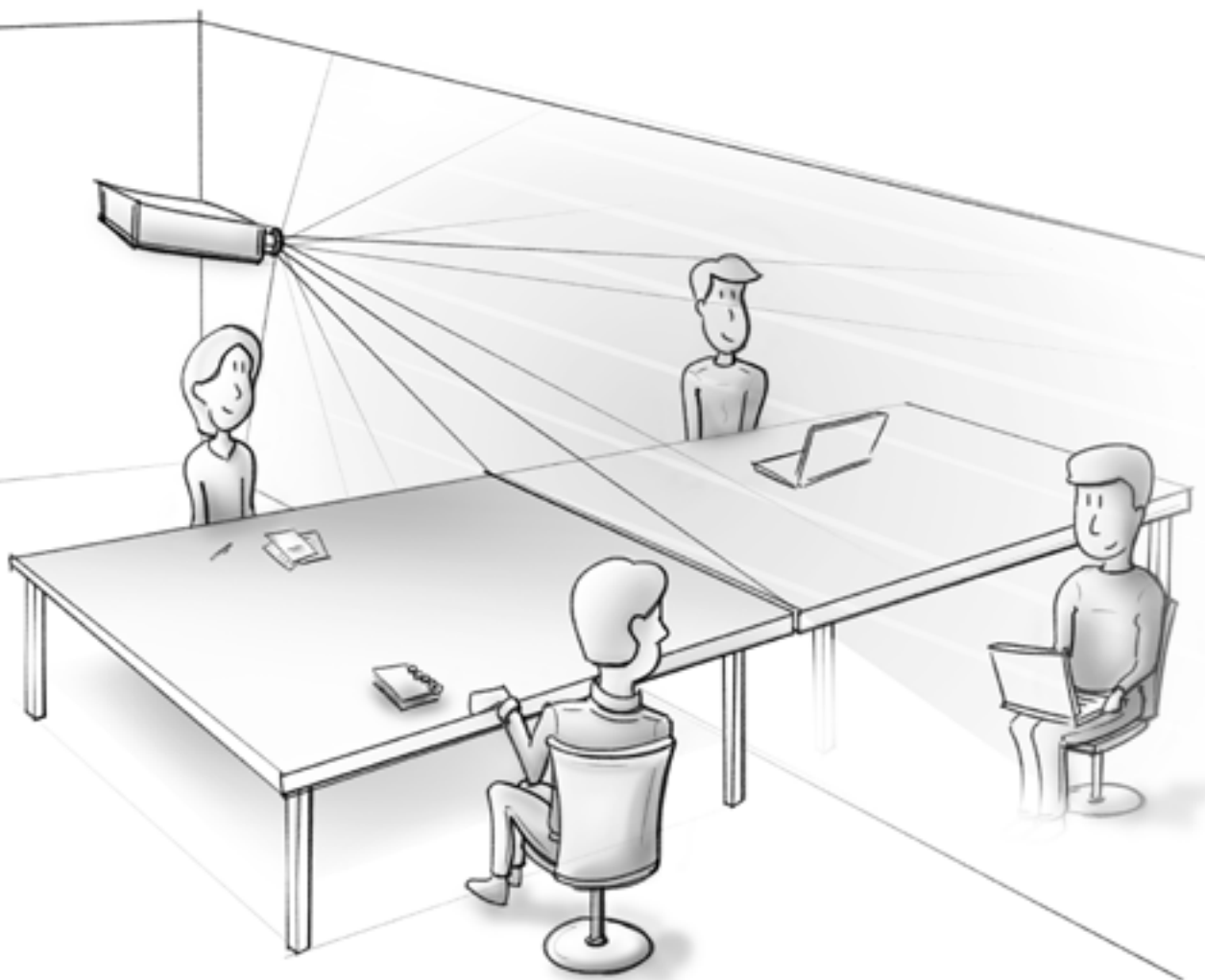


Towards a more human digital workplace

From idea to user value within a technology company



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ABSTRACT

Telework has tremendous potential benefits that can be the solution for problems as traffic jams, work-life conflict and even the environment. But there are still numerous obstacles that need to be overcome for telework to live up to its full potential. The proposed solution to overcome these problems is by developing more 'human' solutions, which means to innovate from a human perspective.

This project proposes a concept that can be seen as a step towards this vision: "A more human digital workplace". It provides one example of how technological innovations can occur through user understanding. This example has taken the form of a concept called The Hotline. A need for better cross-site collaboration has been identified and through numerous Tryout iterations the Hotline concept occurred. The concept has been validated with end users. In a survey 70%

of the respondents wanted the Hotline to stay and 44% was willing to pay over five euros each month for the service.

At the same time organizations as Barco, the case company of this thesis, struggle with understanding their user. This is a common problem of larger organizations. Barco is a business to business technology company specialized in image processing technology. Barco has three departments: Entertainment, Healthcare and Enterprise. The last department offers solutions for the workplace such as Clickshare, a wireless presentation tool. The Enterprise department has a focus on the future of work, making it the perfect candidate to receive this thesis.

In parallel this project also shows the taken steps from idea to user value. The process can serve as input for best practices in the fuzzy front end of new product development.

Towards a more human digital workplace

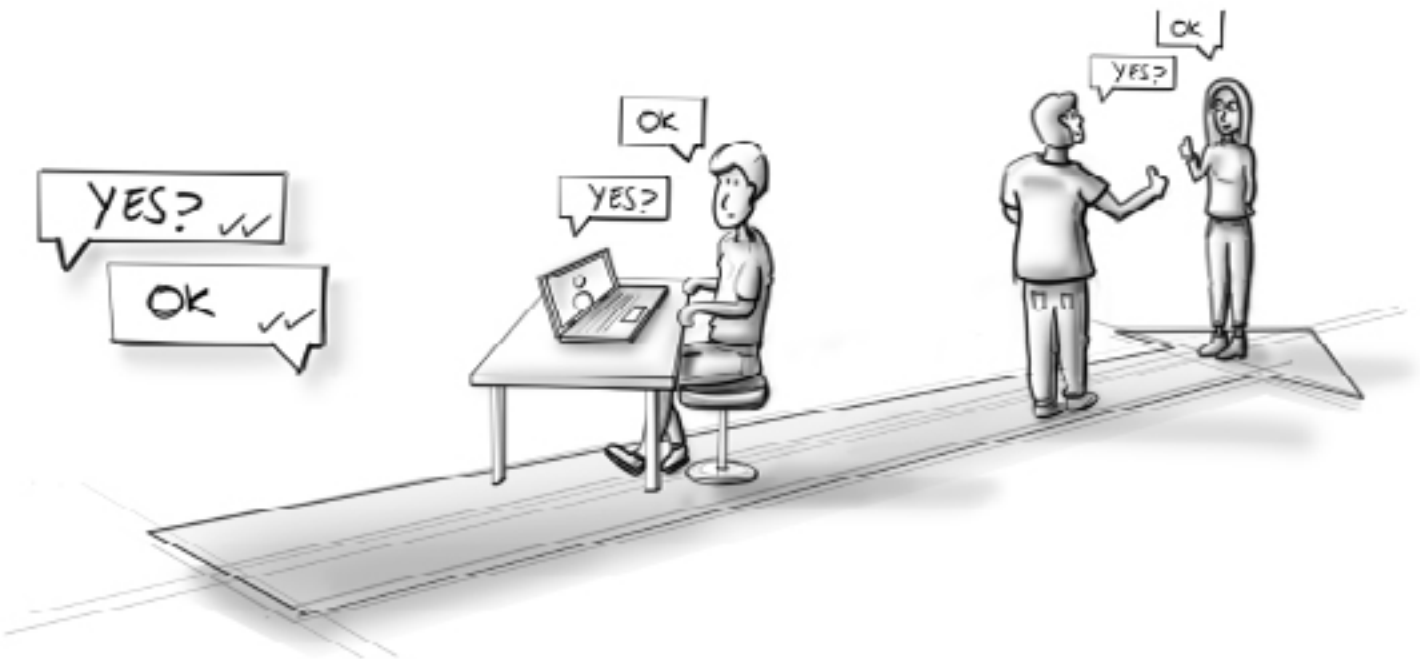


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PREFACE

This project started with the idea: "If technology could make the digital workplace realistic enough, then traffic jams would be a thing of the past".

Imagining a world where nobody had to be stuck in a car, train station or airport for work and where everybody would spend those hours on stuff they enjoy. This idea had the potential to even out smart self driving cars, because in this world there would not be a need to commute anymore. How great is that!

If it was as straightforward as it sounds it would have already been here.

The first step consisted of choosing a problem and deconstruct it in a project brief, which can be found in Appendix 1.



INTRODUCTION

Case company: Barco

Barco is a technology company specialized in image processing. It offers products and services in three main business areas: enterprise, entertainment and healthcare. The technologies can be divided into four categories: image processing technology, display technology, projection technology and collaboration technology. With over 3500 employees worldwide and annual sales over 1 billion euros it established leadership positions in all three markets. Currently, Barco is on a journey towards 'delivering outcomes'. This is a recurring theme in the annual report of 2018. These outcomes can be reached through "understanding customer needs and finding ways to deliver true customer value". The current strategy to enable these outcomes is through combining hardware with software and services (Barco N.V., 2018).

Strategy

The general strategy has been summarized. In order to illustrate the context of where the company wants to go and how this project could be a part of that.

Lead by innovation

Barco has over 85 years of experience with innovation where they have been conceiving, designing and developing new technology. It can be assumed that Barco takes innovation seriously since 11% of sales is invested in R&D, which is more than their peers. There is also a shift in mindset on the way. This mindset advocates that innovation should be more than launching innovative products, innovation should add value for the customers. By sharpening the innovation processes the return on innovation investment should be increased.

