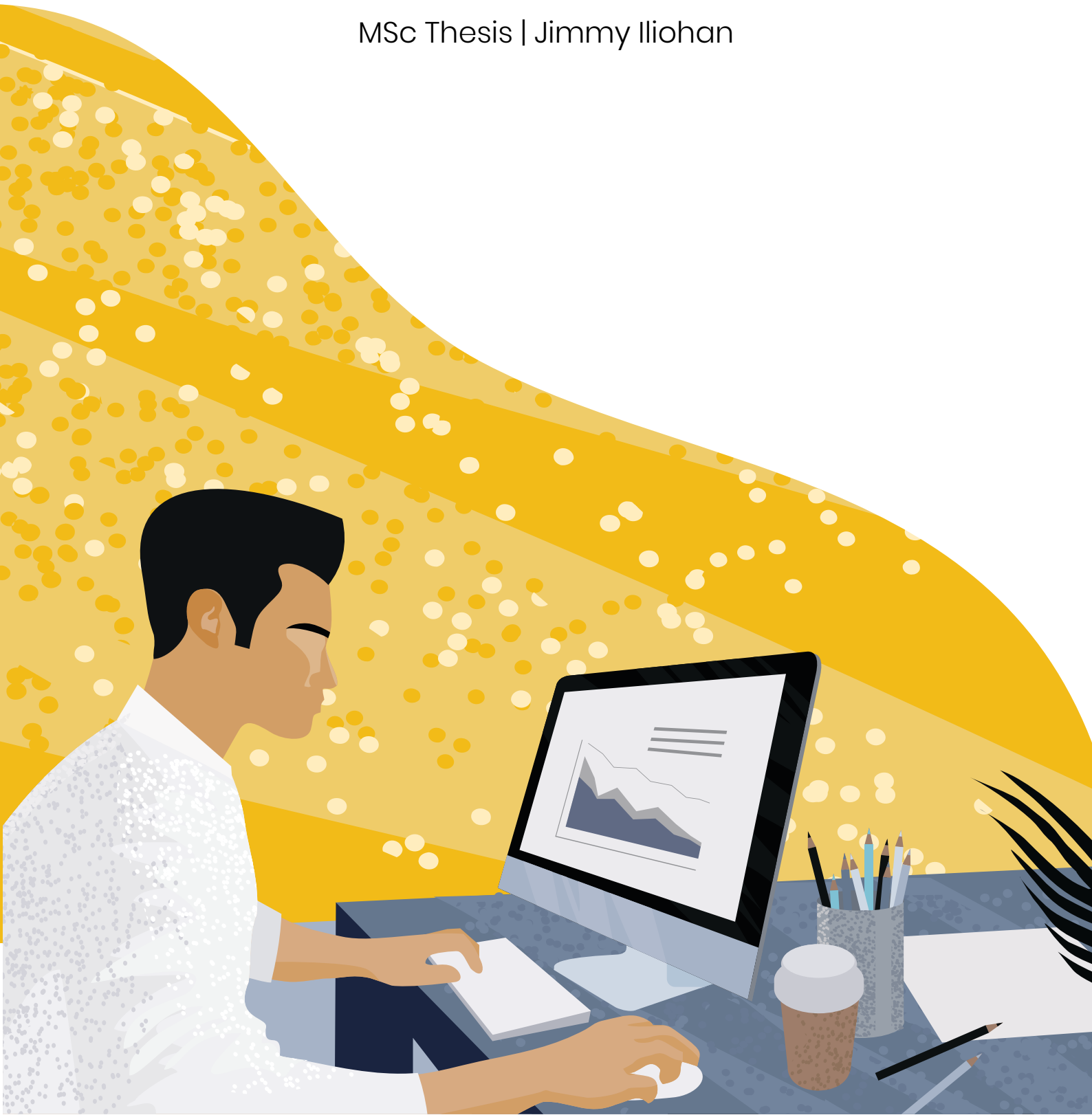
ENHANCED HOMEWORKING

A VIABLE PRODUCT/SERVICE SYSTEM FOR YOUNG PROFESSIONALS

MSc Thesis | Jimmy Iliohan



ENHANCED HOMEWORKING:
A VIABLE PRODUCT/SERVICE SYSTEM FOR YOUNG PROFESSIONALS

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This thesis marks the end of my time at the TU Delft faculty of Industrial Design Engineering. Six years in Delft were challenging and inspiring in so many ways. Most importantly, it was fun. At the end of my time here, I realise how much I enjoyed it; I worked on fantastic projects, was able to perform in many curricular activities and met friends for life. Graduation brings this time to an and. It is the kind of project that challenges you to the limit. Never before have I felt so ambitious to perform, test my skills and develop myself. This project knew high complexity in both its dynamically changing context and my ambition to start a business simultaneously. The last eight months felt like an extreme ride, and I am proud to say that I feel as if I got the most out of it. This strange year challenged all of us; I am grateful that there were many people around me for support. Therefore, I would like to thank:

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Thank you for being there this absurd year.

May my thesis inspire you,

Jimmy Iliohan

EXECUTIVE SUMMARY

The ongoing pandemic raises questions on how the current situation paints the future context of doing work. Although a lot is still uncertain, we can say with confidence that the home workplace will preserve a prominent role. Young professionals, who are limited by space, require extra attention on the long haul. The assignment is to design a viable product/service system that enhances the young professional's homeworking experience. An iterative design approach, enriched by other methods in design and entrepreneurship, helped me in solving this project.

Working from home accelerated in almost every sector. The near future of office work is hybrid; we will work from home several days a week and several days from the office. Mostly young professionals encounter challenges. Their limited space makes maintaining a healthy work-life balance a vital challenge. Working at home, and working in the same room in particular, makes work-life boundaries dissolve and transitions disappear. If we ignore this growing problem, the Dutch workforce will go down on mental illness.

"The home office facilitates a healthy work-life balance by creating smooth transitions between daily activities."

The physical office is an example of clear boundaries; the office is for work and home is not (or at least less). The time people spent in between these physical places helps them to transition mentally from work to private life. Based on principles and my own experiences, a combination of good time management (principle) and the change of scenery can recreate these boundaries and transitions when working from home.

Therefore, I developed Sceny. Sceny can assist young professionals in time management and create new transitions while limited by space. A combination of smart LED bulbs, an app and a controller helps users in improving time management by notifying on transitions, giving quantified insights, timeboxing activities and establishing goals for different life quadrants,. Users feed the system with data by arranging scenes that support them in what they are doing. Different light settings prove to enhance user experiences, such as for focus work, creativity and relaxation. After work, the scene changes and indicates a transition to private life.

A Proof of Concept aimed at validating the desirability and viability of the riskiest minimum concept features. This first iteration of Sceny was a service that offered pre-programmed smart lighting for "switching between work and private life with the push of a button". Interviews verified the desirability but denied its viability. The Minimum Viable Product (MVP) required better-argued features. The new version emphasises the work-life balance more using time management. Users set their boundaries (in time and scene), plan transitions, timebox activities and reflect with quantified insights.

Continued validation of Sceny's MVP on its problem-solution fit is a next step into building a viable business. This validation, together with the product-market fit, will take at least one year to complete. We aim at launching Sceny halfway of next year with young professionals in the IT service sector. This market shows the most viable opportunities for entry. Partnerships with business psychologists and coaches should increase these opportunities. Year two will be about growing and validating the business model fit. After that, we will expand and replicate markets.

READING GUIDE

The Double Diamond (Design Council, 2004) is the primary source of inspiration for structuring this project. Its four stages of diverging and converging help to organise my iterative process. Although not chronological, the structure helps to tell a complete story of how the design came about. A list of regularly used abbreviations finalises this reading guide.

STRUCTURE

Typically, a double diamond process consists of four consecutive steps: discover, define, develop and deliver. These steps stand for a two-time diverging and converging process. In this thesis, the chapters align over the double diamond phases to express where it diverges and converges. The blue colours indicate whether entrepreneurial methods enriched the approach.

Chapters

ABBREVIATIONS

BML	=	Build-Measure-Learn
CVD	=	Cardiovascular Diseases
DE	=	Disciplined Entrepreneurship
KI	=	Key Insights
LSM	=	Lean Startup Method
MVP	=	Minimum Viable Product
PoC	=	Proof of Concept
SME	=	Small- and Medium-sized Enterprise
VDT	=	Video Display Terminal
WMSD	=	Work-related Muscoleskeletal Disorders

TABLE OF CONTENT

CHAPTER 1

INTRODUCTION

We are living in strange times while dealing with great uncertainty about our future. It is almost a year ago since COVID-19 started to spread worldwide. In the meantime, many countries locked down. Governments demand their citizens to stay in their homes as much as possible. The digital workplace enabled many people to work from their homes. As it seems, this new way of working has significant potential for both individuals and the whole of society. However, to make this future feasible, we need to enhance homeworking experiences and assist the people that find it most challenging: such as the young professional with limited space.

Chapter 1.1

ABOUT THE PROJECT

Homeworking is here to stay. During the highlight of the COVID-19 pandemic, many of us got confronted with a rapid shift towards homeworking. This way of doing work taught us that all sorts of digital tools allow us to remain working accordingly. It even proved to have personal benefits, such as higher flexibility and productivity for doing focus work. On a societal level, its advantages could be of even more significant importance. Not going to the office could save a lot of energy and money, as there are fewer commutes and building usage. However, on the long-haul, mainly one group may think otherwise: the young professionals.

PROBLEM DEFINITION

Young professionals (25 to 34 years old) struggle to arrange a productive and attractive home workplace. Their limited space makes it challenging to create such a home office. The target group often lives with peers or a partner, which forces them to set up work in their bedroom or at the kitchen table. Both of these spaces may not be ideal for focusing all day long. In most cases, there is no space for moving around, and work becomes more accessible than ever. The homeworking young professional is struggling with limited space for two reasons:

1. **Physically:** Good home office design should consider both its work environment and workplace. Limited space can make it challenging to create an environment that meets the requirements for a productive work setup. Distractions can be nearby, there is less space to move around, and there may not even be enough room for an ergonomic desk. Designers and other research experts proved that these physical factors contribute to improved productivity and well-being (Klitzman & Stellman, 1989).
2. **Cognitively:** Productivity correlates with well-being. Insufficient achievements may lead to cognitive problems such as stress. Besides, limited space makes it challenging to define the boundaries between work and other quadrants of life. Work always seems available and feels more accessible than ever. Just like other groups, young professionals may feel less related to their organisation, and collaboration can be more difficult when coworkers cannot physically see each other.

THE ASSIGNMENT

There are no smart products and services on the market that would sufficiently appeal to young professionals with limited space that can solve their homeworking challenges. Market opportunities reveal themselves for filling gaps that enhance the young professional's homeworking experience. The assignment is to design a strategy for launching a product/service combination that enables young professionals to remain working from home in the future. The assignment does not yet include any business stakeholders, since it is my ambition to found a startup company.

Design a viable product/service system that enhances the young professional's homeworking experience

Chapter 1.2

PROJECT RELEVANCE

The outbreak of COVID-19 has a significant impact on our future view towards office functionality. Many companies did a great job of arranging short-term ways to make homeworking work. Employees see the benefits of working from home, and many of them foresee a viable future for this new way of working. However, this future requires long-haul solutions for taking upon the challenges that homeworking brings along. Mostly young professionals long for a quick return to the office environment. A further exploding number of burnouts is on the lure which demands a rapid response.

COVID-19

The pandemic outbreak forced many people worldwide to work from home. During the first Dutch lockdown, about 20% of the complete workforce was working from their home office (CBS, 2020). This rapid shift towards an entire digital workplace required many companies to adapt and acquire new digital tools. Such new solutions made homeworking gain credibility. To many, the home workplace is an outcome for limiting commute time and fewer distractions; they enjoy higher flexibility and are less distracted by their colleagues. Besides, this radical movement of workplaces can have a tremendous future impact by limiting energy consumption for commuting and facility power. In short, the home workplace is a keeper and is going to change our view towards office functionality.

"During lockdown, 20% of Dutch employees worked from home"
(CBS, 2020)

YOUNG PROFESSIONALS

The younger generation will encounter more challenges than others. They experience a lack of social interactions, and the disability to define work-life boundaries which result in stress. This group of highly ambitious people was already facing stress-related problems before COVID-19 struck us. According to SKB (2020), 29% of young professionals in 2018 were suffering from burnout complaints. The longer we wait with finding solutions that support young professionals in making homeworking work, this number will only explode even more. Therefore, the scope of this project revolves around designing a product/service system that enhances the young professionals homeworking experience.

Chapter 1.3

AN ITERATIVE DESIGN APPROACH

The structure of this thesis follows the divergent and convergent outlines, as inspired by the double diamond (Design Council, 2015). The double diamond guidelines helps in structuring the fuzzy front-end of this design project. That is because the fundamental approach is iterative; continuously moving back and forth in the design process allows me to explore the most viable opportunities for innovative solutions. A well-executed iterative approach prevents the design from becoming irrelevant in the dynamically changing context of doing work during the Corona crisis. This crisis does not withhold me from the ambition to found a startup with the outcome of this project.

Other sources of inspiration are Disciplined Entrepreneurship (Aulet, 2013) for defining a beachhead market and The Lean Startup method (Ries, 2011) for validated learning about the final concept. Reasons for taking these methods as inspiration are because:

- *Uncertain times demand a thorough examination of the future context to ensure a future-proof design.*
- *Defining a beachhead market increases the viability of business opportunities.*
- *Validated learning helps me building a Minimum Viable Product (MVP)*

DESIGN THINKING & ENTREPRENEURSHIP

Figure 1 best describes the approach to this project and highlights the use of entrepreneurial tools in blue. Kicking off with the project brief typically provides designers with boundaries for the design context. Often, designers continue iteration on this brief. The design brief halfway of this project is the future-proof result of several iterations and redefines the design context. Desk research, interviews and personas help me discover trends and define user needs, which form factors of the future context. Additional desk research helps me discover market opportunities and define a beachhead market, as inspired by Disciplined Entrepreneurship. For creating a viable and future-proof design, the future vision is a crucial part of the new design brief. This new brief kicks off the second part of the project by developing ideas into concepts. Inspired by the Lean Startup method, the process from developing ideas towards the MVP required prototyping, testing (with and without users) and evaluating. Rapid prototypes are perfect for concierging (testing products or services as if they already exist) new concept ideas. Meanwhile is the lean canvas (Maurya, 2012) an excellent tool for documenting new iterations on the concept's value proposition and unfair advantage.

TOOLS & TECHNIQUES OVERVIEW

- Desk research
- Interviews
- Personas
- Lean canvas
- Rapid prototyping (Axure | Arduino)
- Concierging

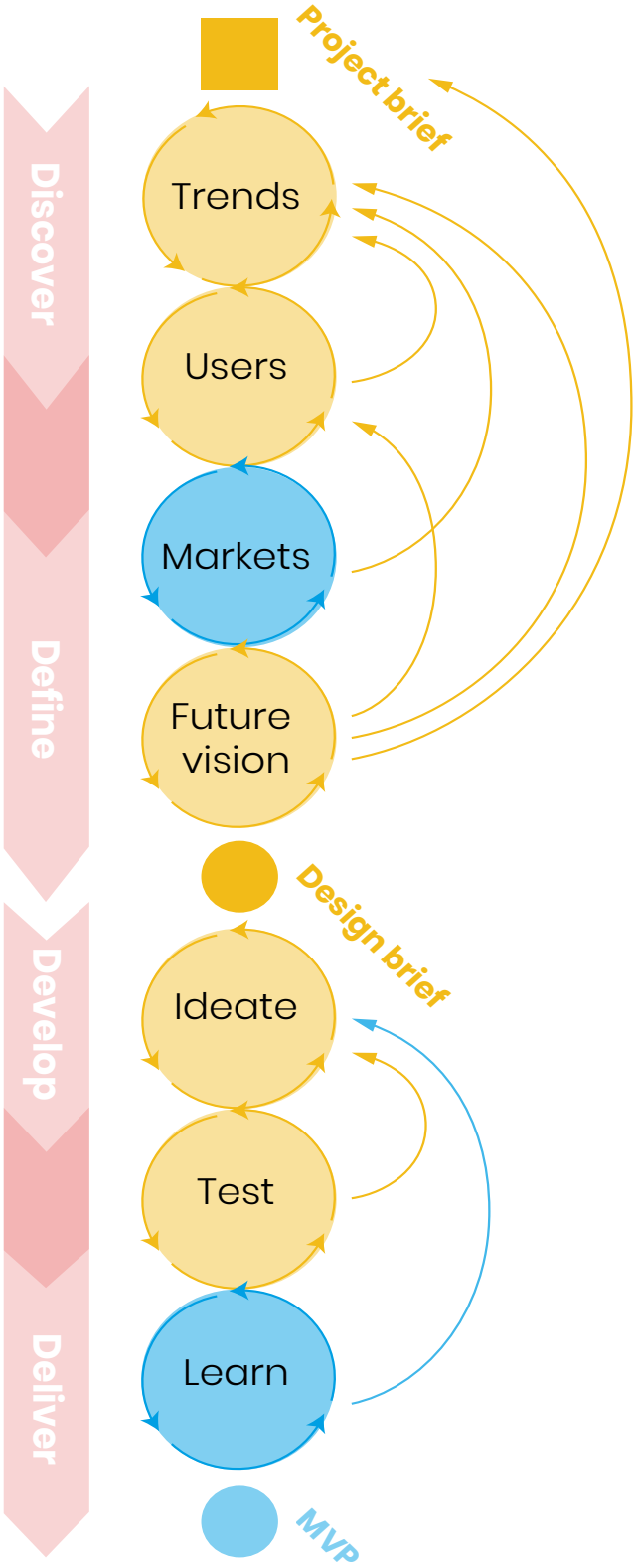


Figure 1: An iterative design appraoch to entrepreneurial design

Source: Getty Images/iStockphoto

CHAPTER 2
YOUNG PROFESSIONALS

In the past months, the Dutch working class proved the viability of homeworking. A rapid shift towards the digital workplace allowed many office employees to work remotely from home. Homeworking benefits both the environment and employers with fewer commutes and less energy usage in office buildings. Although this new way of working seems to work, on the long haul, it will cause problems. It is mostly young professionals who suffer from homeworking. They often have limited space, and this group already faces an exploding number of burnouts. During the COVID-19 pandemic, I educated myself on the essential factors for creating a productive workplace and a healthy way of doing work. Applying these factors to the target group's situation allows me to reveal homeworking challenges. The goal of this chapter is to choose one challenge as a starting point for improving the homeworking experience.


cedarts
PARKING

Chapter 2.1

EXPLORATION OF TRENDS

Observing trends helps me to capture future forecasts of the constant and rapidly changing environment around young professionals, their work and where they live. In the field of office work, many trends make this a dynamic climate that keeps requiring innovation. Over the past years, technology played a role in creating the digital workplace and enabled employees to work remotely. At the same time, organisations put effort into modifying their offices to meet requirements for sustainability and improved employee health & well-being. Trends outside of the office work field are influencing this domain. Urban developments around people's homes cause young professionals to live smaller, making it difficult to respond to the current homeworking demand. To them, the office may be a place that provides the space and comfort they do not have at home. The ongoing pandemic will likely be a trigger for many more trends, which makes for an intricate design context - I need a way to cluster these trends and discover opportunities. By doing creative trend research, I can get a grip on the expectations by carefully observing and scanning the environment. The goal of this exploration is to map trends over time that help to understand how current developments and trends influence the future context.

2.1.1 CREATIVE TREND SCANNING

Within the context of this project, trends within multiple areas determine the life of young professionals. As employees, they often roam in an urban environment and relate to office and home trends. These are the areas (figure 2) I focused on for creative trend scanning. By using the DESTEP technique, I revealed over 60 trends (appendix A). Several trends showed similarities, which allowed to create 35 definite trends (appendix B). I used these cards to define five topics that present interleaved connections and found the basis for telling the future context. A trend map outlines the different topics and their trends to predict future relevance.

Figure 2: There are four search areas for scanning relevant trends

2.1.2 TREND TOPICS

Five groups of trends define the different themes that are relevant to understanding the possible future of young professionals' home offices. These clusters provide a sneak peek of the themes' prospects. The topics are Digital Technology, Office Functionality, Sustainability, Lifestyle and Health & Well-being. Below every topic, two examples of trends (from appendix B) give extra context to the future forecasts.

DIGITAL TECHNOLOGY

Digital technologies are inseparably connected to office work. Over the years, many organisations adopted digital solutions that support the workforce and allowed employees to work from anywhere they want. It appears that the pandemic accelerated the adoption of digital solutions, because of the necessity of working from home. Technology is the key to this digital revolution for supporting the workforce. Nowadays, especially the younger generations, seem to have adopted many everyday kinds of tech; people can play video games or stream video everywhere and the number of people that wear smartwatches daily increases [10, 13]. The most accelerated trends in this revolution seem to be cloud-based working and videoconferencing [1, 4]. These trends allow employees to prepare for a future where remote working becomes the new normal. Storing documents and applications in the cloud, and meeting via a video call enable employees to work from anywhere they want. That can be at home, in a co-working space or some forest cabin.

Moreover, technology is everywhere; even in the physical space. Smart environments that often combine IoT and Machine Learning are inseparable from the development of intelligent virtual assistants [5, 9]. Although digital technologies show high relevance, the implementation of smart technologies in the physical environment is still holding back. The absence of this development is surprising, as the suppliers of these kinds of techniques make big promises: boost of productivity, improve collaboration, better use of office space, improvement of staff well-being and much more. Although these benefits sound very promising, it seems technology was pushed too far [7]. Designing a smart system within this project's context demands for a user-centred approach for adding value. Extended Reality technologies, however, do more often find valuable applications in both professional and entertainment sectors [5].

Cloud-based working

The corona crisis caused a boost for cloud-based working as the current situation forces entire organisations to work from home [1]. The adoption of this way of working has permanent effects on the way people work. More and more employees will be able to work remotely. Cloud-based working means employees have access to the digital workplace and includes files and applications. Half of Small- and Medium-sized Enterprises did not yet have the tools for homeworking in the beginning of the Dutch "lockdown" and was forced to use them quickly [2].

Video conferencing

The number of downloads for video calling applications skyrocketed since the beginning of 2020 [3]. Corona lockdowns might cause video conferencing to be the new way of communication. Now is the time that people familiarise themselves with these kinds of technologies and will feel more comfortable in using them [4].


CLOUD-BASED

OFFICE FUNCTIONALITY

Before the world was under the spell of the COVID pandemic, offices were already preparing for change. The office environment was going to be more flexible; many kinds of service models enable organisations to pivot their office strategy quickly. For example, the open-plan office had to be replaced by an activity-based environment [19]. Furniture, facility services and even locations became easily swappable [16]. Besides, organisations would change to an agile workforce, demanding flexible spaces for teams. When COVID-19 arrived, employees had to work from home, and organisations had to prepare for a social-distancing office. Several businesses responded by, for example, providing flexible office service solutions that enable occupants to maintain a 1,5m distance [15]. When working from home, the current situation challenges agile teams to continue collaborating [22].

However, the COVID crisis also provides many lessons. For example, homeworking can be a valid option for doing work. This trend is likely to cause persistent change, as several international corporates announced they allow their employees to work from home permanently [21]. This "Work-From-Home Revolution" does not mean offices will disappear forever, but likely their functionality changes and people will adopt a "hybrid" way of working. Where the old office had space for individual work, the new office will only focus on meeting people and co-creation [20]. The new office functionality might eventually cause the number of offices to decrease, which can result in a high office vacancy rate.

Office for social activities

Consultants think the pandemic will likely accelerate the change in office functionality. Now, offices contain room for many individual workplaces which may be superfluous when people keep working from home. There will be more space for meeting rooms and coffee bars; the office will soon be more about meeting people and co-creation [20]. Before the crisis this office innovation was already triggered; current homeworking circumstances make room to push these changes even further.

Homeworking remains

More and more people seem convinced that homeworking remains a valid option for doing work after the crisis. Internationally, some bigger corporates are already leading "The Work-From-Home Revolution" [21]. Employees notice they can avoid commute and spend quality time with family or hobbies. Executives remark potential cost savings because of less office space and travel expenses. While most people see that homeworking can work, this will most likely be the new norm.


SOCIAL OFFICE
HOMEWORKING
OFFICE SERVICES
AGILE TEAMS

SUSTAINABILITY

For decades, many people seem to be aware of the growing pollution issues. Nitrogen and CO2 pollution are only several concerns that affect the world environment. With most of society in lockdown, there are some positive effects on the environment [25]. Besides, many people and governments actively come into action; municipalities repel cars and promote the use of bicycles [44]. A challenge, however, is to turn these trends into long-term solutions. Homeworking can be one of the answers, as it can result in less commute and fewer business travels in general.

