to find bad workplace behaviour, triggers to well-being and/or general things that are missed within the workplace. The aim is to find out why current products, for example, do not have the desired effects and how employee well-being can positively be affected.

- How to provide office employees with tools to positively influence behaviour and well-being?

A key behaviour/interaction/mission statement follows and leads to a further generation of ideas. The findings are to develop sustainable and tangible design solutions. The solutions will be communicated through sketches and (virtual) impressions. During the design step of the process, the project will work towards a product-based solution. A physical product that focuses on three key expertise of Ahrend: agile working, employee experience, and well-being. The goal is to deliver a working prototype; solely a concept will not suffice.

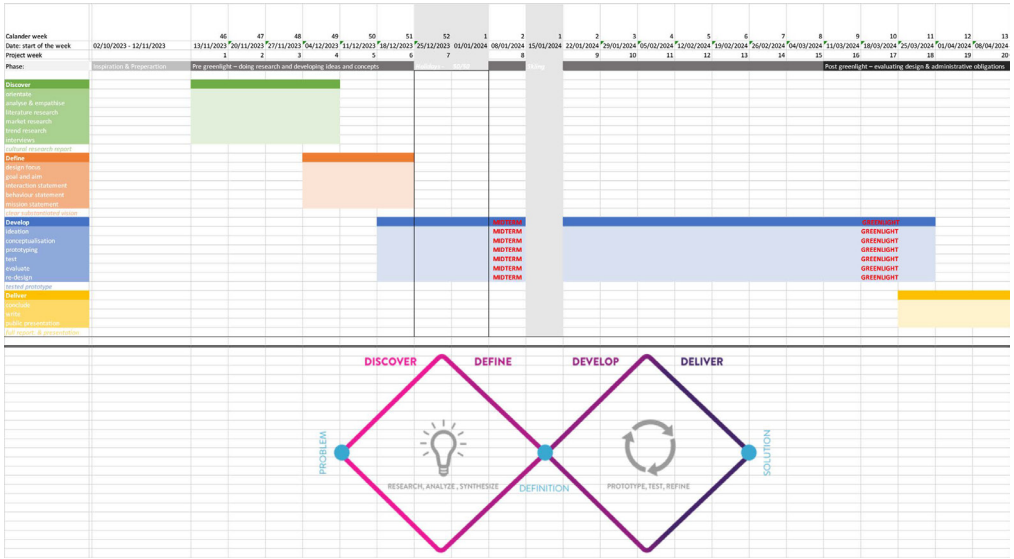
Initials & Name G. Wels Student number 4457935

Title of Project How technology can promote employee well-being.

PLANNING AND APPROACH **

Include a Gantt Chart (replace the example below - more examples can be found in Manual 2) that shows the different phases of your project, deliverables you have in mind, meetings, and how you plan to spend your time. Please note that all activities should fit within the given net time of 30 EC = 20 full time weeks or 100 working days, and your planning should include a kick-off meeting, mid-term meeting, green light meeting and graduation ceremony. Illustrate your Gantt Chart by, for instance, explaining your approach, and please indicate periods of part-time activities and/or periods of not spending time on your graduation project, if any, for instance because of holidays or parallel activities.

start date 13 - 11 - 2023 15 - 4 - 2024 end date



The Gantt chart above shows the project plan based on a double diamond, e.g., diverge-converge-diverge-converge. These four phases, also known as the 4Ds, are: discover, define, develop, and deliver.

In the first diamond, there are sub-phases such as: orientate, research, analyse, synthesise, and define. In the second diamond: ideate, decide, conceptualise, prototype, test, evaluate, and redesign.

It is not a chronological process per se, in between phases there can be loops that are set by the progress of the project.

I plan to work on the project full-time, except during the Christmas holidays. In these two weeks, I will divide 40 hours of work over two weeks. Furthermore, I will be on ski vacation during the week of 15 to 21 January.

MOTIVATION AND PERSONAL AMBITIONS

Explain why you set up this project, what competences you want to prove and learn. For example: acquired competences from your MSc programme, the elective semester, extra-curricular activities (etc.) and point out the competences you have yet developed. Optionally, describe which personal learning ambitions you explicitly want to address in this project, on top of the learning objectives of the Graduation Project, such as: in depth knowledge a on specific subject, broadening your competences or experimenting with a specific tool and/or methodology, ... Stick to no more than five ambitions.

To begin with, I have a great interest in furniture design. During one of IPD's previous courses, AED, I have already worked together with Ahrend to come up with an ergonomic classroom chair with an adjustable seat pan and footrest, and an optional seat pan containing vibration motors for stress reduction and performance improvement. I have experienced this collaboration as meaningful, educational, and overall pleasant.

Besides my interest in furniture I also like to see design from a broader perspective. I experience a lot of overlap between (furniture) design and (interior) architecture. During my Bachelor I have done a Minor in Architecture, called 'House of the Future'. Herefore, I imagined a lot about new interpretations of office space to meet current values and my ambition arose to connect this to my graduation project.

Furthermore, during my exchange with Chalmers University in Gothenburg, Sweden, I followed a course in design for experience. I learned to understand UX, design for UX, and eventually evaluate UX. Although I have consciously chosen to do IPD and not DfI, a personal interest grew and I realized more and more the importance of the combination of both.

Ultimately, I want to combine this broad range of interests and I am confident that with this project in collaboration with Ahrend, I can accomplish this.

For my graduation thesis, the following goals are set;

- Pinpoint and extrapolate current trends within the office environment
- Design valuable addition to the office environment and its workers
- Create a design from an experience point of view
- Illustrate a coherent and accurate story during the whole process of the thesis
- Satisfy the stakeholders but foremost myself with the resulting report, product, and process

Last but not least, I look forward to working again with Gerard from Ahrend and delivering a suitable solution. I hope to learn from my mentor and chair, clearly communicate, and bring my Masters to a positive end. And I hope to find the confidence and structure to fulfill the above goals during my graduation project and look back on it with a smile.

FINAL COMMENTS

In case your project brief needs final comments, please add any information you think is relevant.

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- EIB (2012), Landelijke samenvatting kantorenmonitor. Verkenning van regionale vraag- en aanbodontwikkelingen, Amsterdam: Economisch Instituut voor de Bouw.
- Van Den Heuvel, S. et al. (2021), Thuiswerken. Risico's, gezondheidseffecten en maatregelen, Leiden: TNO.

Initials & Name G. Wels Student number 4457935

Title of Project How technology can promote employee well-being.

APPENDIX B

» *Products focusing on the well-being of the employee.*

	employee			physical workplace						job		
	physical	social	psychological	light	greenery	layout	noise	furniture	control	pleasure	engagement	meaning
SPACEWELL			x			x			x		x	
CTOUCH		x							x		x	
zens			x					x		x		
			x					x		x		
	x		x					x		x		
	x		x					x		x		
	x	x	x				x			x		
The 8 best focus apps			x						x	x		
dyson lightcycle	x		x	x						x		
			x		x					x		
Workrave	x		x						x	x		
Time Out	x		x						x	x		

APPENDIX C

» *A brief history of the office is explained.*

Office Landscape

After the Second World War, closed-door and bullpen offices were replaced with 'büroland-schaft'; a type of space planning with the use of irregular geometry and organic circulation patterns.

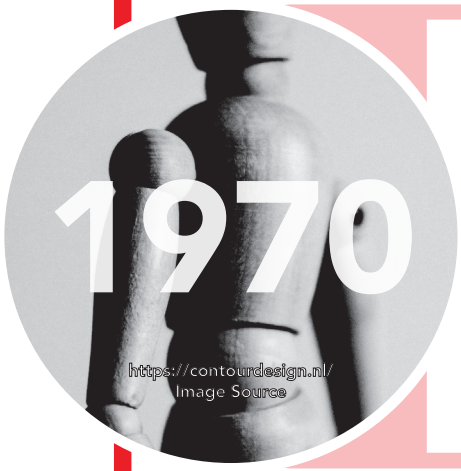
Offices are planned around the organisational processes within the business, and people who work together are physically grouped. Spaces are broken up with screens and plants, and one of the key concepts of the system is that all staff members participate in the open plan. The psychological need for privacy is accomplished with dividers and the placement of furniture. (Friedmann et al., 1978)

Cubicle Farms

Office furniture was developed to provide the advantages of an office landscape but with greater privacy, density, and storage capacity. Initially, the irregular, organic forms were imitated but it degenerated into the regimented sea of cubicles due to standardization of parts in manufacturing and space efficiency.

In the early sixties, Robert Propst invented the Action Office I. It introduced the concept of flexible, semi-enclosed workspaces and evolved into what is now known as cubicles. Desks and workspaces of varying heights that allowed the worker freedom of movement, and the flexibility to assume the work position best suited for the task. (Propst, 1968)

Ergonomics



Modern ergonomics studies how the body functions and how a working environment can be adapted to the natural movements of the human body. The opposite, when the body has to adapt to the working environment and its design, is an outdated approach to ergonomics.

When working with a computer in the office, the emphasis is usually on the design of the office space and office furniture. This also applies to employees in healthcare and education, who predominantly work while sitting in front of a screen. With more physical work in a factory, or outdoor work, the focus is on varying the physical working positions, the correct lifting techniques and the associated tools. (SZW, 2023)

Open Plan Offices

At some point, the more open planned offices were on their return and won companies over by their ability to increase the surface area of the workspace at a low cost, and it became an established feature in service firms, insurance companies, banks and architectural firms.

Hot-desking has become a popular term and way of working. The idea is that desks are not assigned to a single person anymore but that desks can be used by everyone, employees occupy whatever desks or offices are available. (Wise, 2001)

Computers

Computers become smaller and more normal to use by everyone in the office. The Internet is introduced and people are connected in again another way of communication.

Hoteling or 'office hotel' comes up, the idea is that space management is improved and there is a wider range of spaces to work in. It is a way of hot-desking but then the spaces can be reserved, it is mostly popular among freelancers. A closely related term is co-working, which is an arrangement where workers from different companies share an office space. (Hickey, 2015)

New Way of Work

The arrival of the computer and the internet also brought about a shift in the way of working. The two most common forms of the NWoW that can be distinguished are working from home and shifting working hours. (KiM, 2018)

NWoW can be characterized based on four features: 'any time, anywhere', 'manage your own work', 'unlimited access and connectivity', and 'my size fits me'. These respectively stand for: 'work independently of time and place', 'managing employees based on results', 'free access to and use of knowledge, experiences and ideas', and 'flexible employment relationships'. (Baane et al., 2010)

Remote Working

The barrier-free, accessible to everyone, office comes of age. Giving people a variety of places to work. Remote working has become the norm. New technology offers a lot of opportunities but simultaneously with the shift towards remote work, a lot of criticism arises. (Buffer, 2022)

Industry 4.0 is making its debut and revolutionises the way companies manufacture, improve and distribute their products. Manufacturers integrate new technologies, including Internet of Things (IoT), cloud computing and analytics, and AI and machine learning into their production facilities and throughout their operations. Hereby, some professions come into jeopardy.

Well-Being

A worldwide pandemic forces companies and employees to go fully remote. It seems to be taking its toll on people. Employees generally feel less connected to co-workers and wish that their organisation acts more supportive in remote working. Such as optimised systems and technology for collaboration and communication, offering opportunities to socialise with coworkers and help to connect with colleagues. (Buffer, 2022)

In addition, a growing number of people with burn-out-related symptoms is noticeable, mostly among young working adults. Generally, young working adults experience increased work and societal pressure. (TNO & CBS, 2023)

Holistic Approach

A four-day workweek has been introduced. Organisations embraced a more holistic approach to employee well-being. And AI is used to improve the psychosocial well-being of people.

This, however, requires continuous measurement of their well-being states and a systemic mapping of resources and challenges (psychological, social and physical) available to employees in the organisation. The design of product-service systems in such scenarios has the challenge of effectively using technology to continuously engage employees to analyse and understand trends and patterns in changes in well-being and the factors that affect them. (Mohan & Das, 2020)

APPENDIX D1

» *The interview.*

Interview medewerker in een kantooromgeving

Introductieverhaal

Hoi, ik ben Gijs, een student van de TU Delft. Ik ben bezig met een onderzoek naar het welzijn van werknemers in een kantooromgeving en hoe technologie daarbij zou kunnen helpen.

Grofweg is het welzijn onder te verdelen in drie soorten, fysiek, psychologisch en sociaal welzijn. Samen vormt dit het individuele welzijn. De balans tussen de middelen die het individu bezit en de stressoren die op zijn of haar pad komen vormen het subjectieve welzijn. Ik focus mij hier vooral op de psychosociale arbeidsbelasting, maar uiteindelijk staan ze alle drie met elkaar in verband.

Uit onderzoek komt naar boven dat er een trend is in het aantal werknemers met burn-outklachten. Een vijfde van de werkende mensen in Nederland ervaart burn-outklachten. Onder jongeren is dit zelfs een kwart. Daarnaast heeft een kwart van het langdurig ziekteverzuim te maken met burn-out. En een derde van de werknemers is ontevreden door onvoldoende maatregelen die hun organisatie neemt om de werkstress terug te dringen. De helft van alle werknemers in Nederland geven aan dat ze weinig tot geen autonomie ervaren, wat leidt tot meer stress en burn-out gerelateerde klachten. Dat zie ik zelf ook terug in de werkcultuur in Nederland en onderzoeken die zijn gedaan naar het arbeidsethos.

Nu denk ik dat micro-breaks een uitweg kunnen bieden en stress verlagend kunnen werken. Maar de vraag is hoe deze het minst opdringerig en het meest effectief als handvatten kunnen worden aangeboden. Routine is hierbij erg van belang.

Met dit interview hoop ik een beter beeld te krijgen van de dagelijkse bezigheden van een werknemer in een kantooromgeving, zoals jij. Ik hoop de obstakels bloot te leggen die het welzijn vooropstellen tegenhouden. In het kort ben ik dus op zoek naar stressoren tegen, middelen voor en hindernissen naar het welzijn op de werkvloer. Dit kan zijn zoals jij ze persoonlijk ervaart, maar ook bijvoorbeeld hoe je ze meekrijgt van collega's.

Daarnaast wil ik erachter komen waarom men producten die specifiek ontworpen zijn voor het verbeteren van welzijn juist wel of juist niet worden gebruikt en/of omarmt.

Algemeen

Hoe oud ben je?

In welke sector werk je?

Hoeveel werknemers telt de organisatie ongeveer? En jouw team?

Heb je een vast bureau?

Is hybride werken van toepassing in je wekelijkse routine?

Stress

Kun je mij eens meenemen in een dag op het kantoor voor jou?

- Ik neem aan dat deze begint met de aankomst op kantoor, een lunch heeft halverwege de dag en aan het einde een afsluiting waarna je het gebouw verlaat.
- Wat gebeurt er zoal tussen die momenten door?
- Een globale schets van een gemiddelde werkdag is voldoende.
- Ik ben nieuwsgierig of er routines zijn.