Focus on performance

This pillar of the strategy is concerned with performance and changing the way of running a business. This means having a focus on cost efficiencies and commercial excellence. Opening the factory of the future that acts as a manufacturing hub is a result of the performance strategy.

Offer outcome based solutions

The goal is to move from a tech 'specs' vendor towards selling outcome-based solutions. The chosen strategy to achieve this is through combining hardware and software services. A 'fit to lead' program has been introduced in order to realign the organization. Also the introduction of subscription-based services were examples that are results of this strategy pillar. The action points are colored orange which indicates room for improvement.

Internal client

This is a project about the future of work which means this assignment is written for the Enterprise division since they also engage heavily in this topic.

Enterprise

The chosen department for this project is the Enterprise department. In this department there are three divisions:

- Learning room Experience (LX)
- Operating room Experience (OX)
- Meeting room Experience (MX)

Learning room Experience (LX)

This division houses products to enhance learning and collaboration in the classroom. Products as weConnect (figure 1) and wePresent belong to this division. Products and services target the teaching and learning market but also the workplace.



Figure 1: WeConnect a virtual classroom

Operating room Experience (OX)

This is the division that is responsible for large displays in control rooms. This division is joined by the VR projection, screen and structures. Target markets are control rooms (figure 2) and 3D visualizations.



Figure 2: Barco's video wall in a control room

Meeting room Experience (MX)

MX is responsible for one of Barco's flagship products: Clickshare (figure 3). Their market is the B2B workplace, their target group consists of fortune 1000 companies or organizations with ten or more meeting rooms (interview director segment marketing, 2019).



Figure 3: Barco Clickshare a wireless presentation tool

Knowledge about the current and future workplace within MX is present making it a logical choice to see this division as the target client.

Innovation

When it comes to innovation one can adopt a complex or a simple definition. As the context of the case company is already complex enough, the simple version is preferred. In this project something is considered an innovation when: "The new object is absorbed in the existing system which is changed by series of interventions, be it micro, small or large" (Smulders et al. 2003). In other words, an innovation is when something new has been implemented into an existing context and successfully put to use by its intended users (F. Smulders, personal communication, 2020).

The organization has a slightly different perspective on innovation. For Barco, innovation should 'enable bright outcomes'. This should be achieved by fully understanding customer needs. This is their guideline to deliver 'true customer value' (Barco N.V., 2018).

Internal shift

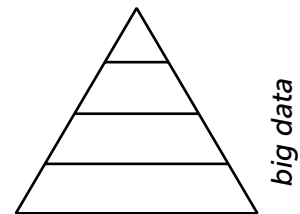
Barco is working hard on evolving from a tech 'specs' vendor towards delivering these outcomes. According to the Head of program office the current strategy is to move from the 'device layer' towards 'data analysis'. In this approach the goal is to try and find a user proposition with existing devices and IT platform (connectivity and workflow). Some may refer to this a 'tech-push'. The other approach starts with capturing different forms of qualitative data (i.e. interviews, observations & focus groups) and develop a workflow, connectivity and device for that specific proposition. This should streamline the innovation process and help develop solutions that users want (figure 4):

Flipping the triangle

This top down approach means to start uses customer centric exploration, "which means knowing the customer really well" (internal presentation, 2019). This exploration should be carried out by the 'value scope'. There are two scopes in a new product introduction track: the system scope and a value scope. The system scope consists of disciplines such as R&D, supply chain & manufacturing. These disciplines are concerned with how a concept should be developed. The value scope is responsible for identifying market trends and the user needs. A product owner or R&D manager is responsible for defining the system scope, the product manager is responsible for the value scope (figure 5).

Current

L4 data analysis
L3 workflow
L2 connectivity
L1 device



Desired

L4 data analysis
L3 workflow
L2 connectivity
L1 device

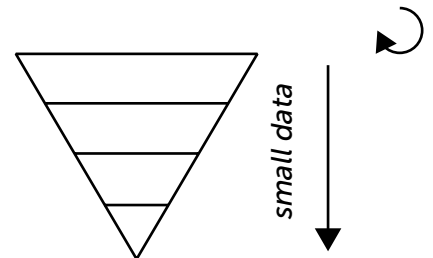
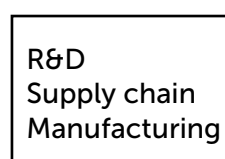


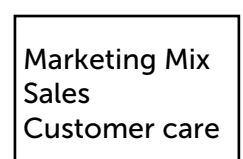
Figure 4: Model to describe the current and desired approach

SYSTEM SCOPE



Product Owner
R&D director

VALUE SCOPE



Product manager
Segment marketer

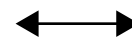


Figure 5: Model to describe the collaboration between different disciplines

Current situation

The current situation of the company is that one in every three employees work in the R&D department. This means that a technological bias is present. This is visible in the current strategy where the bottom up approach is to extend a service, while there is a need to reverse the triangle. In other words, to become more customer centric so that the organization is better able to find and solve the right problems. This is a challenge where "We still do not know who our users are" the Head of program office explained. The value scope needs to communicate to the system scope what the customer wants. This is a challenge since the value scope interacts with the client and naturally has a biased view on the design challenge. The desired functionalities are communicated to the system scope. The threat is that the system scope develops a misinterpreted solution the customer does not need.

From technology to user

The director of innovation confirms, explaining that: "We are looking at things through a pair of technology glasses, where instead we should look through a pair of user glasses". This is another way of explaining the shift towards customer centric exploration. Another reason to reconsider investing heavily in R&D according to Verhasselt & Boucart (2019) is that "R&D investments are subject to diminishing marginal returns, supporting the notion that greater competition for R&D investments is associated with the lower profitability in recent years". This indicates that there is a need for a different innovation approach to within the case company.

Position of the thesis

Expert knowledge about technology and business is present within Barco and this project is not going to add value in those areas. But, knowledge about the end user could be improved as the Head of program office and director of innovation explain. The industrial design engineer (IDE) has been known to be in the center of technology people and business. In this project the people element could be improved (figure 6). Which means that adding new knowledge to the company will be in the form of user understanding. This is why in this project there is such a heavy focus on the user.

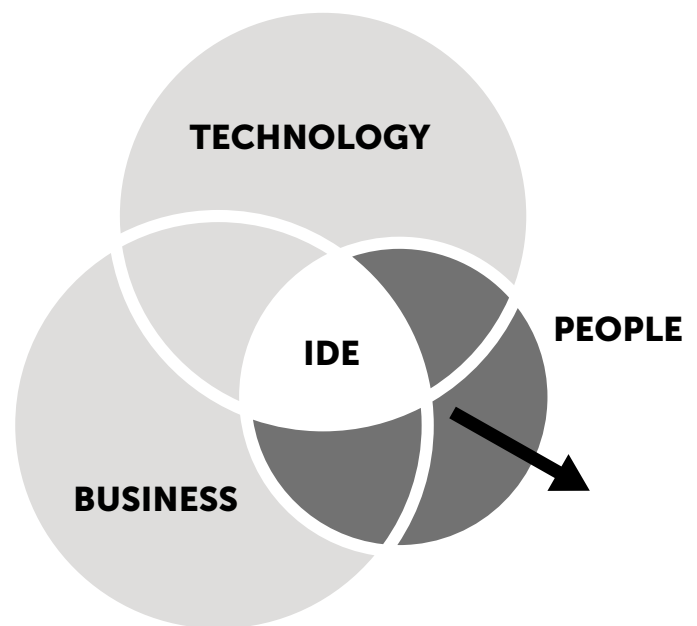


Figure 6: Position of the industrial design engineer and the project in the context of the case company

Competition

There is always competition either direct or indirect. When thinking of direct competition for a future of work solution, innovations as Microsoft Hololens come to mind (figure 7).

In this project the focus on direct competition is not that present. This is because the proposed product service is still at a conceptual stage. The concept does not fit an existing market and therefor competition could come from various places. The most direct competition is considered to be tools in the digital workplace such as Microsoft Teams, Office and Yammer. Indirect competition could even go as far as a company car policy that makes it more attractive for employees to come to the office. Developing a solution with competitive advantage is not a priority due to the early stage of the concept. That is why there has not been a large focus on competition.



Figure 7: Microsoft Hololens 2

CONCLUSION

Barco has been, and still is, an innovative company. However, in the past the company has been known for having a primary focus on technology. Currently, a shift is on the way from technology to customer centricity. That is why this project has such an extensive social perspective.

The goal is to bring novelty to the case company. Currently the technology and business areas are covered but the 'people' element is where knowledge lacks. Therefore extensive user research is necessary for the thesis to add value.

This research will be done in an area that could potentially be a solution Barco is able to develop. The research area is telework.

DISCOVER

This chapter covers the existing literature and context around telework. Uncovering the potential benefits but also the issues.

This consists of exploring telework on general level such the potential impact on society and the environment. It also discusses the existing literature of telework and how it affects users.



*desk research &
literature review*



*interviewing with switch
points*

Perspective of time

The cognitive revolution is the period of time, 70.000 years ago, where Homo sapiens started communicating on a level which has never been seen before. This allowed Homo sapiens to collaborate more efficiently and in larger numbers, separating the Homo sapiens from other animals. For over 30.000 years humans have communicated in the same way: through face to face communication (Harari, 2015). Communication has been a major contribution to the evolution of humans and still is important today.

Telecommunication

But then the internet came and with it a never before seen type of communication emerged: telecommunication. The definition of telecommunication varies and different labels are used to refer to the phenomena: telework, remote work, distributed work, virtual work, flexible work, flexplace, and distance work (Allen, Golden, & Shockley, 2015). In their paper Allen, Golden & Shockley (2015) propose the following definition based on widely adopted conceptualizations: "Telecommuting is a work practice that involves members of an organization substituting a portion of their typical work hours (ranging from a few hours per week to nearly full-time) to work away from a central workplace—typically principally from home—using technology to interact with others as needed to conduct work tasks". They further specify that telecommuters are not mobile workers whose job does not require them to be at the central office.