Of course, the road towards a sustainable future cannot only rely on corona-related benefits. The world's economy, for example, would need a different approach. Circular trends are likely to pursue such a forecast. In this circular world, businesses and people shift to a system where they regenerate natural systems, design out waste and pollution and keep products and materials in use [27]. Slightly different is the sharing economy where people share what is theirs, so others do not have to buy [26].

Technology has opportunities to offer also. Technological systems can optimise energy usage in buildings, store and generate renewable energy [32], and are crucial to green mobility [29].

COVID-related sustainable innovation

Being in lockdown changed the way people travel. Unnecessary travels got cancelled; aircraft stay on the ground, and there are fewer cars on the road. Among others, experts say these actions resulted in lower CO2 and nitrogen emissions that showed a positive environmental effect [24, 25]. However, the same experts warn that this may be a short-term event if society does not change enough. The most straightforward change would be for people to work from home, as this requires less commute and fewer business travels [25].

Circular economy

Other than the sharing economy, this trend is more about recycling, retaining products in use and regenerating natural systems [27]. One way to keep products in use is by providing lease models, where service design plays a significant role. Furniture companies, such as Gispen, provide their furniture as a service to reach their circular vision [28]. Likely, more and more businesses will provide such services.

CIRCULAR

COMMUTES

MOBILITY

ENERGY

LIFESTYLE

Likely, most young professionals do not have much space. For this target group, it is reasonable to find some friends and rent an apartment or house together somewhere in, for example, the Randstad. Starters in their twenties are more likely to postpone their bourgeois life [39]. The most important reason is that women more often finish their higher education these days. Buying a house is often impossible in the starter years. Since 2013 there is a trend of homes becoming significantly more expensive [37]. Besides, student debts make it hard to get a mortgage. Especially between the age of 25 and 35, it is not likely, the young professionals have already paid off their student loans. In 2019, 1,4 million people had student debt, which is 388 thousand more than in 2015 [40]. Students that have lived away from their parent's home had an average obligation of €21.000 to €24.000 in 2018 [41].

Living in urban areas of the Randstad brings along several other trends. In a car-free city, people often prefer to ride their bike or travel by public transport. Carsharing platforms and private leasing make it unnecessary to own a car. Several other services are on the rise that makes urban living more comfortable, such as grocery delivery and other services [42]. Besides private vehicles, municipalities are trying to repel mass tourism from their cities [45] and tourists urge to find nature and beaches instead of world capitals [35].

Postponing bourgeois life

Starters tend to postpone their bourgeois life; they share homes, and get children on a later age [39]. Sharing a house often means that young professionals get limited by space. In these scenarios, likely, there are shared living rooms and bathrooms. The expensive housing market makes this trend more and more relevant.

Return to nature

Since a few years, travellers seem to have rediscovered nature destinations [34]. Escaping the city and going back to forests and empty beaches mean evading mass tourism and focus on stillness. The relevance of this trend is also related to COVID-19. Travel experts think nature and beach destinations are the first to benefit from the increasing travel demands after lockdowns get lifted [35].


LIVING WITH PEERS
RETURN TO NATURE
EXPENSIVE LIVING

HEALTH & WELL-BEING

It appears that only recently, companies realise the importance of good employee health and mental well-being. There is more attention for this in the office environment, and most companies are willing to invest in improving these factors. They provide their employees with height-adjustable desks for reducing sedentary behaviour, stress-friendly settings and shorter working weeks for a lower workload. Several consumer markets respond to these trends with unplugging solutions [50] and health-tracking wearables [13].

An inevitable health trend is the worldwide outbreak of COVID-19, which can have a severe impact on many aspects of society. With the ongoing homeworking revolution, likely, other health and well-being trends become even more relevant; such as sedentary behaviour [56] and work-life balance. This development means that organisations and employees will have to invest in home offices [55]. Besides, in the Netherlands, the Dutch Working Conditions Act (NL: Arbowet) contains a set of rules for employers that concerns employee health, safety and well-being [52]. By valuing well-being, organisations and politics respond to the increasing number of people that have burnouts. This number has increased in the Netherlands by 42% between 2012 and 2017 [59]. In 2018, there was a total number of over 263.000 people that went to the GP with burnout complaints.

Some say that badly-designed open-office plans are the primary cause of more stress and burnouts (De Monitor, 2020). The high number of employees that work in the same space would be the cause of this concept's dysfunctionality—many people in the same space cause employees to experience noise pollution and concentration loss. In the home environment, this does not apply. However, there can always be other reasons for mental imbalance. For example, the technological accessibility of work can cause people to have more additional hours at home. It might harm an employee's work-life balance [63]. As a solution to reduce stress, several trends indicate that people search for rest in nature and try to plan screenless time [50]. Besides, maintaining work-related mental well-being requires proper time management to plan enough breaks and to get everything done during work hours [62]. Several well-being trends around mindfulness can offer solutions to cognitive issues [46].

Politics involve more aspects of work and well-being. Since 2018, a new law, called GDPR, went into force that protects the privacy of EU citizens. GDPR focuses on protecting user data and asks for verification of sharing this data with third parties. This law focuses both on employees and customers, which shows the trend of increasing worries for privacy in EU countries.

Physical ergonomics

Physical ergonomics focuses on human anatomy, physiology and biomechanics concerning job tasks [48]. It is part of the Dutch Working Conditions Act (NL: Arbowet) that organisations need to strive for providing workplaces that concern these human physical factors [49]. Examples of such improvements are ergonomic furniture and computer accessories. Other ergonomic trends, such as lighting [50] and the availability of standing workplaces [51], can contribute to an optimised workplace. The importance of physical ergonomics results in the necessary investments for home offices [55].

Burnouts, stress & Anxiety

This last example is a reaction to the increasing number of people that have burnouts. Burnouts, as an occupational disease has increased by 42% between 2012 and 2017 [55]. In 2018, there was a total number of over 263.000 people that went to the GP with burnout complaints. Especially now during lockdown, young professionals suffer most from stress and anxiety [59].

SEDENTARY BEHAVIOUR
MINDFULNESS
COVID-19

2.1.3 TREND MAP

The definition of a trend is a course which points in a single direction for an extended period. On the right page, the trend map (figure 3) presents the time frame for every trend. A trend is in a specific horizon when it is likely to reach the more significant public at that time.

Constructing this trend map required the following considerations:

- Within the Health & Well-being theme, looking further in the future seems more difficult than in other areas. Besides, within this subject, a lot is happening on a shorter term because of the corona outbreak.
- The digital revolution topic mostly consists of trends that are already combined. Several trends make use of many kinds of different technologies, which are not on the map as separate trends. For a complete overview of all trends, see appendix A.

As the developments around the COVID-19 pandemic are still uncertain, the first horizon does not look further than the end of next year. The impact of this virus on the worldwide economy, society and politics are so significant that even these predictions may change at any time. With time, uncertainty grows even more. Therefore, the second and third horizons take respectively three and five years.

2.1.4 CONCLUSION

Five themes show future relevance and forecasts: Digital Technology, Office Functionality, Sustainability, Lifestyle and Health & Well-being. Each topic tells a story about its ongoing trends and how they may develop over time. Altogether they contain factors that picturise a desirable future for homeworking solutions. It becomes more and more likely that homeworking will remain after the crisis is over, in a hybrid form. Sustainable benefits, such as fewer commutes and energy usage, will be most feasible if the employee chooses to work from home. Especially for young professionals, this will be challenging as their limited space and budget may restrain them in creating a safe and productive workplace at home. There is a wide range of digital tools that support productivity and well-being, which might help this group. However, these solutions often lack user-centeredness, and they do not cover all of the target group's challenges.

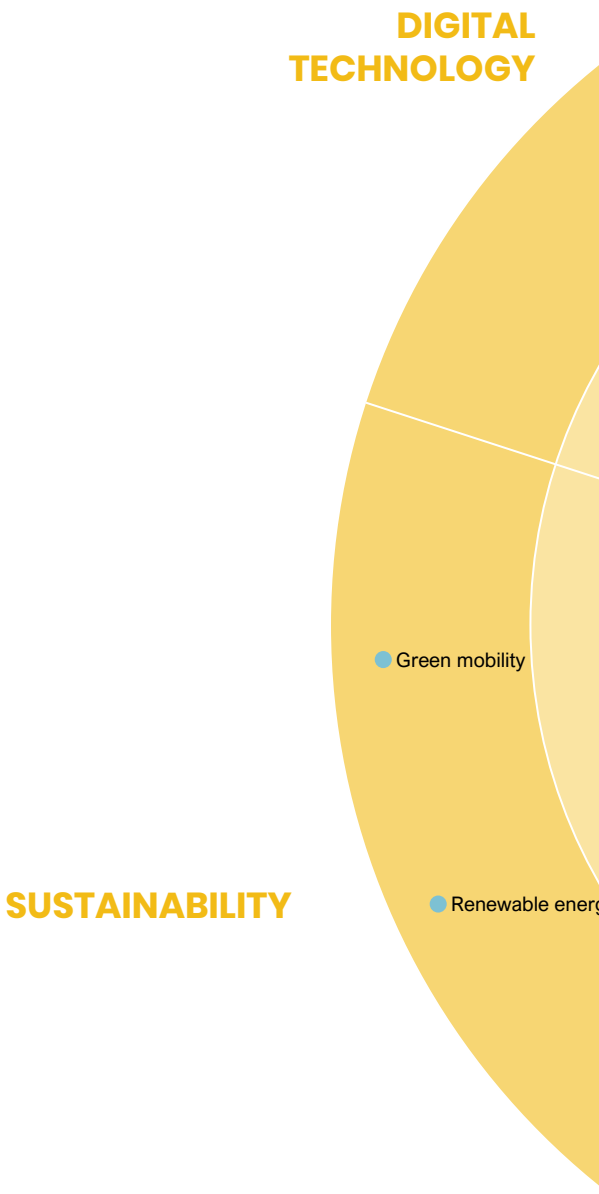
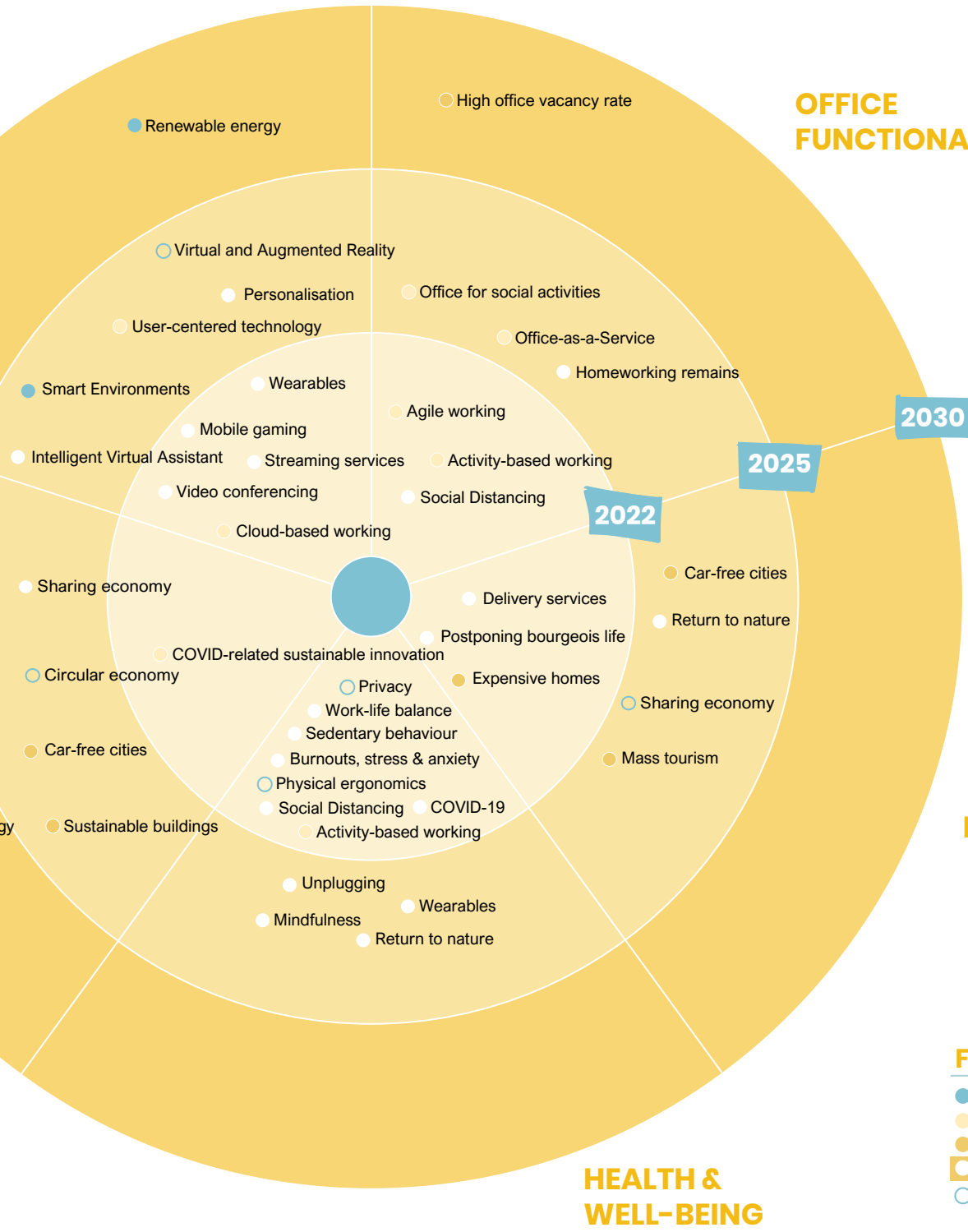


Figure 3: Five trend themes paint the future context


OFFICE FUNCTIONALITY
LIFESTYLE
HEALTH & WELL-BEING
2022
2025
2030
Renewable energy
High office vacancy rate
Virtual and Augmented Reality
Personalisation
Office for social activities
User-centered technology
Office-as-a-Service
Homeworking remains
Smart Environments
Wearables
Agile working
Mobile gaming
Intelligent Virtual Assistant
Streaming services
Activity-based working
Video conferencing
Social Distancing
Cloud-based working
Sharing economy
Delivery services
Car-free cities
Return to nature
Postponing bourgeois life
COVID-related sustainable innovation
Circular economy
Privacy
Expensive homes
Work-life balance
Sharing economy
Sedentary behaviour
Car-free cities
Burnouts, stress & anxiety
Mass tourism
Physical ergonomics
Social Distancing
COVID-19
Sustainable buildings
Activity-based working
Unplugging
Wearables
Mindfulness
Return to nature
FOCUS AREAS
HOME
OFFICE
CITY
EMPLOYEE
OTHER

Chapter 2.2

THE PHYSICAL CHALLENGES OF HOMEWORKING

During the first months of the COVID-19 outbreak, people got creative in arranging home offices. Young professionals used every bit of space to make the most suitable workplace. On the long term, these improvised workplaces will not be sufficient to remain working from home. Over the years, researchers and office designers found ways to create healthy and productive work environments. Such places rely on many requirements, based on physical, organisational and cognitive factors. Concerning the home office, we look at physical aspects on two levels: the work environment and the workplace. By researching the existing literature on office design, we can gather essential elements to picturise a well-designed home office. Comparing this with the target group's situation reveals challenges for arranging an appropriate home office for good homeworking experience.

2.2.1 HOW THE HOME OFFICE SHOULD LOOK LIKE

The home office is the whole of the direct workplace (desk/chair/screen) and the environment around it. Experts found that healthy buildings lead to more flourishing and happy inhabitants (Mendell et al., 2002). Such an environment stimulates productivity and relies on several physical factors. According to the professionals from ErgoDirect (n.a.), physical factors within the field of ergonomics takes into account human anatomy, physiology and biomechanics. Sectors where work mostly consists of doing desk tasks, physical factors set requirements for the workplace (Freudenthal et al., 1991) and environmental design. When done right, a good design can improve both physical and cognitive health (Klitzman & Stellman, 1989). In the exploration of workplaces, I look at physical factors that influence physical health and mental well-being in the office environment. We subdivide the different factors in two levels: the workplace and its surrounding environment.

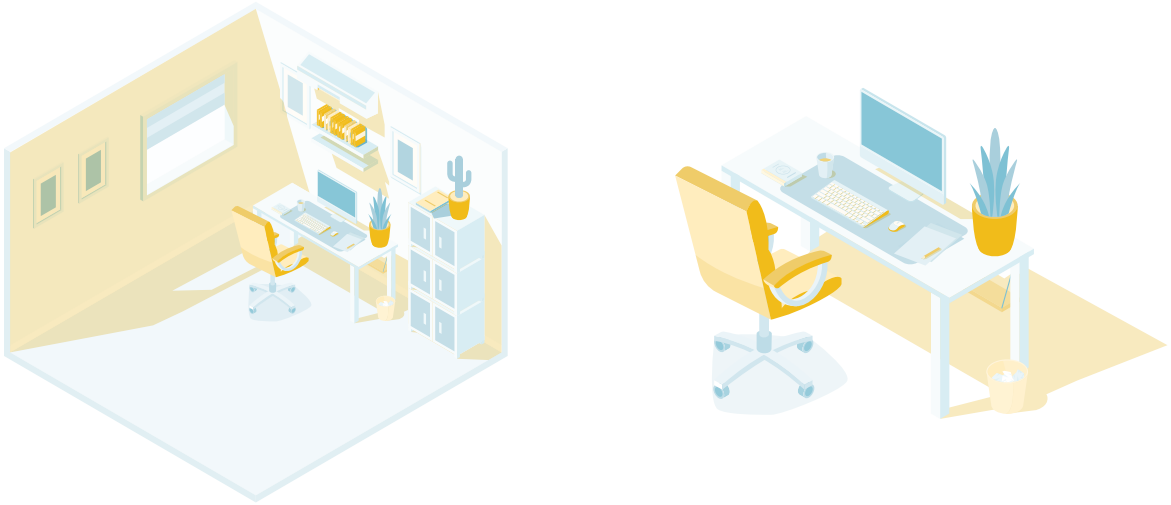


Figure 4: The home office distinguishes the work environment (level 1) and the workplace (level 2)

LEVEL 1: THE WORK ENVIRONMENT

Where one locates its workplace, is what we call the work environment. For creating a healthy and productive environment, this space requires attention for environmental factors concerning elements such as air, thermal comfort and lighting. Below, we listed all factors that can improve every work environment.

Indoor air quality

Research shows that air quality is related to work performance and a healthy environment, thus indirectly related to increased well-being. Although there do not seem to be direct effects on environmental satisfaction, good air quality does show a significant positive impact on tasks such as typing, proof-reading and mathematical tasks (Fanger, 2000; Langer & Bekö, 2013; Ng et al., 2012; Wargocki et al., 2000). Polluted air quality, on the other hand, shows effects on physical issues such as Sick Building Syndrome, asthma and allergy symptoms. Dependent on its location, indoor environments require well-functioning (natural) ventilation and humidity to decrease pollution and CO2 level and increase humidity. Several solutions are available on the market, such as humidifiers and air purifiers.

Thermal comfort

Defined by the American Society of Heating, Refrigerating and Air Conditioning Engineers (2004), thermal comfort is a "state of mind which expresses satisfaction with the thermal environment". Thermal comfort is a subjective state, and its perception may vary per person. A very significant result of thermal comfort is that dissatisfaction leads to productivity loss (Akimoto et al., 2010). Several researchers show different results for ideal temperatures. However, somewhere in the range of 21 - 25 degrees celsius, thermal comfort generally results in increased productivity for tasks such as typewriting, learning and reading (Seppanen & Fisk, 2006).

Lighting and Daylight:

Traditionally, humanity was dependent on daylight for day-to-day activities. The amount of daylight regulates the biological clock according to sunlight at day and darkness at night. As people do their desk jobs indoors, they depend on indoor lighting and windows. Daylight offers the best light for human visual comfort (Al Horr et al., 2016). When sunlight is not available, employees need artificial lighting that comes close to daylight for staying productive and satisfied. Concerning brightness, Ru et al. (2019) discovered that 1000 lx has enhanced effects on job performance compared to 100 lx. Besides, artificial light for doing work tasks should come close to the daylight colour temperature of 6500K. According to Al Hor et al. sunlight can be unwanted when it causes daylight glare and thus discomfort. Then, artificial lighting can be a better option.

Noise and Acoustics

The Cambridge Dictionary defines noise as a sound, especially when it is unwanted. Psychological attributes such as annoyance, noisiness and loudness generally describe the effects of noise (Al Horr et al., 2016). Sound is measured in decibel (dB); the Dutch Working Conditions Act (NL: Arbowet) describes several guidelines for noise and doing work:

- When an employee does not need to communicate, the equivalent sound level cannot exceed 80 dB.
- When communication is required and often occurs, the equivalent sound level cannot exceed 35 dB.

- When an employee does not need to concentrate on mental processes, the equivalent sound level cannot exceed 80 dB.
- When high concentration on mental processes is required, the equivalent sound level cannot exceed 35 dB.

Offices designers use internal and external building elements to reduce noise and increase acoustic performance. A popular method is by designing with sound-absorbing materials, such as foam and fabric panels.

Office Layout

The office layout is a significant design factor for designing work environments that improve job performance. According to Lee (2010), design, proximity and privacy can influence employee job performance in the office space. Besides, the physical environment seems to be an essential factor for an organisation's recruitment, as employees demand fruitful and productive environments. Duffy et al. (2004) found that mismatches between organisations and their office environments can lead to productivity loss. Therefore, Duffy et al. defined four comparisons for productive spaces in office environments. These metaphors are Hive, Cell, Den and Club. Several office furniture companies adopted these terms or gave their twist to it, such as Herman Miller. These metaphors found the basis for the Living Office and initiate activity-based working in the office environment.

In this office, there are separate spaces for doing focus work, meeting, calling or any other work activity. This kind of office includes open spaces which were recently questioned by De Monitor (2020). However, immediately there was a dissent noise too. Harold Coenders (2020), expert workplace innovation at Collier International, encounters the arguments by referring to research from Leesman. This international workplace consultant examined 627.843 respondents in more than 4.403 buildings (Coenders, 2020). Nine out of ten best-scored workplace environments were open-plan offices. Coenders claims it is not open-plan offices themselves that do not work, but it is their design. Good open-plan office design expresses itself as a "courtyard" with a shared inner place that

Figure 5: Seven environmental factors contribute to a healthy and productive work environment

has silent workplaces around it. These spaces feature openness but enable activity-based working for personal needs such as silence and connection.

Biophilia and Views

While rhyming with the return-to-nature trend, biophilia described the connection between nature and humans and proved to increase well-being (Wilson, 1984; Mackerron & Mourato, 2013). Besides, greenery can help in reducing volatile organic compounds and thus improve indoor air quality (Grinde & Patil, 2009). As employee satisfaction and air quality develop with bringing greenery inside the office environment, healthful workplaces would require plants or other natural elements. Bright (2012) defined three concepts for biophilia-based design:

- **Nature in space:** The fusion of greenery in the office space, which can include potted plants, water elements and gardens.
- **Nature analogues:** The use of artwork, biomorphic forms and natural materials as a nature analogue for arousing a feeling of life in the office space.
- **Nature of space:** The reference to psychological and physiological human reaction towards the office layout; requires the space to address a feeling of openness and spaciousness.

Furthermore, nature views outside from a window showed positive effects on well-being and productivity (Chang & Chen, 2005).

Look and feel

The look and feel of an office environment strongly relate to the organisation's identity and impact the employee's mood and sense of well-being. Aesthetical features such as colours can influence the occupant's performance and productivity (Kwallek et al., 1988). Although productivity rarely correlates with colour, appropriate colour can ensure a mood that encourages productivity (Kamarulzaman et al., 2011). There are different beliefs about colours and their effects on office occupants. Besides, it is the combination of colours, textures and shapes used in office design that can arouse a feeling of well-being in the work environment. Meanwhile, when an office design expresses the company's identity, this stimulates the employee in recognising the company's values.

LEVEL 2: THE WORKPLACE

Within the work environment, we find workplaces. A good workplace takes consideration for physical ergonomics. For this analysis, I limited myself to what happens around the employee's office desk and chair. An essential aspect is how the employee uses its workplace. Employees only achieve good health and productivity when they get enough physical activity. Meanwhile, when the employee remains seated, the workplace requires attention for a healthy posture. Below, I listed the essential factors for arranging a healthy and productive workplace.

Physical Activity

Nowadays, many people work in video display terminal (VDT)-intensive work settings. This setting means people sit behind a screen for most of their workday. Although healthcare professionals from Voedingscentrum advise to exercise for at least 60 minutes per day, the sedentary behaviour of VDT-workers impedes this. Over the years, much research became available about the effects of VDT work on the employee's health. Most worrying seems the relations between physical factors at work and both work-related musculoskeletal disorders (WMSDs) and cardiovascular diseases (CVDs). In

other words, good office design reassures employees of the ability be physically active. Especially when the office environment moves towards homes, this may be both a problem and solution. Young professionals may not have enough space for physical activity (such as walks/fitness/cycling desks). However, the flexibility of homeworking could offer more time for young professionals to exercise after office hours.