Tijd	**Activiteit**	**Verdere uitleg**	**Stressmomenten**
	Aankomst		
	Lunch		
	Klaar		

Zijn er, als je deze gemiddelde dag in beschouwing neemt, momenten die duidelijk stress bij je veroorzaken?

Zijn er, als je deze gemiddelde dag in beschouwing neemt, momenten waarna je je uitgeput voelt?

Als je verder kijkt dan een gemiddelde werkdag, wat zijn dan de stressoren die onverwachts komen?

Gebruik je tools/producten om stress te verminderen of tegen te gaan?

- Zo ja:
    - Welke?
- Zo nee?
    - Heb je ze weleens gebruikt?
    - Zou je ze graag willen gebruiken?

Wat voor cijfer, 1-5, geef je je werk op de volgende punten?

- Plezier; Betrokkenheid; Zingeving

Geluk wordt ook wel omschreven als een combinatie van plezier, betrokkenheid en zingeving. Als je dit betrekt op werk en ze zou moeten rangschikken in hoe belangrijk jij ze vindt, hoe zou je dat dan doen? En waarom?

- En vind je dat je werkgever hier voldoende aan doet? En wat kunnen ze doen?
- Kunnen producten in de fysieke werkomgeving hierbij helpen en hoe?

Burn-out

Heb je weleens last gehad van een burn-out?

- Zo ja:
    - Kun je, als je hierop terugkijkt, symptomen herkennen voordat de burn-out kwam? Ofwel, waren er duidelijke red-flags?
    - Zijn er specifieke triggers geweest?
    - Wat doe je er nu aan om deze symptomen te voorkomen?
    - Zou je veranderingen aan de fysieke werkomgeving willen brengen om dit te in de toekomst wellicht te voorkomen?
- Zo nee:
    - Volgende vraag.

Heb je weleens last van burn-out klachten?

- Zo ja:
    - Kun je, als je hierop terugkijkt, uitleggen wat deze symptomen waren?
    - Hoe heb je kunnen voorkomen dat dit doorzette tot een werkelijke burn-out?
    - Zijn er specifieke triggers geweest?
    - Wat doe je er nu aan om deze symptomen te voorkomen?
      Zou je veranderingen aan de fysieke werkomgeving willen brengen om dit te in de toekomst wellicht te voorkomen?
- Zo nee:
    - Ben je je bewust van burn-out gerelateerde symptomen?
    - Zou je veranderingen aan de fysieke werkomgeving willen brengen om dit te in de toekomst wellicht te voorkomen?

Weet je wat burn-outklachten zijn?

- Zo ja:
    - Vraag om uitleg.
- Zo nee:
    - Uitleg.
    - Vraag eerste twee vragen opnieuw.

Vind je het makkelijk om tevreden en gezond te blijven binnen werktijd en -omgeving?

Gebruik je tools/producten om tevredenheid op werk te bevorderen?

- Zo ja:
    - Welke?
- Zo nee:
    - Zou je ze graag willen gebruiken?

Gebruik je tools/producten om burn-outklachten tegen te gaan?

- Zo ja:
    - Welke?
- Zo nee:
    - Heb je ze weleens gebruikt?
    - Zou je ze graag willen gebruiken?

Micro-breaks & Arbeidsethos

Heb je weleens gehoord van micro-breaks?
- Zo ja:
    - Heb je het gevoel dat deze je helpen om gedurende de dag je energiepijl stabiel te houden?
    - Gebruik je micro-break op een manier dat je een routine hebt ontwikkeld?
    - Geven micro-break je houvast?
- Zo nee:
    - Uitleg micro-breaks…

Welke van de volgende activiteiten geeft jou de meeste energie?
- Relaxatie activiteit
    - Denk aan: mindfulness, op de bank zitten, wandelen, even liggen, etc.
- Voedingsinname
    - Denk aan: lunch, tussendoortje, koffie of thee, etc.
- Sociale activiteit
    - Denk aan: kletsen, samen wandelen, lunchgesprek, etc.
- Cognitieve activiteit
    - Denk aan: denkpuzzel, lezen, brainstorm, werk, etc.
- Fysieke activiteit
    - Denk aan: rekken en strekken, yoga, hardlopen, sporten, etc.

Of geeft iets anders je wellicht energie?

Als we weer terugkijken naar de gemiddelde werkdag, waar zitten voor jou dan dipjes in je energie?
- Na welke activiteiten is de energie laag en moet een rustmoment worden ingelast?

Gebruik je tools/producten om tot rust te komen en dus je energiepeil weer in balans te krijgen?
- Zo ja:
    - Welke?
- Zo nee:
    - Heb je ze weleens gebruikt? Zou je ze graag willen gebruiken?

Gebruik je tools/producten om specifiek de micro-break in je routine te krijgen?
- Zo ja:
    - Welke?
- Zo nee:
    - Heb je ze weleens gebruikt? Zou je ze graag willen gebruiken?

Voel je je vrij om te doen wat goed voelt gedurende een dag?
- Kan je de rustmomenten inlassen op de momenten waarop jij ze graag zou willen?
    - Zo ja, hoe werkt dat in de praktijk?
    - Zo nee, wat houdt jou tegen?

Hoe belangrijk is autonomie binnen je werk voor jou?

- Heb je een gevoel van autonomie binnen je werk?
- Kunnen tools/producten bijdragen aan meer gevoel van autonomie?
    - Zo ja, hoe?
    - Zo nee, waarom?

Vragen naar bestaande tools, ervaringen en bijvoorbeeld de houding tegenover een bed op werk.

Foto's laten zien en om een reactie vragen. (Niveau van plezier, betrokkenheid of zingeving?) (Niveau van middel of stressor?) (Staan ze open tegenover het gebruik van het product?) (Niveau van positieve/negatieve invloed op welzijn?)

Productkaarten

Welke van de volgende producten denk je dat het effectiefst werken in de strijd tegen burn-out gerelateerde klachten? Kun je deze op volgorde leggen van links naar rechts; van minst effectief naar effectiefst?

Welke van de volgende producten denk je het snelst zelf zult gebruiken? Kun je deze op volgorde leggen van links naar rechts; van minst snel naar snelst?

Missen er producten? Zou je bepaalde oplossingen willen toevoegen aan deze reeks? Of zijn er problemen die nog niet worden aangekaart door de producten die hier op tafel liggen?

Kantoor & Visual

Mag ik eens een rondje met je door het kantoor wandelen?

- Zou je mij tijdens de toer je beleving willen vertellen bij de dingen die voor jou belangrijk of opvallend zijn of tekortschieten?
- Mag ik ondertussen foto's nemen? Ik zal uiteraard geen foto's van gezichten nemen.

Wat voor cijfer geef je je kantoor op schaal 1-5?

- Ik heb een visual gemaakt van wat welzijn binnen de werkomgeving inhoudt en dat ziet er zo uit…

Nu ben ik benieuwd hoe jij vindt dat het kantoor scoort op de zes pilaren die ik in de visual heb aangeduid. Zou je nog een keer in gedachte met mij door het kantoor willen wandelen en dan een voor een de volgende pilaren willen behandelen?

- De 6 pilaren:
    - Geluid
    - Controle
    - Groen
    - Meubels
    - Licht
    - Indeling

Wat zijn negatieve aspecten van het kantoor volgens jou voor de volgende factoren?

- Geluid
- Controle
- Groen
- Meubels
- Licht
- Indeling

Wat zijn positieve aspecten van het kantoor volgens jou voor de volgende factoren?

- Geluid
- Controle
- Groen
- Meubels
- Licht
- Indeling

Het alarm moment

Moment 1
- Rek- en strekoefeningen

Moment 2
- Van zittende positie naar staande positie rondje lopen en het interview op die manier voortzetten

Ik heb je in het kort en op een simpele manier willen laten zien wat die micro-break inhouden, of hoe weinig ze eigenlijk inhouden, maar veel effect kunnen hebben op je energiebalans.

Zijn dit activiteiten die je al toepast gedurende een werkdag?

Wat vind je ervan?