Why telecommuting?

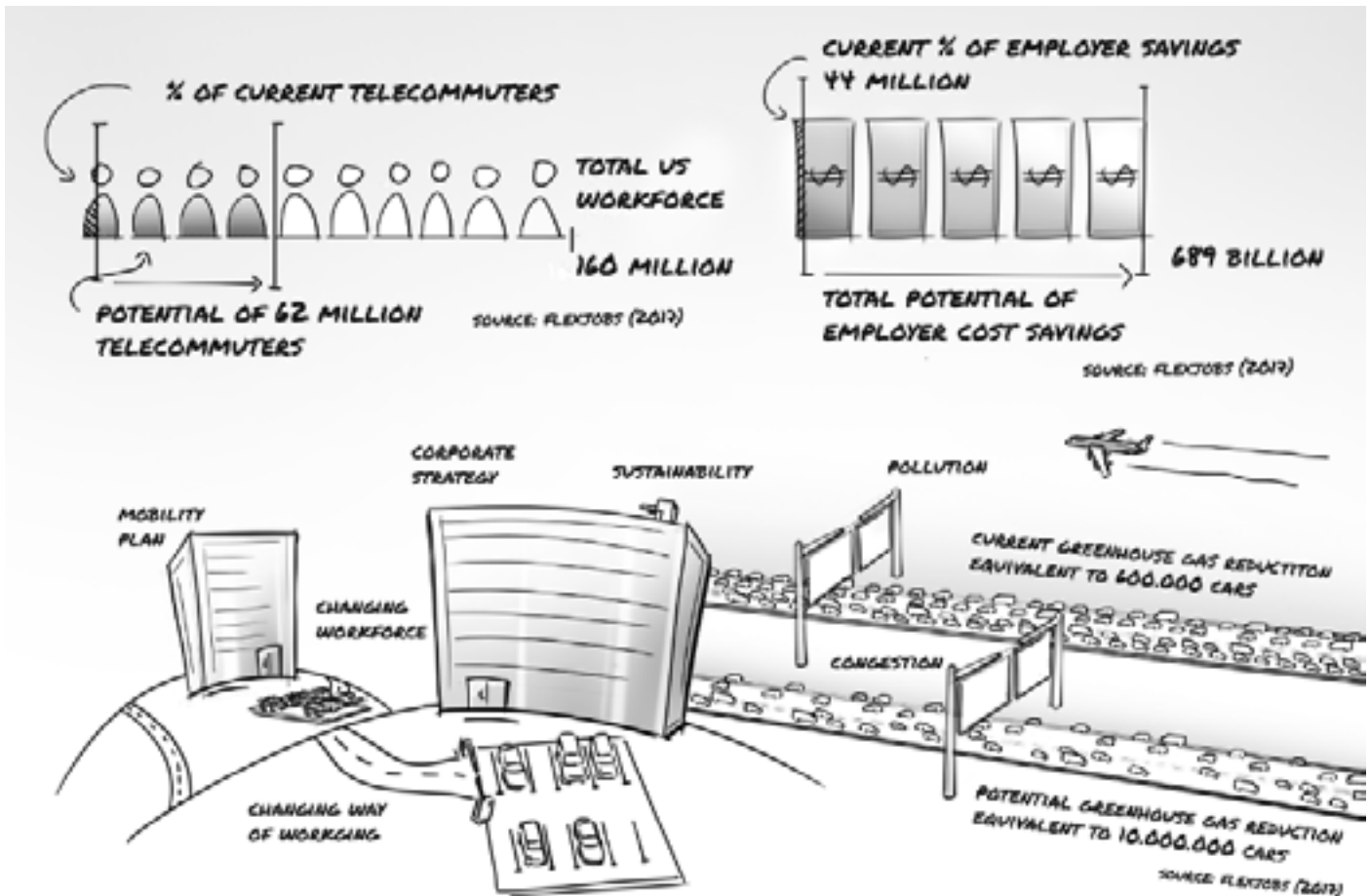
The reason why topic of telecommuting was explored is because of the great potential benefits, problems and a target audience which assumed to provide the most interesting opportunities. In this project telecommuting is seen as 'teleworking from home'. That is the reason why telework and telecommuting are used through each other. Also, telecommuting is considered to be

the most prevalent form of telework (Buffer, 2019). The term remote work is also used from time to time. In this project remote work is considered to be telework from an offsite location.

An overview of the telecommuting context and relevant literature is set out in this chapter. The current literature can be separated into two groups. One group looks at the adoption behaviour towards telecommuting policy, the second investigates the possible consequences of telecommuting (Shabanpour et al. 2018). In this project telework and telecommuting are used in a similar context.

The Potential of telecommuting

The potential impact of telecommuting on society is enormous. Blog writers, academics and organisations have written about the potential benefits telecommuting has to offer. Global Workplace Analytics and Flexjobs presented a report about the state of telecommuting in the US workforce. The report presents numerous findings about telecommuting practices. The report uses a scenario where 56% of the jobs are compatible with telecommuting, and 85% of that group would be willing to spend half their time telecommuting. This would account for 62 million potential telecommuters. In 2017 the US workforce consisted of roughly 160 million people, of which 3.9 million were telecommuters (Flexjobs, 2017). Also, researchers Allen, Golden, & Shockley (2015) acknowledge the enormous attention and widespread benefits at "individual, organizational, and societal levels". This shows that these potential major benefits are acknowledged by various sources.



The environment

The existing 3.9 million telecommuters in the US are responsible for taking 600,000 cars of the road in equivalent of greenhouse gas emissions. If telecommuting would be available to all those who could and wanted to telecommute, this could take 10 million cars of the road in equivalent to greenhouse gas emissions (Flexjobs, 2017).

Traffic

When people stay home they obviously do not get into their car which starts a chain of fortunate additional benefits. Not only does this free up space on the road reducing congestion, it also frees up a space in the parking lot. A car not driving on a road also reduces the wear and tear of the road and the car itself, postponing maintenance. It also lowers the chance of accidents and the costs. Flexjobs (2017) estimated that existing telecommuters reduced traffic accident costs close to 500 million dollars. There are also studies suggesting that because of the time saved commuting, people will make additional or recreative trips during the day

to a preferred grocery store for example. The results of Dutcher (2012) suggest that "telecommuting does not necessarily lead to a lower travel demand at the individual level, as measured by the number of out-of-home activities". However, even though during telework days the number of trips slightly increased, the vehicle-miles travelled were reduced by 11,5% (Mokhtarian & Varma, 1998). The study of Choo et al. (2005) confirmed that despite the occasional extra trip, telecommuting is the most cost-effective congestion mitigation policy. The annual vehicle-miles traveled reduction caused by telecommuting is up to 0.8% which is far more compared to the reduction of vehicle-miles traveled caused by public transport.

For people

On top of that, there are benefits for the individual as well. The current halftime telecommuter could save over \$2.600 annually and fulltime commuters \$4.000 each year (Flexjob, 2017). However, the telecommuter is not only saving money.

They are saving time as well. When someone does not commute it gains back time that can be spend on something else. Not having to commute makes people more flexible which enables them to reduce their work-life conflict. There are exceptions since there is a substantial group of people that spend work time (i.e. calling in the car, responding to emails in the train) during their commute. Since 2013 Flexjobs has been carrying out surveys. Throughout the years the four main reasons why people telecommute were (Weiler Reynolds, 2019):

- Work-life balance (72%)
- Family (45%)
- Time savings (42%)
- Commute stress (41%)

The flexible work option plays a big role in job choice as well. It ranks as the third most important factor for evaluating job prospects. Only salary and work-life balance rank higher. Moeckel (2017) states that because of flexible telecommuting options people will look for housing further away from the company where the rates are lower. Also Dutcher (2012) found that due to the reduction of travel and budget cost constraints the work-life balance improves which might benefit the family as well.

For companies

The report (Flexjobs, 2017) goes on to state that half-time telecommuters gain back eleven days a year which they would have otherwise spent on commuting. This translates into a \$11,000 cost save per half-time telecommuter per year for employers (Flexjobs, 2017). With the potential scenario employers in the US could save \$689 billion a year. However, companies will need to invest in their digital workplace. But, telecommuting may allow for more flexible schedules and offset the cost for office space (Moeckel, 2017). There will be more parking lots available aswell which is a constant problem for most companies and their workforce. Tate, Lartey & Randall (2019) also came to the conclusion that telework can reduce operational costs and office space. They added that value is created because employees are allowed to make more efficient use of organizational resources. Lastly, job satisfaction can positively be affected due to the flexible work schedules and facilitation of cross functional collaboration (Tate, Lartey & Randall, 2019).

Literature overview

Although telecommuting shows great potential these predictions are merely speculative. There are findings in the literature that contradict each other. For telework to reach its full potential numerous obstacles need to be overcome. Even then, the situation is not that simple since the context is complex and a lot of factors influence each other in unpredictable ways. The reason for this is because research on the topic covers fields including psychology, management, transportation, communication and information systems, with often conflicting results (Allen, Golden & Shockley, 2015).

Adoption

Reality shows that "companies are still reluctant to fully embrace the idea of telework" which "may be partially explained by inconclusive, unclear and paradoxical outcomes associated with telework" (Boell, Cecez-Kecmanovic, & Campbell, 2016). They present the following paradoxes:

- Telework has the potential to be both helpful and harmful to work-life balance.
- It remains unclear if telework helps in reducing interruptions and therefore improve productivity, as teleworkers can be subject to different types of disruptions.
- It is argued that working away from colleagues and peers may lead to feelings of isolation and reduced satisfaction, which contradicts findings reporting telework as contributing to increased job satisfaction.