Posture

Researchers have identified biomechanical loads as a potential risk factor for WMSDs (Derjani Bayeh & Smith, 2009). Derjani Bayeh and Smith reviewed and summarised literature that provides an overview of design factors and solutions. These factors can have a positive or adverse effect on motivation, performance, job satisfaction, perceived biomechanical stress, psychological distress, discomfort, and pain of VDT employees. Figure 6 (right) shows a correct sitting and standing posture for decreasing WMSDs (Working Den, 2020) The figure shows a standing position also because long periods of static seated position can lead to high muscle loading, and subsequently to musculoskeletal pain (Gunnersson & Ostberg, 1977).

Design factors and solutions:

- Working surfaces (desks) should height-adjustable
- Chairs should be adjustable
- Storage areas
- Accessories (keyboard trays, document holders, task lighting, wrist rests, footrests)

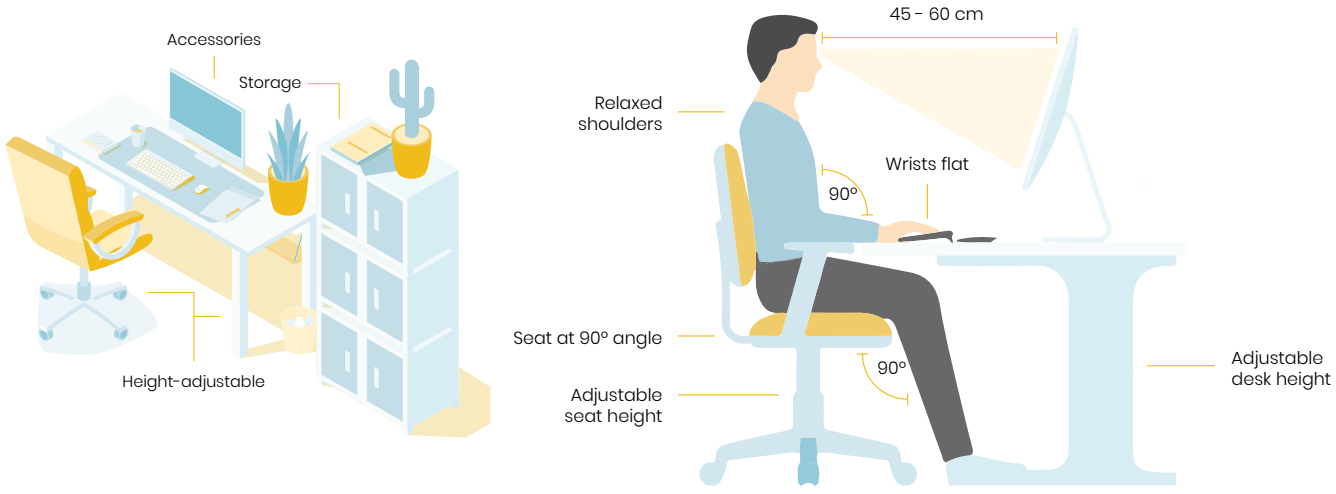


Figure 6: The workplace considers several design factors that contribute to health and productivity (left) and the right working posture (right)

2.2.2 HOW HOME OFFICES ACTUALLY LOOK LIKE

By exploring relevant factors for arranging good offices, I can apply this new knowledge to the young professional's home office. As we learned before, young professionals tend to live relatively small and often share their homes with partners or peers. None of the young professionals I approached had the opportunity to create their own separate home office (appendix C). In all cases, their work environment had to share its space with the bedroom, kitchen or living area. Most recurring seem the workplaces in bedrooms or at kitchen tables. Some people were so creative to arrange standing desks, while still limited by space. In all cases, it became clear that it is challenging to meet all of the requirements for a productive and healthy workplace.

Most of the examples did not show solutions for most of the environmental design factors. All environmental factors are very much dependent on the occupant's situation, such as indoor air quality and thermal comfort. Urban areas or poorly ventilated houses are more likely to demand solutions for improving air quality. Thermal discomfort can be very personal or destructive to solve permanently, as it would require things as better isolation or heating/airconditioning. It can be a real challenge to solve these kinds of issues for creating a productive workplace. There may be one factor that is particularly challenging to include: distractions. Besides sounds, I could imagine that people get distracted when they work in their bedroom or at the kitchen table. Chores are within reach and could seduce people to withdraw from work. Finally, the limited spaces could be limiting the occupant's physical activity. Before lockdown, people were commuting by train or having walks with colleagues. In the home offices pictured below, it can become challenging to maintain a certain amount of physical activity.

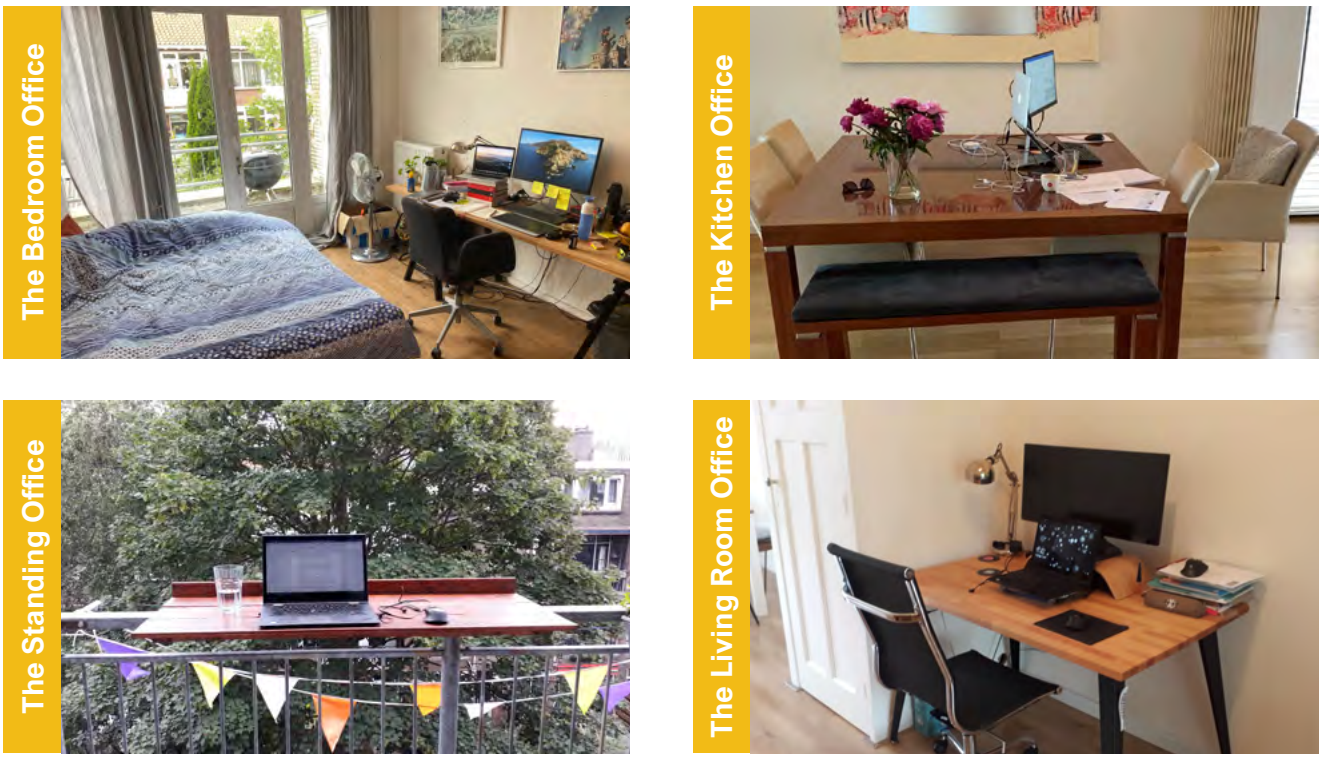


Figure 7: Young professionals found different ways to create their home office

2.2.3 CONCLUSION: EXPECTED HOME OFFICE CHALLENGES

It is unlikely for young professionals to meet all of the physical requirements for a productive and healthy environment. Workplace solutions, such as height-adjustable desks, chairs and surface products, would be the first to add to the home office. These solutions are relatively accessible and affordable. However, as I can relate to the target group, I recognised three issues that are more challenging for making the home office into a success:

- **People are not aware of what makes a productive work environment:** Office environments became smarter over the years and its design considered to increase productivity. The home environment, however, might be uncomfortable for doing work, can feel too dark, too warm or too suffocating. To meet similar productivity requirements as at the office, employers and employees would need to invest in the right furniture, optimised lighting, thermal comfort solutions (e.g. air conditioning), air purifiers, greenery and provide a good look and feel. Meeting the requirements of these factors could mean significant investments and designing such a home workplace is very personal. Besides, most people are not aware of these factors and might not manage to create such a workplace.
- **The home environment is distracting:** Employers are likely not to be aware of their employees' home situation. Especially within the context of this project, it seems highly relevant to take noise into account as significant parts of the target group live in urban areas. Other distractions such as doing laundry, housemates or a desire for coffee could keep the employee from doing work.
- **Homeworking causes a decrease in people's physical activity:** Sedentary behaviour and a lack of physical activity already were a problem before homeworking started. Now, people do not cycle to their offices anymore or have a walk with their colleagues. Besides, most people do not have height-adjustable desks yet.

Chapter 2.3

THE COGNITIVE CHALLENGES OF HOMEWORKING

Many cognitive factors, such as human motivation and stress, played a role in psychological well-being. The self-determination theory (SDT) explains how the fulfilment of three essential needs has a positive relationship with well-being. Stress, on the other hand, is known as a negative factor and is something you may want to prevent from happening. I will research the existing literature to gain a better understanding of which issues may occur in the homeworking environment.

2.3.1 HUMAN MOTIVATION

Before diving into the cognitive factors that can contribute to improved well-being in the work environment, I needed to educate myself on what drives humans, or most importantly, the employee. The self-determination theory outlines a comprehensive framework by Ryan & Deci (2000) for the subject of human motivation and personality. SDT statements focus on how personal, social/cultural and environmental factors facilitate (or undermine) people's sense of willingness and initiative. Besides, this can result in improved well-being and performance (Ryan & Deci, 2000). These factors support people in fulfilling the three basic psychological needs:

- **Competence:** This need is about seeking for the mastery of things and to control the outcome of actions. Among others, it is about productvity and achieving daily tasks. A good workplace, as previously described could help in fulfilling this need. However, there is also personal responsibility for proper time management. Sometimes, people are relying on others for reaching a sense of competence. Good collaboration could fulfill the need for both competence and relatedness.
- **Relatedness:** The need for relatedness is about interaction and connectivity with others, a sense of belonging. In office environments this is likely to be easier; often, there is enough space for breaks, walks and having coffee together. At home, this is a different story and it can be much more challenging to maintain a sense of belonging.
- **Autonomy:** The need for autonomy is a desire to be in control of one's own life and to be self-endorsed. People may feel a greater sense of autonomy when working from home. There is more flexibility and, likely, nobody else is watching. Fulfilling the need for autonomy can be a benefit of homeworking .

The fulfilment of these needs relates to mental well-being. If the factors fail while working from home, employees could encounter reduced well-being. We can influence the need for competence by creating a productive work environment and by arranging good collaboration between employees. Concerning the need for relatedness, it can become difficult to feel a sense of belonging when working from home. To get a better understanding of this need, we will briefly dive into the different factors that relate to this need.

Sense of belonging

A sense of belonging is characterised by the ability of employees to identify with the organisation's identity. In the former office scenario, employees would breathe their company's DNA by an environment that stimulates formal and informal communication with coworkers (Jaitli & Hua, 2013).

Besides, organisational communication can serve as a way to give employees information with which to identify (Bartels et al., 2010). Having a familiar workplace layout can determine an organisation's physical structure and in turn, influence communication among employees (Rogers & Agarwal-Rogers, 1976). Jaitli & Hua (2013) discovered that an employee's sense of belonging associates with the perception of physical attributes. They determined four physical workplace factors that predict relate to this sense of belonging, from which four statements apply to the context of this project.

- **Support for productivity:** Physical characteristics & design that enable employees to work productively contribute to a greater sense of belonging.
- **Familiarity:** For a sense of belonging, workplace characteristics should reflect the company culture and values.
- **Immediate vs overall environment:** Design of the individual workspace is as important as the whole environment.
- **The relevance of a corporate campus:** Places that stimulate both formal and informal serendipity between colleagues help in reaching a sense of belonging.

However, these factors focus on physical office environments. At home, there is a factor that seems more challenging: social contacts. The occasional meetings at coffee machines or an incidental question at a coworker's desk disappear in the homeworking environment. Digital tools, such as Zoom, should fulfil the need for relatedness. However, it does not seem that this is a long-term solution, which means the challenge for a sense of belonging remains.

2.3.2 STRESS PREVENTION

Another critical factor for well-being is stress. Too much stress can have severe consequences and could result in, e.g. depression or burnout. One of the generally accepted definitions of stress is: "the psychological and physical state that results when the resources of the individual are not sufficient to cope with the demands and pressures of the situation" (Michie, 2002). Michie explained two protective physiological mechanisms in the human body in her research:

- **Alarm reaction:** Although initially triggered by a physical safety threat, nowadays, this reaction often has a psychological or reason. For example, a verbal attack by a coworker or superior. As literal "fight or flight" is not socially accepted, this reaction requires emotional and physical energy.
- **Adaptation:** This mechanism allows the human mind to acknowledge that environmental stimuli are no threat anymore, even though they were. For example, fear of dogs might disappear when spending more time with one. The process of adaptation is crucial to prevent mental exhaustion.

One can experience stress when either of these mechanisms does not function properly or when switching between mechanisms is hard. According to Michie (2002), critical factors for psychological ill-health are:

- Long hours worked, work overload and pressure
- The effects of these on personal lives
- Lack of control over work and lack of participation in decision making
- Poor social support
- Unclear management and work role and poor management style

Especially now, preventing stress is more important than ever. The homeworking environment demands measures that stop the exploding number of burnouts among young professionals.

Work-life Balance
Often named as inseparable from preventing work-related stress is a healthy work-life balance. There are many opinions on what the exact definition is. Some say the term is misleading as work is part of life and not the counterpart. However, I took a definition that should satisfy both camps. Work-life balance is having "meaningful daily achievement and enjoyment in each of the four life quadrants: work, family, friends and self" (WorkLifeBalance, 2003). This balance is not determined by time but by the perception of achievement and enjoyment. Knowing what you like and dislike helps to set priorities in all four life quadrants. When you set priorities, time management can help to fulfil daily achievement and enjoyment.

Time Management
From all stress management techniques I educated myself on (appendix D), teaching time management behaviours proved ease in managing stress. Good time management is key for achieving daily tasks and creaing time for enjoyment. For a long time, many organisations use this kind of training as a stress-management intervention (Richards, 1987). Besides, a proper planning can make time for other techniques also, such as more breaks, yoga, exercise and other stress relieving activities. However, this would only relate partly, as time management distinguishes three dimensions (Macan, Shahani, Dipboye and Phillips, 1990):

- Goal setting and prioritisation: This dimension includes what an employee wants to achieve each day and what is most valuable. Besides work goals, this could include setting personal goals, such as the earlier described resting activities.
- Mechanics of time management: This dimension consists of techniques and behaviours that time management training programs typically contain. For example, making to-do lists and preparing clothes to wear the next day at night.
- Preference for organisation: This dimension is about having an organised, systematic approach to work, such as cleaning one's desk before work every day.

Both Macan (1994) and Jex & Elacqua (1999) found that the relationship between time management practice and stress may depend upon its influence on feelings of control over time, which indicates a correlation with the need for autonomy. It can be interpreted that employees need control over their planning and should not be forced into this by anything or anyone. Else, this might have negative effects upon the employees perception of stress.

2.3.3 CONCLUSION: EXPECTED WELL-BEING CHALLENGES

The self-determination theory explains that humans have three basic needs for well-being, which are the need for competence, relatedness and autonomy. Likely, the home environment makes it easier to fulfil the need for autonomy. Your boss or coworkers will not look at what you are doing, and you may feel in full control over your work. However, the need for relatedness is harder to fulfil. For example, at home, there are fewer factors that will contribute to a sense of belonging. Digital tools, such as Zoom, may not be sufficient for maintaining social interactions. These solutions may solve some collaboration issues, but I question if this will be enough to tackle all collaboration challenges. Sometimes you would rely on others to achieve daily tasks. Insufficient collaboration could harm the sense of competence. Besides, if there are no more achievements, people could feel stress, as work may overload. A solution is to increase daily achievements, that meanwhile contribute to a better work-life balance. People can reach this kind of balance with good time management and setting priorities on achievement and enjoyment. The following homeworking challenges summarise issues of the above:

- **Homeworking makes a healthy work-life balance difficult to maintain:** When the perception of workload is too high, the four quadrants of life may become unbalanced. Especially when work is always available, and there is limited space for distinguishing work and living space, work stress could arise. When working from home, it may be easy to skip breaks and make long hours. Proper time management could help in setting boundaries for work and private life activities. A balance of daily achievement and enjoyment can help to improve the young professional's well-being.
- **Working apart from coworkers causes a lacked sense of belonging:** As people will work from home more often, and employees may stop interacting with their coworkers, reaching for a sense of belonging can be challenging. Furthermore, this sense of belonging is crucial to achieving organisational successes.
- **Homeworking complicates goog Collaboration:** Working from home demands a different approach to collaboration. Coworkers are not together anymore in the physical environment, and information overload and zoom fatigue are on the lure for making collaboration even more challenging.

Chapter 2.4

GET TO KNOW THE YOUNG PROFESSIONAL

So far, I based the six challenges on the available literature and own experiences. For verifying the existence of these challenges among the target group, I need insights into the homeworkers' behaviour and experiences. For this validation, I rely on the results of three different homeworking studies.. These insights are the basis for assessing user needs. The goal of this subchapter is to gather enough insights to create personas from which I can derive requirements for improving the homeworking experience. I approach these improvements from the perspective of one validated homeworking challenge.

2.4.1 VALIDATION OF HOMEWORKING CHALLENGES

My own experience with homeworking taught me that homeworking brings along many challenges. Even beyond the scope of this project homeworking demanded many changes in organisations, physical workplaces and the way people do their job. At the start of lockdown, many of us could not imagine that some of the changes would be permanent. This project bases its context on a significant assumption: Most organisations will shift towards a hybrid way of working with most employees working from home for at least half of the working hours.

For validating this assumption, along with the six homeworking challenges, I looked at the results of three different studies. Appendix E shows a comprehensive overview of these results. Throughout this chapter, you will find one of the following study numbers behind the Key Insights (KI's).

STUDY 1: Own interviews with young professionals
STUDY 2: IDE Student insights into homeworking through interviews
STUDY 3: KiM research 'Homeworking and the Corona crisis'

Note: Only study 1 was focusing on young professionals. The rest focused on all sorts of homeworkers.

Organisations will shift towards a hybrid way of working

By doing trend research, I already predicted that the future way of doing work would be hybrid. Employees would spend most of their week at home, where they are flexible and in control over their spent time. The rest of their workweek, employees would use to meet coworkers for collaborating socialising at the office. The Kennisinstituut voor Mobiliteitsbeleid performed a study on COVID-19 and the changes it brought along. Below, you find the key insights that predict the viability of a hybrid working future.

KI1 Over 60% expects the upcoming months to be working from home more often than before the corona crisis. The part that thinks this will be permanent, increased from 25% to 45%. (3)

KI2 This homeworking will likely only cover a part of the entire workweek. Most homeworkers (around 60%) expect to work from home one or two days a week in the future. Less than 10% intends to work from home for more than 25 hours a week. (3)

Conclusion: Confirmed. This report from the end of June already showed growth in people that want to work from home. Likely, employers will respond to this demand, as it benefits them also with fewer costs on facilities and commutes. The home/office ratio will vary per individual and may be different from the target group.

People are not aware of what makes a productive work environment

As we learned during the exploration of the physical homeworking factors, the work environment and workplace are two different things. Most people are aware of the importance of biomechanical ergonomy. They quickly arranged screens, keyboards and chairs. These kinds of design solutions are available in abundance. It does not have to be expensive to add some of these homeworking essentials to your home office. Some employers even allow their homeworking employees to get these products. However, there does not seem to be much awareness about the influence of environmental factors on productivity and well-being.

KI3 People are only partly aware of what makes a good home office. **(**1&2)

KI4 Ergonomic design solutions such as a secondary screen, keyboard and a good chair are homeworking essentials. (1&2)

KI5 Whether people miss any office practicalities varies per individual and could be more significant for young professionals. (1&2)

Conclusion: Partly confirmed. During lockdown, many people got workplace solutions from their offices, or they bought their own screens and chairs. People are aware that these kinds of solutions are essential for creating a healthy and productive home office. Even to young professionals, with their limited budget and space, this is not a significant challenge. However, the unawareness of environmental factors indicates that there is still a vital step to make.

The home environment is distracting

Although the home environment can be distracting to the target group, it is not necessarily a bad thing. At the office, coworkers can be distracting. At home, it is easier to remain in a workflow, because the colleagues are not there. People consider chores as meaningful distractions that can replace office walks. However, at home, there are also negative distractions. The temptation to go on social media grows when the office peer pressure disappears.

KI6 Not having coworkers around often means a better workflow. (1&2)

KI7 Chores can act as meaningful breaks throughout the day. (2)

KI8 At the office, peer pressure prevents people from going on social media. (2)

Conclusion: Denied. Dealing with distractions is not a significant challenge for young professionals. Instead, homeworking can even be less distracting and better for doing focus work.

Homeworking causes a decrease in people's physical activity

Physical activity is vital for productivity and well-being. In the days that young professionals went to their offices, they would go by bike, walk to the train or have regular walks in- or outside the office. There was sufficient space and many incentives to move. Lack of space prevents young professionals from having regular walks and reduce sedentary behaviour.

KI9 Limited living space detains young professionals to have short walks. (1)

KI10 The young professional makes long hours while seated. (1)

Conclusion: Confirmed. Decreased physical activity is a challenge that requires attention for making homeworking viable on the long-haul. Sedentary behaviour increases when people do not have enough space to move and could cause both physical and psychological illness.

Homeworking makes a healthy work-life balance difficult to maintain

It can be stressful when there is an imbalance between the four quadrants of life: work, family, friends & self. When all four quadrants take part in the same space, people experience issues with maintaining a healthy work-life balance. Young professionals are often bound to limited space for most life activities. The lack of a physical office makes borders between work and private life fade even more. These were already significant problems before COVID-19 because the digital workplace enabled people to work from anywhere they wanted. Now, even the transitions between work and private life disappeared.

KI11 The office was a clear physical boundary between work and private life. (1)

KI12 Most daily activities happen within the same space. (1&2)

KI13 Fading borders make it hard to let go of work. (2)

KI14 People miss transitions from work to private life. (2)

KI15 35% of all homeworkers experiences issues with work-life balance. (3)

Conclusion: Confirmed. Many homeworkers experience issues with maintaining work-life balance. Among others, young professionals face this challenge because of their limited space and disappearing transitions between work and private life.

Working apart from coworkers causes a lacked sense of belonging

Relationships and interactions between colleagues define a certain sense of belonging and fulfil the need for relatedness. When done right, people can relate to both their coworkers and the organisation's DNA. The current situation makes serendipitous encounters rarer, and contacts between colleagues fade away. Especially when we can all go back to the office, the difference between physical and digital presence becomes more noticeable.

KI16 People who meet physically have an advantage over people who meet digitally. (2)

KI17 Homeworking caused contacts between coworkers to fade away. (2)

KI18 People miss the bigger picture of their work. (2)

KI19 Homeworkers feel better connected to others when they know most people work from home. (2)

KI20 Homeworking requires trust among employees. (2)

Conclusion: Partly confirmed. To all homeworkers, there is a challenge to feel a sense of belonging. It could even become more relevant when people work from home on different days and feel disadvantaged over the people at the office. However, there might be a simple solution: standard days at the office for meeting and socialising. I doubt the future relevance of this challenge.

Homeworking complicates good collaboration
Sometimes, achievements depend on the competence of multiple employees who need to work together. Digital technologies allowed employees to work remotely and still to be able to communicate and collaborate. Adopting these kinds of tools became essential during the first period of lockdown. This shift required employees to adapt to a completely digital way of collaboration. The young professional was able to adopt these technologies rapidly and recognised them as useful tools for collaborating from home. Besides, meetings became more punctual and efficient. However, this digital collaboration does have a few downsides, such as low serendipity.

KI21 Many digital tools allow for good collaboration from home. (1)
KI22 Video calls are punctual and efficient. (2)
KI23 It is difficult to "read" people from a screen. (2)
KI24 Serendipity is lower when working from home. (2)
KI25 There are less one-on-one encounters. (2)

Conclusion: Denied. Some challenges within collaboration require attention in the current situation. During a video call, it can indeed be hard to read every single face, and it can be tiring. However, the young professional is more used to digital technologies than older generations. They recognise these tools as useful and easy to use. Besides, going to the office for a few days a week will likely solve most of the collaboration issues, as people can meet face-to-face again.