Product – Qabin Chat

Product – Charge Lounge

Product – Kaigan Lounge

Product – Silence Call

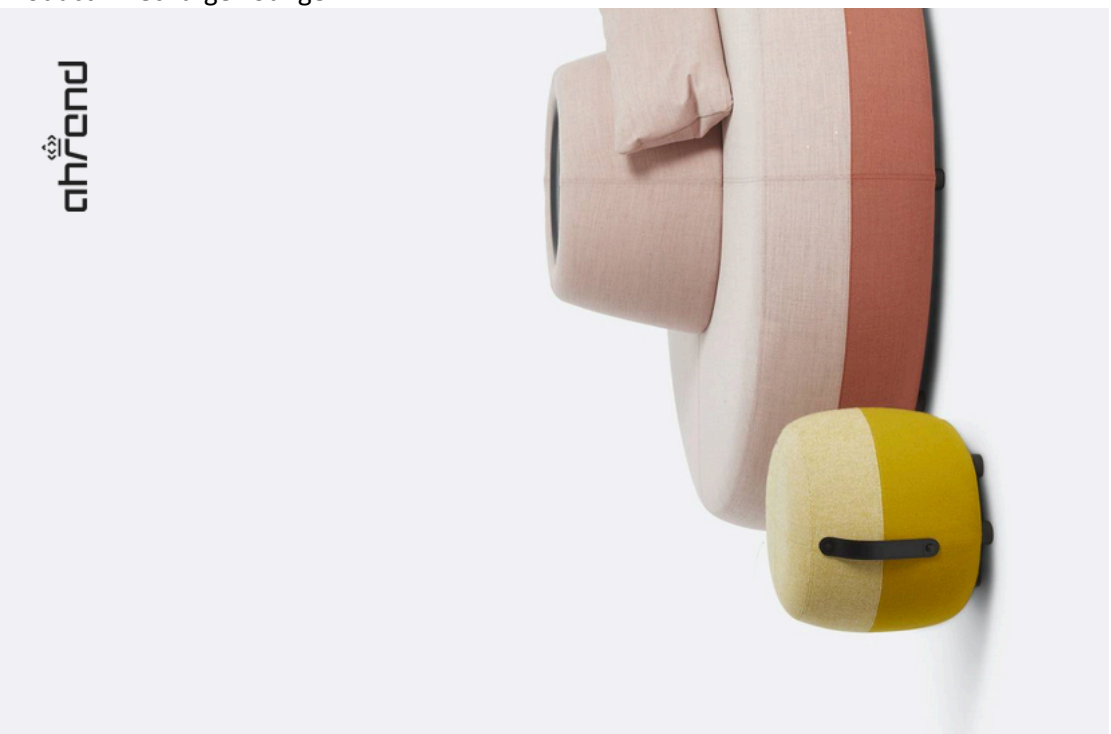
Product – Acoustic Retreat

Product – Powernap

Product – Desk Chair

Product – Balance Comfort Desk

Product – Recharge Lounge



Product – Acoustic Balance

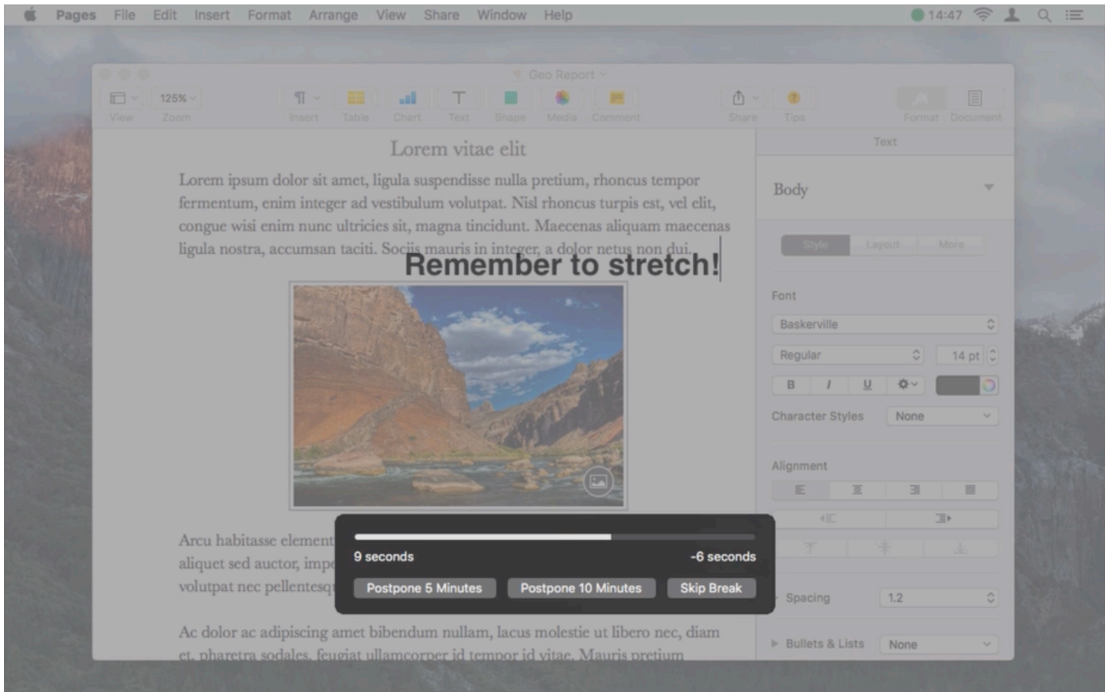
Product – Outdoor Working Station

Product – Reload Booth

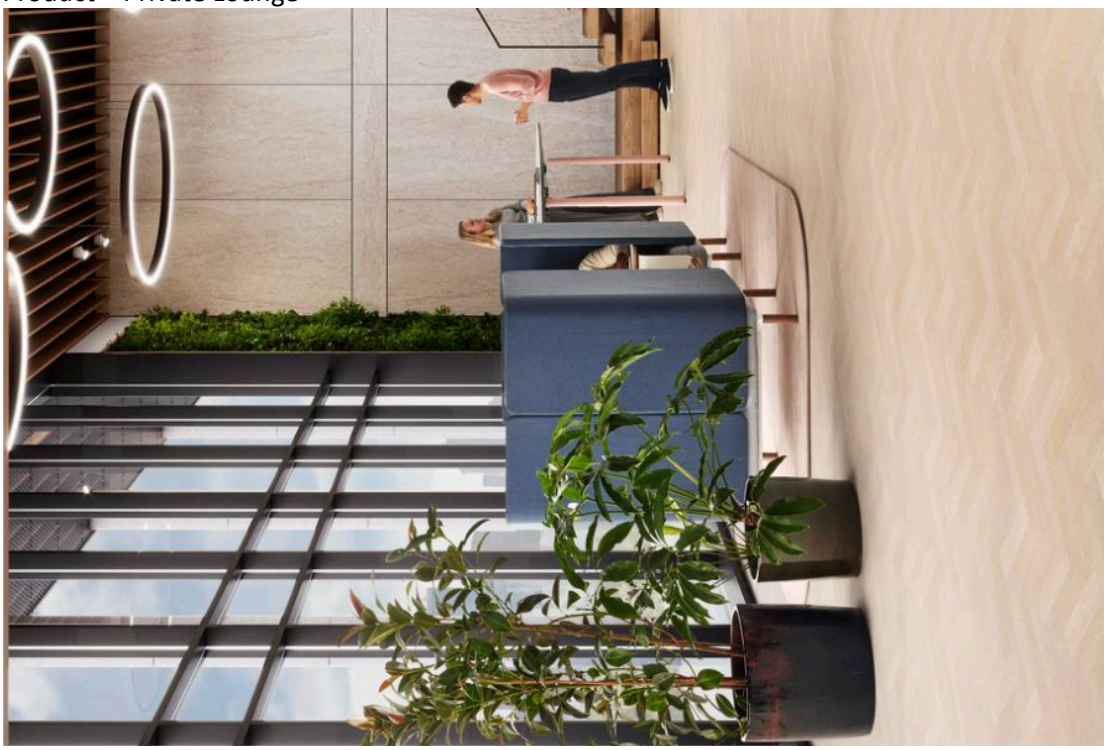
Product – Digital Pause Application

Workrave

Time Out
You deserve a break



Product – Private Lounge



APPENDIX D2

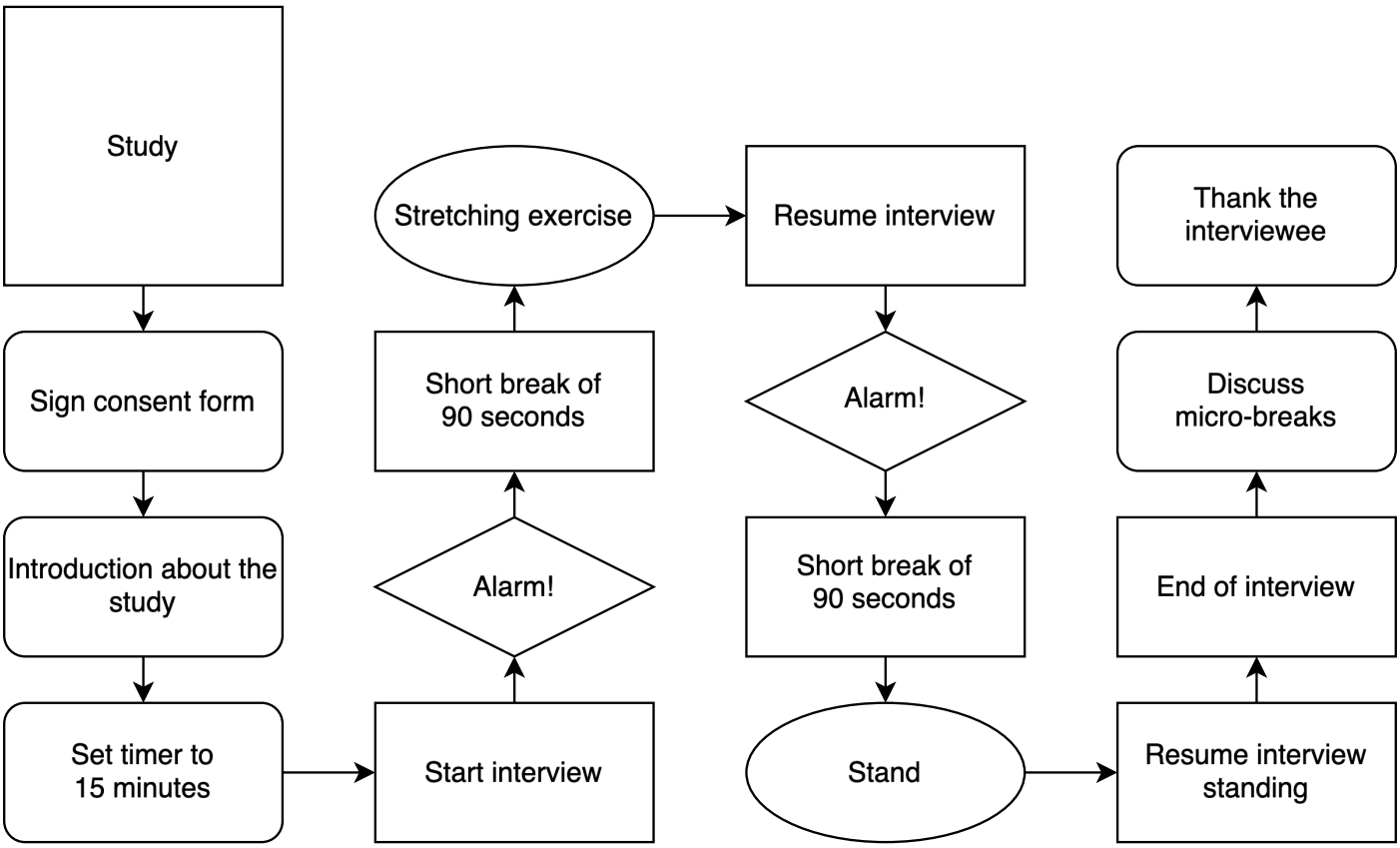
» *Participant list of the interview.*

Participant *(nr.)*	**Age** *(years)*	**Gender** *(m/f)*	**Sector** *(sector)*	**Title** *(profession)*	**Organisation** *(<10 / <50 / <250 / >250)**	**Desk** *(y/n)*	**Hybrid** *(y/n)*
Pilot	*62*	*f*	*Education*	*Primary School Teacher*	*<50*	*yes*	*no*
001	26	f	Telecom	Implementation Manager	>250	no	yes
002	27	f	HR	Intern	>250	no	yes
003	28	f	Banking (ABN AMRO)	Business manager	>250	no	yes
004	28	m	Energy (Green Create)	Project developer	>250	no	yes
005	60	f	Government (Municipality Utrecht)	Interim chief	>250	yes	yes
006	65	m	Research & Education (TU Delft)	Professor	>250	yes	yes

*Enterprises: micro = <10; small = <50; medium = <250; large = >250.

APPENDIX D3

» *Flowchart of the interview.*



APPENDIX D4

» *Consent form of the interview.*

Promoting psychosocial well-being at the workplace

This research is conducted as part of the MSc study Industrial Design Engineering at TU Delft.

Student: Gijs Wels

Contact person: Gijs Wels

Informed consent participant

I participate in this research voluntarily.

I acknowledge that I received sufficient information and explanation about the research and that all my questions have been answered satisfactorily. I was given sufficient time to consent to my participation. I can ask questions for further clarification at any moment during the research.

I am aware that this research consists of the following activities:

1. A qualitative interview about well-being and micro-breaks
2. Recording audio of the interview
3. Photographing the workplace and the office

I am aware that data will be collected during the research, such as notes, photos, video and/or audio recordings. I permit to collect this data and to make photos, audio and/or video recordings during the research. Data will be processed and analysed anonymously (without your name or other identifiable information). The data will only be accessible to the research team and their TU Delft supervisors.

The photos, video and/or audio recordings will be used to support analysis of the collected data. The video recordings and photos can also be used to illustrate research findings in publications and presentations about the project.

I permit the use of photos and audio recordings of my participation:
(select what applies to you)

- ☐ in which I am recognisable in publications and presentations about the project.
- ☐ in which I am not recognisable in publications and presentations about the project.
- ☐ for data analysis only and not for publications and presentations about the project.

I permit to storage of the data for a maximum of 6 months after completion of this research and using it for educational and research purposes.

I acknowledge that no financial compensation will be provided for my participation in this research.

With my signature, I acknowledge that I have read the provided information about the research and understand the nature of my participation. I understand that I am free to withdraw and stop participation in the research at any given time. I understand that I am not obliged to answer questions which I prefer not to answer, and I can indicate this to the research team.

I will receive a copy of this consent form.

_____ _____

Last name First name

___ / ___ / 2023 _____

Date (dd/mm/yyyy) Signature

APPENDIX D5

» *Ethics checklist of the interview.*

	Y/N	
Does the study involve children or teenagers (<18 year)?	N	* IF YES: CONSENT FOR PARTICIPATION NEEDS TO BE GIVEN BY BOTH THE CHILD (FROM AGE 6, VERBAL CONSENT IS SUFFICIENT) AND THE PARENT, WHO NEEDS TO GIVE WRITTEN CONSENT
Does the study involve other types of participants who are particularly vulnerable or unable to give informed consent (e.g., people with learning difficulties, people living in care or nursing homes)?	N	* IF YES: THE RESEARCHER SHOULD EXPLAIN IN THE INFORMED CONSENT IN DETAIL THE STUDY PROCEDURE AND THE POTENTIAL RISKS (TAKING INTO CONSIDERATION THEIR VULNERABILITY) IN SIMPLE TO COMPREHEND TERMS TO ENSURE THAT THE PARTICIPANT KNOWS WHAT (S)HE IS AGREEING TO * IF THERE IS A PERSON ENTITLED TO TAKE DECISIONS FOR THE (VULNERABLE) PARTICIPANT (E.G. FAMILY MEMBER), THIS PERSON ALSO NEEDS TO GIVE WRITTEN CONSENT
Does the study involve investigating participants without their knowledge and consent at the time the study takes place (e.g., observation studies)? *If yes, can you change your study design in such a way that participants are able to give consent beforehand?*	N	* IF YOU CAN CHANGE YOUR STUDY DESIGN, UPDATE THE METHODS AND FILL IN THE CHECKLIST BASED ON THE NEW PROCEDURES * IF CASE OF DEVIATION: ADD EXPLANATION
Will the study involve actively deceiving the participants (e.g., will participants be deliberately falsely informed, will information be withheld from them or will they be misled)? *If yes, can you change your study design in such a way that participants are not deceived?* *If you cannot change your study design, is it likely that the deception will lead to unease with participants after debriefing them afterwards about the actual motivation of the study and the necessity of the deception?*	N	* IF YOU CAN CHANGE YOUR STUDY DESIGN, UPDATE THE METHODS AND FILL IN THE CHECKLIST BASED ON THE NEW PROCEDURES * IN CASE OF DEVIATION: ADD EXPLANATION
Will the study involve discussion or collection of information on sensitive topics? (e.g., sexual activity, drug use, mental health)	Y	The interview is partly about burn-out related symptoms. It is emphazised to the interviewee that answering the questions is not mandatory and they can indicate if they experience it as private or unpleasant.
Will drinks, food or food constituents be administered to the study participants as part of the research? *If yes, are these drinks, food, or food constituents available in European stores? (thereby complying to the standard food safety requirements)*	N	
Will participants be asked to perform tasks that are invasive (e.g., damaging the skin) or involve collection of blood or tissue samples from participants?	N	* IF YES: THE RESEARCH NEEDS TO BE SUBMITTED TO THE HREC
Is pain or a more than mild discomfort for the participants likely to result from the study? *If yes, can you change your study design in such a way that experiencing pain or discomfort is not needed or less likely?*	N	* IF YOU CAN CHANGE YOUR STUDY DESIGN, UPDATE THE METHODS AND FILL IN THE CHECKLIST BASED ON THE NEW PROCEDURES * IN CASE OF DEVIATION: ADD EXPLANATION
Does the study risk causing psychological stress or anxiety or other harm or negative consequences beyond that normally encountered by the participants in their life outside research? *If yes, can you change your study design in such a way that experiencing psychological stress, anxiety or other harm or negative consequences is not needed or less likely?*	N	* IF YOU CAN CHANGE YOUR STUDY DESIGN, UPDATE THE METHODS AND FILL IN THE CHECKLIST BASED ON THE NEW PROCEDURES * IN CASE OF DEVIATION: ADD EXPLANATION
Will financial inducement (other than a reasonable compensation for time) be offered to participants?	N	
Will you collect and store videos, pictures, or other directly identifiable data (e.g., name, address, phone number) of human subjects in your research?	Y	* IF YES: THE PARTICIPANTS NEED TO GIVE WRITTEN PERMISSION
Will this directly identifiable data be kept longer than 6 months? *If yes, explain why it is necessary to keep this data longer than 6 months.*	N	* IF YES: THE PARTICIPANTS NEED TO GIVE WRITTEN PERMISSION IN THE INFORMED CONSENT FORM TO STORE THEIR INFORMATION FOR LONGER THAN 6 MONTHS * IF YES: ADD EXPLANATION
What measures will you take to respect the participants' privacy during the research activities and when reporting about the research results (i.e., process identifiable data confidentially and de-identified, obtaining consent to use photos in reports)?		* PARTICIPANTS NEED TO GIVE WRITTEN PERMISSION IN THE INFORMED CONSENT TO REPORT ANY IDENTIFIABLE DATA MORE SPECIFICALLY, THE INFORMED CONSENT FORM NEEDS TO DESCRIBE IN DETAIL WHAT WILL BE SHOWN IN THE PICTURES OR VIDEOS AND THE SPECIFIC OUTLETS (E.G. YOUTUBE, NEWSPAPERS) IN WHICH THE DATA WILL BE PRESENTED NOTE THAT THIS ALSO INCLUDES APPROPRIATE PRIVACY MEASURES ANTICIPATING HANDING OVER REPORTS AND PRESENTATION FILES TO YOUR CLIENT No real names, but only participant numbers and using SURFdrive.
How will you store your research data and who will have access to the data?		Using SURFdrive and only I will have access.
Will the experiment involve the use of devices that are not 'CE' certified? *If yes, is the device a preliminary mock up prototype that is made up out of flexible materials, such as paper, carton board, and foam and that does not contain any sharp edges?*	N	* IF NO (NO CARDBOARD OR FOAM MODEL): HAVE THE DEVICE BEEN INSPECTED BY A SAFETY EXPERT AT TU DELFT (E.G. PMB, COACH) ONLY IF (S)HE SIGNS THE SAFETY REPORT AND THUS AGREES THAT NO HAZARDS ARE LIKELY TO BE PRESENT WHEN USING THE DEVICE, THE DEVICE CAN BE USED ON HUMAN SUBJECTS FOR RESEARCH PURPOSES HAND IN THE SIGNED SAFETY REPORT TOGETHER WITH THIS ETHICS FORM TO YOUR EXPERT/COACH
What measures will you take to respect the participants safety in your research (i.e., checking well-being, inform about relevant information)?		Not applicable.