These contradicting findings make it confusing and difficult for the organization to invest in a telecommuting policy. Other scholars as Rasmussen, Erling & Corbett (2008) point out and elaborate on three barriers to implementation:

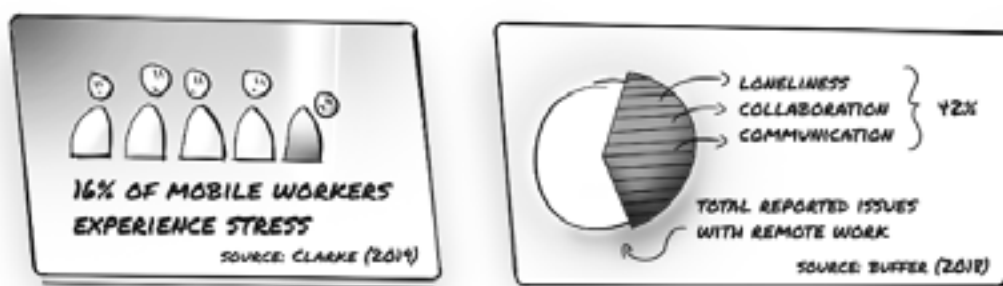
- Technical and financial issues
- Organisational or managerial barriers
- Employee-oriented drawbacks

BARRIERS TO ADOPTION

SOURCE: RASMUSSEN, ERLING AND CORBETT (2008)



INDIVIDUAL IMPACT



The technological issues often have to do with the concept of telecommuting itself. Where insufficient investment in up-to-date tools leads to a failing telework experience. The willingness to invest in a proper telework infrastructure is another barrier since it is for organizations often unclear what the benefits are. Managerial 'buy in' is important for the adoption of telecommuting policies, this is one of the most significant barriers to be overcome. The last barrier is the perspective of employees and how they perceive telecommuting. For example, the possibility to become isolated and the fear of being 'out of sight out of mind' are causes of the third barrier.

Allen, Golden & Shockley (2015) added that once telecommuting has been adopted, employees might still be reluctant to take advantage of it. They mentioned studies (Coltrane et al. 2013) that found "those who request and or use flexible work arrangements may be viewed as less committed to their career by others". Also concerns about negative career consequences are reasons for employees not to make use of telecommuting when it is available (Allen, Golden & Shockley, 2015).

Dangerous consequences

There are more problems with the broad topic of telecommuting. Numerous articles have been dedicated to understand how telecommuting impacts the daily lives of people. Morganson et al. (2010) cite Bartel et al.'s (2007) qualitative telework study which indicated that "Teleworkers felt excluded, out of the loop, and not respected as workgroup members". Besides, Golden et al. (2008) and Montreuil & Lippel (2003) both indicated the drawback of professional and social isolation associated with telework. In a more recent study Tate, Lartey & Randall (2019) pointed out the findings of scholar practitioners that telecommuters felt left out and lacked the

sense of organizational belonging. In these studies telecommuters were concerned with being excluded from decision making and being perceived as less committed to the workgroup. Since the interest and popularity of telecommuting is increasing every year it is important to better understand how it impacts individuals.

Workplace inclusion

In their article "Comparing telework locations and traditional work arrangements" Morganson et al. (2010) elaborate on workplace inclusion, building on previous research. In this paragraph they state that "workplace inclusion refers to one's sense of belonging to the organization", and where "workplace exclusion is associated with numerous motivational issues as burnouts and disinterest". They also paraphrase: "Professionally isolated workers report anxiety, loneliness, and physiological health symptoms (Beaumeister and Tice, 1990; DeWall and Beaumeister, 2006; Jones, 1990). It is not a surprise that telecommuters are exposed to the numerous threats. Stress, anxiety and loneliness can have tremendous negative impact on the health of an individual. Studies even go as far to mention that the effects of stress are greater than that of other risks as smoking, excessive alcohol consumption and physical inactivity (Toussaint et al., 2014). The issues related with telecommuting have to be taken serious since it threatens employee wellbeing.

Social isolation

The cause of the problems individuals experience seems to be isolation. This emerges as the prominent problem in multiple studies. Hafermalz & Riemer (2016) came to the conclusion: "A frequent concern is that remote workers will experience social isolation". This case study investigates 'belonging through technology in remote work' and dives deeper into the social

isolation issue. It seems that when work is done remotely, the social aspects of working are cut off. As Hafermalz & Riemer (2016) put it: "Remote work is thus in many ways based upon this separation of the "task" from the "social". With remote work the focus is often on results and outcomes while the social side of work is deemphasised". This is a common concern, where remote workers will experience social isolation (Hafermalz & Riemer, 2016).

Loneliness

Physical separation from the workplace can lead to social isolation. Social isolation is the objective measure of the number of social contacts a person has (Care Connect and Age UK, 2018). But, social isolation is not the same as loneliness: "Loneliness is a subjective feeling about the gap between a person's desired levels of social contact and their actual level of social contact" (Care Connect and Age UK, 2018). Where some people do not suffer from social isolation others end up having unaddressed needs for social interaction. A study showed that introverted employees were better able to face stress resulting from telecommuting than their extroverted colleagues (Meymandpour & Bagheri, 2017).

Burn out

When an individual does suffer from social isolation they might experience anxiety and loneliness which is related to stress and burnouts. Telecommuters are able to work for longer hours because of the flexible nature of telework. Morganson et al. (2010) explain that because of this, telecommuters may experience increased stress and overload (Morganson et al. 2010).

Professional isolation

There is another type of isolation called 'professional isolation' which is yet another phenomena. Cooper and Kurland (2002) define it as the fear of missing out on employee development activities, such as opportunities for promotions and organizational rewards. They identified three types of activities telecommuters miss out on through professional isolation:

- interpersonal networking with others in the organization
- informal learning that enhances work-related skills and information distribution
- mentoring from colleagues and superiors.

SOCIAL AND PROFESSIONAL ISOLATION

STRESS AND BURNOUT



SOURCE: HAFERMALZ AND RIEMER (2016)

WORK-LIFE BALANCE

WELLBEING AND PRODUCTIVE



SOURCE: MORGANSON ET AL. (2010)

Belonging

The opposite of social isolation, social inclusion, is directly related to belonging. Hafermalz & Riemer (2016) indicate how belonging gets established: "Informal communications play an important part in building the collective resource of belonging and this, we argue, is important for work performance". They conclude that "wellbeing and productivity are strongly related forming two sides of the same coin" (Hafermalz & Riemer, 2016). These informal communications seem to be lacking in current communication systems. Despite the increasing quality of these mediated tools, "they do not remedy the loss of the random watercooler conversations that occur among workers who are colocated" (Allen, Golden, & Shockley, 2015). Water cooler conversations are the type of social interaction that are lacking in current teleworking. Without an environment that can foster social inclusion remote workers will experience isolation. This reduces the feeling of belonging which threatens wellbeing and productivity.

The reversal

It appears that the biggest issue is when telecommuters start experiencing that they are isolated. Isolation, either social or professional, can be perceived as the umbrella issue for the cause of the problems for employees who are separated from the office. But, employees who are separated from the workplace can also report workplace inclusion. There are multiple benefits related to telecommuting as previously discussed. The benefits seem to be a bit more straightforward. The functional benefits for the individual as reduced travel time and budget constraints are caused by the flexible work schedule. Dutcher (2012) confirms that reducing the travel time and budget constraints improves the work-life balance of telecommuters. Not only can telecommuting improve the work-life balance it automatically gives the individual more autonomy. Gajendran & Harrison (2007) found that "perceived autonomy has beneficial effects on

job satisfaction". Autonomy impacts work-life balance and job satisfaction as well because of the "entrusted status it may symbolize" (Morganson et al. 2012).

Overview

The information above has been captured in a visual overview that conveys the context of telework on multiple layers. This is a combination of statistics providing insight into the potential market but also shows the known themes in the literature around telework (figure 8).

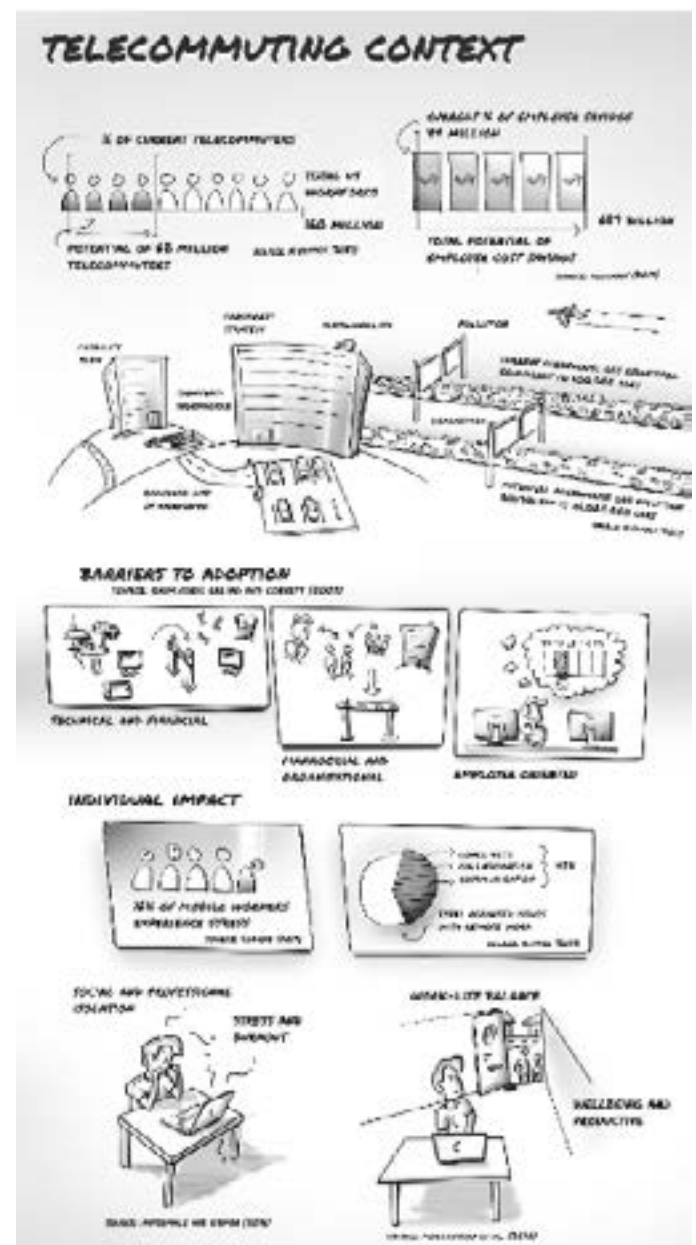


Figure 8: An overview of the context on multiple layers

For who?