2.4.2 PROFILING THE YOUNG PROFESSIONALS

It is confirmed: homeworking remains part of the new way of working, and we need to solve the challenges that come along. These challenges do not apply to everyone. When your space and budget do not play a significant role in arranging a home office, there may be different challenges. Young professionals are part of a group that struggles with making homeworking feasible. During study 1, I chatted with young professionals, observed them and conducted interviews. The result is many insights into the target group's (work)life. I summarised these insights by creating personas, which reflect the target group. These personas help me to explore user needs and narrowing down the target group.

PERSONAS

Personas reflect specific characteristics of end-users. These personas are not real, but consist of insights from observed individuals within the target group. They help to gain a better understanding of user behaviour and their needs. Before starting on creating the personas, I made several choices that reflect the people I observed. These choices narrow down the specific target group. I focus on young professionals:

- aged 25 to 34
- without children
- who work from home at least 60%
- who live within the 'Randstad'

The next two pages show Joseph's profile, which is one of the personas from appendix E.

Joseph

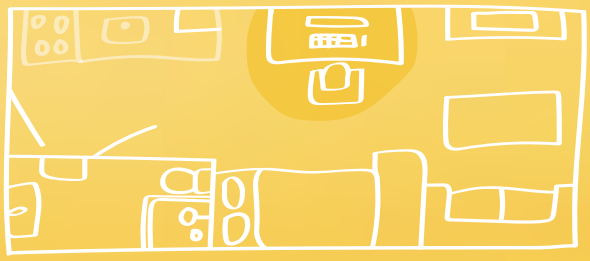
The Studio Office

ABOUT

- Single, 28 years
- €40k - €50k
- Software developer (36h/w)
- Amsterdam

THE STUDIO AS A HOME OFFICE

As a single, Joseph never needed more space than he has now. After several months of homeworking, Joseph turned his studio into a home office. He realised his little studio did not have enough space for distinguishing work *and* private life. Housing prices exploded, and he cannot afford to live any more spacious at this moment.



32m²
Of room space

100%
Of work is done here

CURRENT HOME OFFICE SOLUTIONS

Second screen

Desk + chair

Smart LEDs

“All my daily activities take place in one space”

MOTIVATION

Joseph is ambitious and a perfectionist. These characteristics make him vulnerable to stress. In his private life, Joseph finds joy in sports (running/cycling) and playing video games.

DILEMMAS

Joseph would like to remain working from home as he is more focused and flexible. However, he cannot afford to live any bigger. His limited space causes him stress, which can be a significant problem on the long-haul.

Flexibility
For running & hobbies

VS

Imbalance
All activities in one place

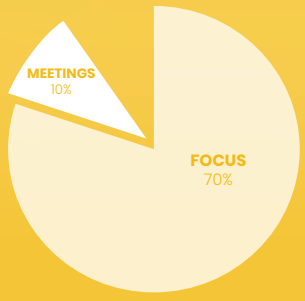
DAILY ACTIVITIES

Most of Joseph’s workday exists of doing focused work. As a software developer, he mostly works on coding. A fifth of his workday consists of meetings and the remaining time is for breaks, which often is not more than 45 minutes.

CORE NEEDS

The office was meant for work and home for relaxation. Joseph needs physical boundaries for work and private life activities within his small living space.

A LOOK INTO THE AGENDA



Work

4h/week
Video games

1h/week
Running

Private on workdays

2.4.3 CONCLUSION: NEEDS FOR BALANCING WORK AND PRIVATE LIFE

Although four out of six challenges proved relevance among young professionals, it seems that maintaining a work-life balance is the biggest problem. Improving this balance could withhold the exploding number of burnouts. This challenge requires a solution to make sure homeworking has a future for young professionals. The personas from appendix E summarise all user insights. These profiles describe three user situations and reveal user needs.

Users need a healthy work-life balance:

- The user needs physical boundaries to distinguish the work environment from the living space
- These boundaries should relate to the user's work and private life activities
- Users need some time to clear the mind off of work for transitioning from work to private life
- Users need a lower perception of workload for rebalancing work-life
- Users need the motivation to take regular breaks for decreasing workload


Bank Chan

Source: Royal Ahrend (2020)

CHAPTER | 3

VIABLE MARKET OPPORTUNITIES

The current circumstances demand great adaptability on maintaining a healthy work-life balance. As I learned, many people struggle with this challenge. Before I start tackling this hurdle, I want to verify if it has the opportunity for fulfilling my ambition of starting a business. Therefore, I need to explore viable market opportunities. An analysis of the competitive environment reveals potential market gaps and opportunities for partnering up with competitors. Together with other primary market insights, I can perform market segmentation and predict different market sizes. The goal of this chapter is to discover viable market opportunities.

Chapter 3.1

THE COMPETITIVE ENVIRONMENT

On the market, there is a wide range of digital and non-digital offerings aimed at supporting various aspects of office work. Among these offerings are desks, collaboration software and entire office spaces. During the first lockdown, there was one industry that grew significantly and demanded existing businesses to pivot towards facilitating remote working. This dynamic field is the operating environment. Independently from their work location, employees may need care. The Dutch Working Conditions Act sets conditions for workplaces on a physical, cognitive and organisational level. There is a whole industry that responds to these requirements by helping employers to improve their employee care. However, within my project, I focus on improving the young professional's work-life balance while working from home. Therefore, the market I will explore is the market of work-life balance solutions.

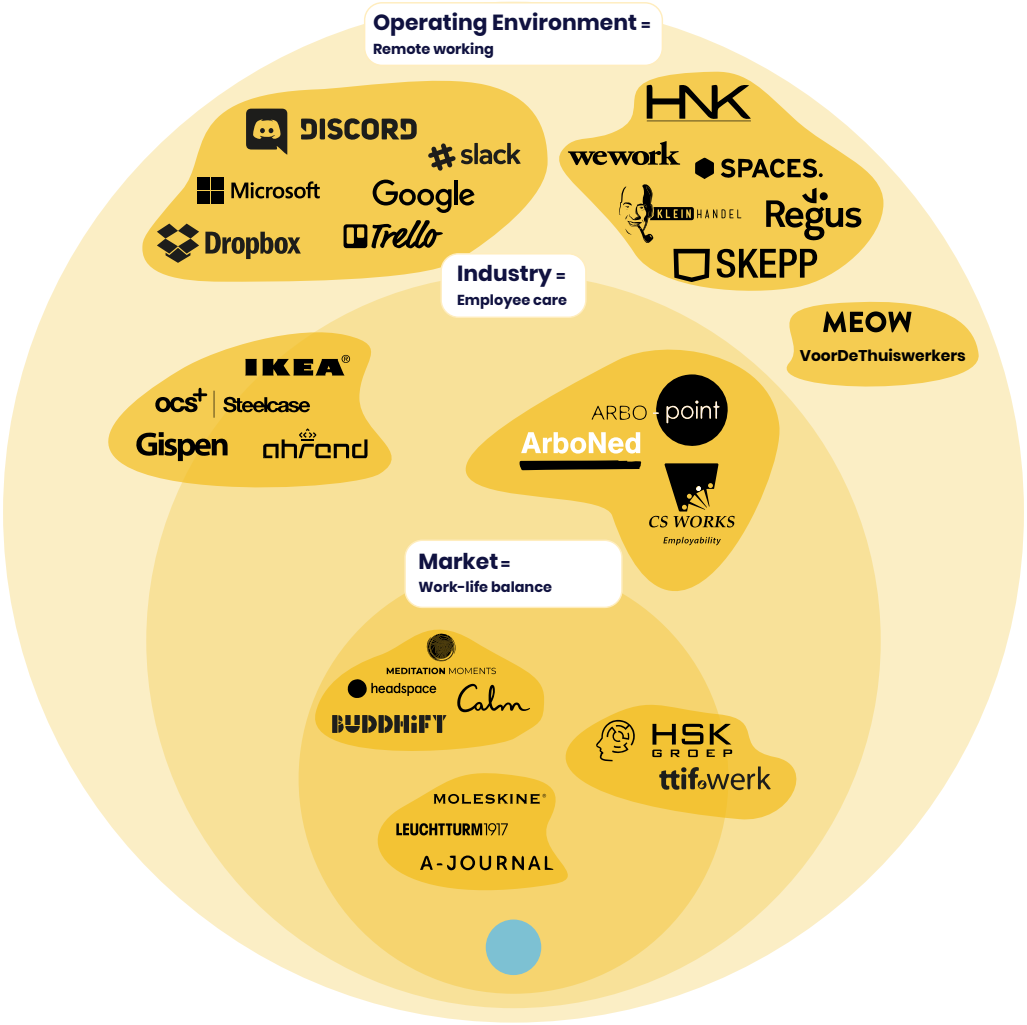


Figure 8: The competitive environment shows all businesses that contribute to the domains of doing work and well-being

3.1.1 OPERATING ENVIRONMENT: REMOTE WORKING

During the pandemic, the government strongly requests those who can to work from home. This announcement resulted in companies closing their doors and asking employees to work remotely. These measurements were enabled by a wide range of digital workplace solutions, such as Zoom and Teams, that allowed people to collaborate and communicate remotely. As the environment proliferates, new businesses responded to this new way of working. Some, such as Ahrend, started to provide flexible services for arranging home workplaces. However, there are more ways to work remotely. A new entry within this domain is the hotel branch. Platforms, such as VoorDeThuiswerkers and Meow, arose that facilitate a service for hotels to offer their rooms as office spaces. All of a sudden, hotels were competing with flex workplace providers. However, to the office-as-a-service business, opportunities open up as employers may get rid of their own office spaces.

COVID-19 business adjustments:

- More and more people are using digital collaboration tools to work together from a distance, which increases the market size and competition
- Office-as-a-Service facilitators are likely to change their strategy as office functionality changes.
- Shared office spaces can be a solution to companies who do not want to own an office anymore after the crisis.
- Companies in the Office-as-a-Service industry are likely to pivot towards facilitating hybrid working.
- Hotels started to offer their empty rooms as flexible workplaces.

3.1.2 INDUSTRY: EMPLOYEE CARE

Several factors determine the field of employee care. The most common element in the work environment is workplace ergonomics, which is subdivided by cognitive, physical and organisation factors (ErgoDirect, n.a.). Multiple consulting agencies, such as Arbo Point and Arbo Consult, specialise in this field. These companies advise on how employers can, for example, decrease leave of absence. On a physical level, furniture companies play a role in arranging home workplaces. Business psychologists can help with improving the cognitive ergonomics within an organisation. Employers can have these in-house or hire as a third-party. Other third-parties that can help are coaches and trainers, who often operate as freelancers.

COVID-19 business adjustments:

- Existing furniture suppliers are making pivots towards facilitating home workplaces with desks and chairs.
- Office furniture will mostly focus on social interactions and collaboration.
- The home workplace becomes part of the employer's responsibility.
- The lockdown demands more psychological help for employees.

3.1.3 MARKET: WORK-LIFE BALANCE SOLUTIONS

Within the direction of this project, I dive into the well-being side of the employee care industry. Improving the work-life balance tools for young professionals is going to be our Market. Besides the earlier named psychologists and coaches, some businesses focus on improving well-being among a bigger audience. An example of such companies is the growing number of mindfulness apps, such as Calm and Headspace. They provide meditation services that seem most popular among young professionals. However, there are some critics on this approach. Such applications would be too commercial and focused on symptom relief instead of long-term solutions. Time management

techniques, on the other hand, already proved their effectiveness on work-life balance. The increasing popularity of bullet journals strengthens the position of stationery companies, such as Moleskine and Leuchtturm1917. There are digital tools for this technique also. Time Doctor and DeskTime are offering tools that help employees prevent from working too long.

COVID-19 business adjustments:

- There is increased relevance during times of uncertainty and lockdown.

3.1.4 CONCLUSION: OPPORTUNITIES

The most significant threat is to lose our target group to the market of flexible workplaces. We need to operate fast to prevent this from happening. All other existing homeworking solutions promise great possibilities for making homeworking work. An immense number of digital tools make collaboration and communication relatively easy. Besides, Furniture-as-a-Service concepts should limit investment costs into a physically ergonomic home workplace. Many parties advice on arranging the best circumstances for (home)working. Psychologists and coaches help employees to find balance. However, they have a limited audience. Existing mindfulness apps have a larger audience, but do not seem able to provide a long-term solution to everyone. There can be an opportunity to cooperate with other parties in the industry to reach a larger audience for improving work-life balance. Besides, there is a market gap for solutions that help to balance all four life quadrants (work, family, friends and self) while working from home with limited space.

Chapter 3.2

EXPLORATION OF VIABLE MARKETS

The future perspective of our competitive environment is still dynamic but is becoming more stative as the homeworking days pass. Companies are changing their business models permanently towards a hybrid future. In this future, I positioned our company as the party that fills the gap between maintaining work-life balance and homeworking. This gap may be relevant to a broader audience than just young professionals. In this chapter, I will zoom in and out of our beachhead market. By predicting various market sizes, I will validate them on viability for new ventures. Market segmentation allows me to discover different opportunities for market entry.

3.2.1 THE BEACHHEAD MARKET

During this project, I often use methods from Aulet's book Disciplined Entrepreneurship (2013). One of the steps described in this book is choosing a beachhead market. According to Aulet, a beachhead market is a place where you will have the strength to tackle other markets with different opportunities. Aulet describes three conditions that define such a beachhead market:

1. The customers within the market all buy similar products.
2. The customers within the market have a similar sales cycle and expect products to provide value in similar ways.
3. Word of mouth between customers serves as high-value references in this market.

Because the assignment and previous analysis already described most of the beachhead market, I can already define it as solutions for young professionals with work-life balance caused by limited space. During the prediction of market sizes, I will explore even narrower markets to address this specific target group.

3.2.2 MARKET SIZES

We can divide the total market we aim at into three levels: the Total Addressable Market, Serviceable Available Market and the Serviceable Obtainable Market. With our beachhead market, we may skip on a large group of homeworkers to whom our design can be relevant also. Arguably, the total addressable market is the total of all homeworkers that experience similar problems. Therefore, we define the market sizes as the following:

- Total Addressable Market: This is the annual revenue we would collect if we achieve 100 per cent market share. Outside the young professional target group, there are many more people struggling with the work-life balance challenge. Therefore, to the TAM, we count all homeworkers that struggle with maintaining work-life balance.
- Serviceable Available Market: Young professionals, part of our beachhead market, are a significant share of the TAM and likely to reach with our product/service. Previously, I validated the relevance of the work-life balance challenge to this target group. Therefore, I expect that we can reach this group.
- Serviceable Obtainable Market: By further narrowing down the SAM, we can explore opportunities for reaching our target group. This portion of the SAM, is what we call the SOM and helps to examine ways of getting to our beachhead market.

TAM SIZING

Primary market insights help to predict the different market sizes. For the Total Addressable Market, I rely on results from CBS and KiM. As a starting point, there are 5.683.000 people (15 to 75 years old) with a permanent contract (CBS, 2020). On average, 38% of all employees could theoretically work from home (CBS, 2020). Among all employees are 35% struggling with work-life balance issues (Kennisinstituut voor Mobiliteitsbeleid, 2020). These numbers indicate that over 746 000 Dutch employees could work from home and struggle with work-life balance problems.

Primary market insights:

- 5.683.000 Dutch employees with a permanent contract (CBS, 2020)
- 38% of all Dutch employees could work from home (CBS, 2020)
- 35% struggles with maintaining work-life balance (Kennisinstituut voor Mobiliteitsbeleid, 2020)

Figure 9 shows how the total number of Dutch employees narrows down towards the TAM and SAM. It still misses a calculation of the potential revenue with a 100 per cent market share is still missing. For calculating this value, I rely on the VAT-free homeworking budget of €363/year. Taking this budget for predicting the TAM, depends on the assumption that employers use this budget for solving their work-life balance issues with homeworking. Multiplication of the TAM-size with the homeworking budget results in a TAM-value of €271M.

Primary market insights:

- The VAT-free homeworking budget is €363/year (FNV Professionals, 2020).

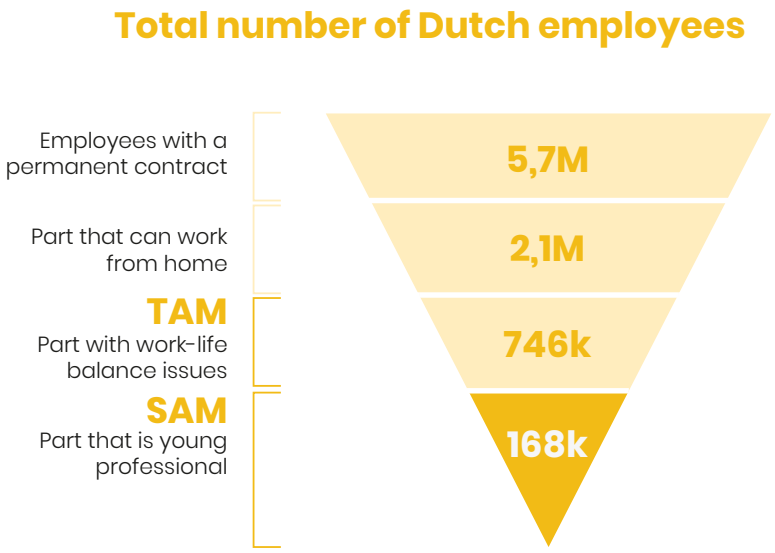


Figure 9: The total adressable market size is 746 000

SAM SIZING

The Serviceable Available Market targets our beachhead market: all young professionals that struggle with work-life balance. The original TAM-size is the starting point for calculating the SAM-size. According to CBS (2020) statistics, 23% of the Dutch are between 25 and 34 years old. Calculation of the SAM size relies on two assumptions:

1. The 23% is equal for people with a permanent contract, although I expect this to be lower.
2. Percentage of young professionals with work-life problems is similar to the 35% average, although I expect this to be higher.

Multiplication of the target group share (23%) with the TAM results in the SAM. Its size is about 168.000 young professionals and with a value of €61M.

SOM SIZING

The Serviceable Obtainable Market contains a narrow group of the most accessible people to acquire using our product/service. Determination of the most opportunistic group required a market segmentation. Appendix G contains the complete segmentation chart. The IT services branch with a total size of 278.000 in 2017 (CBS, 2018) scores highest on the following criteria (Aulet, 2013):

1. Is the target customer well-funded?
2. Is the target customer readily accessible for user testing?
3. Does the target customer have a compelling reason to buy?
4. If you win this segment, can you leverage it to enter additional segments?
5. Is the market consistent with the values, passions, and goals of the founding team?

The results of this ranking show that the IT services sector promises most opportunities for obtaining the market. Young professionals within this group have most possibilities to work from home (81% of them can), and they are known to be early adopters. These are two excellent characteristics for adopting our product/service. Calculation of the SOM replaces the previous TAM/SAM numbers. However, the same assumptions count for this prediction. Among the 278.000 IT service employees are expected to be around 18.000 young professionals with work-life balance problems. Its value is, therefore, estimated at around €7M.

Primary market insights:

- In 2017, there were 278.000 people employed in the IT services sector (CBS, 2019)
- 81% of the IT employees can work from home (CBS, 2020)

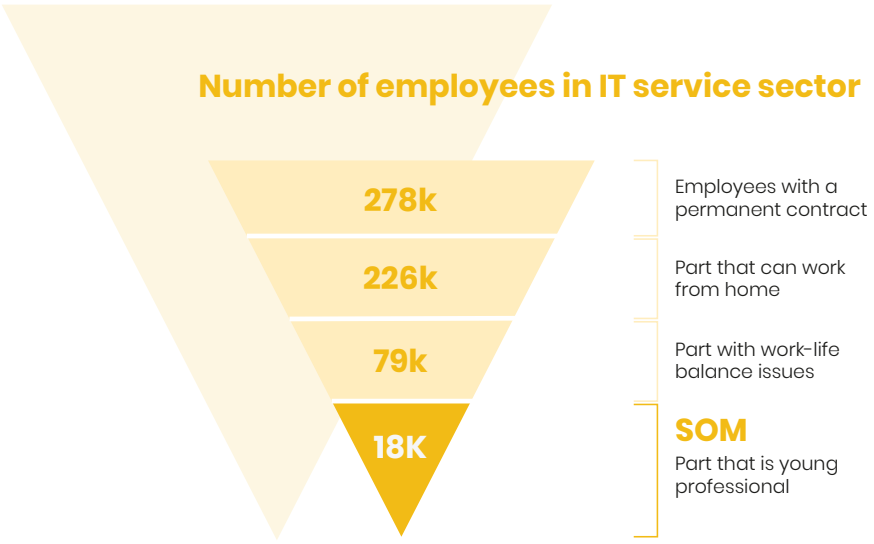


Figure 10: The serviceable obtainable market size is 18 000

3.2.3 CONCLUSION

This subchapter aimed to validate the beachhead market size on viability. The criterium for this validation was that the predicted size should be between €17M and €85M. During the determination of market sizes, I defined the beachhead market size as our Serviceable Available Market. This SAM has a potential market value of €61M and is, therefore, validated on viability. Addressing this market may lead to even vaster opportunities within other markets with an aim for a Total Addressable Market value of €271M.

Further segmentation of the SAM led to the Serviceable Obtainable Market. The SOM specifies the beachhead market even further by aiming at IT service employees. This group is known as early adopters and has most opportunities form making homeworking work. Obtaining this specific market may be an excellent opportunity for market entry.

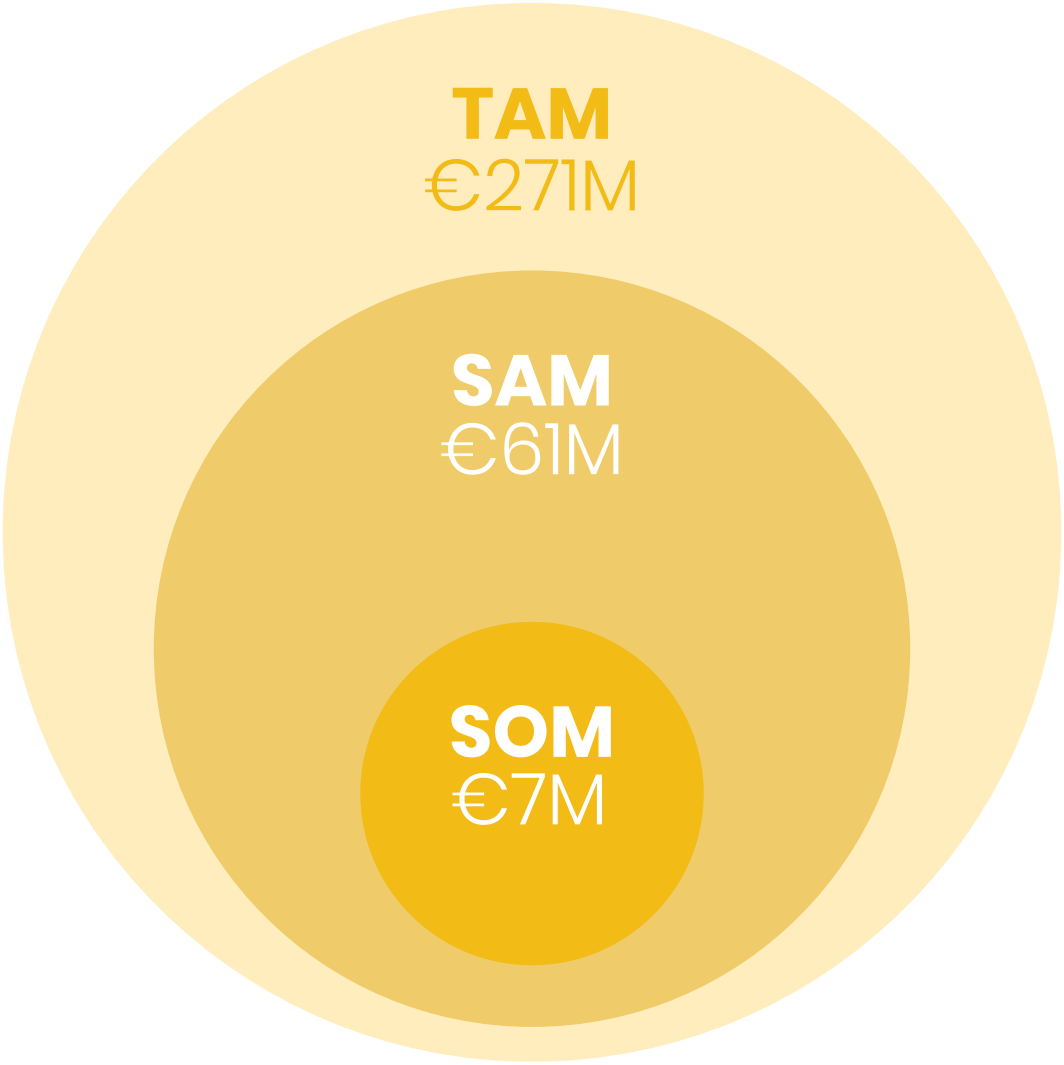


Figure 11: The beachhead market size is large enough for a viable business enttry

CHAPTER | 4

DESIGN BRIEF FOR A HYBRID FUTURE

Most of us are going to work from home more often after the Corona crisis is over. Offices will not disappear but become a place where people meet and collaborate. With knowledge of current developments and trends I aim to define a storyline that summarises the future way of doing work. This glimpse, of what the future could look like, helps in specifying the assignment into a design brief. The design brief covers both future vision and stakeholder needs to safeguard the necessity of creating a desirable and viable design.