APPENDIX E1

» *Micro-break checklist experiment survey.*

- Did you make use of all 12 micro-breaks today? *
- At what time were you at the WPVH today? **
- And at what time did you leave the WPVH today? **
- On a personal level, do you think this assignment nudged you today to take a break now and then? ***
- On a personal level, do you think this assignment helped you today to be more aware of your well-being? ***
- On a collegial level, did you feel freer to take a break as others were working? ***
- On a collegial level, do you think colleagues were more aware of each other's well-being? ***
- On a managerial level, did you feel like it was more allowed to take a break now and then? ***
- On a managerial level, did you feel more understood about the importance of your well-being by your "superiors" (me, your manager)? ***
- Did you use more than 12 micro-breaks? *
- If you failed to take 12 micro-breaks or had more than 12 micro-breaks, please tell me how many and why! ****
- Did you place the checklist in sight for everyone to see? *
- Why did or didn't you? And did it affect your experience? ****
- Lastly, did you experience some sort, or more, of control because of this experiment? ***
- Why did or didn't you feel more in control? ****
- I was just wondering if you had any thoughts about the subject and/or the experiment. ****

* Yes/No
** Set time
*** Please answer on a scale from 1 to 5.
1 = absolutely not
2 = no
3 = maybe
4 = yes
5 = absolutely yes
**** Open answer

APPENDIX E2

» *Micro-break checklist experiment participants list.*

Participant *(nr.)*	**Age** *(young adult/adult)* *	**Gender** *(m/f)*
Pilot	*young adult*	*m*
001	young adult	f
002	young adult	f
003	young adult	f
004	young adult	m
005	young adult	m
006	young adult	m

* Age: young adult = 18 – 35 years old; adult > 35 years old.

APPENDIX E3

» *Micro-break checklist experiment.*

Take a micro-break!	
1	0
2	0
3	0
4	0
5	0
6	0
7	0
8	0
9	0
10	0
11	0
12	0
more	0

Hi, I am the manager and today I have a task for you!

Try to use all micro-breaks and check them om the other side of this paper.
Everybody today has the same task, even me! So, enjoy your breaks and don't be afraid to use more if needed.

A micro-break is a break of 2 minutes minimum and 10 minutes maximum.
Depending on what is good for you to refill your energy level.

Nothing work-related should be done during the break, so stand up and walk.
Your thoughts should be somewhere else than work, otherwise, it won't count.

Please fill in the Google Forms at the end of the day (see QR inside)! :)
By the way, it is up to you to place the check-list in sight, for you or colleagues, or not.

Scan me!

Or click here/ type over this url:

https://forms.gle/1afRPQ526FEHpniz8

Thank you!

APPENDIX F

» *Hinders and whishes for employee well-being in the workplace envrironment according to the interviewees.*

HINDERS

Ad Hoc situations
Overly planned agenda
The idea of being too important to miss
Feeling vulnerable
Too many tasks
Understaffed
No or little privacy

Bad management
Feeling that they should work when colleagues are
Social pressure
Group dynamics – go with the flow
Unclear rules and expectations
Collective interest over self-interest
Not aware of their self

No or bad material
Women in a men's world
The idea that pressure also leads to results
No or little control over the agenda
Practical matters
Lack of (experienced) control

Self-imposed assumptions
Bad trained managers
Poorly informed managers
Difficulty guarding their boundaries
Overall low awareness
Overall little understanding

WISHES

Personalisation
Non-intrusive and sustainable product solutions
Feeling healthy
The feeling of character – organisation or team

Good management
Aware and understanding managers
Aware and understanding colleagues
A safe space

Autonomy
Control
Courage
Privacy
Distinction between work at the office and home

No judgement
Clear communication
Setting boundaries
Clear expectations
Breaking taboos

APPENDIX G1

» *Set-up for group brainstorm.*

ROLE PLAY

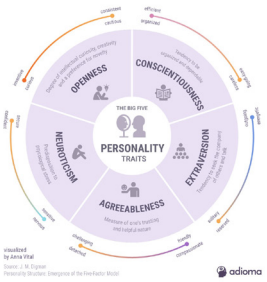
Scenario

People at the office seem to be unaware of personal or collective state.

More and more working people experience burnout-related (stress) symptoms.

Because of unknown reasons they're not able to detect, express or act upon that feeling.

BIG 5 PERSONALITY TRAITS



5 minutes

What can be measured?

5 minutes

What information can be gathered to create overview/awareness/understanding of the personal or collective state.

Think of what kind of information you would be okay with to share (anonymously)?

5 minutes

How can be measured?

5 minutes

Where or when can information be gathered.

Think of when or where you would be okay to share information (anonymously)?

5 minutes 5 minutes

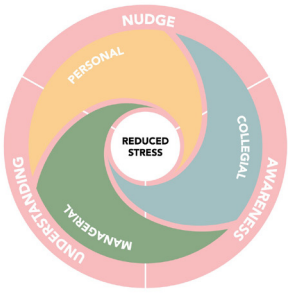
Where do senses fall short?

How can information be processed/provided
to create overview/awareness/understanding of
the personal or collective state.

Think of when or where you would be okay
with to share information (anonymously)?

15 minutes 15 minutes

CONVERGE



5 minutes 5 minutes

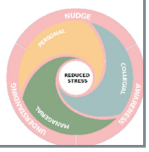
Conceptualise!

1) in groups of 2

2) combine 3 answers; 1 of each round

3) think of an concept

4) draw or play



10 minutes 10 minutes

The essence.

What the essence of the concept?
What are the benefits?
What is the social character?

APPENDIX G2

» *All ideas from the brainstorm are compared to the criteria.*

	efficiency	questions	connectedness	productivity	coffees/drinks	status	heart rate	conversations/ chats/talks	walking routine	walks	sitting	work hours	phone hours	after work schedule	hobbies	thoughts	music	to-do's	rooms/seats/ desks (reserved)	tabs	sound	HSP: high sensitive personality	occupancy	presence	breaks	stress	meetings	sensors
C1	-	0	-	-	0	-	-	-	0	+	-	-	-	-		-	-	0	+	+	+	-		-	0	-	0	+
C2	-	+	+	-	0	+	-	+	0	+	0	0	-	+		+	+	+	-	-	-	+		0	+	-	0	-
C3	0	+	0	0	0	+	-	+	0	+	-	-	-	+		+	+	+	0	-	0	+		0	+	-	0	0
C4	-	+	+	0	0	0	-	+	0	0	-	0	-	+		0	+	0	0	-	0	0		+	+	0	0	0
C5	-	+	0	-	+	0	+	+	+	+	-	-	-	-		0	0	-	0	-	0	+		0	+	+	0	0
C6	0	+	0	-	+	0	-	+	0	+	-	-	-	+		+	+	-	0	-	0	0		+	+	-	0	0
C7	0	+	+	+	+	+	-	+	+	-	+	+	+	+		+	+	+	+	+	+	+		+	+	+	+	+
C8	0	+	+	+	0	+	-	+	0	-	-	0	0	+		+	0	+	0	0	0	+		0	0	+	0	+
C9	-	+	+	+	0	+	+	0	+	+	+	+	+	0		+	0	0	0	+	+	+		0	+	+	+	+
C10	-	+	+	+	0	+	+	0	0	0	-	0	0	0		+	0	0	0	0	0	+		0	0	+	0	+
	-6	9	5	0	3	5	-4	6	3	4	-5	-2	-4	4	4	6	4	2	1	-2	2	6	1	2	7	1	2	4

	dashboard	mailbox	agenda	thumbs up	scores 1-10	notification	smileys	updates	puck notification	main lights	coffee machine	mood lighting	sound/ noise	managers	text	workshop/ training	e-mail/ newsletter	sessions/ feedback	video/ animation	poster	stickers	digital board	statistics	fake plants	in-desk	colour changes	different soundscapes	social media
C1	0	+	0	0	-	+	0	0	-	+	0	0	0	0	-	-	+	-	+	+	-	0	+	0	+	0	+	-
C2	0	+	+	+	+	+	+	+	-	0	+	0	+	+	+	+	0	+	0	-	+	+	0	0	0	0	-	+
C3	0	0	+	-	+	+	+	0	0	0	+	0	+	0	+	+	0	+	+	-	+	+	0	0	0	0	-	+
C4	0	0	+	+	0	0	+	+	0	+	0	0	0	0	0	+	0	0	0	0	0	0	0	0	-	0	0	+
C5	0	0	0	-	0	0	0	-	0	0	+	0	0	-	-	-	0	-	0	0	0	0	0	0	0	0	0	+
C6	0	-	0	0	0	0	0	0	-	0	0	0	0	+	0	0	-	0	-	-	0	0	0	-	-	0	0	+
C7	+	+	+	+	+	+	+	+	0	+	+	0	0	+	+	0	0	+	0	0	+	0	+	0	0	0	+	+
C8	0	+	+	+	+	+	0	0	0	0	0	0	0	+	0	0	0	0	0	0	0	0	+	0	0	0	0	+
C9	+	0	+	+	+	+	+	+	+	0	0	0	0	+	+	+	0	+	0	0	0	0	+	0	+	0	0	-
C10	0	0	+	+	+	+	0	0	0	0	0	0	0	+	0	0	0	0	0	0	0	0	+	0	0	0	0	-
	2	3	7	4	5	7	5	3	-2	3	4	0	2	5	2	2	0	2	1	-2	2	2	5	-1	1	0	0	4

APPENDIX H1

» *WhatsApp experiment consent form.*

Promoting psychosocial well-being at the workplace

This research is conducted as part of the MSc study Industrial Design Engineering at TU Delft.

Student: Gijs Wels

Contact person: Gijs Wels

Informed consent participant

I participate in this research voluntarily.

I acknowledge that I received sufficient information and explanation about the research and that all my questions have been answered satisfactorily. I was given sufficient time to consent to my participation. I can ask questions for further clarification at any moment during the research.

I am aware that this research consists of the following activities:

1. A test about communicating micro-breaks at work.
    a. With the WhatsApp application on a personal device.
2. Observing employee behaviour and group dynamics.
3. A group discussion.

I am aware that data will be collected during the research, such as notes, photos, video and/or audio recordings. I permit to collect this data and to make photos, audio and/or video recordings during the research. Data will be processed and analysed anonymously (without your name or other identifiable information). The data will only be accessible to the research team and their TU Delft supervisors.

The photos, video and/or audio recordings will be used to support analysis of the collected data. The video recordings and photos can also be used to illustrate research findings in publications and presentations about the project.

I permit the use of photos and audio recordings of my participation:
(select what applies to you)

- ☐ in which I am recognisable in publications and presentations about the project.
- ☐ in which I am not recognisable in publications and presentations about the project.
- ☐ for data analysis only and not for publications and presentations about the project.

I permit to storage of the data for a maximum of 6 months after completion of this research and using it for educational and research purposes.

I acknowledge that no financial compensation will be provided for my participation in this research.

With my signature, I acknowledge that I have read the provided information about the research and understand the nature of my participation. I understand that I am free to withdraw and stop participation in the research at any given time. I understand that I am not obliged to answer questions which I prefer not to answer, and I can indicate this to the research team.

I will receive a copy of this consent form.

_____ _____

Last name First name

___ / ___ / 2023 _____

Date (dd/mm/yyyy) Signature

APPENDIX H2

» *WhatsApp experiment participants list.*

Participant *(nr.)*	**Age** *(young adult/adult)**	**Gender** *(m/f)*
001	young adult	m
002	young adult	m
003	young adult	m
004	young adult	m
005	young adult	m
006	young adult	f
007	young adult	f
008	young adult	f
009	young adult	f
010	young adult	f

* Age: young adult = 18 – 35 years old; adult > 35 years old.

APPENDIX I

» *Desk lights experiment consent form.*

Promoting psychosocial well-being at the workplace

This research is conducted as part of the MSc study Industrial Design Engineering at TU Delft.

Student: Gijs Wels

Contact person: Gijs Wels

Informed consent participant

I participate in this research voluntarily.

I acknowledge that I received sufficient information and explanation about the research and that all my questions have been answered satisfactorily. I was given sufficient time to consent to my participation. I can ask questions for further clarification at any moment during the research.

I am aware that this research consists of the following activities:

1. A test about communicating micro-breaks at work.
    a. With a button placed in the office.
    b. And desk lights.
2. Observing employee behaviour and group dynamics.
3. A group discussion.

I am aware that data will be collected during the research, such as notes, photos, video and/or audio recordings. I permit to collect this data and to make photos, audio and/or video recordings during the research. Data will be processed and analysed anonymously (without your name or other identifiable information). The data will only be accessible to the research team and their TU Delft supervisors.

The photos, video and/or audio recordings will be used to support analysis of the collected data. The video recordings and photos can also be used to illustrate research findings in publications and presentations about the project.

I permit the use of photos and audio recordings of my participation:
(select what applies to you)

- ☐ in which I am recognisable in publications and presentations about the project.
- ☐ in which I am not recognisable in publications and presentations about the project.
- ☐ for data analysis only and not for publications and presentations about the project.

I permit to storage of the data for a maximum of 6 months after completion of this research and using it for educational and research purposes.

I acknowledge that no financial compensation will be provided for my participation in this research.

With my signature, I acknowledge that I have read the provided information about the research and understand the nature of my participation. I understand that I am free to withdraw and stop participation in the research at any given time. I understand that I am not obliged to answer questions which I prefer not to answer, and I can indicate this to the research team.

I will receive a copy of this consent form.

_____ _____

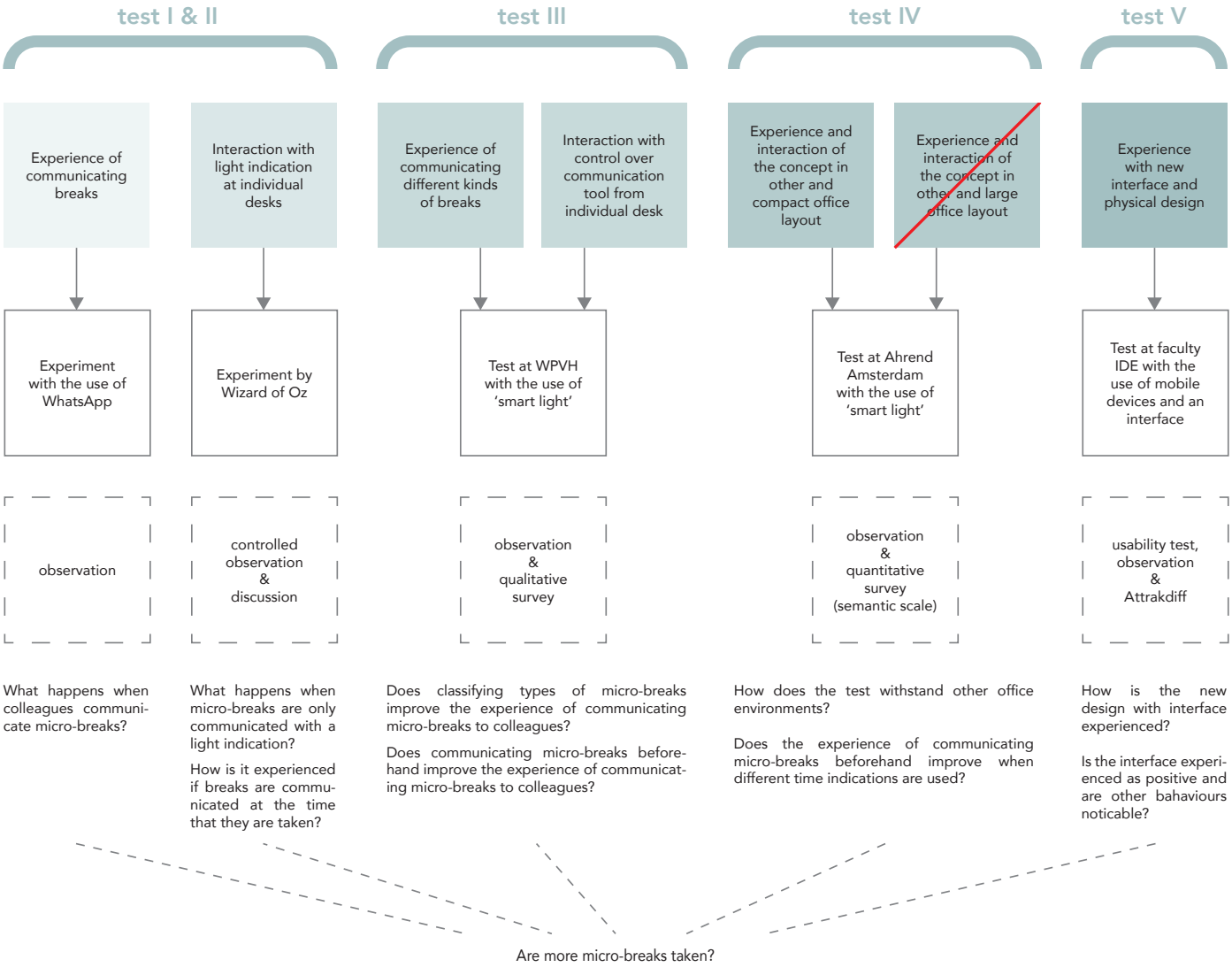
Last name First name

___ / ___ / 2023 _____

Date (dd/mm/yyyy) Signature

APPENDIX J

» *Structure of studies.*



APPENDIX K1

» *Smart light experiment consent form.*

Promoting psychosocial well-being at the workplace

This research is conducted as part of the MSc study Industrial Design Engineering at TU Delft.