Every individual is different and will respond differently to telework. How people organize their working hours depends on preferences and is of personal concern. Some prefer to work from home so they can focus. Others prefer not to work from home because they get distracted. A taxonomy of telecommuters was set up to get an overview of the different needs.

Types of teleworkers

Aguilera et al. (2016) presented three categories of teleworkers: Home-based work, nomadic (or mobile) workers and overtime teleworkers. Where the home-based worker is spending working hours at home instead of the fixed office. The nomadic worker is spending working hours beyond the home or office. This could be on trains, airport lounges and in client office for example. The overtime teleworkers are people who spend their time working from home outside normal working hours. This taxonomy is rather shallow since one person can in theory be all the three different definitions in one day.

Allen, Renne & Griffeth (2003) proposed six parameters in order to describe the decisions organizations make regarding their telework arrangements:

- Telecommuting frequency
- Telecommuting location
- Flexibility of scheduling
- Formalization of policies
- Extent and nature of performance monitoring
- Initiation of the telecommuting arrangement

This creates a comprehensible overview of how many parameters are involved on a functional level. But, it does not give an overview of how the target group actually looks like. In order to narrow down the target group the questions to answer are:

Who can work from home?

According to flexjobs (2017) 56% of the jobs are compatible with telework. These are the type of jobs that can be executed from home. It does not require any physical work on a specific location.

Who has the need to work from home?

Then, of this vast group of people, not all have the same need to work from home. This can be due to the fact that they live close to the organization or that they can not concentrate at home. People who do have a need to work from home might have to travel a long time to work, need to concentrate on a task or simply need to open the door for a handyman. People work from home for different reasons. The goal is to specify what type of needs should be addressed.

Who has the need to stay in touch with their organization while they are working from home?

Now it becomes important to understand what staying in touch means. To 'stay in touch' is described as (The Free Dictionary by Farlex, 2015): "To maintain contact with another person, especially at intervals so as to remain up to date with each other's lives".

Staying in touch is a need that is naturally satisfied inside a physical office. Walking through the hallways, getting coffee at the coffee corner and the serendipitous conversations that occur in the open office help individuals to stay in touch. These are the easiest and most natural ways to maintain contact with another person. When someone is working at home they miss a certain type of information that has impact and is relevant for their work but that does not reach them. The next questions arise: stay in touch with what? Why is specifically the organization

important? The reason for that probably lies within the relationship with colleagues, who are part of an organization. The individual in this segment has overlap with another colleague, otherwise there would be less of a need to stay in touch. This still does not provide any in-depth knowledge about what it means to the user. Other dimensions are necessary to create more insightful segmentation. Since people all respond differently to telework, a segmentation based on needs most likely provides practical results. Therefore, a design exercise has been carried out based on qualitative insights.

Extreme users

A design exercise has been used to create insight into how individuals can differ amongst each other in the same target group. The goal was to find a domain that indicates what kind of needs could emerge in the target group. It is also used as a tool to narrow down the scope. The following overview was created based on qualitative insights captured during interviews. In the following extreme scenario the users share the following context:

- They work remote 100% of the time
- They work in the same team for the same department in the same organization

This leads to the following extreme user profiles visualized below (figure 9):

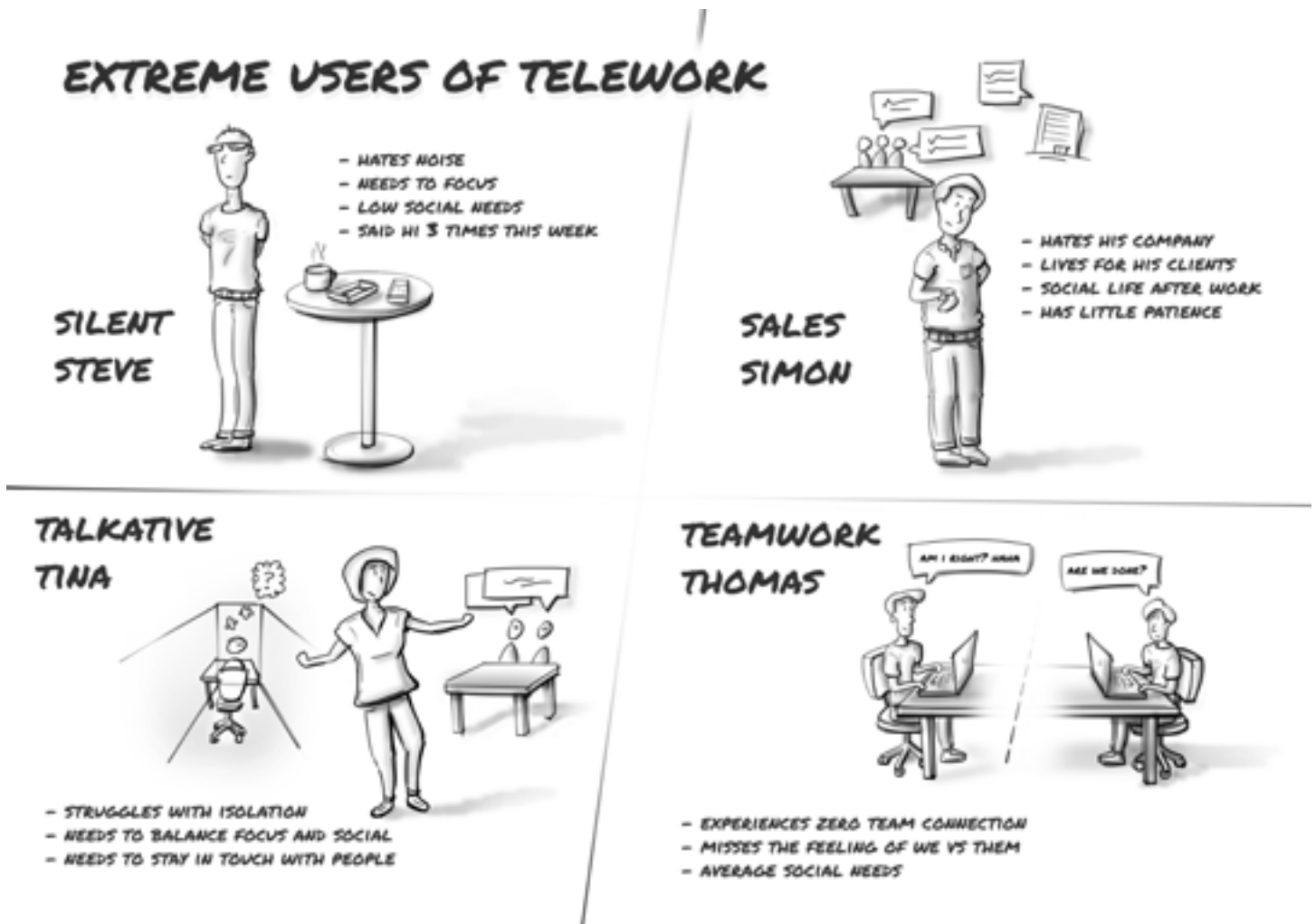


Figure 9: Extreme users exercise to better understand varying needs in the target group

Steven & Simon

The upper two profiles (Steve & Simon) have no need for a connection with the company. They do not like the company they are working for, they consider their job to be okay. They do their job because they have to and because there is not a better alternative for them at the moment. There is no need for them to connect with colleagues since they have no need for more social interaction. Steve his social needs are non existent, Simon has an active social live outside working hours. He meets up and maintains contact with his friends. On the surface, these profiles might be part of the target group since they: can work from home, have a need to work from home and have a need to stay in touch with the organization since they work in a team. However, the need to stay in touch for these profiles is merely a necessary evil rather than an actual need. Although something could be designed for them they are left out of scope. It is assumed there are other problems and needs that appeal to a larger audience.

Tina & Thomas

The bottom two profiles are more interesting. These people have a genuine need to connect and are likely to suffer the most from the issues of remote work. Where Tina struggles with balancing the need to focus on her personal task she also needs people around her. Back in the days where she was in the office she already felt lonely and isolated when her desk was placed two meters away from her colleague. She actually never wanted to work fully remote. Thomas on the other hand, made the deliberate choice to work fully remote. He is used to collaborating remotely and against all odds he finds that it is actually not that bad. Despite the bad connection, audio quality and cultural differences (he works with people all over the world) he and his team get work done. However, he finds that the team feeling is completely missing. There is no 'we versus them', all the meetings are formal and impersonal. Thomas does not have a high need for social interaction. He never joins launch drinks at the office, which is an hour away from his house. But, he does have a need for a human connection, a team spirit.