Chapter 4.1

DESIGN FOR HYBRID WORKING

Although COVID-19 leaves us in significant uncertainty about the future, there are some pieces visible that fit the puzzle of the domain. Current developments show that the economy is on its way to recovery. In most countries, this requires employees to remain working from home. The longer the situation continues, the more likely that companies build their strategies around homeworking. The hybrid form, where people alternate home and office work, gains popularity. People need to tackle their homeworking challenges to make this new concept work. It becomes difficult to set clear boundaries for work and private life when all daily activities happen in the same room and scenery. Without a solution, the problem of the increasing number of burnouts will only become more relevant. Young professionals need to be able to balance achievement with enjoyment again. Before the crisis, commuting facilitated the transition from work to private life, and at home, there was mostly a time for relaxation and fun. Now, we need to be creative and recreate these transitions in other ways. When not doing work, we need a little help to get our mind off of work and make time for ourselves. The ViP approach inspired me to define a future statement out of my own observations, thoughts, beliefs and opinions, based on previous research.

The pandemic has a long-term societal impact
COVID-19 forced most countries into a lockdown in spring/summer of 2020. Economies are at a standstill; people still lose their jobs and companies face bankruptcy. The economy is currently in a crisis or trying to recover from one, which may take years. However, the Corona crisis brings along some positive developments too. CO^2 emissions may reduce because of fewer commuters and less office usage. The radical change of working from home pushed companies into adopting new technologies that accelerated the digital workplace and remote working. All of us learned that homeworking is feasible.

The future way of working is hybrid
Office functionality and the role of homeworking currently is a high priority topic among most companies. Employers might need to adjust their office strategy. There are three possible directions companies are likely to explore: a) go back to the way it was, b) get rid of all office spaces or c) alternate home and office work. This last option, which experts often refer to as ‘hybrid’ working, is likely to win territory in many company strategies. The remaining office buildings will then focus even more on co-creation and social interactions, which contributes to solving the problem of having no sense of belonging. Together with the numerous digital collaboration tools, people will be able to collaborate efficiently in the future.

Working from home benefits all
Working from home shows excellent potential for solving many issues; employers can save costs, flexibility increases for employees, and the government can address environmental challenges. However, not every employee will agree instantly. Some have better circumstances for homeworking than others; space is a crucial factor in making it work. The future requires attention for people, such as young professionals, whose limited space challenges them in maintaining work-life balance. The hybrid future considers equalising opportunities for creating physical boundaries between work and private life; homeworking should benefit all.

A productive environment for well-being

Employers will need to improve the working environment in people's homes to increase both productivity and well-being. These experiences are related and rely on many factors; these go beyond ergonomic desks and chairs. For example, lighting and temperature are of significant influence on employee job performance and should increase the perception of daily achievement. Over the years, many businesses focused on creating productive and stress-reducing environments. These developments will shift towards the home environment in the hybrid working future. The way we design and furnish our homes needs to change for creating safe workplaces and living spaces.

Young professionals need back their transitions

Especially setting the boundaries between work and living spaces is what challenges the young professionals. The office was a clear boundary between work and private life. Leaving the office initiated a transition to their evening off, often in the form of commuting. In the hybrid working future, these transitions happen at home; employees will again go through the physical transition from work to private life but in different forms. Such transitions are the perfect way to add daily enjoyment, which influences the perception of work-life balance. The interactiveness of home offices is going to play a significant role in facilitating a healthy work-life balance by assisting in creating such transitions.

"The home office facilitates a healthy work-life balance by creating smooth transitions between daily activities"

Chapter 4.2

A REFINED BRIEF

In a future where homeworking takes a priority role in doing work, young professionals are likely to be the target group that experiences most challenges in the home office environment. Starters, who are limited by space, often turn their bedroom or the kitchen into an improvised home office. This kind of home office results in all activities happening in the same room, which causes work-life issues. Several opportunities to solve this problem revealed themselves during earlier analysis. This brief summarises the opportunities and supplements the scope with user needs and guidelines.

4.2.1 DESIGN OPPORTUNITIES

The design opportunities are the result of literature research, target group analysis and market research. The principle of time management proved great opportunities for both stress-prevention and work-life balance. User research showed that fading boundaries make it difficult to transition from work to private life. Market research indicates that the IT services sector is an excellent opportunity to enter the market.

Work-life balance

A healthy balance means coordinating work and life activities such that the perception in daily achievement and enjoyment is nearly equal in all quadrants of life (work, family, friends and self). Balance means altering different life activities and often demands time to get the mind off of work. Therefore, work-life balance often relates to planning. People need time for activities that balance their achievement with enjoyment and requires them to set priorities for each quadrant. Improving people's time management shows excellent potential for improving work-life balance.

Time management

The exploration in appendix E shows that time management is an excellent technique to prevent stress. It is the first step towards planning activities that relieve stress, as they may bring people a sense of achievement, enjoyment or both. For example, to some, yoga is a great way to relax and workout. This kind of activity could result in a perception of both achievement and joy in life quadrant of self. Good time management requires to set daily or longer-term priorities. Besides, it is an excellent way to define boundaries in time between the different parts of life.

Boundaries & Transitions

Earlier research showed that setting boundaries becomes more complicated when all activities happen in a small space, as is the case for young professionals. Time management can help in determining when to work and when not. However, it requires more to define physical boundaries, similar to the office. Changing the young professional's environment shows opportunities in distinguishing different life quadrants. These different sceneries could vary from going outside for distraction to making the home environment interactively changing, which may perfectly replace former commute transitions. Homeworkers miss these transitions as a way to clear their minds and slide into an evening off.

IT services sector

Market research showed viable opportunities for market entry by approaching young professionals in the IT services sector. This group is likely to be acquainted with remote working, contains many young professionals and is a tremendous market. The final strategy should focus on approaching this market as a beachhead market.

4.2.2 THE SCOPE & ASSIGNMENT

Initially, the scoped revolved around all young professionals, aged 25 to 34 years old. The insights from previous chapters allowed me to refine this scope. The new scope revolves around solving work-life balance problems and excludes young professionals with children and the ones that can create home offices in separate spaces. To fit this profile, users need to share their home office with a place for private life (e.g. bedroom or living room). Personas from appendix G (figure 12) show realistic young professional circumstances, which found the basis for the defined user needs:

- The user needs physical boundaries to distinguish the work environment from the living space
- These boundaries should relate to the user's work and private life activities
- Users need some time to clear the mind off of work for transitioning from work to private life
- Users need a lower perception of workload for rebalancing work-life
- Users need the motivation to take regular breaks for decreasing workload

These needs result in two important design guidelines that supplement to the new assignment:

- The design should consider improving employee time management for a healthier work-life balance
- The design should enable employees to change their scenery after each workday significantly

Refined assignment: design a viable product/service system that solves the young professional's work-life balance problems when working from the home environment.

Figure 12: The brief focusses on designing for the three personas

CHAPTER | 5

ENABLING HYBRID WORKING

The future form of doing work will be hybrid. People go to the office about once or twice a week. Then, the rest of the week they work from home. Hybrid working shows excellent potential in improving productivity and well-being. Before it comes to that, there are some hurdles to conquer. To enable hybrid working, young professionals need solutions that assist them in transitioning from work to other life activities. The starting point of developing new concepts is ideating on ways to create clear boundaries between the different quadrants of life. Cognitively moving from one to the other state will represent the transition. As this direction is set clearly, I can start generating ideas, cluster these and develop concepts—final clustering results in one last concept that is most likely to support young professionals in creating work-life balance.

Chapter 5.1

TURNING IDEAS INTO CONCEPTS

The young professional that is limited by space uses the same room for many of its daily activities. Whether it is writing emails, video calling, playing the guitar or reading a book, most activities happen within this particular room. Previously, there was one apparent border between work and private life: the office. Stepping out of the office often initiated the transition to having an evening off. Concept ideation will revolve around creating ideas that evoke similar experiences. By testing their features, I can evaluate them on desirability, viability and feasibility. A final clustering combines the best ideas into one concept that should be most promising to assist young professionals in experiencing transitions between work and other life quadrants.

5.1.1 CONCEPT IDEAS

The outcome of the brainstorm session resulted in many fruitful ideas, which were clustered and iteratively developed into three concepts. In this subchapter, I elaborate on these concepts and summarise all key features. The key features are the basis for evaluating the desirability, viability and feasibility of the concept.

Getting these boundaries back, requires answering one central question: how can someone create clear boundaries between work and private life?

- How can you improve work-life balance?
- How can you simulate transitions between work and private life activities?
- How can you differentiate work from private life?
- How can you use technology to play a role in setting boundaries between work and private life?

CONCEPT 1: JAMES, YOUR WORKDAY COACH

Figure 13: James focuses on coaching you to balance your daily life activities

James is an intelligent virtual assistant (figure 13) that helps users in time management. James talks via Siri or Google Assistant, and users have access to James' functionalities through a different application. James safeguards private and breaks time by tracking user calendar usage and controlling digital workplaces. Users have control over James by saying they want to work for a maximum number of hours per day. If the user exceeds this maximum, James first sends a notification. Snoozing is an option, but James becomes more annoying over time. If the user surrenders to James, he turns off your work applications (such as email and work sim card). Within the application, there is the option to access the user's schedule through an API. A more comfortable interface assists the user in improving time management by setting priorities per activity and suggesting when to take breaks.

KEY FEATURES:

- An Intelligent Virtual Assistant that sends notifications with tips, time management suggestions and workday insights
- Full control over James' behaviour via a smartphone application
- Time Management tool connects with the calendar and helps to set priorities and schedule break time
- Can enable/disable the user's Digital Workplace when the time for breaks or end of the workday
- Subscription model for full access

CONCEPT 2: THE SMART HOME OFFICE

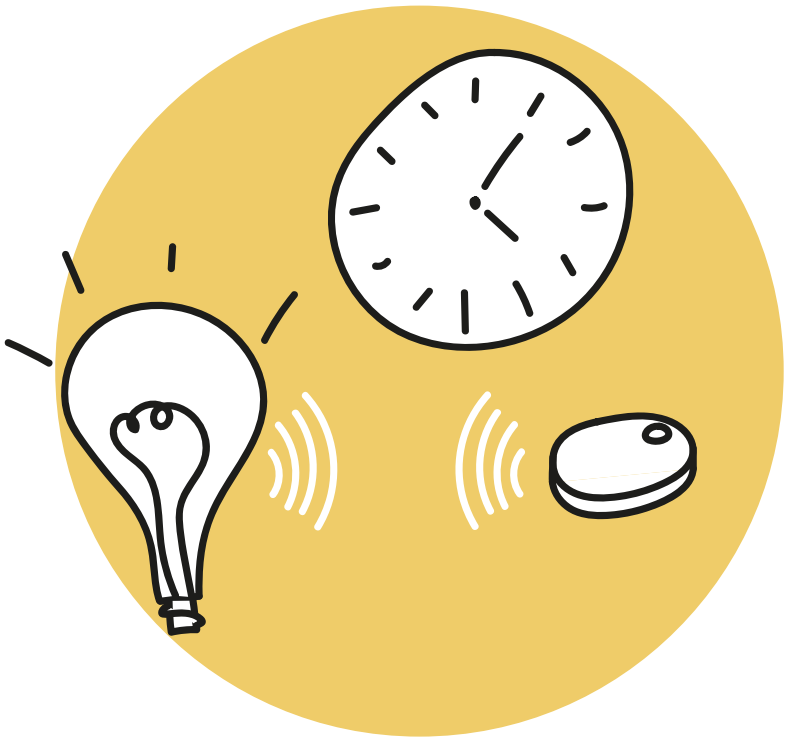


Figure 14: The smart home office connects all kinds of IoT products that help to set boundaries

The smart home office (figure 14) is a platform that connects all kinds of IoT products to set the optimum scene for different daily activities, making boundaries between work and private life extremely clear. The user itself sets these boundaries. The user tells the smart home office when a regular workday starts and ends. Because the smart home office connects with the user's calendar, it knows when activities and thus sceneries should change. In the app, users can set different scenes for different activities to make clear it is time for a particular action and to improve efficiency during work or relaxation during life activities. These scenes include lighting, sound systems, heating, air conditioning or any other IoT product. The smart home office competes with other smart home platforms and has trigger features, similar to IFTTT, Homey and Olisto. However, this smart home office differentiates itself by focusing on transitions between work and life. Triggers are, therefore called transitions. 'Explore' function discovering transitions from colleagues, friends and strangers. An 'insights' tab shows insights into daily activities and time spent. Optional: smart desk as home office mothership and "trigger" for getting out of the office.

KEY FEATURES:

- Setting clear boundaries for work and life activities by Changing Scenery with IoT products
- A Smartphone Application for setting scenes, workday routines, and exploring and defining transitions
- Automation triggers are called Transitions and work with third-party APIs
- Calendar Connectivity allows the platform to react to user's activities, and requires proper time management
- Workplace-as-a-Service for providing full smart home office packages, includes light, automated desks and other office products

CONCEPT 3: TIMEBOXING LIGHTS

Figure 15: The timeboxing lights focus on timing activities and retrieving insights

Inspiration for the timebox lights (figure 15) lies at the Pomodoro timer. These connected lights show specific behaviour when it is time for a break. An app lets users choose this behaviour themselves. A separate controller enables the user to set a timer. With this timer, users are forced to work in blocks with obligated breaks. They cannot work for longer than 50 minutes, and the lights are then unusable for 10 minutes. Or they can choose the Pomodoro technique and select the number of Pomodoros one needs for a task. One Pomodoro is 20 minutes. After one Pomodoro there is a 5-minute break, and there is a 15-minute break after the fourth break. With the smartphone app, users can personalise their lights and retrieve insights on their time spent on work. The lights connect with the user's calendar. They can warn the user when they want to overwrite another activity and thus notify them when they have activities such as meetings.

KEY FEATURES:

- Interaction via a Physical Knob that connects with smart lights and sets a timer
- Users can Personalise their Lighting to suit their work- and lifestyle
- Timeboxing Activities with pomodoro technique or 50/10
- An app for retrieving Insights into time spent for daily activities
- Calendar Connectivity warns overwriting of activities and notifies when a new event begins

5.1.2 CONCEPT TESTING

In design thinking, there are three pillars for developing valuable and innovative design concepts. Figure 16 shows that innovative design must be desirable (people), viable (business) and feasible (technology). Safeguarding these three principles means that the design has to meet specific criteria for each pillar.

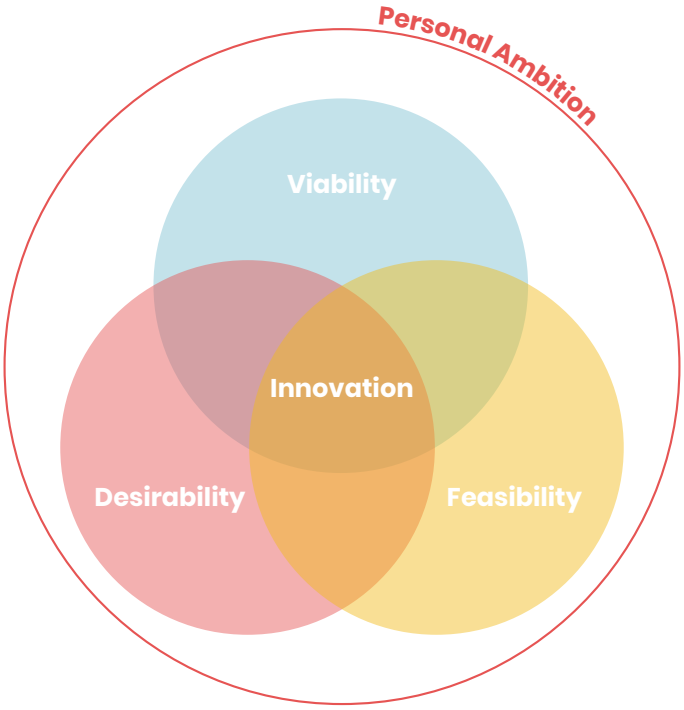


Figure 16: Innovative and valuable design meets requirements on desirability, viability and feasibility

TESTING IDEAS

Before being able to evaluate which concept scores best on the criteria, I needed to test several of the concepts' key features. Some of the features I based on assumptions, without knowing if it would work or if it may already exist. By testing the ideas' key features, I revealed whether the concept would be suitable for my target group.

Concept 1

As James is an intelligent virtual assistant, the closest existing solutions are other IVA's such as Siri. However, Siri and other solutions do not have similar features like James. As prototyping an own IVA is impossible, I tested the time management tool the old-school way: on paper. A tool that seems very popular these days is the bullet journal. For two weeks, I put the most effort into managing my time and setting priorities for each day.

Concept 2

Smart home platforms do not directly offer any solutions for homeworking, but you could create this yourself. I bought a Philips Hue starter kit and chose IFTTT to test some of the concept's smart features. Both solutions got good reviews on functionality and design. Theoretically, I should be able to recreate my concept.

Concept	Concept 1	Concept 2		Concept 3	
Tests	**Bullet Journal**	**IFTTT**	**Philips Hue**	**Pomofocus**	**Kitchen Timer**
What works	Efficient for setting priorities and planning	Countless APIs for IoT products	Changing scenery is a great experience	Proper time management tool	Very cheap and accessible
	Personalisable	Automating actions: applets	Change of scenery is an apparaent stimulus	Including tasks helps with setting priorities	Flexible timeboxing (50/10)
	Effective for closing of a workday	Triggers and actions are shared on a platform	Setting routines helps to create habbits	The app gives notifications including sounds	
			Siri connectivity makes it easy to use		
			One could set a timer		
What does not work	Hard to turn into a habbit	More companies withdraw from IFTTT	Routines do not work with user's location	Easily to ignore becaues of short notifications	Very annoying
	Easily to forget when things go well	One could need a lot of triggers	Timer is hidden somewhere in the app	Pomodoros are often too short	
	No digital reminders or notifications	Slow refreshing, so it misses many activities	There is no calendar connectivity		

Figure 17: Testing features led to pros and cons for each concept

Concept 3
While working with IFTTT, I did miss several features. For example, connecting it to my calendar did not work correctly. I wanted my Philips Hue lights to change the scene for every event in my calendar. However, the calendar connectivity was refreshing only a few times a day, so it skipped many of the events. For the smart home office concept, this would be a crucial feature. Likely, this would be possible if I connect the lights myself to the Google Calendar API. Programming this function would be too time-consuming though. Besides the slow refreshing rate with API's, IFTTT was hard to use and time-consuming to arrange all triggers and events.

Scan me for a demo

5.1.3 EVALUATION

CRITERIA

Desirability:
Desirability is about the people who will benefit from the concept because it fulfils their user needs. Not every young professional is the same, and they do not experience the same problems. Therefore, these criteria assess if the concept solves work-life balance issues and other homeworking problems (such as a sense of belonging and productivity). Together, the requirements determine if an idea fulfils the needs of homeworking young professionals.

The extent to which the concept idea fulfils the needs of a homeworking young professional (D)
- The extent to which the concept applies to others than the specific target group within the beachhead market (D1)
- The extent to which the concept can impact the user's work-life balance (D2)

Viability:
Viability criteria test the concepts on its opportunities for starting a new business. Customers should be willing to pay for the final product. Besides, the idea should fit the future vision that reasons why users/customers would want/buy the product.

The extent to which the concept is viable for starting a new business (V)
- The extent to which the concept aligns with the vision (V1)
- The extent to which the customer would pay for the product (V2)

Feasibility:
Feasibility is about the required technology for developing and launching the concept as a final product. As our resources are minimal, we must be able to create a first version of the concept ourselves. Besides, it must be likely that users will adopt the technology. During trend research, we already discovered that new technologies in our domain often fail because of their technology push. Therefore, the concept's technology must not come too soon and feel relatively familiar to the user.

The extent to which the concept is technologically feasible (F)
- The extent to which I can realise the concept together with my co-founder (F1)
- The extent to which the concept's technology feels familiar to the user (F2)

Personal Ambition:
Especially in launching a startup, I think it is essential to believe in your product. Therefore, I consider personal ambition as a crucial criterium in comparing concepts. The personal ambition is a gut feeling that encapsulates originality, enthusiasm and overall preference.

The extent to which the concept can fulfil my personal ambitions (PA)

RESULTS

After testing the different concept ideas, they were evaluated on the criteria for desirability, viability and feasibility. The Harvey balls (figure 18) show the rewarded points for all requirements. The Harvey balls are divided into five stages, where the empty ball means 'none'; the concept does not meet the criteria. The fifth and full ball means 'all'; the idea meets all criteria.

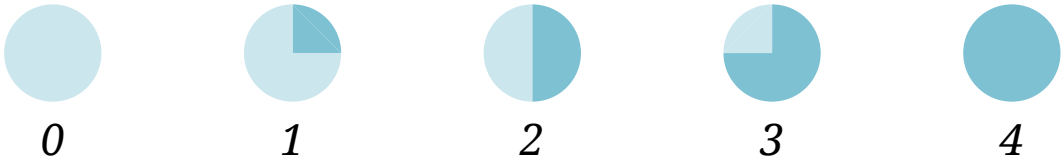


Figure 18: Harvey balls are a tool for evaluation

James, the IVA, turned out to be nothing more than a fair idea. It scored reasonably on desirability. A tool that supports one's time management sounds promising for one's work-life balance. Similar tools could help to achieve all daily tasks, set priorities and successfully reach deadlines. This kind of time management helps to clear the mind after work is done and allows for relaxation (when planned). Viability and feasibility were exceptionally low because of the technological requirements of the concept. It is unlikely that the customer would pay for a VIA concept. Besides, my team cannot turn this concept into an MVP. All these considerations result in a low personal preference.

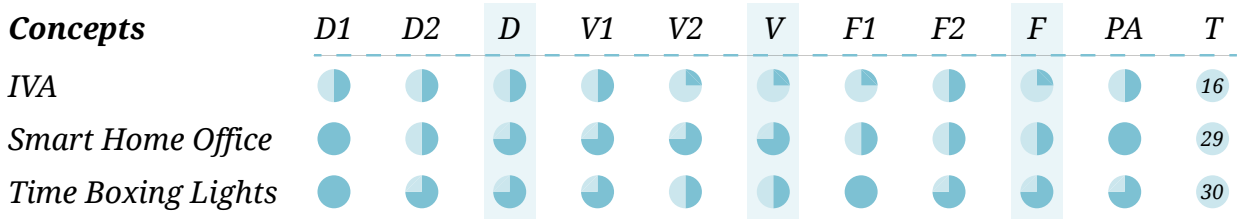


Figure 19 : Evaluation made the timeboxing lights the winning concept

Figure 19 shows that both the Smart Home Office and Time Boxing Lights score well on all criteria. I experienced positive effects on my work-life balance when testing the different features. I believe they apply to both the target group and even beyond. Both concepts show potential in aiming towards the future vision. They can both stimulate transitions that create clear boundaries between work and private life activities. Based on products where people already pay for, so increases viability. Both concepts seem feasible to build together with my co-founder.

5.1.4 CONCLUSION

Especially within the smart home market, there are many solutions available that could be of value. Meanwhile, that is part of the problem. There are so many products available, and it is often hard to understand their added value. Besides, properly setting up the devices requires time and technical knowledge.
Nevertheless, I had a great experience with the “smart” Philips Hue lights. Changing scenes with light has potential in distinguishing activities. However, with current on-market solutions, I was not able to build my concepts. Calendar connectivity was poor, and the timeboxing functionality was limited.

Testing most concept features made me experienced enough to evaluate my ideas on desirability, viability and feasibility. The Smart Home Office and the Timeboxing Lights scored best. Combining the strengths of the two resulted in a concept that is most promising in creating transitions.


MacBook Pro

Chapter 5.2

THIS IS 'SCENY'

Further iteration with the smart home office and time boxing lights concept resulted in Sceny. It is designed to assist young professionals in creating clear boundaries in both time and space for their small home workplaces. Sceny is a product/service system that combines smart LED bulbs with its own smart home platform and consists of three parts: a smartphone application, a controller and smart LED bulbs (as a service).