Student: Gijs Wels

Contact person: Gijs Wels

Informed consent participant

I participate in this research voluntarily.

I acknowledge that I received sufficient information and explanation about the research and that all my questions have been answered satisfactorily. I was given sufficient time to consent to my participation. I can ask questions for further clarification at any moment during the research.

I am aware that this research consists of the following activities:

1. A test about communicating micro-breaks at work.
    a. With smart lights at desks.
2. Downloading the 'Smart Life' application on a personal mobile device.
    a. Making an account in the Smart Life app
    b. Being added to a Smart Life 'family'
3. Observing employee behaviour and group dynamics.
4. A survey about experiences.

I am aware that data will be collected during the research, such as notes, photos, video and/or audio recordings. I permit to collect this data and to make photos, audio and/or video recordings during the research. Data will be processed and analysed anonymously (without your name or other identifiable information). The data will only be accessible to the research team and their TU Delft supervisors.

The photos, video and/or audio recordings will be used to support analysis of the collected data. The video recordings and photos can also be used to illustrate research findings in publications and presentations about the project.

I permit the use of photos and audio recordings of my participation:
(select what applies to you)

- ☐ in which I am recognisable in publications and presentations about the project.
- ☐ in which I am not recognisable in publications and presentations about the project.
- ☐ for data analysis only and not for publications and presentations about the project.

I permit to storage of the data for a maximum of 6 months after completion of this research and using it for educational and research purposes.

I acknowledge that no financial compensation will be provided for my participation in this research.

With my signature, I acknowledge that I have read the provided information about the research and understand the nature of my participation. I understand that I am free to withdraw and stop participation in the research at any given time. I understand that I am not obliged to answer questions which I prefer not to answer, and I can indicate this to the research team.

I will receive a copy of this consent form.

_____ _____

Last name First name

___ / ___ / 2023 _____

Date (dd/mm/yyyy) Signature

APPENDIX K2

» *Smart light experiment ethics checklist.*

Research Ethics Checklist for the Master Thesis of Gijs Wels

The research consists of qualitative interviews with subjects who work in office environments and experts in the field of psychosocial workplace well-being. The interview are

	Project Title	Promoting psychosocial well-being at the workplace
	Chair	David Keyson
	Mentor	Gonny Hoekstra
	Planned research start date	18/12/2023 - 22/12/2023
	Student name	Gijs Wels
1	Please briefly summarise your research, describe:	A qualitative interview about well-being and micro-breaks, to find specific obstacles and proceed with the ideation phase.
1a	research question(s)	1. What are specific office problems that hinder employee (psychosocial) well-being?
		a. How can micro-breaks be implemented in daily routines of people who work in office environments?
		b. How can micro-breaks help employees to gain better (psychosocial) well-being?
1b	who will be your participants	Employees in an office environment
1c	number of participants	min of 5 - max of 10
1d	research methods (activities & tasks)	Qualitative interview and observation/photographing of the workplace

		Y/N	
2	Does the study involve children or teenagers (<18 year)?	N	* IF YES: CONSENT FOR PARTICIPATION NEEDS TO BE GIVEN BY BOTH THE CHILD (FROM AGE 6, VERBAL CONSENT IS SUFFICIENT) AND THE PARENT, WHO NEEDS TO GIVE WRITTEN CONSENT
3	Does the study involve other types of participants who are particularly vulnerable or unable to give informed consent (e.g., people with learning difficulties, people living in care or nursing homes)?	N	* IF YES: THE RESEARCHER SHOULD EXPLAIN IN THE INFORMED CONSENT IN DETAIL THE STUDY PROCEDURE AND THE POTENTIAL RISKS (TAKING INTO CONSIDERATION THEIR VULNERABILITY) IN SIMPLE TO COMPREHEND TERMS TO ENSURE THAT THE PARTICIPANT KNOWS WHAT (S)HE IS AGREEING TO * IF THERE IS A PERSON ENTITLED TO TAKE DECISIONS FOR THE (VULNERABLE) PARTICIPANT (E.G. FAMILY MEMBER), THIS PERSON ALSO NEEDS TO GIVE WRITTEN CONSENT
4	Does the study involve investigating participants without their knowledge and consent at the time the study takes place (e.g., observation studies)? *If yes, can you change your study design in such a way that participants are able to give consent beforehand?*	N	* IF YOU CAN CHANGE YOUR STUDY DESIGN, UPDATE THE METHODS AND FILL IN THE CHECKLIST BASED ON THE NEW PROCEDURES * IF CASE OF DEVIATION: ADD EXPLANATION
5	Will the study involve actively deceiving the participants (e.g., will participants be deliberately falsely informed, will information be withheld from them or will they be misled)? *If yes, can you change your study design in such a way that participants are not deceived?* *If you cannot change your study design, is it likely that the deception will lead to unease with participants after debriefing them afterwards about the actual motivation of the study and the necessity of the deception?*	N	* IF YOU CAN CHANGE YOUR STUDY DESIGN, UPDATE THE METHODS AND FILL IN THE CHECKLIST BASED ON THE NEW PROCEDURES * IN CASE OF DEVIATION: ADD EXPLANATION
6	Will the study involve discussion or collection of information on sensitive topics? (e.g., sexual activity, drug use, mental health)	N	The interview is partly about burn-out related symptoms. It is emphazised to the interviewee that answering the questions is not mandatory and they can indicate if they experience it as private or unpleasant.
7	Will drinks, food or food constituents be administered to the study participants as part of the research? *If yes, are these drinks, food, or food constituents available in European stores? (thereby complying to the standard food safety requirements)*	N	
8	Will participants be asked to perform tasks that are invasive (e.g., damaging the skin) or involve collection of blood or tissue samples from participants?	N	* IF YES: THE RESEARCH NEEDS TO BE SUBMITTED TO THE HREC
9	Is pain or a more than mild discomfort for the participants likely to result from the study? *If yes, can you change your study design in such a way that experiencing pain or discomfort is not needed or less likely?*	N	* IF YOU CAN CHANGE YOUR STUDY DESIGN, UPDATE THE METHODS AND FILL IN THE CHECKLIST BASED ON THE NEW PROCEDURES * IN CASE OF DEVIATION: ADD EXPLANATION
10	Does the study risk causing psychological stress or anxiety or other harm or negative consequences beyond that normally encountered by the participants in their life outside research? *If yes, can you change your study design in such a way that experiencing psychological stress, anxiety or other harm or negative consequences is not needed or less likely?*	N	* IF YOU CAN CHANGE YOUR STUDY DESIGN, UPDATE THE METHODS AND FILL IN THE CHECKLIST BASED ON THE NEW PROCEDURES * IN CASE OF DEVIATION: ADD EXPLANATION
11	Will financial inducement (other than a reasonable compensation for time) be offered to participants?	N	
12	Will you collect and store videos, pictures, or other directly identifiable data (e.g., name, address, phone number) of human subjects in your research?	Y	* IF YES: THE PARTICIPANTS NEED TO GIVE WRITTEN PERMISSION
13	Will this directly identifiable data be kept longer than 6 months? *If yes, explain why it is necessary to keep this data longer than 6 months.*	N	* IF YES: THE PARTICIPANTS NEED TO GIVE WRITTEN PERMISSION IN THE INFORMED CONSENT FORM TO STORE THEIR INFORMATION FOR LONGER THAN 6 MONTHS * IF YES: ADD EXPLANATION
14	What measures will you take to respect the participants' privacy during the research activities and when reporting about the research results (i.e., process identifiable data confidentially and de-identified, obtaining consent to use photos in reports)?		* PARTICIPANTS NEED TO GIVE WRITTEN PERMISSION IN THE INFORMED CONSENT TO REPORT ANY IDENTIFIABLE DATA MORE SPECIFICALLY, THE INFORMED CONSENT FORM NEEDS TO DESCRIBE IN DETAIL WHAT WILL BE SHOWN IN THE PICTURES OR VIDEOS AND THE SPECIFIC OUTLETS (E.G. YOUTUBE, NEWSPAPERS) IN WHICH THE DATA WILL BE PRESENTED NOTE THAT THIS ALSO INCLUDES APPROPRIATE PRIVACY MEASURES ANTICIPATING HANDING OVER REPORTS AND PRESENTATION FILES TO YOUR CLIENT No real names, but only participant numbers and using SURFdrive.
15	How will you store your research data and who will have access to the data?		Using SURFdrive and only I will have access.
16	Will the experiment involve the use of devices that are not 'CE' certified? *If yes, is the device a preliminary mock up prototype that is made up out of flexible materials, such as paper, carton board, and foam and that does not contain any sharp edges?*	N	* IF NO (NO CARDBOARD OR FOAM MODEL): HAVE THE DEVICE BEEN INSPECTED BY A SAFETY EXPERT AT TU DELFT (E.G. PMB, COACH) ONLY IF (S)HE SIGNS THE SAFETY REPORT AND THUS AGREES THAT NO HAZARDS ARE LIKELY TO BE PRESENT WHEN USING THE DEVICE, THE DEVICE CAN BE USED ON HUMAN SUBJECTS FOR RESEARCH PURPOSES HAND IN THE SIGNED SAFETY REPORT TOGETHER WITH THIS ETHICS FORM TO YOUR EXPERT/COACH
17	What measures will you take to respect the participants safety in your research (i.e., checking well-being, inform about relevant information)?		Not applicable.

APPENDIX K3

» *Smart light experiment participants list.*

Participant *(nr.)*	**Age** *(young adult/adult)**	**Gender** *(m/f)*
001	young adult	m
002	young adult	m
003	young adult	m
004	young adult	m
005	young adult	m
006	young adult	f
007	young adult	f
008	young adult	f
009	young adult	f
010	young adult	f

* Age: young adult = 18 – 35 years old; adult > 35 years old.

» *Desk lights experiment survey questions.*

Micro-Breaks and Desk Lights Test

Hi all! Thank you for participating in testing this idea. The lights of course haven't taken the form of a product yet, but I wanted to test the functionality and take a look at the behaviour. Now, I'm really curious about your experience and thoughts.

The first set of questions is about how you feel at work/study in general. The second set of questions is about the test and the product.

Thanks in advance!

* Verplichte vraag

1. But first, did you participate in the test on Wednesday, Thursday or both? *

Markeer slechts één ovaal.

- ◯ Wednesday
- ◯ Thursday
- ◯ Both

General Questions

Questions about your experience at work/study in general.

2. How often do you experience stress at or because of work/study? *

1 = Never
2 = Sporadically
3 = Every month
4 = Every week
5 = Always

Markeer slechts één ovaal.

	1	2	3	4	5	
Nev	◯	◯	◯	◯	◯	Always

3. Do you experience autonomy at work/study? *

Markeer slechts één ovaal.

- Yes
- No
- Sometimes

4. Do you feel free to take breaks during a work/study day? *

Markeer slechts één ovaal.

- Yes
- No
- Sometimes

5. How often do you take a micro-break during a work/study day? A micro-break is a break of 2 - 10 minutes and specifically NOT work-related, try to make an estimation. *

Markeer slechts één ovaal.

- 1-3
- 4-6
- 7-9
- 10-12
- >12

6. How hard do you find it to make social interaction during these breaks because of how the office is organised/lay-out? *

1 = It's not hard
2 = Sometimes difficult
3 = It's hard

Markeer slechts één ovaal.

	1	2	3	
Fine	◯	◯	◯	Hard

7. How hard do you find it to make social interaction during these breaks because of the difference in work rhythm? *

1 = It's not hard
2 = Sometimes difficult
3 = It's hard

Markeer slechts één ovaal.

	1	2	3	
Fine	◯	◯	◯	Hard

8. How hard do you find it to make social interaction during these breaks because of personal characteristics? *

1 = It's not hard
2 = Sometimes difficult
3 = It's hard

Markeer slechts één ovaal.