Domains

This project will focus on the bottom two user profiles. It is assumed that this is a large target group with the biggest shared problem. The two profiles represent two problems. Remote workers (Thomas profile) struggle with a missing team connection, engagement and belonging to the team or organization.

The second problem occurs to people who have to work from home more than they would like to. They (Tina profile) suffer from missing out on important information and social interaction. In other words, they feel that they are losing the connection with their organization and fear that they will become out of sight out of mind.

Gap in literature

There is a vast amount of research that covers the consequences of remote work both from a societal as well as an individual perspective. Research investigating the adoption of telework policies in organizations is extensive. In the meantime a significant share of papers are over ten years old which, in general, can be considered reasonably recent. However in the past ten years innovations in information communication technologies and other disruptive developments have impacted the ways of working which might affect the relevance of those findings. Therefore, research into understanding the current perspective of users of remote work is important. Since the seventies scholars and marketers have promoted various forms of telework and predicted it will change the world for ever. Fifty years later, still only a small percentage has come true. The identified gap is the insufficient understanding of the employee perspective towards telework and the attitude towards more telework.

CONCLUSION

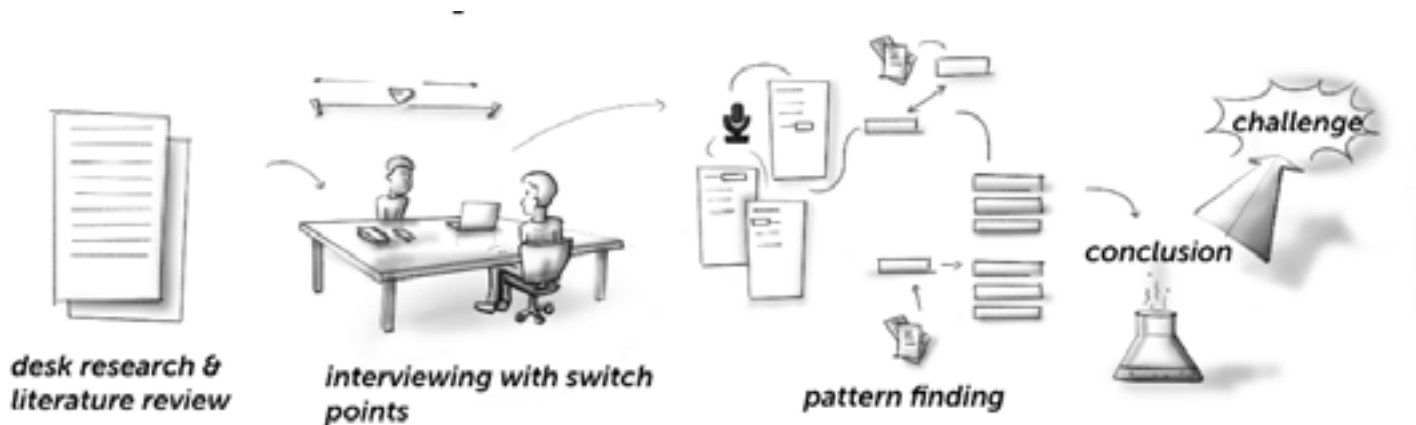
The potential benefits remote work has to offer are tremendous. But it seems that the telework experience has room for improvement. The literature overview reveals that issues such as social and professional isolation, loneliness and anxiety are related to remote work. These are threats for people that have to be taken seriously because remote work here to stay.

The identified gap was the current insufficient understanding of the employee perspective towards telework and the attitude towards more telework. This gap can be filled with qualitative research that aims to develop a deeper understanding of this phenomenon. The majority of the workforce does not work fully remote which narrows the target group. Most jobs require employees to be present at least half of the time making the part time remote worker more interesting to research.

The goal is to find out what are the phenomena that keep people from more telework. The following chapter tries to validate the findings in the literature and develop an understanding of how the telework experience is perceived.

DEFINE

This chapter analyses the results of the research phase. It covers the most important findings and its justification. The aim was to develop a better understanding of the employee perspective towards telework and more telework. The results have been processed into a pattern relation framework.



Telework research

The rationale for this study was to develop an understanding of the current perception towards the telework experience from individuals who are already experienced with this way of working. It can be assumed that the white collar workforce is going to work from home more often in the near future. That is why it is important to understand what their perception is of the current telework and their perception of more telework. Therefore this study aims to understand the current barriers and enablers for people working from home and how these factors influence each other. The type of telework that was studied was working from home since this is the most prevalent form (Buffer, 2019). Therefore the main research question is: "What are the barrier and enabler factors of telework, and more telework from a user perspective?"

Sample

The aim was to find respondents who were experienced teleworkers and teleworking on a frequent basis (every week or month). The sample was contacted through internal emails, and asked for permission to schedule a one hour interview. The respondents were working for the same department (Research & Development). All were working from home varying from two days a week to once a month. There was one interview that did not match the sample which was a fully remote contractor. This was incorporated in the sample because the respondent made numerous comparisons between the previous job (being partially on-site) and the current job (fully remote) which provided interesting insights. The demographic details can be found below in table 1.

Respondent	Frequency	Age group	Gender	Children	Commute
A1	1-2 days per week	45 - 55	M	Yes	More than an hour
A2	1-2 days per week	45 - 55	M	Yes, living away from home	less than 30 minutes
A3	half a day per week	45 - 55	M	Yes	less than 15 minutes
A4	1 per month	35 - 45	M	Yes	less than 30 minutes
A5	1 per week	35 - 45	M	No	less than 30 minutes
A6	1 per week	55 - 65	M	Yes, living away from home	less than 30 minutes
A7	1 per month	35 - 45	F	Yes	less than 15 minutes
A8	2 days per week	35 - 45	M	Yes	more than an hour
B1	Full time	35 - 45	M	Yes	N A

Table 1: Demographic details of interview sample

Method

A grounded theory approach was used using semi-structured interviews. The semi structured interview guide (Appendix 2.1: Interview guide remote work) had two sections and was conducted in Dutch. The first section was to discuss how a normal day for the respondent looked like. What kind of work was carried out at the office and how the respondent was interacting with colleagues. The next section was to discuss how a normal day looks like when the respondent is working from home. The first interviews followed the guide in a structural way. Later in the process the interview guide was of less use. The conversations flowed naturally back and forth between working from home and from the office.

Switch points

Extra attention was paid to switch points, boundaries and comparisons of the respondents regarding their telework experience:

- "I started working from home two years ago" (switch point)
- "I would not want to work more than two days from home" (boundary)
- "I know that if I am working from home, I don't have any meetings that day" (comparison)

Enablers & barriers

Next, it is important to define what can be seen as an enabler and a barrier factor. In the used definition, a factor is considered an enabler when it results in more telework and/or a better experience. The used definition of a barrier factor is the exact opposite of an enabler. This means that a barrier factor will cause less telework and/or a worse experience. The factors are used to create a more black and white overview of how the respondents perceived telework and more telework



Coding procedure

A visual overview of the qualitative research process has been created to help better explain the taken steps (figure 10).

The interviews were conducted in person except B1 since this respondent was working fully remote. The interviews were recorded (1) with the consent of the participants in a silent, small meeting room without the interruption of colleagues. The average interview lasted a full hour. Transcription (2) occurred in between and after the interviews. When transcription was finished the first four transcripts were coded on paper by hand and transferred into a digital spreadsheet that was used as the codebook (step 3.1 to 4). The quotes of interest and their codes from the first four interviews were collected in the codebook accompanied by memos every now and then. During this process it seemed quicker and more environmentally friendly to code the transcripts digitally (step 3.2 - 4). The quotes of interest were placed in the codebook

and given a code which yielded a significant list of quotes and codes. After coding the digital transcripts the coded quotes were grouped together as much as seemed logical with the codes that were already present. When at some point the codes could not be placed into a group, the coding of the next transcription followed. During this phase the first categories started to appear. This means that step 3 to 6 happened simultaneously at one point. Step 6 to 7 were carried out in another document where all the noteworthy categories (groups of codes) and themes were collected, grouped and reordered. These are presented the following paragraph. The final step consisted of describing, linking and structuring the categories and themes in the pattern relation overview (figure 11).