5.2.1 WHAT IS SCENY?

Sceny offers digital and non-digital solutions for creating clear boundaries between work and private life (see figure 20). Users get smart LED bulbs that help to set different light scenes for their daily activities. A smartphone application allows setting boundaries for what is work time and what is not. Light scenes automatically adjust to these boundaries, so users experience a different ambience for work and other life quadrant activities. When people work for too long, Sceny's auto-break function tells people to take regular breaks. During work hours, users can timebox specific actions with the 'events' tab in the app or with the controller. Appendix H shows an exploration of the different connectivity technologies that are required to build the Sceny system.

Boundaries and (new) events appear in the user's online calendar and automatically synchronise. Sceny gathers this data and provides an overview of time spent at different life activities. Together with defining goals, this data helps to quantify the user's work-life balance. There is an imbalance when users systematically do not reach their goals. When this is the case, Sceny gives suggestions on how to redefine goals and other tips and tricks.

Sceny is a product/service system that focuses on the B2B market for employers that arrange home workplaces for their employees. Appendix I shows the Lean canvas, the cost structures/revenue streams and a service blueprint.

Unfair advantage:
Transition from work to private life with the push of a button

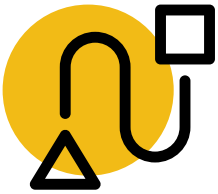
Figure 20: Sceny consists of an app, a smart controller and smart LED bulbs

USER SCENARIO

Sceny is designed to assist users in creating clear boundaries and transitions between work and private life. Users need a certain amount of autonomy to use Sceny properly. A scenario describes in four steps how the target group should use Sceny to improve their work-life balance:

1. **Set work-life boundaries:** When building a profile, users set up their light spaces and potential zones. Then, Sceny asks users to set their boundaries for work and other life quadrants. The auto-break function can suggest regular breaks during work hours. Not only do they define when they work and when not, but they also determine their work scene. For example, users can set up their boundaries such that their desk lights do not turn on after work hours.

2. **Define goals & track your time:** The Sceny application allows users to set goals for daily tasks or to improve their time management. For example, goals could consider the number of overtime users make or specific daily tasks. The controller can help in finishing tasks by timeboxing activities and taking regular breaks.



3. **Transition to private life:** Transitions help to clear the mind and define the end of a workday. They are moments between work and other parts of life where users spend time for themselves. When work hours are over, Sceny notifies the user and suggests to start one of their self-determined transition events. Their scene then adapts to the specific event. For example, some may find a short walk an excellent way to clear the mind.

4. **Reflect with data:** Gathering data on how users spend their daily time and whether or not they reach their goals helps to quantify work-life balance. When users keep crossing their work-life borders and missing their goals, this may indicate something is wrong. Sceny may suggest being more conscious of how users set their goals and give other tips & tricks to safeguard work-life boundaries.

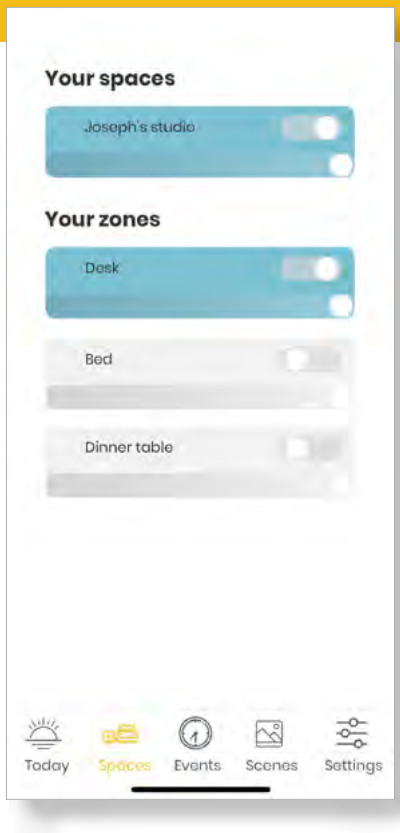
5.2.2 A SMARTPHONE APPLICATION

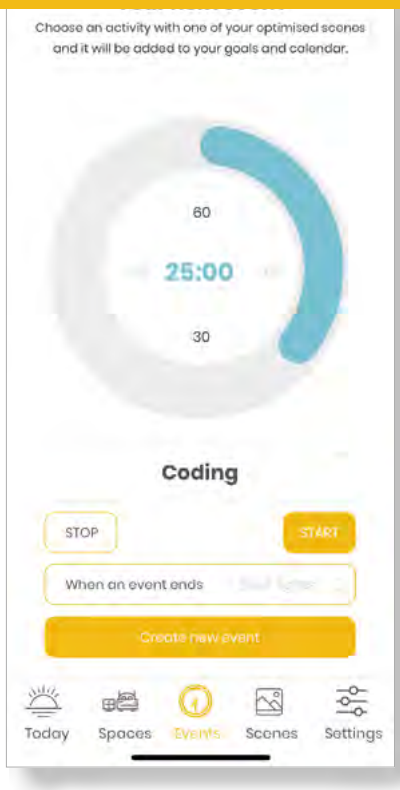
Sceny has an app (scan or click the QR-code for prototype experience) with which users can set up the system, control its behaviour and can obtain quantitative work-life balance insights. Both the lights and the controller connect to the wifi network, which requires setup via the app. I will not dive into this procedure, as it is one of the three standard connectivity methods for smart home applications. The following paragraphs show how users follow the scenario steps with the app. As an example, the next pages show how an earlier mentioned persona (Joseph) would use Sceny. Appendix F contains the personas, from which we learn that Joseph is a single 28-year-old software developer, who works full-time in a studio in Amsterdam. Although Joseph likes the flexibility of homeworking, he is struggling with the fact that most of his daily activities happen in the same space.

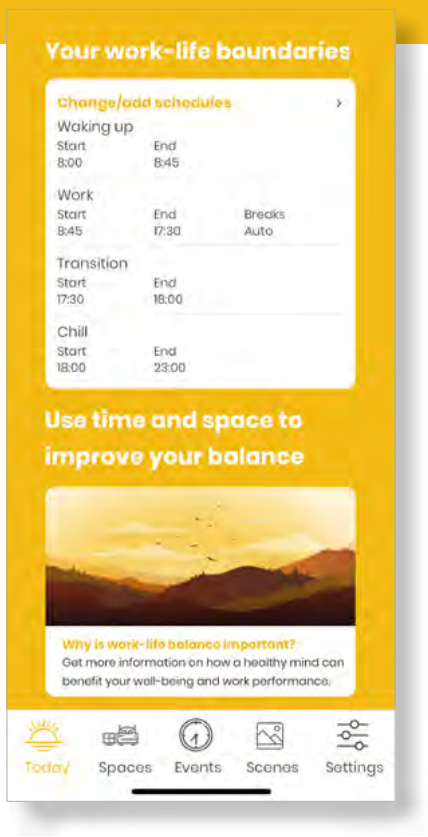
Scan me for a demo

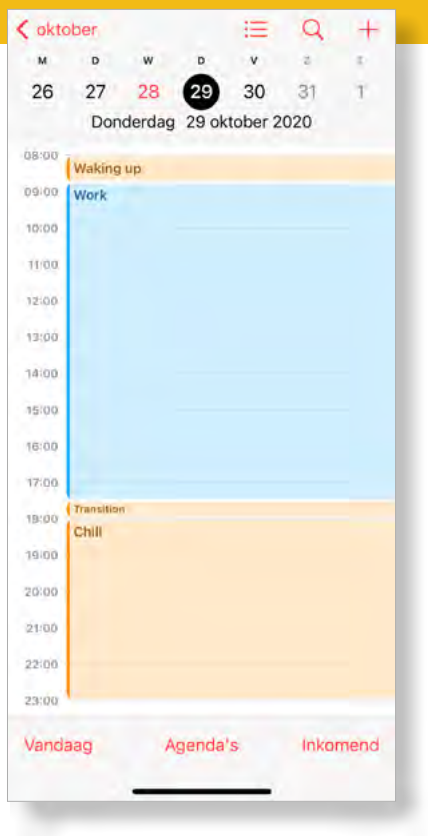
Set Work-life boundaries

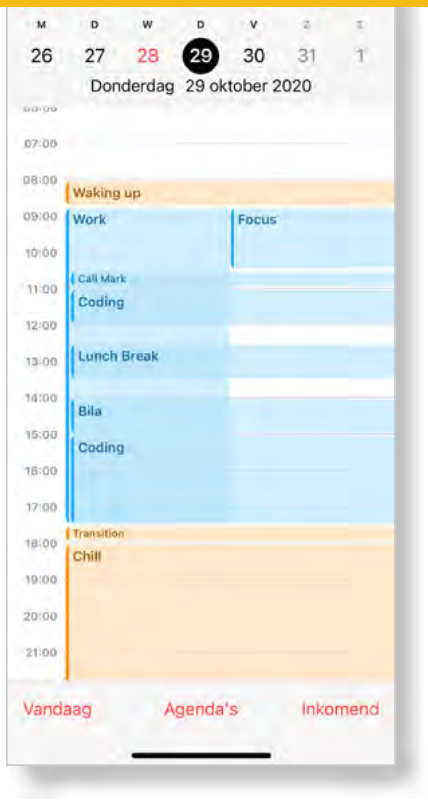
Joseph lives in a studio, in which he works, eats, sleeps and does his hobbies. The first step is to set up this space with light bulbs and create different zones. In his studio, Joseph distinguishes three zones: his desk, bed and the dinner table. Then, Joseph defines his daily boundaries with schedules: waking up, work, transition and chill. For every schedule, Joseph sets his different to one of the default scenes (figure 23): work, life, break or creativity. Sceny automatically synchronises with Joseph's online calendar. Any daily adjustments in the calendar automatically appear in the app.









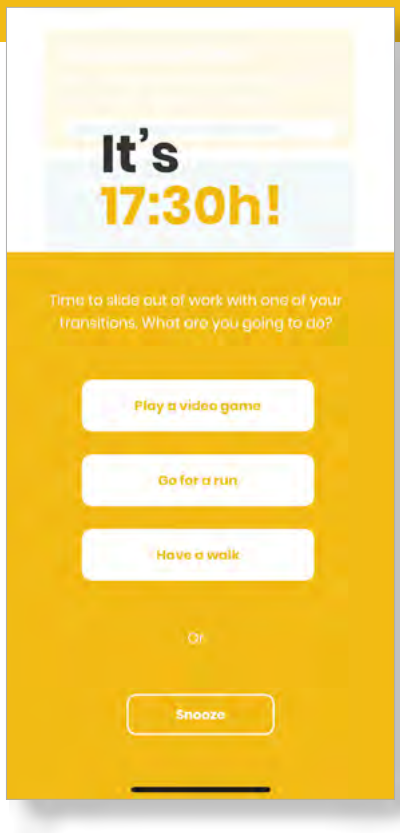


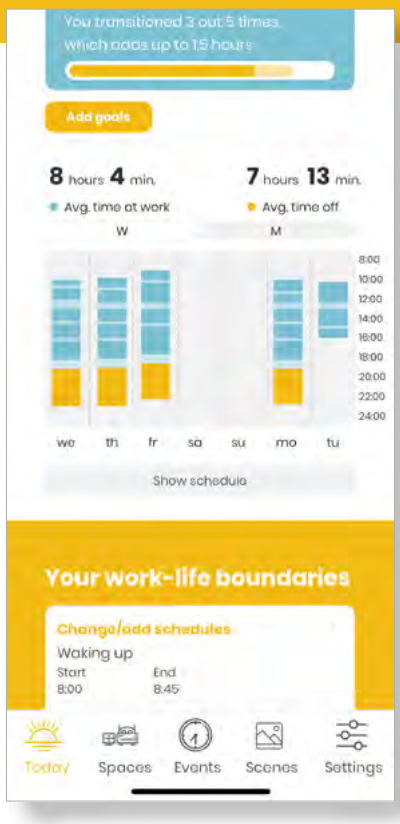
Define goals and track time

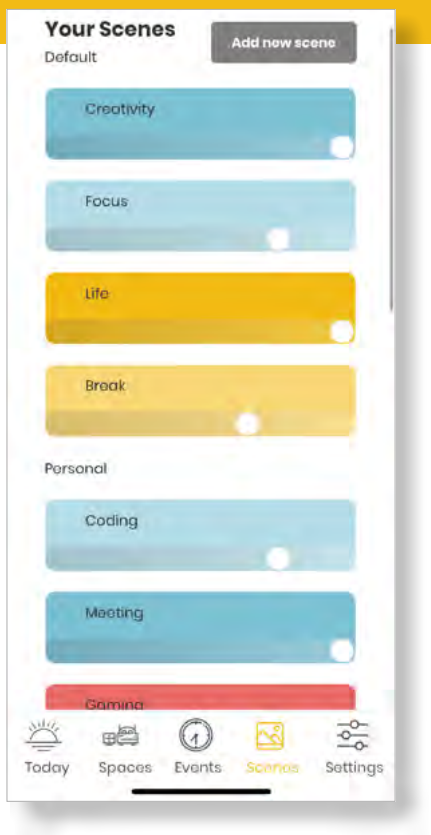
Every day, week or month, Joseph sets goals that help him to achieve his daily tasks and find enjoyment in both work and other parts of life. One of the goals Joseph sets for himself is to limit his overtime to 30 minutes per week. Meanwhile, he uses the ‘events’ tab to timebox his tasks, which helps him to reduce his overtime. After an event finishes, Joseph gets notified by a signal (e.g. softly blinking lights or a different scene). The task he had finished adds up to his calendar. In case Joseph is not on track to reach his goals, Sceny sends tips & tricks that may help.

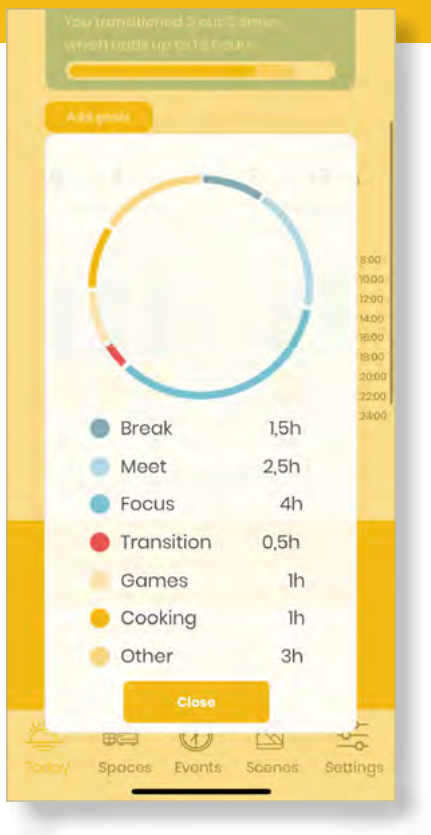
Work-life transitions

People who currently work from home miss commute as a form of transitioning from work to private life. Commuting was a little self-time for people to process their workday and clear the mind. Sceny helps people to reach a similar feeling by initiating individual transitions after a workday. In his transition schedule, Joseph defined playing video games, running and walking as ways for him to clear his mind. At the end of each workday, Joseph gets a reminder to close off the day and choose one of his transitions. His studio sets the right scene for this transition, so Joseph experiences a clear boundary between what is work and what is not.









Reflect with Data

Sceny gathers user data from Joseph's calendar to quantify his work-life balance. When Joseph achieves daily tasks and undertakes activities that give enjoyment, it may be likely that Joseph's work-life balance is healthy. Of course, this may not always be the case. When goals are not reached, and Joseph spends a lot of time at doing work, Sceny may suggest to slow down and take more time for friends, family and himself. These suggestions are made daily and based on whether or not Joseph is on track for reaching his goals.

5.2.3 THE CONTROLLER

Users can, besides the application, use the controller (connected via WiFi) to interact with their smart home office. The idea behind the controller is that it replaces the light knob and makes it more accessible to gather data and timebox specific events. Users can manage the displayed scenes from the Sceny app.

Timeboxing

The most critical functionality of the controller is that it allows users to set time-specific scenes. It works similar to setting new events in the app. However, while the controller replaces a standard light knob, it becomes a habit to time activities by setting scenes. This functionality should be the most accessible way to gather enough data for quantifying the user's work-life balance. Users can also use the knob without setting a specific time. Then, Sceny times how long a scene is set and adds it to the user's calendar. When users do set a time for the scene, there is a maximum of 60 minutes for work activities to safeguard regular breaks. Without setting a timer, the auto-break function ensures these regular breaks. The controller indicates time by a full circle of 60 minutes (see figure 21).

Easy Interactions

A limited number of interactions should make it easier to turn the timeboxing functionality into a habit. Setting scenes should be a minimum effort. Therefore, there are only two actions possible: turning and pushing. Turning the outer aluminium wheel allows scrolling through the different events. A single push means choosing an event. Turning again is setting a time, and another push is setting the timed event.

Figure 21: The controller uses a full circle to indicate a 60 minute timespan

5.2.4 SMART LED BULBS

The most crucial part of setting boundaries with light scenes are the smart LED bulbs. Appendix J shows an exploration of the different kinds of available bulbs. Sceny uses the CCT type, as visualised in figure 22, with WiFi connection. This kind of LED bulb often has a temperature range between 2000K and 6500K, brightness of around 800lx and a colour rendering index (CRI) of 90%.

Setting Scenes

The Sceny smart LED bulbs allow users to define their boundaries in space. Different light scenes should contribute to creating physical boundaries between work and living space, even when there is limited space available. With the app, users can set different light scenes themselves or use the default scenes. According to the University of North Carolina (2017), the following temperatures should enhance their scenes:

1. Evening: 2000K, requires 300lx, 3 light bulbs turn on at almost 100% brightness
2. Break: 2700K, requires 300lx, 2 light bulbs provide 300lx at around 50% brightness, third light in the corner at full brightness for increasing the range of ambience.
3. Focus: 5000K, requires 500lx, 2 light bulbs provide 500lx at around 75% brightness
4. Creative: 6500K, requires 750lx, 2 light bulbs provide 550lx at 100% brightness, a 3rd (desk)light is required

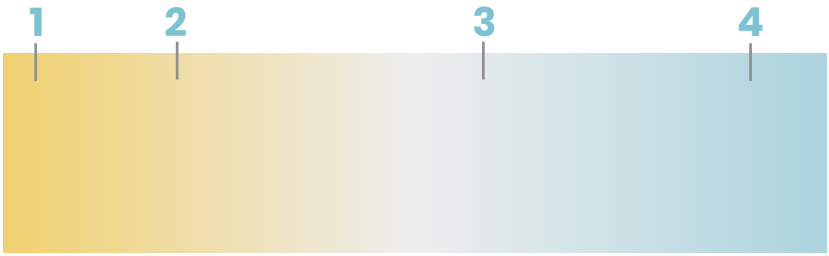


Figure 22: There are four default scenes divided over the CCT spectrum

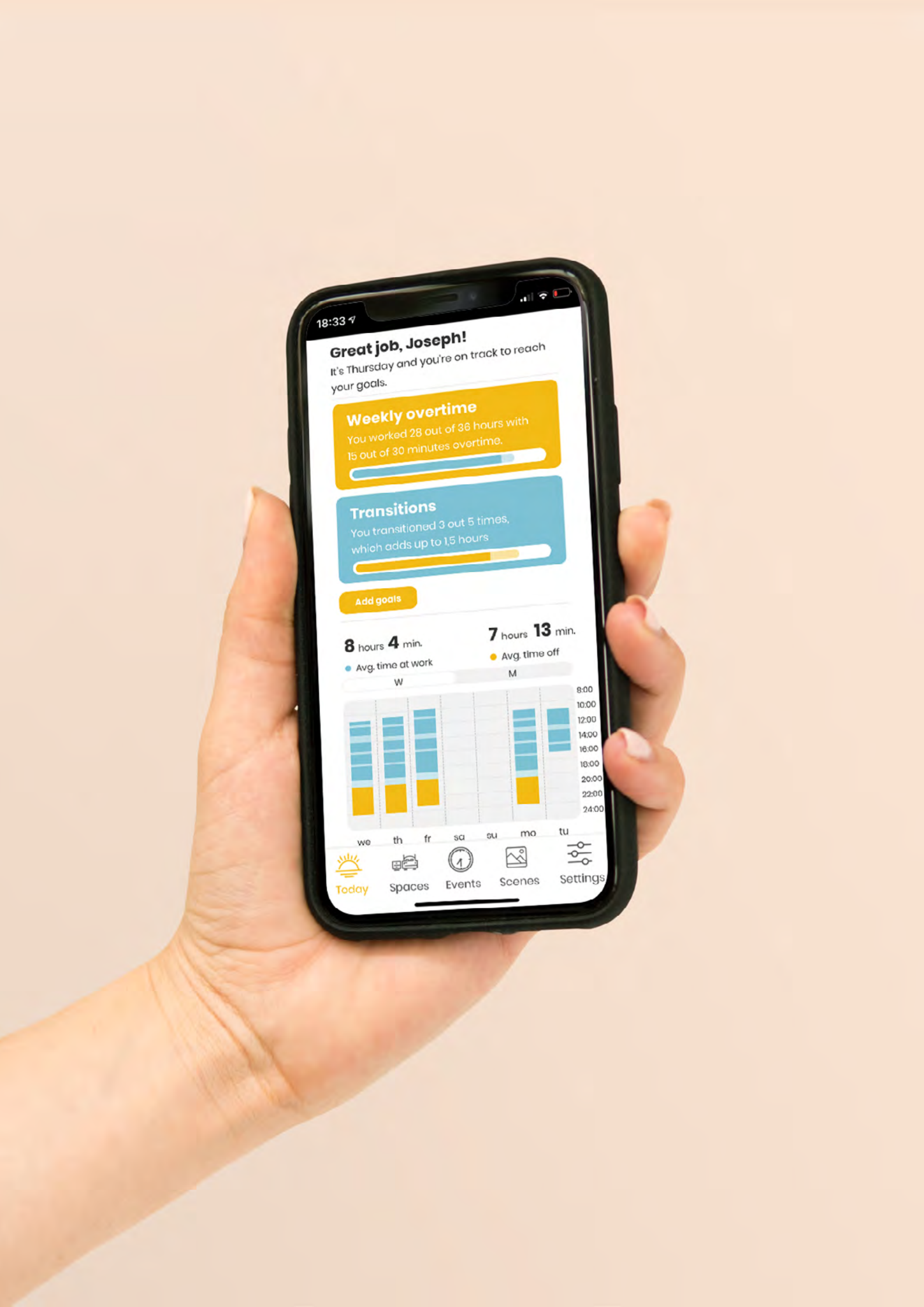
Light-as-a-Service

As appendix J shows, smart LED bulbs can get expensive. Especially when you need multiple to set the right scenes, it can become quite the investment. With a fixed monthly fee, employers can arrange their employee's offices with smart LED bulbs. The Light-as-a-Service concept means that Sceny staff will advise on the number of bulbs, delivers them and makes sure that they work the way users want them to. Appendix I shows a blueprint of the service concept.

5.2.5 CONCLUSION

Sceny is a product/service system that aims at assisting users in setting clear boundaries for transitioning from work to private life. Users define boundaries in their time management and link the appropriate light scene to specific events. Sceny allows users to set goals for improving both daily achievement and enjoyment. So-called transitions can help to bring joy and clear the mind of off work at the end of a workday. Knowing how users spend their time will enable Sceny to quantify work-life balance. This quantification is a time-based and shows how users spend their time at work and in private life. If users are structurally not reaching their goals, Sceny will suggest taking another look at the goals/tasks or give tips & tricks on improving time management.

The Sceny service consists of three parts: a smartphone application, a controller and smart LED bulbs. With the app, users can define their goals, configure environmental behaviour and retrieve insights in their work-life balance. The controller replaces ordinary light knobs to make data gathering more accessible. Its main functionality is to set events/scenes for a specific time to raise awareness on user's time management. Smart LED bulbs make it possible to set entire different ambiences for work and life activities. These lights are essential in creating distinct environmental boundaries between work and other life activities. Normally, these kinds of bulbs can be a significant investment. Smartening home workplaces such should be made more accessible by providing smart bulbs as a service.


18:33
Great job, Joseph!
It's Thursday and you're on track to reach your goals.
Weekly overtime
You worked 28 out of 36 hours with 15 out of 30 minutes overtime.
Transitions
You transitioned 3 out 5 times, which adds up to 1,5 hours
Add goals
8 hours 4 min.
Avg. time at work
7 hours 13 min.
Avg. time off
W
M
8:00
10:00
12:00
14:00
16:00
18:00
20:00
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we
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fr
sa
su
mo
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Today
Spaces
Events
Scenes
Settings

CHAPTER | 6

THE REALISATION OF SCENY

We find Light-as-a-Service concepts in offices, stores and within other B2B markets. However, bringing LaaS to people's homes is something else. Disrupting the field of home offices by introducing this new concept requires a trajectory of validations. Before developing a Minimum Viable Product (MVP), I can already test some of the risky assumptions on desirability, viability and feasibility with Proof of Concepts (PoC). This approach prevents from putting time and effort into an unwanted product/service. By going through the Build-Measure-Learn (BML) loop (Ries, 2011), I can quickly test our risky assumptions to learn how to improve or to pivot. The MVP is a result of the BML setup. Besides developing an MVP, an implementation strategy presents a follow-up scenario for bringing the concept to market.