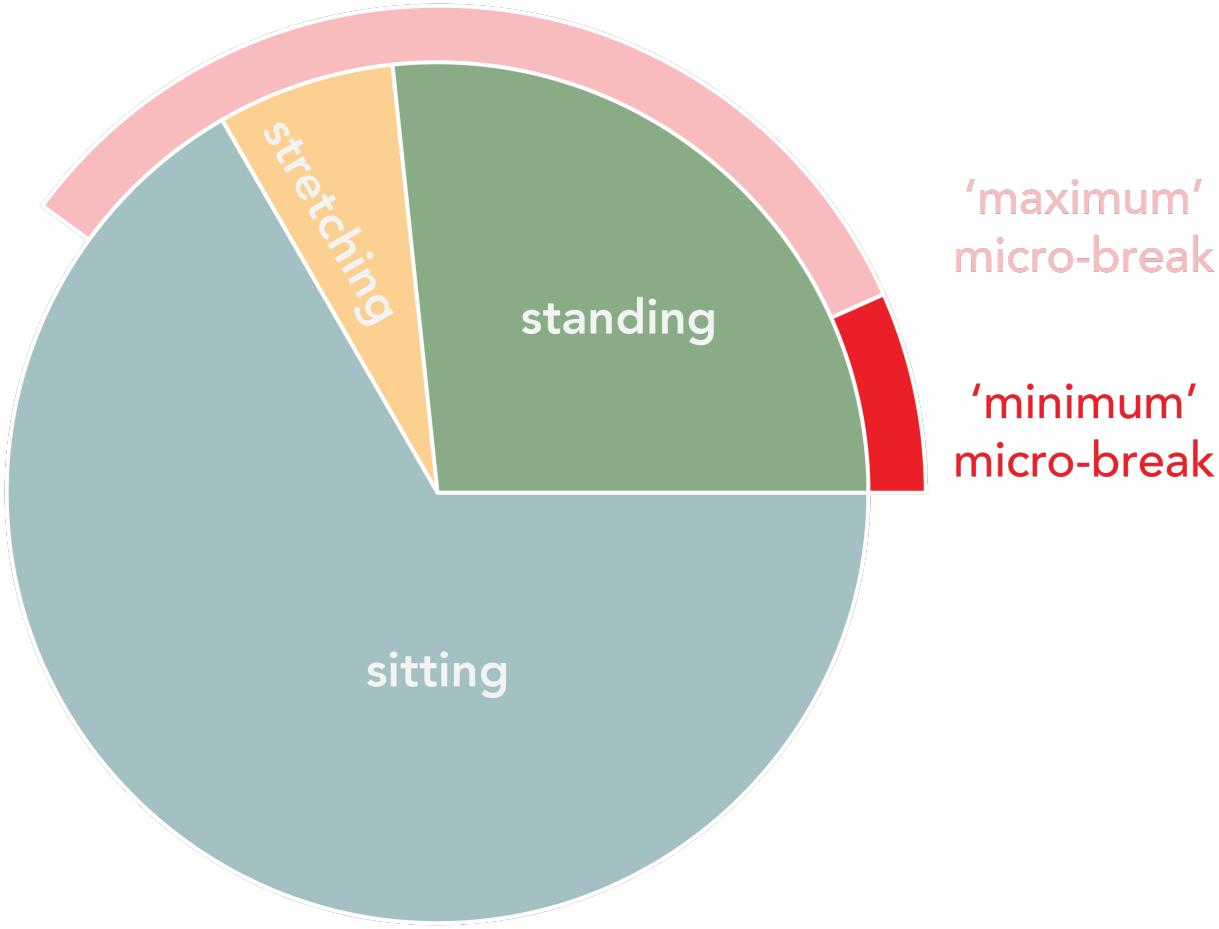
	1	2	3	
Fine	◯	◯	◯	Hard

9. Do you think micro-breaks help to restore your energy level? *

Markeer slechts één ovaal.

◯ Yes
◯ No

This is an ideal division of a working day. The next question is about the amount of time spent on micro-breaks during the day. A micro-break is a break between 2 and 10 minutes without any work-related activities.



10. If you look at the ideal division of a workday, at least 10% should be focused on micro-breaks. So, if you have a workday of 7,5 hours, there would be 45 minutes of micro-breaks. Do you think, in general, that you spent at least 10% of a working day on breaks? Lunch NOT included! *

Markeer slechts één ovaal.

- ◯ Yes
- ◯ No

11. Do you personally think that you take enough micro-breaks during the day or would you like to focus more on taking breaks? *

Markeer slechts één ovaal.

- ◯ Yes, I take enough breaks from work.
- ◯ No, I would like to focus more on taking breaks.

12. How did it feel to know that people are having a break? *

13. How did it feel to let people know that you want to have a break? *

14. Did it make you more aware of your work rhythm? *

15. Did it make you want to join the break? *

16. What do you think of this way of communicating? *

17. What do you think of the way the information is provided, so, with a light? *

18. What do you think of the distinction made in micro-breaks? So, the different colours: *

Green = to walk
Blue = to conversate
Red = to drink

Do you see a different division of types of micro-breaks?

19. If you could change this idea, how would you want to change it? *

20. If this product was around, would you use it? *

Markeer slechts één ovaal.

- No
- Yes, I would use it.
- Yes, I would really like to have this product!

21. Did it make you have more breaks? *

Markeer slechts één ovaal.

- No
- Yes

22. Did it make you have more social interaction during breaks? *

Markeer slechts één ovaal.

- No
- Yes

23. Did it lower the threshold for you to have a break? *

Markeer slechts één ovaal.

- No
- Yes

APPENDIX L1

» *Different environment experiment participants list.*

Participant *(nr.)*	**Age** *(young adult/adult)**	**Gender** *(m/f)*
001	young adult	m
002	young adult	f
003	young adult	f
004	young adult	f
005	adult	m
006	adult	f
007	adult	f
008	adult	f
009	adult	f
010	adult	f

* Age: young adult = 18 – 35 years old; adult > 35 years old.

» *Different environment experiment survey questions.*

Communicating micro-breaks/ Micro-Breaks communiceren

Hello everyone! Thank you for participating in testing this idea. The lamps have of course not yet taken the form of a product, but I mainly wanted to test the functionality and see the behaviour. Now I am very curious about your experiences and thoughts.

The survey looks like this: First I give a brief explanation of the idea based on an initial prototype. Then there are 3 general multiple-choice questions. Then 11 questions where I ask you to indicate your experience on a scale. And then 1 open question for comments. It will take about 5-10 minutes!

Thanks in advance!

Dag Allemaal! Bedankt voor jullie deelname aan het testen van dit idee. De lampen hebben uiteraard nog niet de vorm van een product aangenomen, maar ik wilde voornamelijk de functionaliteit testen en het gedrag bekijken. Nu ben ik erg benieuwd naar jouw ervaringen en gedachten.

De enquête ziet er als volgt uit. Eerst geef ik een korte uitleg van het idee aan de hand van een eerste prototype. Dan zijn er 3 algemene meerkeuze vragen. Dan 11 vragen waarbij ik vraag om op een schaal je ervaring aan te geven. En dan nog 1 open vraag voor commentaar. Het zal ongeveer 5-10 minuten kosten!

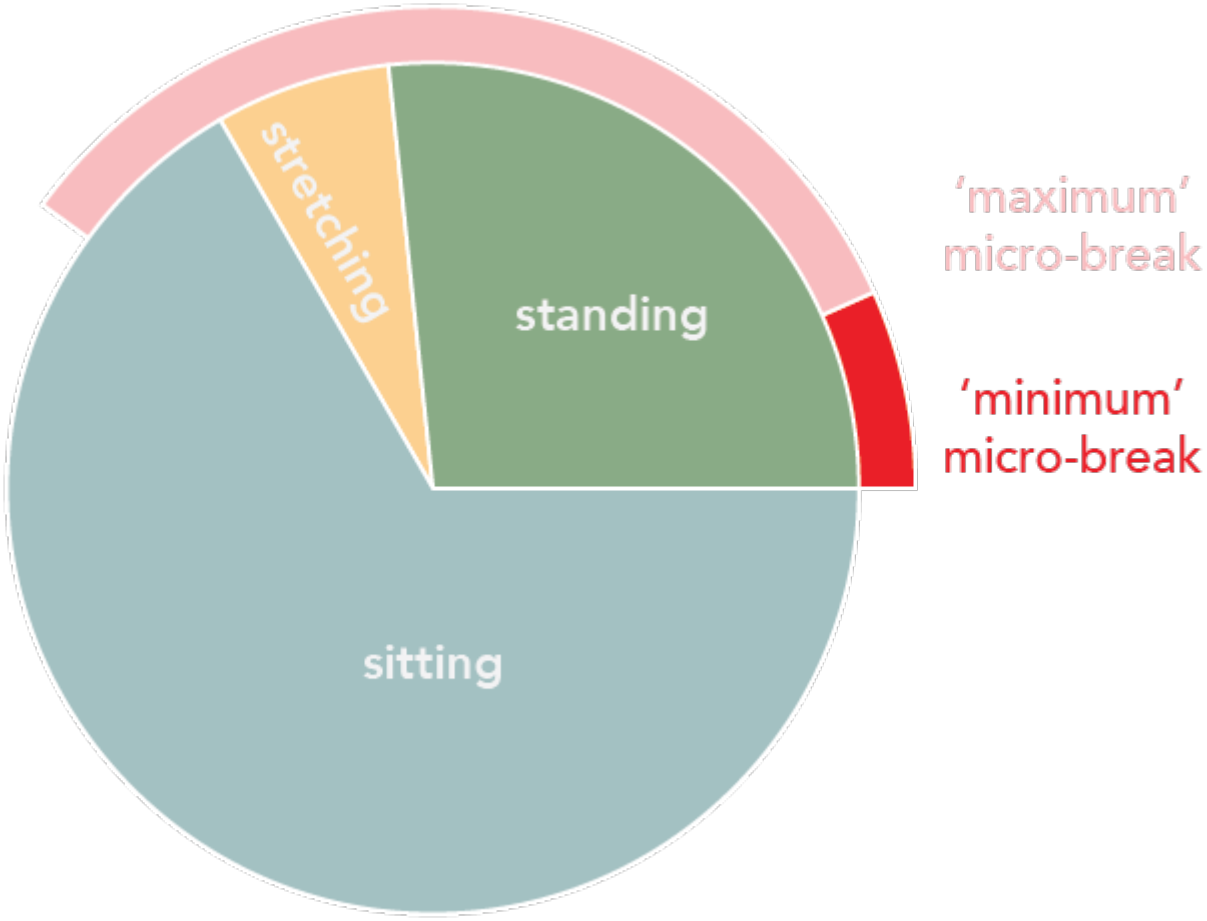
Bij voorbaat bedankt!

* Verplichte vraag

A first prototype. Een eerste prototype.

http://youtube.com/watch?v=bUqNF1jup20

This is an ideal division of a working day.
Dit is een ideale indeling van een werkdag.



Explanation workday division. Uitleg werkdagindeling.

A micro-break is a break between 2 and 10 minutes without any work-related activities. If you look at the ideal division of a workday, at least 10% should be focused on micro-breaks. And besides that, you should take a break after every 20 to 30 minutes of work. To keep your energy level balanced.

Een micropauze is een pauze tussen de 2 en 10 minuten zonder werkgerelateerde activiteiten. Als je kijkt naar de ideale verdeling van een werkdag, zou minimaal 10% gericht moeten zijn op micro-breaks. En daarnaast moet je idealiter na elke 20 tot 30 minuten werken een pauze nemen om je energieniveau in balans te houden.

1. So, if you have a workday of 7,5 hours, there would be 45 minutes of micro-breaks. Do you think, in general, that you spend at least 10% of a working day on breaks? Lunch NOT included! *

   Op een werkdag van 7,5 uur, zijn er dus idealiter 45 minuten van besteed aan micro-breaks. Denkt je dat je in het algemeen minimaal 10% van de werkdag aan pauzes besteedt? Lunch NIET inbegrepen!

   Markeer slechts één ovaal.

   - ◯ Yes
   - ◯ No

2. Do you think micro-breaks would help you to keep your energy balanced? *

   Denk je dat micro-breaks je zouden helpen om je energieniveau gebalanceerd te houden?

   Markeer slechts één ovaal.

   - ◯ Yes (ja)
   - ◯ Sometimes (soms)
   - ◯ No (nee)

3. Do you personally think that you take enough micro-breaks during the day or would you like to focus more on taking breaks? *

   Vind jij persoonlijk dat je voldoende micro-breaks neemt gedurende de dag of wil je je meer focussen op het nemen van pauzes?

   Markeer slechts één ovaal.

   - ◯ Yes, I take enough breaks from work. (Ja, ik vind dat ik er genoeg neem.)
   - ◯ No, I would like to focus more on taking breaks. (Nee, ik zou meer willen letten op het nemen van pauze.)

Reflective (Reflecterend)

I'd like to know what you thought of the concept. For this, I use a semantic scale to provide a better user experience in subsequent designs. There are on both sides of the scale two opposites/antonyms and I would like to know in which direction your experience is. I divided the coming 11 questions into 3 parts; reflective, behaviour, and visceral.

Ik wil graag weten wat jullie van het concept vonden. Hiervoor gebruik ik een semantische schaal om in vervolgontwerpen een betere gebruikerservaring te bieden. Op de schaal staan aan weerszijde twee tegenovergestelde/antoniemen en ik wil graag weten in welke richting jullie ervaring ligt. Ik het de volgende 11 vragen verdeeld in 3 delen; reflecterend op het concept, gedrag bij gebruik en je gevoel.

4. Do you think it could work? *
   Denk je dat het zou kunnen werken?

   Markeer slechts één ovaal.

	1	2	3	4	5	
Will	◯	◯	◯	◯	◯	Will definitely work (zal zeker werken)

5. Do you think it could work? *
   Denk je dat het zou kunnen werken?

   Markeer slechts één ovaal.

	1	2	3	4	5	
Will	◯	◯	◯	◯	◯	Will definitely work (zal zeker werken)

6. Do you think you would use it? *
   Denk je dat je het zou gebruiken?

   Markeer slechts één ovaal.

	1	2	3	4	5	
Will	◯	◯	◯	◯	◯	Will definitely use it (zal het zeker gebruiken)

Behavioural (gedrag)

7. How did you experience the concept? *
Hoe heb je het concept ervaren?

Markeer slechts één ovaal.

	1	2	3	4	5	
Frus	◯	◯	◯	◯	◯	Enjoyable (plezierig)

8. How did you experience the concept? *
Hoe heb je het concept ervaren?

Markeer slechts één ovaal.

	1	2	3	4	5	
Non	◯	◯	◯	◯	◯	Intuitive (intuïtief)

9. How did you experience the concept? *
Hoe heb je het concept ervaren?

Markeer slechts één ovaal.

	1	2	3	4	5	
Unle	◯	◯	◯	◯	◯	Leerbaar (leerbaar)

10. How did you experience the concept? *
Hoe heb je het concept ervaren?

Markeer slechts één ovaal.

	1	2	3	4	5	
Cha	◯	◯	◯	◯	◯	Structured (gestructureerd)

11. How did you experience the concept? *
Hoe heb je het concept ervaren?

Markeer slechts één ovaal.

	1	2	3	4	5	
Indiv	◯	◯	◯	◯	◯	Socially interactive (sociaal interactief)

12. How did you experience the concept? *
Hoe heb je het concept ervaren?

Markeer slechts één ovaal.

	1	2	3	4	5	
Lack	◯	◯	◯	◯	◯	Enough feedback (genoeg feedback)

13. How did you experience the concept? * 21-05-
Hoe heb je het concept ervaren?

Markeer slechts één ovaal.

	1	2	3	4	5	
Para	◯	◯	◯	◯	◯	Creates awareness (creëert bewustzijn)

Visceral (gevoel)

14. What do you feel when communicating? *
Wat voel je tijdens het communiceren?

Markeer slechts één ovaal.

	1	2	3	4	5	
Intru	◯	◯	◯	◯	◯	Non-intrusive (niet opdringerig)

15. What do you feel when communicating? *
Wat voel je tijdens het communiceren?

Markeer slechts één ovaal.

	1	2	3	4	5	
Unsa	◯	◯	◯	◯	◯	Satisfying (bevredigend)

Thank you!