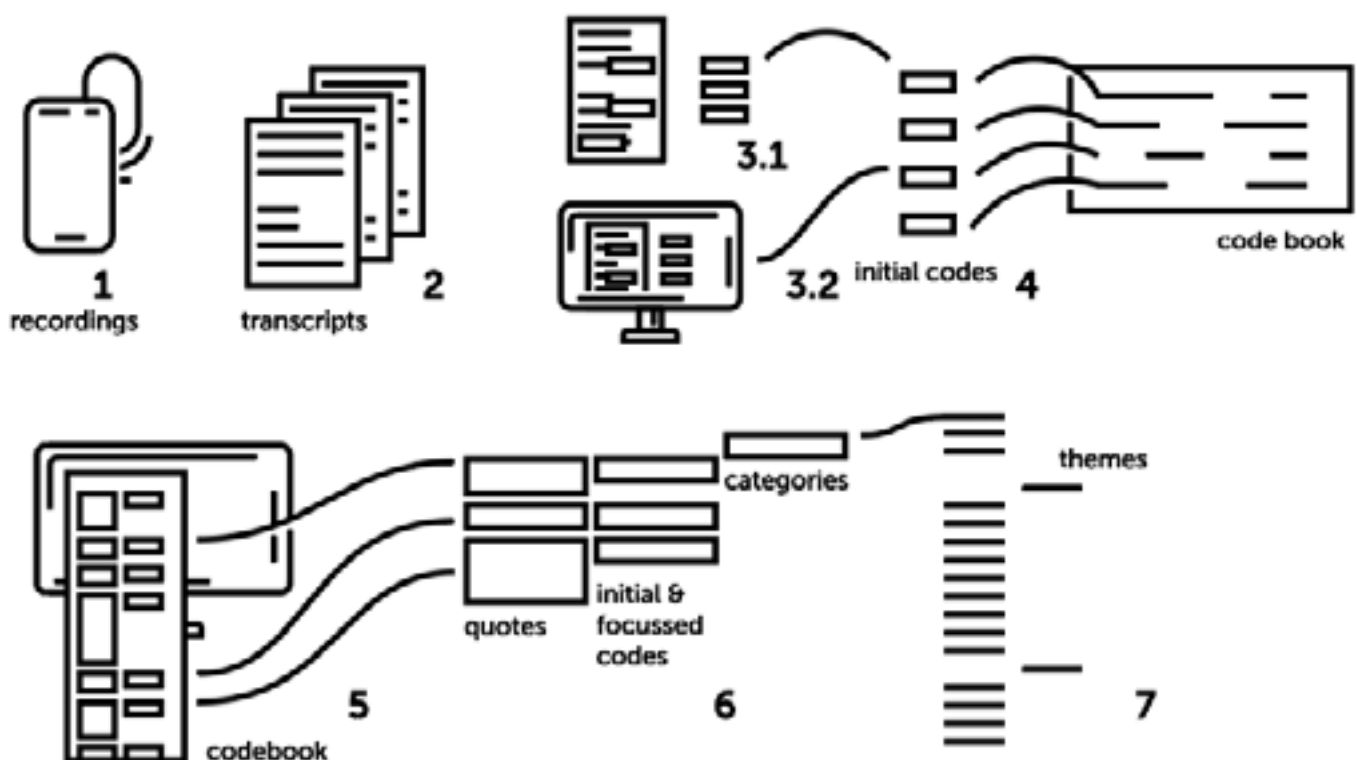


Figure 10: procedure overview

Results

The categories and themes that were derived from the qualitative data are presented below. They emerged during the coding procedure.

Working from home

Freedom
Distraction
Trust
Organizational attitude
Concentration
Efficiency
Children
Commuting
Overwork
Work-life balance

Working at the office

Distraction
Physical presence for meetings

Remote meetings

Technical issues
Disengagement

Interacting with colleagues

Human connection
Face to face communication
Relation
Approachability
Physical presence for colleagues

Influence of distance

Hallway information
Losing connection
Problems stay invisible
Expected consequences
Presence vs. absence

Telework research findings

The main research question was to develop an understanding of the barriers and enablers of the telework experience. The overarching themes were: working from home, working from the office, remote meetings, interactions with colleagues and influence of distance. In this chapter only the barrier themes 'interactions with colleagues' and 'influence of distance' are discussed in depth since these themes seemed to be the biggest barriers to the telework experience. The rest of the themes are described in Appendix 2.2.

The influence relation overview was created in order to provide insight into how the enablers and barriers relate to each other (figure 11):

The overview is meant to be used in the following way. Every theme or category above the dotted line represents a factor that enables people to telework. Whether that is to spend more hours teleworking or that it improves the actual experience. Every theme or category below the dotted line is a factor that provides a barrier to telework. The arrows indicate the direction of influence (cause effect relationship) which gives insight into how factors relate and depend on each other.

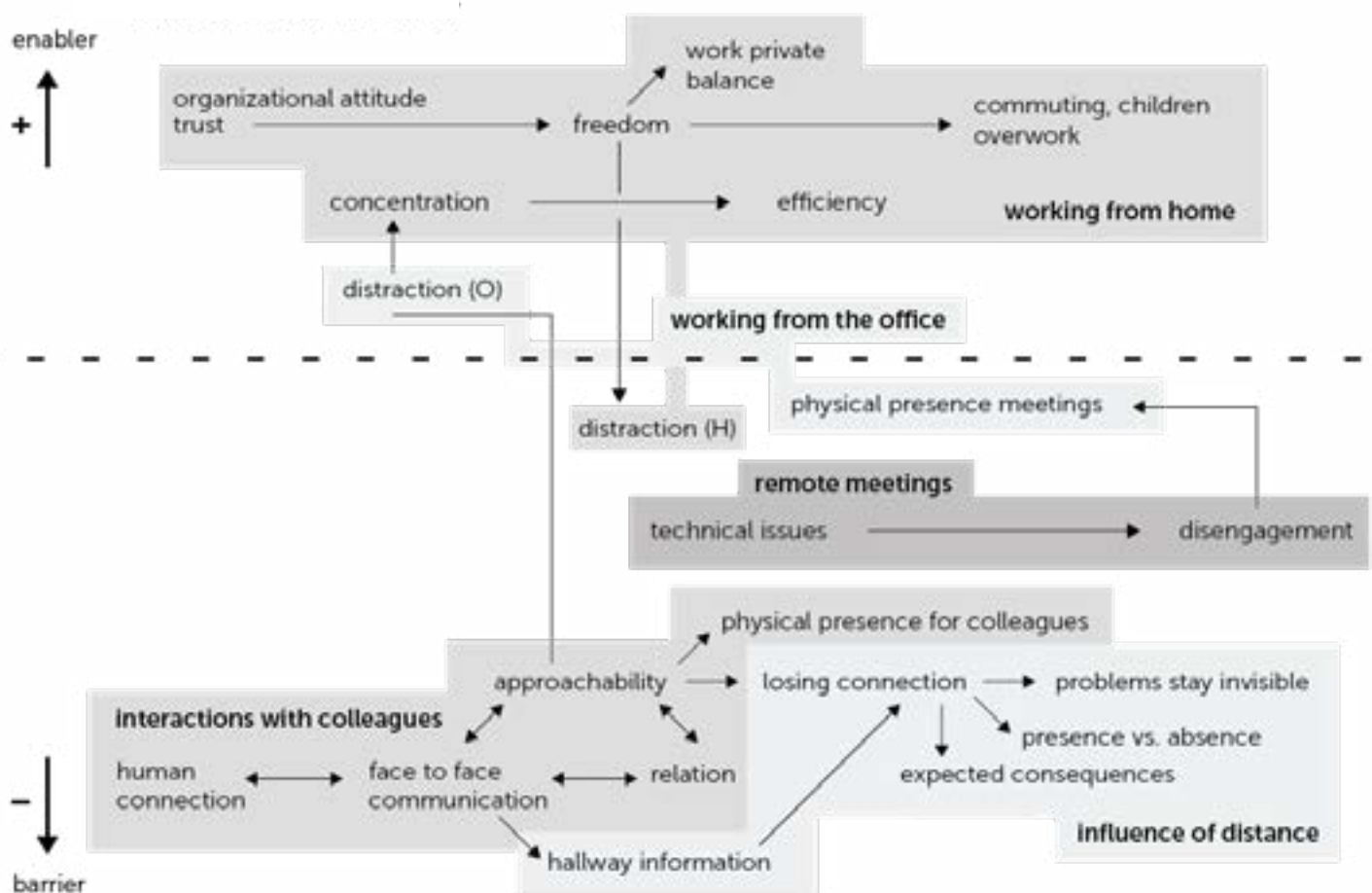


Figure 11: Pattern relation overview

Interacting with colleagues

This theme reflects on the interaction individuals experience with their colleagues, both when working remote and working from the office.

Relation

The relation with colleagues logically differs per organisation, type of job and type of person. Some jobs require lots of interaction with other people while others hardly require any. The relations with other colleagues was mostly functional and pragmatic. Respondents did not engage in strong personal bonds at work. In every organisation people need to work together which involves communication and collaboration. Maintaining a good relationship with colleagues might help with communication and collaboration in some cases "It [informal contact] strengthens the bond with colleagues. But I can't judge whether it changes the work relation. It might influence who you approach when you need help with something" (interview A4). The quality of the relationship between colleagues does not seem to have a major influence as a barrier or enabler of telework. It does however have influence on approachability which is one of the next categories.

Face to face communication

This type of communication is the most effortless. It takes the lowest amount of effort. One can simply walk to the person they need to talk to and ask a question. "It's also easier if you need colleagues. It's more convenient to approach someone here than via Skype" (interview A4).

Face to face communication helps with improving the relationship, in some cases actually acting as an enabler to telework. If there is a good relation it becomes easier to communicate and collaborate remotely. "It is the same with suppliers. We are constantly in touch with suppliers. We try to visit suppliers with procurement. Once you've had face to

face contact, they have started to get to know you a bit more, the communication becomes a lot better for sure" (interview A1).

Face to face communication is important. Employees take regular flights to see each other in person: "[on why a party from Germany came over] Well to investigate a couple of problems a bit more accurately. Or to have a more intensive way of collaboration with the people here" (interview A4). Because without face to face communication problems might occur: "I don't know what causes that. My experience is that if you meet with people regularly and it's over the phone, you might get a 'we versus them' mentality. And I have that impression, well not that extreme, but that there is a tension that starts growing. I catch myself on that. And after you sat down together it goes back to normal again" (interview A5).

The need for face to face communication is a direct barrier to telework. Currently it is impossible to create such an interaction environment "there is nothing better than sitting together" (interview A1).

Human connection

The importance of face to face communication seems to be caused by the real human connection it provides which is impossible to establish through mediated tools. "And this is also connecting... [points to skype for business chat] but it misses something" (interview A1).

Some respondents indicated a need to connect with one another. In real life this is caused by the natural non verbal communication that stimulates engagement. "It's about the connection, it's about communicating. It's not always that when someone isn't talking their not saying anything" (interview A1). This need for a human connection is a barrier to telework since it is currently almost impossible to

create a mediated connection that is on the same level as in real life.

Approachability

This is phenomena appears to be more important than previously assumed. In this thesis the approachability is the level of how approachable someone is. The approachability can be managed in various ways. Respondents frequently referred to the approachability in the office and when teleworking. The biggest subcategories were approachability status, control and remote availability.