Chapter 6.1

VALIDATION

Creating a viable business; that is my ambition within this graduation project. Although viability is inseparable from the lenses desirability and feasibility, I approach the validation from a business perspective. During a first validation, I test some of the concept's critical features through all design lenses. Which features I experiment with, depends on the corresponding assumptions. I validate the riskiest ones that have the most impact on business opportunities and are most uncertain. Every risky assumption gets assigned an adequate validation requirement. The goal of the validation is to learn whether or not pivots need to be made for increasing a potential problem-solution fit.

6.1.1 RISKIEST ASSUMPTIONS

Defining the riskiest assumptions helps to select vital and uncertain characteristics of the Sceny concept that require testing. By realising some of these features in the form of a Proof of Concept, I can test risky assumptions on Sceny's desirability, viability and feasibility. The insights from this validation help me to design a Minimum Viable Product with just enough features to satisfy early adopters. Which assumptions require testing, depends on their impact and uncertainty. Figure 23shows a map of all riskiest assumptions. These assumptions mostly rely on the first iteration of the lean canvas.

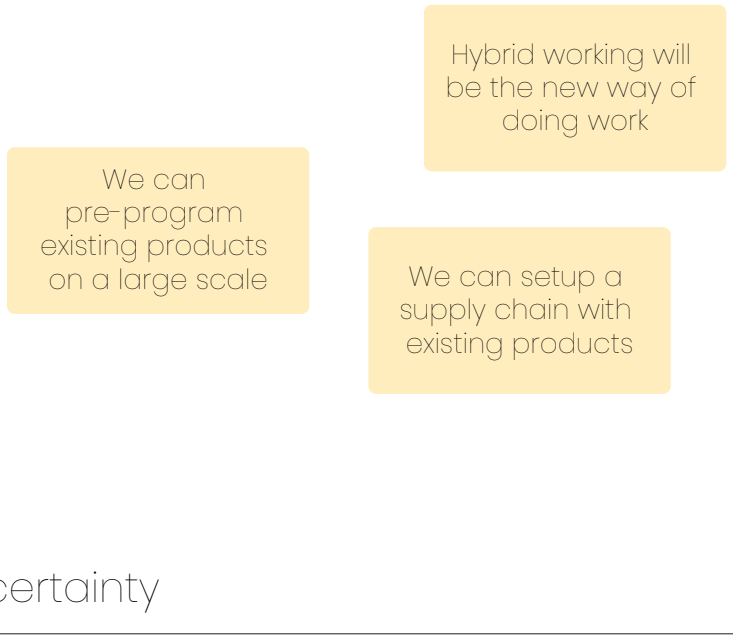

Figure 23: The three riskiest assumptions are mapped on their impact and certainty


High impact
Employees will want their employer to pay for the service
My co-founder and I can build a prototype controller ourselves
Employers will be willing to pay for Light-as-a-Service
If people are limited by space, they are willing to keep working from home
Employers will be assisting their employees in creating boundaries between work and private life
Employers will invest in their employees' home workplace
Low certainty
People have light fixtures above their desk
Low impact

Riskiest assumptions

- Desirability: Employers will be assisting their employees in creating boundaries between work and private life
  I based this assumption on my own experiences and previous research, which makes it more likely that others will think similar to it.
- Viability: Employers will be willing to pay for our Light-as-a-Service concept
  The whole business model relies on this assumption. If this turns out to be false, the business model needs to be revised. This assumption mainly focuses on the viability aspect of the concept.
- Feasibility: Together with my co-founder, I am able to build an MVP by the end of this year
  This assumption is crucial for testing the feasibility of the concept. The impact of this assumption is high because we need to make progress in order to test.

6.1.2 PROOF OF CONCEPT 1: TESTING LIGHT-AS-A-SERVICE

The first proof of concept is for testing the desirability and viability assumptions. I used the UX prototyping tool Axure to rapidly build a website which displays the Sceny service as if it already exists. Employers will browse the website along with an interview. This interview consists of two parts:

- Part 1: The first part is about the problem context and does not yet show the Sceny website. The goal of this part is to test the desirability assumption by verifying that employers acknowledge a disturbed work-life balance as a real problem.
- Part 2: If the employer understands the problem context, I continue to the second part. The interviewee browses the website, tells what he/she thinks Sceny is and if it would solve their problem. The goal is to know if and what the employer is willing to pay for Sceny.

PART 1: DESIRABILITY

To a certain extent, the Dutch Working Conditions Act (Arbo) obliges employers to care for their employees. This act contains a broad set of rules for both physical and cognitive factors. For example, the Arbo tells how long an employee's workday may be in most cases (max. 12 hours/day and 60 hours/week) and that it must contain a minimum break time (30 minutes/day). These kinds of rules should contribute to an improved work-life balance. However, they are bound to time and do not (yet) include the employee's home office and workload. When stress-related complaints arise, employees can report these at the Arbo service. Whether employers would be willing to assist their employees beyond the obligatory rules, remains an assumption.

"Employers will be assisting their employees in balancing work and private life beyond the obligatory prescriptions."

Validation criterium:
Find ten employers that acknowledge the work-life balance problem and assist their employees in solving it.

Research question:
Will employers feel a growing need to assist in solving the employee's challenge of maintaining a healthy work-life balance?

Method:
Interviews

Setting up the validation

Topic 1: Target group identification

Although the interviewees are already known for having young employees, the first topic is about verifying whether they fit the target group. Therefore, employers need to have young employees who are working from home. The interviewee can tell a bit more about the organisation and its employees; whether there is a homeworking policy and describe the employees' current situation.

Topic 2: The home office

We are several months into homeworking already. Likely, employers took measurements for making this work. I want to know to what extent the employer provides a fair home workplace for its employees. Some may give a homeworking budget, other forms of compensation or offer to pick-up furniture from the office. When employers put some effort (and budget) in improving the homeworking experience, they may be doing this for the future too. If they do so, I want to find out what they think is most important and what challenges their employees most.

Validation results

Ten employers that feel a growing need to assist their employees in improving their work-life balance; that is what it would take to validate the desirability assumption. Within two weeks, the goal was to find this number of interviewees. However, both cold (30 emails sent) and warm acquisition led to four employers willing to participate. Among the interviewees were a facility manager (municipality), a CFO (international scale-up), a TU Delft manager and an HR manager (international software company).

Topic 1: Target group identification

Four out of four employers acknowledged the relevance of a disturbed work-life balance in the homeworking environment. Often mentioned was the fading borders between work and private life. The interviewees mostly recalled two reasons for this kind of imbalance: 1) kids distracted their parents during the first lockdown and 2) young professionals often have limited space. Although the second reason was nothing new, it confirms the earlier mentioned needs for work-life balance solutions.

According to the employers, homeworking will have a future in their organisations. However, three out of four mentioned they "are not like Twitter". Meaning: they will not drastically get rid of their offices, but they will change their functionality gradually.

"We are not Twitter."

Topic 2: The home office

Four out of four employers contributed to improving the employees' home offices. The facility manager mentioned a small budget (€150) which employees could spend on their workplace and a high possibility of using the VAT-free budget in the future. The other interviewees had not taken any financial measurements yet, but do expect to make them. In the meantime, they allow their employees to take desks, chairs and screens from the office to their homes. Before Corona, solutions for improving work-life balance differed from workshops to social activities.

Conclusion

The assumption is expected to be true. All employers mentioned issues with work-life balance as a challenge in homeworking. Meanwhile, all employers are considering to (remain) working hybrid. Some employers already offer more solutions, such as workshops and fun activities, than others.

PART 2: VIABILITY

Employers feel the need to assist in solving the employee's challenge of maintaining a healthy work-life balance. During part 1, the interviewees proved desirability for work-life balance solutions and similar stress-prevention solutions. Whether our Light-as-a-Service concept could be a viable solution, was the central question during the second part. Interviewees access Sceny's website where they find Sceny in its first form: altogether, this is the Proof of Concept for testing features on viability.

"Employers will be willing to pay for our Light-as-a-Service concept for improving their employees' work-life balance."

Validation criterium:
Find ten employers that are willing to pay for the LaaS concept.

Research Question:
How much will employers be willing to pay for a service that improves employees' work-life balance?

Method:
Concierge testing and interviews

Proof of Concept: Light-as-a-Service

A prototype version of Sceny's website is online (click on figure 24 for a demo). The website shows the Sceny service as if it is available right now. The proof of concept tests a value proposition from the first iteration of our lean canvas: I provide a pre-programmed package of smart solutions that assist in creating clear boundaries between work and private life. This proposition would lead to the assumed unfair advantage: a transition from work to private life with the push of a button. Testing this value proposition and unfair advantage does not require the final controller. Pre-programming Philips Hue lights and a white label smart button could already do the job. Therefore, the proof of concept is a package with 1, 3 or 5 smart bulbs and 1 or 2 flic buttons. On the website, I offer this package and promise that changing scenery with light can help to transition from work to private life. Testing and

Figure 24: Click the figure for a demo of Sceny's homepage

building the proof of concept is an iterative process, where I got inspired by the build-measure-learn loop from the lean startup method. After every test, I would evaluate and iterate on a new website version.

Setting up the validation

Topic 0: Setting the problem context

The first part of this validation will set most of the problem context. In case anything is missing, topic 0 allows to complement this context. This additional storyline revolves again around the young professionals and their homeworking challenges. Most importantly, little space challenges young professionals to maintain a healthy work-life balance. They have a hard time setting clear boundaries, and they miss their transitions from work to private life. Sceny is the solution to these challenges.

Topic 1: Demo

From here, the concierge testing starts. Sceny's website will show its service as if it already exists. The interviewee shares its screen and allows me to record their browsing behaviour. While thinking out loud, the employer shows whether he/she understands the service. Some iterations on the website may be necessary to explain the concept adequately. If it is not clear, there will be room for a better explanation of the idea.

Topic 2: Prices

The website prototype shows three kinds of available Sceny packages: one for a small room, one for a regular space and one for the more spacious environment. This topic is about understanding if and what the interviewee would be willing to pay for the service. The rates are based on earning back the purchase price of the Philips Hue bulbs and smart buttons (ex. VAT) within a year time.

Topic 3: Wrap-up

The interview ends with a hook for a follow-up meeting. The intention for this second meeting is to discuss the details for a test pilot. By scheduling a second meeting, I know if the interviewee is really interested or just pretending. The goal of the free test pilot is to find at least ten employees. They would get three LED Bulbs and a flic button (regular package).

Validation results

The interview with the employers from part 1 continued.

Topic 1: Demo

The first interviewee did not understand anything of the website. It was unclear what the concept was about and where to navigate to for finding the answer. The longer the interviewee was on the website, the more confused he got. After the first test, the feedback was processed before the second meeting and again after that interview. This iteration helped in gaining more insights about the user experience and resulted in improved web design during the test. The concept was clear to the third and fourth interviewee.

Topic 2: Prices

During the first interview, it did not come to test the second and third topic. It immediately felt like the interviewee had no interest in the concept. The second interviewee showed interest but thought €4 was way too much. Afterwards, I adjusted the prices to €3, €6 and €10. These lower prices seemed still too much for the promised goods. Participants 2, 3 and 4 would not be willing to pay for the concept at all. All of them did not think the product was “smart” enough, or it would solve their problems. In other words, the PoC proved no practical potential.

Topic 3: Wrap-up
Although none of the interviewees seemed to be willing to pay for the concept, two out of four showed interest. They were enthusiastic about the possibilities and especially the aimed problem to solve. When asking them to join the free pilot, they both responded positively. Interviewee 2 was willing to participate, but then personally and not including his employees already. Interviewee 4 was interested in participating but wanted a more specific pilot plan. Therefore, we agreed on making a second appointment when I processed the feedback and developed the MVP.

Conclusion
The assumption is expected to be false. I learned that Light-as-a-Service is too simple to offer as a solution to the work-life balance challenge. Businesses are not going to pay for a few pre-programmed light bulbs and a button. A next iteration on the lean canvas should improve the value proposition and unfair advantage. Although the service did not prove to be viable yet, most employers did recognise the potential in using light to solve their problem. Therefore, they offered their help in testing the MVP.

6.1.4 PROOF OF CONCEPT 2: FEASIBILITY OF THE CONTROLLER

Light-as-a-Service did not prove its value on its own. The proof of concept for testing Sceny on viability lacked “some smartness”. Building our own controller could be a solution for making Sceny a little smarter. One of its functionalities is to timebox light scenes. Whether or not this would be feasible to implement into the Minimum Viable Product, is only based on the assumption that my co-founder and I could build such a controller. Therefore, the second PoC focuses on validating the feasibility assumption.

“Together with my co-founder, I am able to prototype the Sceny controller.”

Validation:
Build a working controller with a timing function before January.

Research question:
Can we rapidly (within a week) prototype a controller that times scenes and, thus, connects with smart LED bulbs?

Method:
Rapid prototyping
Proof of Concept: Sceny controller

Sceny's first version of the controller should have the ability to time activities and light scenes. By rapidly prototyping working functionalities of the controller, I aim to validate this feature on feasibility. The prototype consists of a hardware and software part. Building the hardware part of the controller will be my responsibility, whereas the software part will be Felix' (co-founder) responsibility and left out of this thesis. The prototyped controller required the following electronics hardware and components:

- Arduino Nano 33 IoT
- NeoPixel LED Ring for interface
- Hall sensors for creating an encoder function
- Resistors
- Capacitors

Conclusion

The assumption is true. By rapidly prototyping a physical controller (figure 25) with timer function, I proved we can build a working prototype that could represent as the first version of the Sceny controller. We have not yet connected the controller with Philips Hue or other LED bulbs. However, Felix validated this functionality by setting scenes at home with a different Arduino.

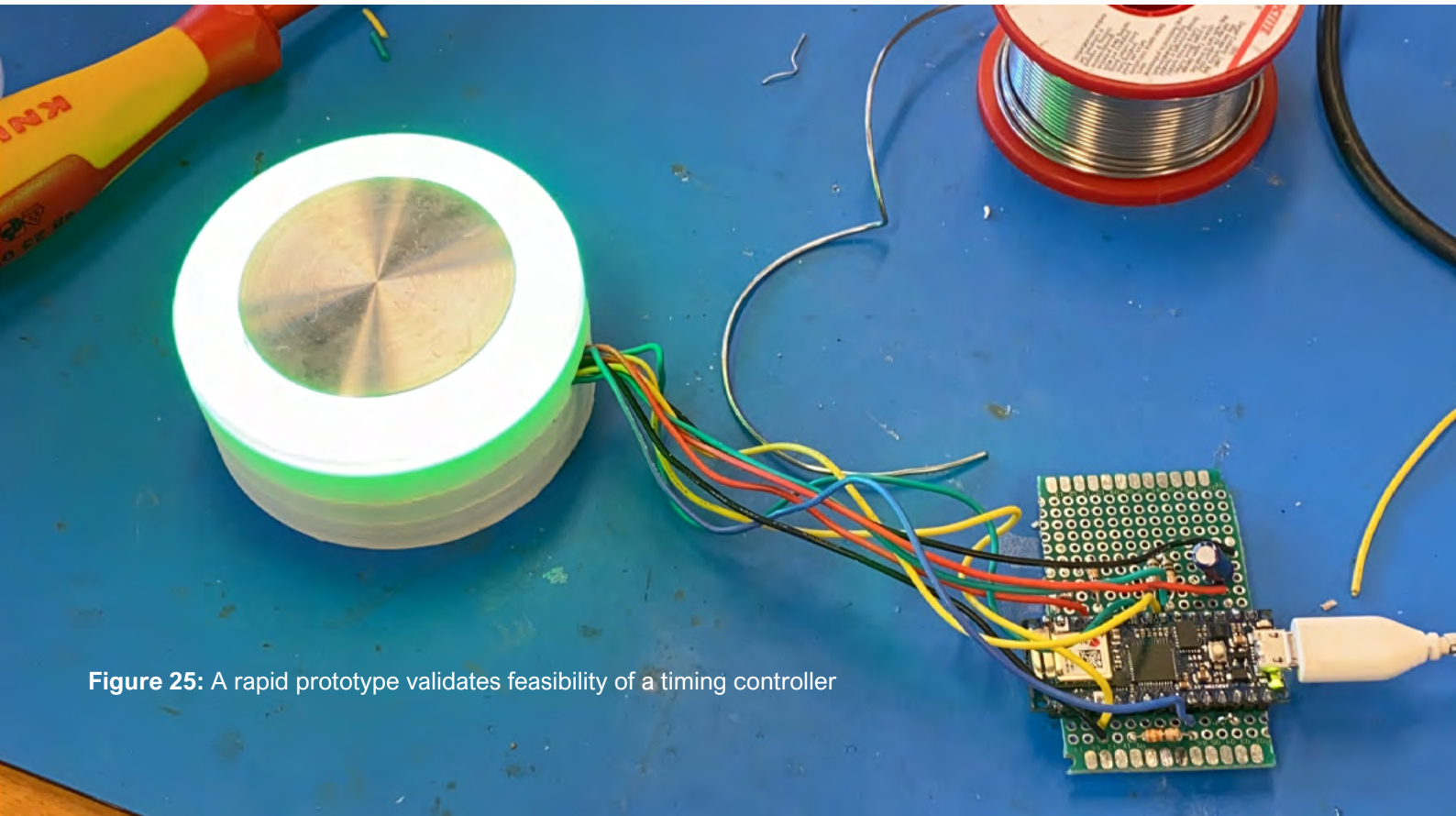

Figure 25: A rapid prototype validates feasibility of a timing controller

6.1.5 CONCLUSION

All interviewees are convinced that homeworking has future relevance within their organisations. The benefits of saving money and increasing flexibility are clear to them. Although COVID-19 challenged most employers and employees with arranging homeworking, the interviewees seemed proud about how they handled the situation. This year proved that homeworking works in their organisations. However, all four employers acknowledged employee challenges, such as maintaining work-life balance. These kinds of challenges withhold the employer to shift towards homeworking only radically. Instead, the hybrid working future applies to this group also. Meanwhile, there is a growing need for solutions that solve the employer's concern about work-life balance issues among its employees.

A concierge test with Sceny's LaaS feature proved no value on its own. Employers do not believe the current service is going to solve their problem. Besides, as a service, the proof of concept lacked smartness. Employers get the feeling they could make our product themselves. These insights suggest to address the problem more and add an extra feature in the next version: the Minimum Viable Product (MVP).

As an extra feature, the Sceny controller could be the answer. The timeboxing functionality may provide a little additional service that employers desire. A rapid prototype proved that we could implement a timeboxing controller in the MVP.

Chapter 6.2

MINIMUM VIABLE PRODUCT

Sceny's Light-as-a-Service is insufficient on its own for starting a viable business because employers do not believe changing light scenes is a solution to their problem. As a response to this insight, I take a small pivot on the service side. The product/service system lacked principles that substantiate evidence that Sceny is a solution for improving work-life balance. Sceny's next iteration will rely on a technique that experts often recall as the answer to our problem: time management. This iteration will have the form of a Minimum Viable Product (MVP). I will test a service with essential features that should improve people's time management for maintaining a healthy work-life balance. This MVP aims to validate Sceny's problem-solution fit. An adequate validation criterium is: successfully help 20 young professionals with improving their work-life balance, and have them all satisfied with their experience.

6.2.1 NEW ITERATIONS

Earlier Proof of Concept did not yet contain time management solutions because it relied on a different assumption. Light on its own would create boundaries between work and private life. Employers believed this assumption would be false. Therefore, the next aim is to add time management features from the Sceny concept. The MVP contains minimum time management features which include a timeboxing controller and a planner. Incorporating these features into the MVP, resulted in a second iteration of the Lean Canvas (appendix K). Below, figure 26 shows the most significant differences between the first and second iteration.

Product	PoC	MVP
Package type:	Personalisable package with light bulbs (max. 5) and flic buttons (max. 2)	Package with guide towards work-life balance, including a planner, bulbs and a controller.
Unique Value Proposition	Full package of pre-programmed hw solutions for creating clear work-life boundaries	Manage work and private life scenery while enjoying the flexibility of homeworking
Unfair advantage	Transition from work to private life with the push of a button	Control over creating work-life transitions in time and scenery without having to leave the house

Figure 26: A pivot resulted in changing the concept's value proposition and unfair advantage.


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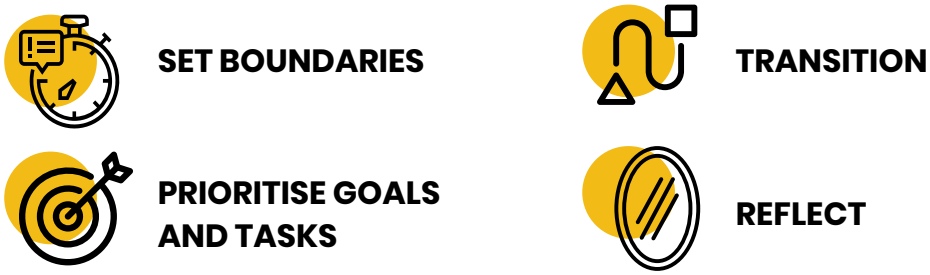
work-life balance.

6.2.2 THE SCENY SERVICE

Where the final concept has a smartphone application and a controller, the MVP has a planner and a simplified version of the controller. The planner helps people to use their time management for setting boundaries and creating work-to-life transitions. Users are appointed to themselves to gather data about their work-life balance, so they can quantify this and reflect goals. The controller supports people in their time management by allowing users to timebox their activities. This first version only allows switching between scenes for work and private life.

A GUIDE TOWARDS A HEALTHIER WORK-LIFE BALANCE

As an extra service, users need to understand how they use Sceny as intended. The manual (see figure 27) is the first thing people see when they open their package. It acts as a guide for maintaining a healthy work-life balance with the help of time management and changing light scenes. When reading the manual, users get information on two service components: time management and scene control. The same four steps from the earlier described user scenario explain the time management part:



As the light bulbs and controller are delivered as a closed system, it is only plug-and-play. The manual explains the two interactions, push and turn, and how to use them. Most importantly, the warm light scene is for relaxing activities and the cool setting for focus activities. Appendix L shows the full design of the manual.

Figure 27: The guide explains users how they can improve their work-life balance

A PLANNER FOR IMPROVED TIME MANAGMENT

According to Macan (1994) and Jex & Elacqua (1999), there is a relationship between time management practice and stress. This relationship depends upon people's influence on feelings of control over time, which indicates a correlation with the need for autonomy. Therefore, this planner (figure 28) focuses on helping users to improve their time management. It contains two parts to do so.

Part 1: Self-definition

The self-definition part (appendix M) helps users to explore what work-life balance means to them. Especially the way people achieve this balance can be different to anyone. For every life quadrant (work, family, friends and self), users are asked to write three events for achievement and enjoyment. Whenever days may seem to become imbalanced, users can grab back on these events. Besides these events, some activities help users to clear mind. Users can list these activities as transitions from work to other parts of life.

Part 2: Planning

With the help of the planner (appendix N), users set monthly goals for creating meaningful achievement and enjoyment in all life quadrants. Setting these goals helps to maintain daily work-life balance and to reflect on this at the end of each month. Every week, users set goals and plan how much time it will take to achieve these. They are flexible to schedule their work and private activities to their liking. For example, Joseph plans a longer workday on Tuesday so he can go for an extra-long run on Wednesday. Daily, users prioritise their life activities and set boundaries for when they work and when they do not. The planner reminds them to check out of work by switching their light scene back to private life and initiate one of their transitions.

Figure 28: The planner helps users in improving their time management

A CONTROLLER FOR TIMEBOXING ACTIVITIES

In their Sceny package, users find two TP-Link smart bulbs which are connected to the controller. This closed system is still accessible with a smartphone, but it is not intended to use it that way. As they can read in the guide, users should use it as a plug-and-play product. They screw the bulbs in their fixtures and powerup the controller via a socket. This controller is a bit more polished version (see figure 29) of the rapid prototype from chapter 5. Users can choose out of two light scenes: focus and chill. A light ring on the device indicates with orange or blue light which scene is selected. There are three user interactions:

1. Pushing the knob allows switching between the two scenes.
2. Turning the knob sets a timer (max. 60 minutes) for when the lights should turn off.
3. The light turn of with a long push.

In case users do not set a timer for the focus scene, the lights will automatically dim after 60 minutes. This change of scenery suggests users taking a break.

Figure 29: The controller is a simplified version of the final concept

6.2.3 CONCLUSION

Sceny is ompleted with additional services that would exactly explain to users how they can improve their work-life balance. The package falls more to the background of the sales pitch as a tool. The concept itself is more about the service. Together with Philips Hue lights and the Sceny controller, users get a manual that explains how they can improve their work-life balance. The combination of a planner and the Sceny system will be the key to enhanced balance. Together they are the ultimate time management tool that helps to create clear boundaries between work and private life. The changing scenery may indicate that it is time to reflect on the planner and transition towards a night off.