Thank you very much for your feedback! Fortunately, I am a little closer to the end of my graduation project. I'd love to hear if you have any comments, ideas or anything along those lines! All comments are welcome.

Ontzettend bedankt voor je feedback! Ik ben gelukkig weer iets dichterbij het einde van mijn afstudeerproject. Ik hoor het graag als je op-, aanmerkingen, ideeën, dingen die je zou willen veranderen aan het concept of iets in die richting hebt! Al het commentaar is welkom.

16. Any comments? *
Commentaar?

APPENDIX L3

» *Different environment experiment results.*

Reflective

will not work	○	3	3	4	○	will definitely work
will not use it	○	3	3	4	○	will definitely use it

Behavioural

frustrating	○	○	4	3	3	enjoyable
non-intuitive	○	3	3	3	1	intuitive
unlearnable	○	○	2	6	2	learnable
chaotic	○	3	3	3	1	structured
individual	○	○	2	6	2	socially interactive
lack of feedback	○	3	2	4	1	enough feedback
paralyses consciousness	○	2	1	6	1	creates awareness

Visceral

intrusive	○	2	2	3	3	non-intrusive
unsatisfying	○	2	5	2	1	satisfying

APPENDIX M1

» *Interface experiment participants list.*

Participant *(nr.)*	**Situation** *(1/2)* *	**Environment** *(1/2/3)* **	**Age** *(young adult/adult)**	**Gender** *(m/f)*
001	1	1	adult	f
002	1	1	young adult	f
003	1	1	young adult	m
004	2	2	adult	f
005	2	2	adult	f
006	2	2	adult	f
007	2	3	young adult	m
008	2	3	young adult	m
009	2	3	young adult	m
010	2	3	young adult	f

* Situation: 1 = not a connected interface; 2 = connected web application.

** Environment: 1 = same room; 2 = different rooms; 3 = same office but out of sight.

APPENDIX M2

» *Interface experiment consent form for the first group.*

Promoting psychosocial well-being at the workplace

This research is conducted as part of the MSc study Industrial Design Engineering at TU Delft.

Student: Gijs Wels

Contact person: Gijs Wels

Informed consent participant

I participate in this research voluntarily.

I acknowledge that I received sufficient information and explanation about the research and that all my questions have been answered satisfactorily. I was given sufficient time to consent to my participation. I can ask questions for further clarification at any moment during the research.

I am aware that this research consists of the following activities:

1. A test about communicating micro-breaks at work.
2. A mobile device is used to test the interface.
    a. A device can be provided when a personal device is needed during the workday.
3. The main objective of the test is the experience with the designed interface.
    a. The application is not connected.
    b. It is necessary to speak actions out loud when using the interface.
4. Observing employee behaviour and group dynamics.
5. A survey about experiences.

I am aware that data will be collected during the research, such as notes, photos, video and/or audio recordings. I permit to collect this data and to make photos, audio and/or video recordings during the research. Data will be processed and analysed anonymously (without your name or other identifiable information). The data will only be accessible to the research team and their TU Delft supervisors.

The photos, video and/or audio recordings will be used to support analysis of the collected data. The video recordings and photos can also be used to illustrate research findings in publications and presentations about the project.

I permit the use of photos and audio recordings of my participation:
(select what applies to you)

- ☐ in which I am recognisable in publications and presentations about the project.
- ☐ in which I am not recognisable in publications and presentations about the project.
- ☐ for data analysis only and not for publications and presentations about the project.

I permit to storage of the data for a maximum of 6 months after completion of this research and using it for educational and research purposes.

I acknowledge that no financial compensation will be provided for my participation in this research.

With my signature, I acknowledge that I have read the provided information about the research and understand the nature of my participation. I understand that I am free to withdraw and stop participation in the research at any given time. I understand that I am not obliged to answer questions which I prefer not to answer, and I can indicate this to the research team.

I will receive a copy of this consent form.

_____ _____

Last name First name

___ / ___ / 2023 _____

Date (dd/mm/yyyy) Signature

APPENDIX M3

» *Interface experiment consent form for the second and third group.*

Promoting psychosocial well-being at the workplace

This research is conducted as part of the MSc study Industrial Design Engineering at TU Delft.

Student: Gijs Wels

Contact person: Gijs Wels

Informed consent participant

I participate in this research voluntarily.

I acknowledge that I received sufficient information and explanation about the research and that all my questions have been answered satisfactorily. I was given sufficient time to consent to my participation. I can ask questions for further clarification at any moment during the research.

I am aware that this research consists of the following activities:

1. A test about communicating micro-breaks at work.
2. A mobile device is used to test the interface.
    a. A device can be provided when a personal device is needed during the workday.
3. The main objective of the test is the experience with the designed interface.
    a. The application is connected, and actions will be shown on other devices in the form of invites.
4. Observing employee behaviour and group dynamics.
5. A survey about experiences.

I am aware that data will be collected during the research, such as notes, photos, video and/or audio recordings. I permit to collect this data and to make photos, audio and/or video recordings during the research. Data will be processed and analysed anonymously (without your name or other identifiable information). The data will only be accessible to the research team and their TU Delft supervisors.

The photos, video and/or audio recordings will be used to support analysis of the collected data. The video recordings and photos can also be used to illustrate research findings in publications and presentations about the project.

I permit the use of photos and audio recordings of my participation:
(select what applies to you)

- ☐ in which I am recognisable in publications and presentations about the project.
- ☐ in which I am not recognisable in publications and presentations about the project.
- ☐ for data analysis only and not for publications and presentations about the project.

I permit to storage of the data for a maximum of 6 months after completion of this research and using it for educational and research purposes.

I acknowledge that no financial compensation will be provided for my participation in this research.

With my signature, I acknowledge that I have read the provided information about the research and understand the nature of my participation. I understand that I am free to withdraw and stop participation in the research at any given time. I understand that I am not obliged to answer questions which I prefer not to answer, and I can indicate this to the research team.

I will receive a copy of this consent form.

_____ _____

Last name First name

___ / ___ / 2023 _____

Date (dd/mm/yyyy) Signature

» *Interface experiment survey questions.*

Micro-Break Application Test Survey

Hello! Thank you for participating in
testing my idea. Some of you have only worked with an interface that is not connected and others with a functioning app. I will shortly show you the differences in a video below.

With this survey, I would like to learn about your experiences. The first part, therefore, will focus on that and the second part of the survey will focus more on the interface and product.

Thanks in advance!

Hallo! Bedankt voor je deelname aan het testen van mijn idee. Sommigen van jullie hebben alleen gewerkt met een interface die niet gekoppeld is en anderen met een functionerende app. In onderstaande video laat ik je kort de verschillen zien.

Met deze enquête wil ik graag weten wat uw ervaringen zijn. Het eerste deel zal zich daar dan ook op richten en het tweede deel van het onderzoek zal zich meer op de interface en het product richten.

Alvast bedankt!

* Verplichte vraag

Concept video

The concept consists of an interface as shown in video 1 and a connected functionality which is shown in video 2. It will eventually be designed into a small round product that you can place anywhere you want, see images.

Het concept bestaat uit een interface zoals weergegeven in video 1 en een gekoppelde functionaliteit die wordt weergegeven in video 2. Het zal uiteindelijk worden ontworpen tot een klein rond product dat je overal kunt plaatsen, zie afbeeldingen.

The interface of the micro-break communication app.
De interface van de micro-break-communicatie-app.

00:00 - Home screen (Beginscherm)
00:15 - Chat break (Kletspauze)
00:40 - Drink break (Koffiepauze)
01:02 - Game break (Spelpauze)
01:20 - Walk break (Wandelpauze)
01:33 - Invite accepted (Uitnodiging accepteren)
01:48 - Invite declined (Uitnodiging weigeren)

http://youtube.com/watch?v=adh_L8qfO8M

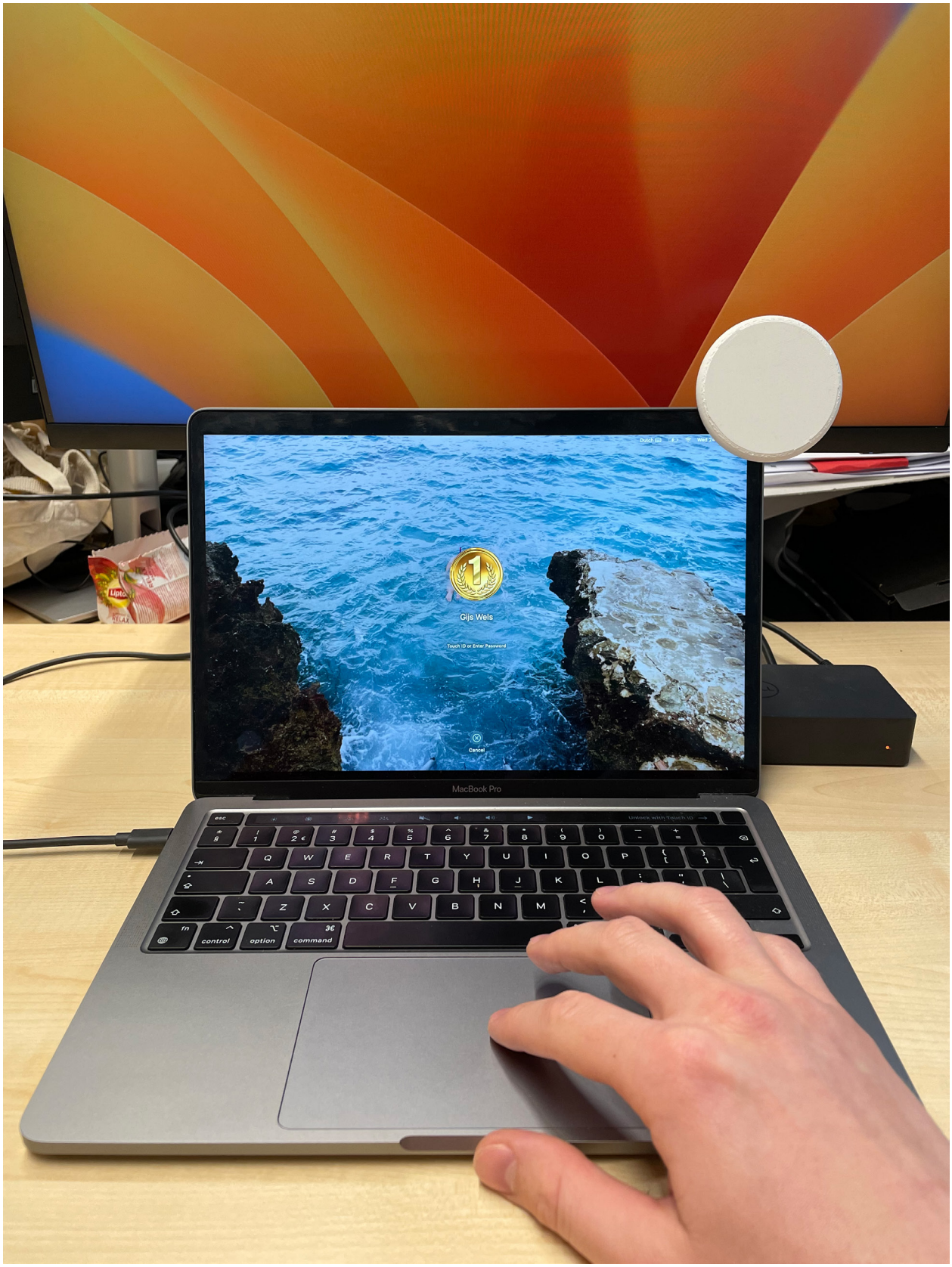
Working send & receive functionality of the app.
Werkende verzend & ontvang functionaliteit van de app.

00:00 - One invites the other for a drink in 5 min. (Een nodigt ander uit)
00:35 - Other invites for a walk now. (En omgekeerd)
01:25 - Countdown has ended. (Aftellen is gestopt)


http://youtube.com/watch?v=ljhM7mHi5tI

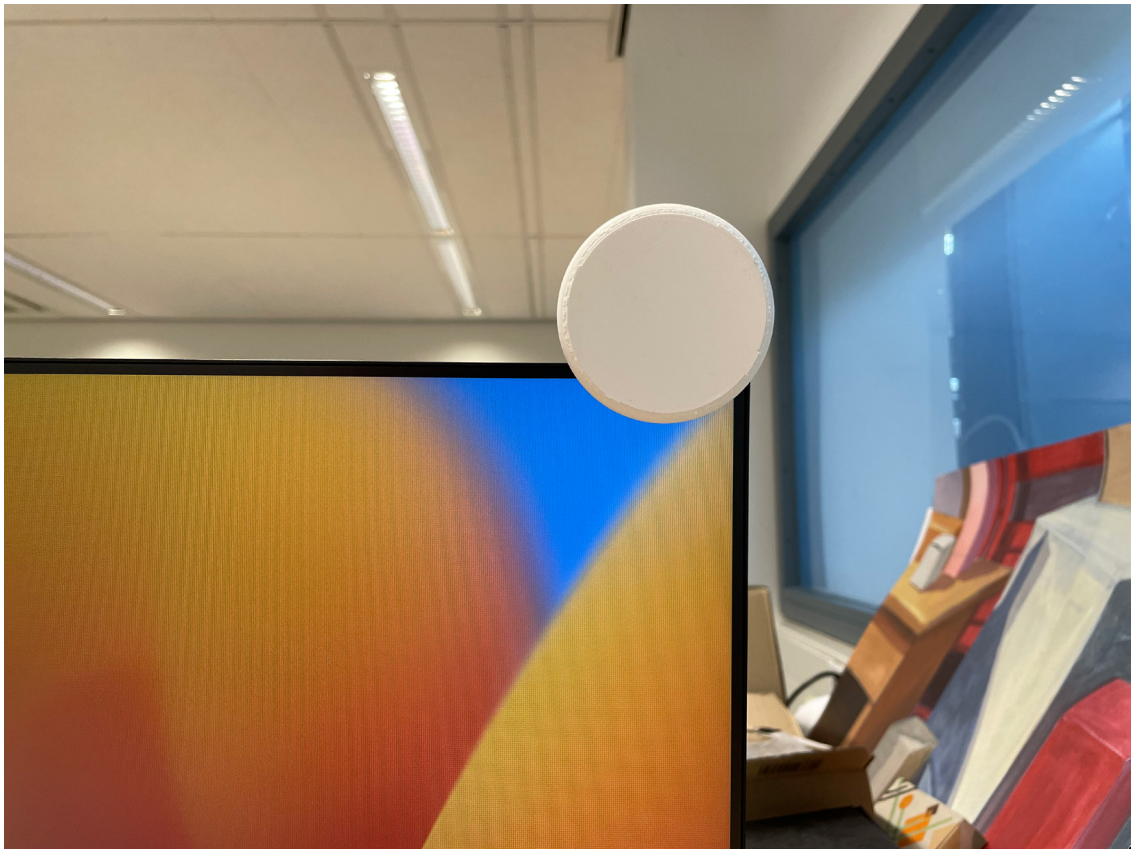
Eventually, it will turn into a small round device with touchscreen.
Uiteindelijk zal het gevormd worden tot een klein rond apparaat met touchscreen.