Chapter 6.3

UPSCALING SCENY

Sceny is going to enhance the homeworking experience by fulfilling one significant need: transitions in time and space between work and other life quadrants for a healthy work-life balance. I designed the MVP to test whether young professionals will experience these work-life balance improvements. This test is part of the validation step and aims at proving the problem-solution fit. Between validation and upscaling the service are several other steps - visualised with the implementation strategy. These steps are part of a plan for establishing Sceny into a startup and consequently a scale-up. Likely, this is not something my co-founder and I can do on our own. With Sceny, we are no psychology professionals, and it can be tough to find potential clients for starting pilots. Therefore, we need partners that already operate in the field of business psychology.

6.3.1 PARTNERS

Larger organisations may have business psychologists or coaches internally. On the other hand, the small- and medium-sized enterprises (SMEs) often reach these experts externally. Sceny aims for partnering up with the external experts, as they are more accessible and their clients are smaller. The client may, therefore, be more flexible in adopting new techniques. To us, this can be a more comfortable start for our pilots instead of having hundreds of users at once. These partners can be our key in finding a product-market fit. There is also something in it for the potential partner. These kinds of parties often do not have a technical background and may be unaware of the benefits of existing technologies. Our technology may as well improve their service. Figure 30 presents an overview of potential partners within this sector.

Figure 30: Overview of potential partners

6.3.2 IMPLEMENTATION STRATEGY

Making Sceny into a viable business requires taking several steps of validation and improvements. According to the YES!Delft programme (n.d.), there are four focuses towards upscaling new enterprises: problem-solution fit, product-market fit, business model fit and market replication. These focuses form the basis of our implementation strategy. The first year will be about the validation of the first two steps, the second year about optimising the business model and the third year about expanding to other markets. Earlier tests were already part of the problem-solution fit as they proved the existence of problems around work-life balance for employees who work from home. Therefore, the next step is to validate that Sceny is the solution to this problem.

"The home office facilitates a healthy work-life balance by creating smooth transitions between daily activities"

Within the three years of our implementation strategy (figure 31), we work towards a hybrid future where the home office is capable of facilitating a healthy work-life balance by providing smooth transitions between work and private life.

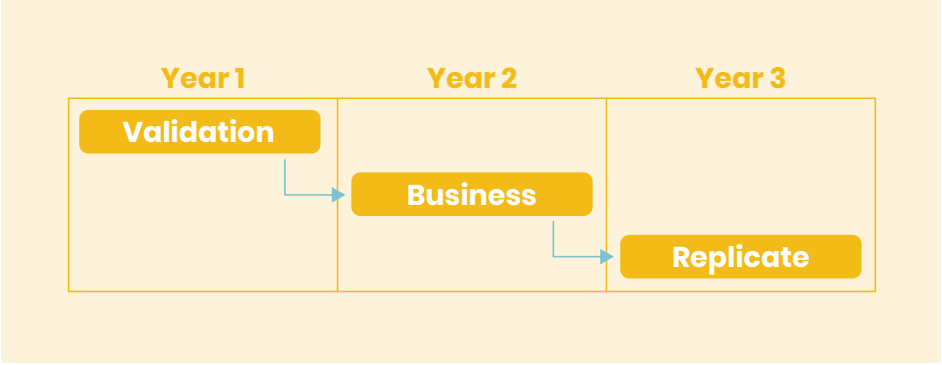
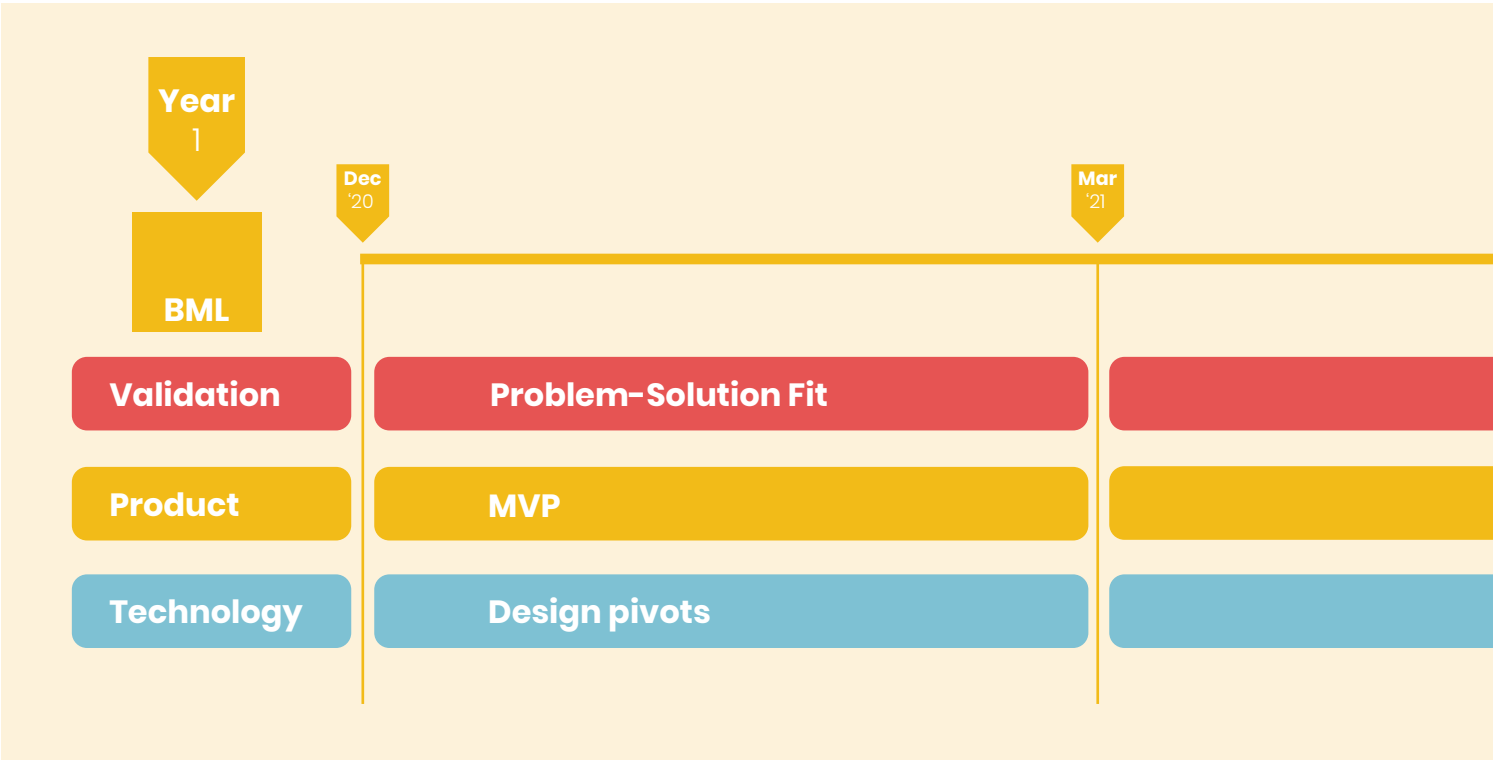


Figure 31: Overview of the implementation strategy

The Lean Startup

As a large part of the strategy consists of validations, we will use the validated learning principle from the Lean Startup Method (2011). According to Ries, validated learning helps in the step-by-step verification of assumptions by testing with the Minimum Viable Product (MVP). Although this MVP is an unfinished form of the final concept, we will be able to validate whether or not there will be paying customers. With the MVP, we will go through the build-measure-learn loop as many times as possible. Therefore, the MVP and even the final concept are not set in stone. When we cannot validate the MVP on viability, the design or business model requires a pivot. Depending on the stage we are in, the pivot can be drastic or only small. There can be countless possible scenarios for validating Sceny. The implementation strategy considers a scenario in which we can validate the current MVP on its problem-solution fit.



YEAR 1: VALIDATION

The first year (figure 32) focuses on validating the problem-solution fit and product-market fit. During these validations, Sceny has three product designs that form define the first year's milestones:

1. Minimum Viable Product: a free minimum version meant for testing the problem-solution fit with family and friends.
2. Prototype: a bèta (unfinished) version of Sceny with calendar connectivity.
3. Commercial: a final first version of Sceny meant for a broader audience.

Problem-Solution fit

The first milestone is to have validated the problem-solution fit with the - earlier defined - MVP. This test focuses on verifying that Sceny can help people improve their work-life balance. As we rely on our own funding, and one MVP is still relatively expensive to build (ca. €120), we aim at finding a maximum of 20 friends and family members. The first tests take a month, after which we take one-week sprints to conduct potential pivots and build new versions. As a measurement, we use interviews and a questionnaire to find out whether or not the MVP was successful in assisting to improve work-life balance. In March 2021, we aim to have validated the problem-solution fit.

1st Milestone Criterium: The first milestone is reached when we successfully helped 20 young professionals with improving their work-life balance, and have them all satisfied with their experience.

Product-Market fit

In the build-up to validating Sceny on its product-market fit, it requires an upscalable and feasible prototype. This bèta version of Sceny must be easy to produce and should already contain new features, retrieved from user insights. For example, we add calendar connectivity if users are satisfied but would prefer to use Sceny with their online calendar. We aim to have the prototype ready by July 2021.

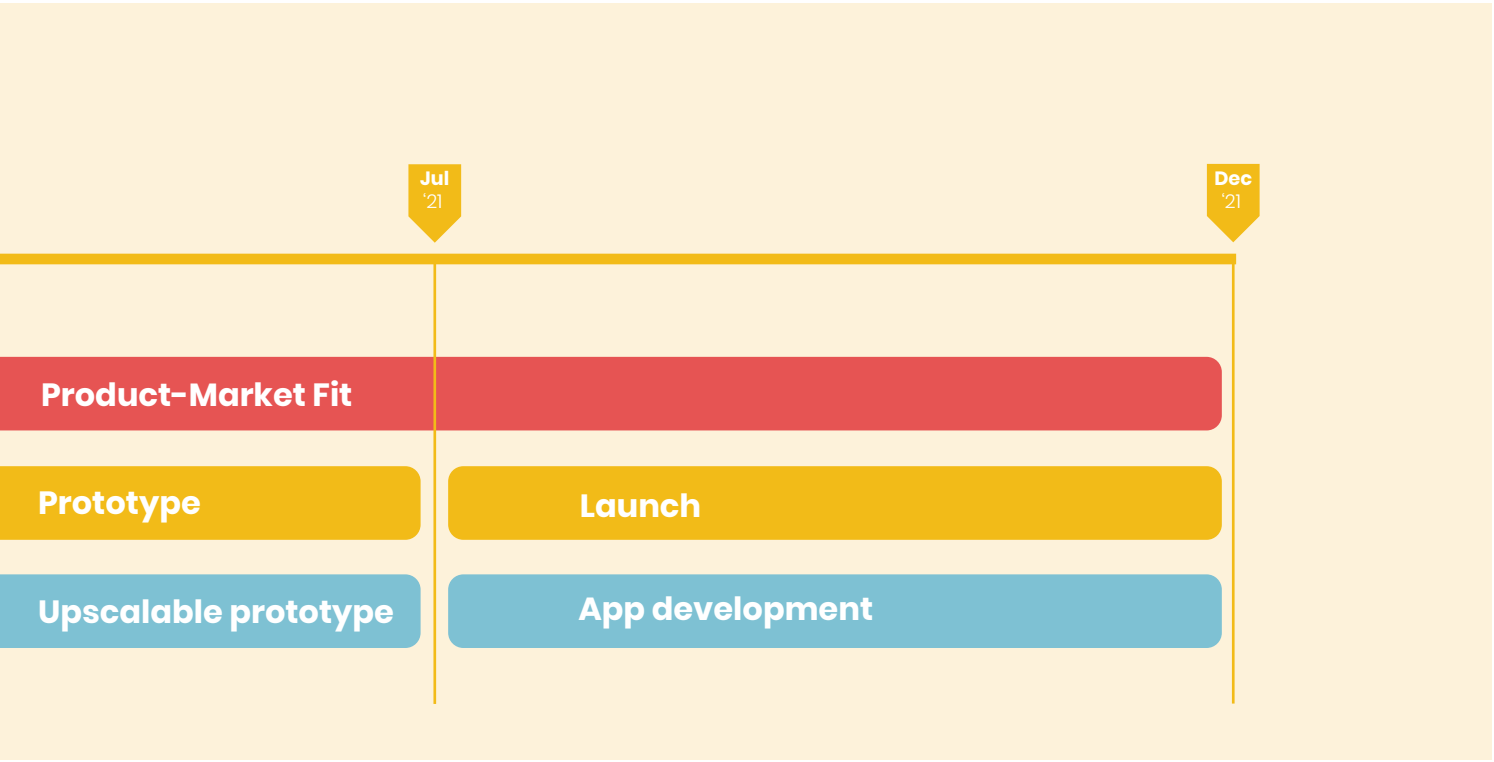


Figure 32: Milestones divide the first year in three parts

2nd Milestone Criterium: The second milestone is reached when we succeeded in developing an upscalable prototype.

From this point, the strategy focuses on validating the beachhead market. Earlier market segmentation promised young professionals in the IT service sector to be most viable. We chose customer growth as the most significant measure for testing the product-market fit. There are about 18.000 young professionals in the IT service sector, and we aim to serve 2.000 of them by the end of 2021. This kind of growth means that our value proposition and distribution channels align with our customers.

3rd Milestone Criterium: The third milestone is reached when we obtained 2.000 paying customers and have them recommend Sceny to their friends.

YEAR 2: BUSINESS MODEL

After a year, there is a first moment on deciding whether or not Sceny has the potential to become a viable business. An example criterium for this decision is that we at least reached the second milestone and attracted an investor. When decided to continue with Sceny, the second year will be about validating a business model fit. Find such a fit is very different for every company. Determining new milestone criteria should be in consultation with new stakeholders, such as upcoming co-founders and investors. We will aim to find a business model fit that is sustainable for becoming an upscalable business. One way to measure this progress is to have existing customers to renew their contracts and want more of it.

YEAR 3: REPLICATION

With a business model fit, Sceny proves the ability to attract and maintain buyers. In this stage, the business model is profitable, and it will be time to expand to cross border or cross-sector markets. From this point, the aim is to grow Sceny into a scale-up stage company. We will make Sceny ready to accelerate commercial activities in other markets. The next years will have to determine which markets this will be (e.g. expand to Germany/Belgium or start workplace consulting).

6.3.3 CONCLUSION

As a startup, gaining traction can be challenging. In our case, employers may not be aware of how Sceny is going to solve their problem. They may want to hear this from professionals, such as business psychologists. We aim to partner up with these psychologists to provide their clients with our package. There are several scenarios for partnering up with experts that advice on improving work-life balance. We aim at the external experts that mostly advice SMEs.

The implementation strategy covers four of the ordinary startup focuspoints: problem-solution fit, product-market fit, business model fit and market replication. I divided these stages over three years. In year one, the focus is at validating a problem-solution and product-market fit. By using lean methods, such as the BML-loop, we are aware of potential pivots. Key deliverables in this year are the MVP (validation stage) and a functioning prototype (early-stage startup). Even the prototype does not need to be perfect, but it should contain the key features. The second year is about marketing the product and grow towards a late-stage startup. The goal is to keep improving the business model and reach for a perfect fit. The product is beyond a prototype and serves a minimum of 2.000 paying customers. Year three is about market replication. In this stage, we focus on upscaling the business and find more markets to serve.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CHAPTER 7
CONCLUSION

Chapter 7.1

CONCLUSION

The benefits of homeworking became apparent during the lockdown; people felt more efficient and flexible in spending their time. For employers, there is an opportunity to save high costs in their offices. However, there is one group in particular that finds homeworking very challenging: the young professionals. Their limited space at home can make it hard to adapt to the new hybrid form of doing work. Lack of space can make it hard to create a productive environment and to stay physically active. On top of that, they may feel, like many other people, as if they work inside their bubble.

There is one psychological challenge that is most significant among the target group: maintaining a healthy work-life balance. Many young professionals find it challenging to create clear boundaries between work and other life quadrants (family, friends and self). Previous transitions, such as commuting, disappeared. Now, every activity happens within the same space. In a future where we work most days of the week within this small space, we need to create clear boundaries between what is work and what is private. Otherwise, there are lurking dangers, such as burnouts, that could harm our mental well-being and employers financial health.

Therefore, I designed 'Sceny' - a smart product/service system that combines modern technologies with light to assist users in creating boundaries and transitions. With Sceny, employees can easily change their environmental ambience. Changing ambience, in combination with notifications, helps to define the transitions from work to private life. Testing risky assumptions validated the concept of its desirability and feasibility. On viability, however, it still lacked certainty that Sceny would solve the problem. As a service, Sceny was too simple and did not show its value. Employees would not be willing to take a subscription for something that feels like they could do it themselves. Sceny's service side required a redesign.

Sceny's Minimum Viable Product (MVP) is the redesigned service - a service for enhancing employees' work-life balance. Employers do not pay for a package with some light bulbs, but to assist their employees in transitioning from work to other quadrants of life. I added extra service in the form of a manual and planner that guide users on the road towards work-life balance. The planner is a time management tool that allows users to quantify their work-life balance for reflection and setting new goals. The MVP is part of a validation process that will test the problem-solution fit. It is the first deliverable in the implementation strategy towards a viable product/service system. Within this phase, we can determine if the beachhead market within IT services indeed shows most opportunities. Otherwise, we need to pivot towards one of the other potential markets. Meanwhile, we aim for pilots with Small- and Medium-sized Enterprises in the branch of IT services by partnering with third-party well-being experts, such as business psychologists and coaches. Together, we will make homeworking work.

Chapter 7.2

RECOMMENDATIONS

Graduating in a crisis, in combination with the independency of this project, made me encounter several limitations. The industry around doing work required a quick shift and will remain dynamic for some time. Although the current situation makes homeworking a highly relevant topic, finding study participants was not easy in this independent project. However, there are plentiful opportunities ahead for starting new business and research in the context of homeworking.

LIMITATIONS

Desirability

Maintaining a healthy work-life balance becomes more challenging for young professionals when they need to work from home. In general, employees miss transitions, such as commute, from work to private life. These transitions help in defining the boundaries between what is work and what is not. Young professionals have an extra limiting factor in creating such boundaries: their limited space. Changing ambience with light helped me myself initiating the transition from work to an evening off. Further testing the Minimum Viable Product with >20 young professionals will validate the problem-solution fit. Validating the desirability among users is essential for verifying its viability; employers will not pay for the service when it does not solve user problems.

Among employers, there is likely to be a growing need to assist in tackling employee work-life challenges. However, this remains an assumption until we could verify with >10 employers. New insights should result in a better understanding of customers, which leads to customer personas. Finding participants was challenging because this is an independent project. Partnering up with business psychologists and coaches should help in finding new participants, as both users and customers.

Viability

Analysis of the industry pointed validated the viability of the home office market for IT service young professionals. The validation bases its result on the VAT-free budget for arranging home offices. However, a lot is still uncertain about company policies for this budget. The coming months should reveal whether this is the right fund for calculating market sizes. Interviews and MVP tests can help in validating the assumption that companies would use this budget for Sceny.

The first iteration of Sceny was likely not viable. Although not able to validate with >10 potential customers, the four participants did not think our service would solve their problem. Insights from the interviews resulted in a second iteration: the MVP. When the first upcoming free tests on desirability are a success, a pilot should reveal Sceny's viability. Likely, multiple iterations should precede to the success story. Preferably, this iterative process considers the build-measure-learn loop for building a lean startup.

Feasibility

The Sceny product/service system consists of several technological components. Getting the controller to work was the priority for testing. Connecting the timeboxing feature with smart light bulbs was crucial for time management functionalities and creating the transitions in work and life ambience. The result was a controller that sets and time light scenes with Philips Hue bulbs. However, TP-Link bulbs were the better option for the MVP because they are cheaper. Although it will be a new challenge to get it to work again, other bulbs should not be a limiting factor for getting the system to work. The first weeks after this project will validate this assumption.

RECOMMENDATIONS

As the assignment revolves around designing a viable product/service system, the following considerations mainly focus on improving Sceny's viability. However, the outcome of this project also opens up research opportunities.

- **Keep it lean**
  The MVP is the next step in the validation process. Testing and developing Sceny will require many more iterations. Performing short design sprints along the build-measure-learn loop allows reaching for an optimal fit. How users experience using Sceny is crucial for making human-centred improvements. Besides, it can save time on undesired developments.
- **App development**
  If during early-stage validations, the controller does not work as intended, we should consider building an app instead. Although we would need support, smartphone applications are relatively easy to make. Besides, quick updates could support lean processes and test new features instantly. Tracking clicks, downloads and other user data can help in the validation process.
- **Research**
  How light affects the perception of work-life boundaries is based on personal experiences. Whether this effect generalises to other users requires further investigation. The significance of this effect could be a topic for new academic research. I recommend considering the following research question: Do dynamic light ambiences have a significant impact on the perception of work-life boundaries?
- **Machine Learning**
  On the long haul, Sceny has the potential to become smart. By gathering data, we could smartly automate individual behaviour. Users may change their habits and overrule specific events. For example, if users tend to postpone the start of a workday and stop later, Sceny could notify users and make personalised recommendations.
- **Smart bulbs**
  The MVP uses bulbs from TP-Link. These have the right specifications and are relatively cheap for testing. However, future testing should reveal whether we should keep providing smart bulbs. If so, we should consider white label bulbs or outsourcing manufacturing. There are several options for white label production, such as Tuya. This kind of production is often fast, easy and low-priced. However, quality is not always a guarantee and specifications may not be sufficient. Outsourcing, on the other hand, could guarantee good quality and optimal specifications. There are mediators, such as Orange Creatives, that help European companies finding Asian manufacturers. The downside of this method is the high prices that come along.
- **Consulting**
  With a focus on enhancing the homeworking experience, we became experts on the topic. We should consider sharing this generated knowledge as an extra service through consulting. It can improve relationships with the client and could even improve Sceny's business model. Tailored homeworking experiences can be attractive to employers for recruiting new personnel.
- **Other solutions**
  Expanding the business model with other solutions can provide additional opportunities for viability. Desks, chairs and other accessories could expand the Sceny assortment. There could be more opportunities for developing Sceny and expand to other markets. We should consider providing a service that offers complete home offices in a care-free and circular manner.

Chapter 7.3

PERSONAL REFLECTION

My graduation project was a turbulent ride; a journey with ups and downs. I challenged myself with a complex context that was changing dynamically. Eight months later, the future of office work is still full of uncertainties. Starting the project with smartening SME office environments (appendix O), the COVID-19 pandemic forced me to change the topic halfway of June. Feeling stuck in my room, while limited by space, I identified with an increasingly relevant challenge to other young professionals: maintaining a healthy work-life balance.

Of course, I could not leave Corona unmentioned. It was a strange year to graduate in. Offices became inaccessible, which complicated analysis and endangered my ambition of starting a business in this industry. However, other opportunities opened up. The future way of working is hybrid; forcing this future so radically requires innovation fast. The pivot towards this new context required extra time for re-analysing and adjusting most of my work. Personally, this was not easy. My new planning put a lot of pressure on my ambition to finish the project on time. With the pivot in mind, this was unrealistic. Although this process was challenging, it did help me get more focused and improve the quality of my work. Eventually, I am proud to complete my graduation five months after the pivot.

Besides strict planning, I had more ambitions; for example, I wanted to test my competencies on entrepreneurship. A successful design in an earlier project drives this ambition. It was challenging to combine design thinking with entrepreneurship without any experience. By reading The Lean Startup (Ries, 2011) and Disciplined Entrepreneurship (Aulet, 2013), I taught myself on the topic. However, to me, the LS method was not right for starting a business out of nothing. It lacks creative processes and a step-by-step approach to building a startup. DE provided a better approach to the fundamentals of starting a new business. Design thinking principles helped me in getting ideas and a final concept that would be the basis of my startup. I will continue to pursue my ambition to build a successful company; on October 7th, I signed for starting a business together with my co-founder, Felix.

Although not previously defined as ambition, I enjoyed prototyping more than expected. I enjoyed it even so much that I often found myself spending too much time on it. Iterations on websites, apps and 3D prints were the result of this rogue prototyping. However, it taught me more about what I enjoy and how I foresee my future. Besides prototyping, I developed myself on another subject: writing. I always thought I was a good writer, but quickly it became clear that it needed some improvements. My sentences were too long and too vague. Even during my green light, there were still many comments left. However, again, I made a lot of progress and was able to improve significantly.

Overall, I am proud of how I developed myself throughout this project. Under the current circumstances, I think Corona justifies that I was not able to keep to my strict planning. Besides, I am happy with the result, and I honestly believe it can be viable for business. The coming months, I will continue further development of Sceny.

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