You can attach it to your laptop.
Je kunt hem aan je laptop bevestigen.



Or just lay it next to you on your desk.
Of leg hem gewoon naast je op je bureau.

Or attach it to your second screen, or desk dividing screen.
Of bevestig hem aan je tweede scherm of bureauscheidingsscherm.



Experiences - Ervaringen

The coming 10 questions are about your experience during the test. The questions focus on three different topics: reflective, behavioural and visceral.

De komende 10 vragen gaan over uw ervaring tijdens de test. De vragen richten zich op drie verschillende onderwerpen: reflectie, gedrag en gevoel.

1. Reflecting on the test. *
   Reflecteren op de test.

   Markeer slechts één ovaal.

	1	2	3	4	5	
Will	◯	◯	◯	◯	◯	Will definitely work (zal zeker werken)

2. Reflecting on the test. *
   Reflecteren op de test.

   Markeer slechts één ovaal.

	1	2	3	4	5	
Will	◯	◯	◯	◯	◯	Will definitely use it (zal het zeker gebruiken)

3. Reflecting on the test. *
   Reflecteren op de test.

   Markeer slechts één ovaal.

	1	2	3	4	5	
Frus	◯	◯	◯	◯	◯	Enjoyable (plezierig)

4. Behavioural experience during the test. *
Gedragservaring tijdens de test.

Markeer slechts één ovaal.

	1	2	3	4	5	
Non	◯	◯	◯	◯	◯	Intuitive (intuïtief)

5. Behavioural experience during the test. *
Gedragservaring tijdens de test.

Markeer slechts één ovaal.

	1	2	3	4	5	
Unle	◯	◯	◯	◯	◯	Leerbaar (leerbaar)

6. Behavioural experience during the test. *
Gedragservaring tijdens de test.

Markeer slechts één ovaal.

	1	2	3	4	5	
Cha	◯	◯	◯	◯	◯	Structured (gestructureerd)

7. Behavioural experience during the test. *
Gedragservaring tijdens de test.

Markeer slechts één ovaal.

	1	2	3	4	5	
Indi	◯	◯	◯	◯	◯	Socially interactive (sociaal interactief)

8. Behavioural experience during the test. *
Gedragservaring tijdens de test.

Markeer slechts één ovaal.

	1	2	3	4	5	
Lack	◯	◯	◯	◯	◯	Enough feedback (genoeg feedback)

9. Behavioural experience during the test. *
Gedragservaring tijdens de test.

Markeer slechts één ovaal.

	1	2	3	4	5	
Para	◯	◯	◯	◯	◯	Creates awareness (creëert bewustzijn)

10. Feeling during use. *
Gevoel tijdens gebruik.

Markeer slechts één ovaal.

	1	2	3	4	5	
Intru	◯	◯	◯	◯	◯	Non-intrusive (niet opdringerig)

11. Feeling during use. *
Gevoel tijdens gebruik.

Markeer slechts één ovaal.

	1	2	3	4	5	
Unsa	◯	◯	◯	◯	◯	Satisfying (bevredigend)

Product

The coming questions are about your feelings towards the design. Keep in mind the designed interface, connected functionality and the final design.

De komende vragen gaan over uw gevoelens ten opzichte van het ontwerp. Probeer hierbij de opgemaakte interface, een verbonden functionaliteit en het eindontwerp in gedachte te houden.

12. The design is.. *

Markeer slechts één ovaal.

	1	2	3	4	5	
Tecl	◯	◯	◯	◯	◯	Human (menselijk)

13. The design is.. *

Markeer slechts één ovaal.

	1	2	3	4	5	
Com	◯	◯	◯	◯	◯	Simple (simpel)

14. The design is.. *

Markeer slechts één ovaal.

	1	2	3	4	5	
Impı	◯	◯	◯	◯	◯	Practicle (praktisch)

15. The design is.. *

Markeer slechts één ovaal.

	1	2	3	4	5	
Cum	◯	◯	◯	◯	◯	Straightforward (duidelijk)

16. The design is.. *

Markeer slechts één ovaal.

	1	2	3	4	5	
Unp	◯	◯	◯	◯	◯	Predictable (voorspelbaar)

17. The design is.. *

Markeer slechts één ovaal.

	1	2	3	4	5	
Con	◯	◯	◯	◯	◯	Clearly structured (duidelijk gestructureerd)

18. The design is.. *

Markeer slechts één ovaal.

	1	2	3	4	5	
Unr	◯	◯	◯	◯	◯	Manageable (handelbaar)

19. The design is.. *

Markeer slechts één ovaal.

	1	2	3	4	5	
Isol	◯	◯	◯	◯	◯	Connective (verbindend)

20. The design is.. *

Markeer slechts één ovaal.

	1	2	3	4	5	
Unp	◯	◯	◯	◯	◯	Professional (professioneel)

21. The design is.. *

Markeer slechts één ovaal.

	1	2	3	4	5	
Tacl	◯	◯	◯	◯	◯	Stylish (stijlvol)

22. The design is.. *

Markeer slechts één ovaal.

	1	2	3	4	5	
Che	◯	◯	◯	◯	◯	Premium (waardevol)

23. The design is.. *

Markeer slechts één ovaal.

	1	2	3	4	5	
Alie	◯	◯	◯	◯	◯	Integrating (integrerend)

24. The design is.. *

Markeer slechts één ovaal.

	1	2	3	4	5	
Unp	◯	◯	◯	◯	◯	Presentable (toonbaar)

25. The design is.. *

Markeer slechts één ovaal.

	1	2	3	4	5	
Con	◯	◯	◯	◯	◯	Inventive (inventief)

26. The design is.. *

Markeer slechts één ovaal.

	1	2	3	4	5	
Unin	◯	◯	◯	◯	◯	Creative (creatief)

27. The design is.. *

Markeer slechts één ovaal.

	1	2	3	4	5	
Cau	◯	◯	◯	◯	◯	Bold (gedurfd)

28. The design is.. *

Markeer slechts één ovaal.

	1	2	3	4	5	
Con	◯	◯	◯	◯	◯	Innovative (innovatief)

29. The design is.. *

Markeer slechts één ovaal.

	1	2	3	4	5	
Dull	◯	◯	◯	◯	◯	Captivating (boeiend)

30. The design is.. *

Markeer slechts één ovaal.

	1	2	3	4	5	
Und	◯	◯	◯	◯	◯	Challenging (uitdagend)

31. The design is.. *

Markeer slechts één ovaal.

	1	2	3	4	5	
Ordi	◯	◯	◯	◯	◯	Novel (nieuw)

32. The design is.. *

Markeer slechts één ovaal.

	1	2	3	4	5	
Unp	◯	◯	◯	◯	◯	Pleasant (prettig)

33. The design is.. *

Markeer slechts één ovaal.

	1	2	3	4	5	
Ugly	◯	◯	◯	◯	◯	Attractive (aantrekkelijk)

34. The design is.. *

Markeer slechts één ovaal.

	1	2	3	4	5	
Reje	◯	◯	◯	◯	◯	Inviting (uitnodigend)

35. The design is.. *

Markeer slechts één ovaal.

	1	2	3	4	5	
Bad	◯	◯	◯	◯	◯	Good (goed)

36. The design is.. *

Markeer slechts één ovaal.

	1	2	3	4	5	
Repe	◯	◯	◯	◯	◯	Appealing (aantrekkelijk)

37. The design is.. *

Markeer slechts één ovaal.

	1	2	3	4	5	
Disc	◯	◯	◯	◯	◯	Motivating (motiverend)

Thank you so much! - Ontzettend bedankt!

Thank you so much for testing with me and filling in the questionnaire! If you have any feedback, please let me know below! Maybe you can tell me something about your personal experience or something that you would like to change or add to the concept.

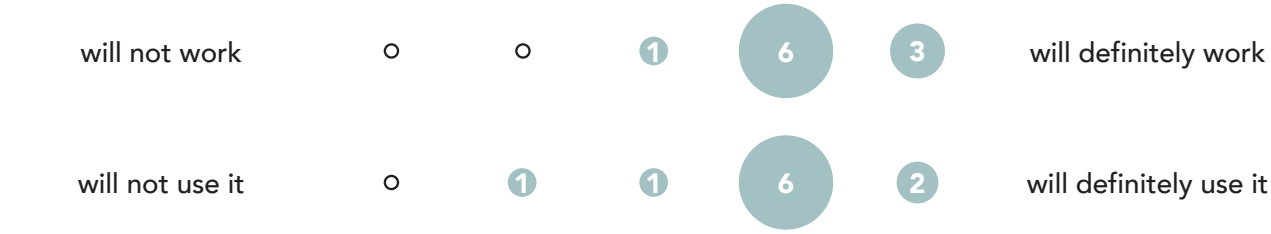
Ontzettend bedankt voor het testen en het invullen van de vragenlijst! Als je nog enige feedback hebt, laat het me aub weten hier beneden! Misschien kan je mij iets vertellen over je persoonlijke ervaring of iets dat je graag zou willen veranderen of toevoegen aan het concept.

38. Feedback? *

APPENDIX M5

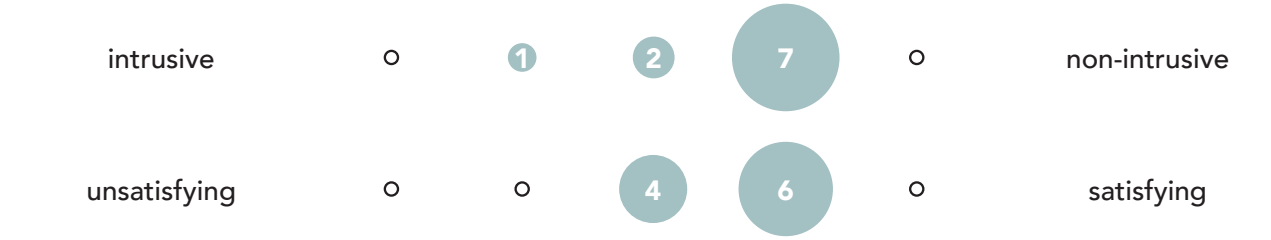
» *Interface experiment results: semantic scale based on Norman's levels of design and Attrakdiff.*

Reflective



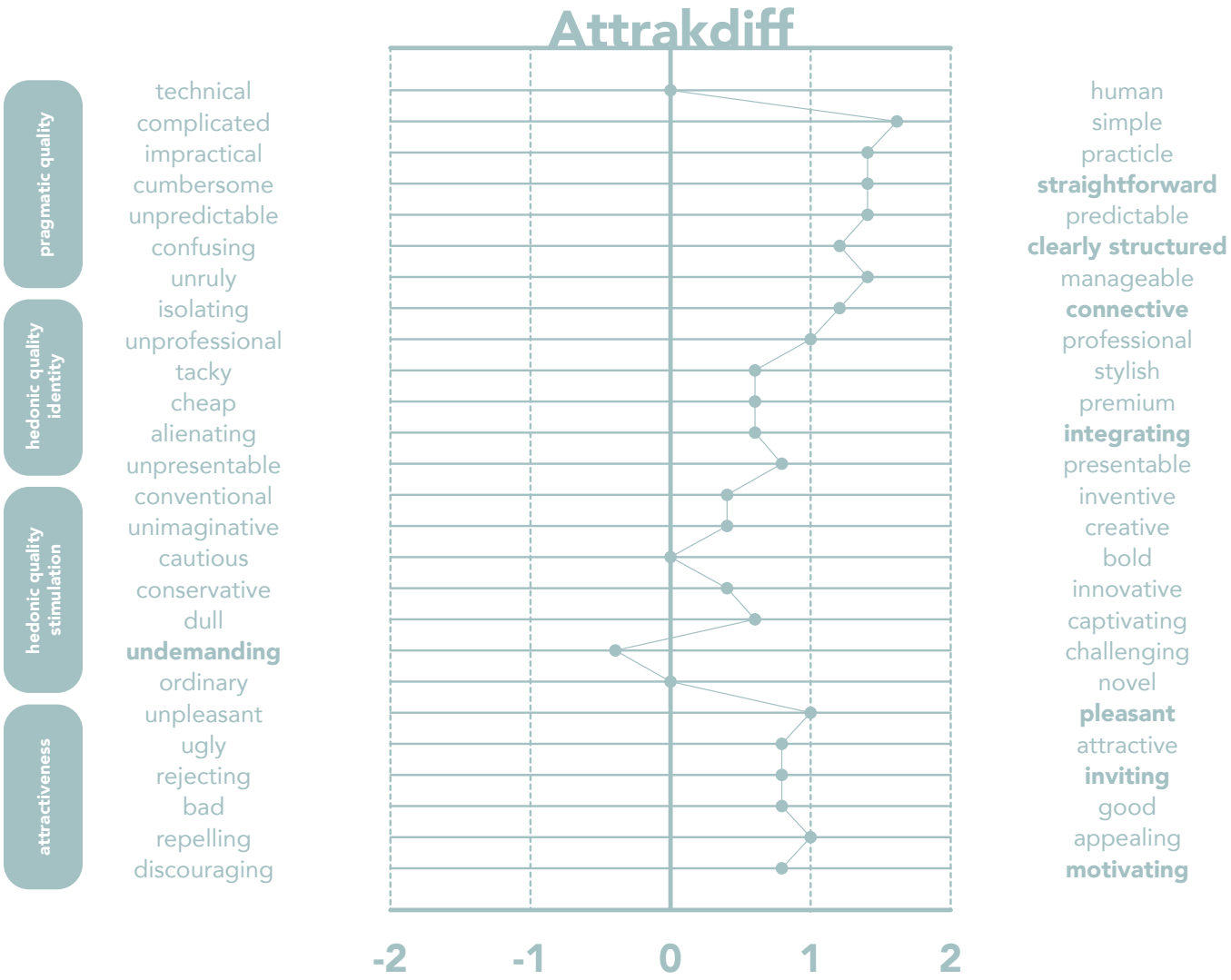
Behavioural

Visceral



APPENDIX M6

» *Interface experiment results: Attrakdiff, bold words are important factors for the design.*



APPENDIX N

» *DFA Ahrend*





MATERIAL	steel[4]	steel	steel	steel	wood
	wood[4]	foam[2]	wood	wood	fabric
	glass[1]	netweave[1]		foam	
	plastic[2]	plastic[1]		fabric	
	felt				textile[4]
FORM	square[4]	organic	square	square	square
	angular[3]	rounding	angular	angular	angular
	small radius rounding[5]	small radius rounding	small radius rounding	small radius rounding	small radius rounding
FUNCTIONALITIES	electricity	heating	electricity	light	acoustically dampening
	controlpanel		controlpanel	charger	cable tray/entry
	light		ventilation		
	ventilation		heating		
APPEARANCE	calm[4]	calm	sturdy/reliable	calm	calm
	soft[4]	soft	hard	soft	soft