Communication of approachability in the office occurs naturally: "You decide, I'm taking a short break, I'm getting a cup of coffee. And on that moment you can encounter other people. You run into people that are also walking through the hallway but you do not get disturbed when you don't want to [in the case of working in a silent room]" (interview A5). A closed or open door, wearing headphones, walking through the hallway or physically being present in a meeting naturally communicates the approachability of someone. When teleworking this becomes a different story. Some respondents relied a bit more on the digital tools that allow for such communication. "And by the way, I'm in a meeting and everyone in the company, Norway, China, can see that. He's probably not available for a chat" (interview A1). Or in another way "When you frequently work from home you need to cultivate that. An email, or a chat. Or a call sometimes, so that they know you are available" (interview A2).

The category control refers to how the degree of control over approachability differs when working from home. "I'm in control.. I never do that 'do not disturb'. Because even if someone says 'Hey have you got five minutes for me?' I just ignore it he. I don't even answer. And then that person realizes 'ah he went to the bathroom or something'" (interview A1).

Remote availability explains how it can be more difficult and annoying to approach someone who is working from home.

"That's a mindset, I don't see him so he's not there. No he is there but you don't see him" (interview A2). "We had that with someone [who was leading a project and working from home half of the time] and if you need someone and he's not there that's annoying" (interview A6).

This means that the approachability becomes a barrier to telework since it requires more effort to communicate and be aware of each others approachability status.

Physical presence for colleagues

Respondents also indicated a willingness to physically be present for their colleagues.

"I'm able to work from home two days a week. I can do that, but with regard to my colleagues I won't" (interview A6). Reasons for that could be to stay in touch "[On how to stay in touch with colleagues] being present; 'good morning', having a chat. With this [Skype chat function] you are not going to start a conversation" (interview A1). Or to be approachable for spontaneous ideas "You need that interaction between people, sometimes ideas can grow out of that. Someone says something in the hallway, you give it a second thought and then the second time you bring it up again. And then someone else picks it up. You don't have that when you are working from home because you don't encounter anyone" (interview A5). This behaviour is a barrier to telework because of the need to stay in touch with colleagues who are present at the office. It is also linked to approachability since being present at the office makes one easier to approach via face to face communication.

This barrier can turn quickly into an enabler. When colleagues are not present, there is no reason to go to the office causing more people to telework. This phenomenon is already visible in the vacation period. "Then

[if the whole team would work from home two days from per week] there would be no reason to come here [the office] because they're not here anyway [the colleagues]. Then I would probably do the same" (interview A6).

Influence of distance

The influence of distance is a rather intangible concept. Distance can refer to the distance between desks and floors but also between the house and office, regional offices, countries and time zones.

Hallway information

This is a major barriers to telework and a primary reason for people to come to the office. There are two interesting subcategories: the information threshold and staying in touch. There is an amount of valuable information that flows through the hallways, coffee corners and the department floor (see previous category physical presence for colleagues). This is a type of information that is communicated face to face and in some cases does not even reach the other side of the department floor. This is the information threshold. "So two days after the meeting you encounter each other in the hallway, you discuss the things from the previous meeting and on that moment the people that are sitting here [the office] know that, the others hear about that a week later" (interview A5). This information threshold becomes even greater when someone is working remote. "Colleagues, meetings, informal contacts, technical information that does not reach you when you are not present" (interview A2). The remote party misses out on this type of information.

The fear of missing out on this type of information is a barrier to telework. The subcategory staying in touch is strongly related to the information threshold. Employees have a need to stay in touch

with the organisation and they do that through spreading and receiving this type of information. "You can't do that much. You can't push your designs. You never have the latest state of affairs. That I didn't.. I didn't think that was amazing" (interview A6). Teleworkers can not overcome this threshold and will not have access to this type of information. "Every week you receive a meeting report, but it differs just a couple of lines from the previous. And if you were there you know that. But you are not going to read that whole report, in search of the differences" (interview A6). So not receiving the hallway information is a direct barrier to telework that is caused by the information threshold.

Losing the connection

This category might seem similar to staying in touch but this category reflects the influence of distance on the connection with the organization. Respondents referred to losing the connection through absence. "The things that I'm working on, where do they fit in? Currently I'm kind of working in the air. I don't think I will be able to recognize the software we developed for some of the products if they were in front of me. I can look for them but I don't have a connection with it" (interview B1).

The overall goal of the connection is so that respondents are aware of 'what is going on in the company'. This need to know what is going on is satisfied through maintaining a connection with the organization by being physically present. "There is a lot of interaction between each and everyone. "When you're at home you miss a part of what is going on in the organization" (interview A7). The need to maintain a connection with the organization is a direct barrier to telework since the current digital infrastructure is not able to facilitate that.

Problems stay invisible

The information threshold also results in the deterioration of problem communication. Instead people wait with communicating these issues until the remote individual is present at the office again, or until the next meeting: "I've had that on a few occasions, where someone came to me saying 'I had a problem but you weren't there'. No, I was there I just wasn't here [the office]" (interview A2). It seems to be more difficult to determine if the other side experiences issues. It also takes more effort to communicate issues remotely: "What happens way to often, that I would like to solve, is that people wait until the daily with communicating their problems to the team" (interview B1). This is an issue since problems will surface later, which makes the situation worse. "I only get to know something about your situation when you come and say it to me. But that causes sometimes that problems surface later than expected" (interview B1). This is a direct barrier of telework since this is accompanied with a certain mindset and behaviour that hinders the communication of problems.

Expected consequences

Expectations can influence people and act as a barrier or enabler. In this case, respondents were asked to reflect how they would perceive more telework: "If it would be just one week, I wouldn't be too bad I think. I don't think we would suddenly have a more distant relationship. If it were for like.. two months. That starts to become a long time. Then it will just only be about the work" (interview A4). Respondents indicated in some cases it would in theory be possible to telework for longer periods of time, but were reluctant to do so. "I wouldn't mind doing that three days per week [working from home]. But I'm afraid of the connection. I don't know if I will feel part of the same organization" (interview A5). They were afraid they would lose connection with the organization and grow out of the project due to the physical absence. "14 days would be long. It would.. you would grow out of the project

so to speak" (interview A3). The expected consequences for longer periods of telework are a direct barrier.

Presence vs. absence

Respondents referred to maintaining a good balance between being present and absent. "If I would work from home for a month than that [relation with colleagues] would probably change. Because there is less activity and interaction. I think you should balance that a bit. A month? Then that would be out of balance" (interview A2). The balance in the interview sample was between concentrating at home and being present at the office to collaborate and stay in touch. "It should be a balance, would I work more days from home? Why not? The question is, it needs to be doable. Because if you have to communicate a lot, you should also stay in touch with the organization, the people" (interview A2). People have a need to stay in touch with their organization. Balancing that is a way of satisfying both those needs, but also other needs that are satisfied through telework.

Practical implications

The following propositions could be derived from the overview:

- The two key enabling factors to telework are trust and an organizational attitude
- Trust & organizational attitude provides the freedom necessary for the teleworker to experience the benefits of telework
- Technical issues of remote meetings cause people to disengage
- Technical issues are audio quality, network connection and the limitations of the tools
- People disengage because of the effort it takes to meet remotely, not being on the same level and not knowing who said what.
- Making a human connection occurs through face to face communication
- Face to face communication creates a different relation among colleagues than a mediated interaction
- Receiving hallway information and being approachable are key factors to not losing the connection with the organization and are the greatest barriers of telework.

Limitations

Since these are qualitative results they are not statistically significant should therefore be verified. The sample already has experience with telework which means they are biased but provide an experienced perspective making them more representative than people who have no telework experience. Another bias is that the respondents all had a technological background and worked for a technological company. People that have a social studies background for instance are likely to provide a different perspective to the telework experience.

Discussion

There was a clear need to stay in touch with the organization which was the reason why respondents did not want to telework more, even if they could and would have liked to. What did resonate with the finding in the literature review was that some respondents (one literally quoting) were afraid to become out of 'sight out of mind'. The way respondents stayed in touch and did not lose the connection was to manage their presence vs. absence. By being present, they received crucial hallway information via face to face communication that they otherwise would not have received. By being approachable the respondents were able to receive the hallway information that was necessary for them to maintain a connection with the organization.

The phenomenon approachability is an interesting one. How people manage their approachability in the office and remotely "has not been described to a full extend" Hafermalz (personal communication, 1 november 2019) explains during a video call.

CONCLUSION

Besides identifying practical implications it appeared that fully remote workers suffer more from the known issues with telework than the sample (primarily part time teleworkers). The identified enablers and barriers could be used to improve the current and future telework experience and help understanding the sometimes paradoxical nature of telework. Barriers as approachability and losing the connection will be key in improving the telework experience.

Pivot

This was a crucial point in the project where a target group pivot occurred. Therefore the midterm challenge is compared with the adjusted challenge.

Initial challenge

Both organizations and individual employees benefit from a good connection. Establishing this connection in the office occurs naturally. This connection is established through face to face communication and is maintained through the hallway information that flows between the walls of the organization. When employees are separated from the office they start losing a connection with the organization. Not only do they miss important information which results in problems showing up later, they also start losing the connection with the organization or team. This leaves them feeling left out of scope and 'out of sight out of mind'.

Initial assignment

To develop a user centered remote work manifesto for the Meeting Room experience division (MX) within Barco. This manifesto has captured user values that should empower the team (from segment marketers to product owners) to improve the current and future of remote work with a time span of five years. The manifesto will be aligned with the roadmap MX has set out. This manifesto will be grounded in qualitative research and empirical findings gathered through prototyping with users. The manifesto will be accompanied by one product service concept that could be integrated as a feature for future meeting room solutions of Barco.

The identified challenges were:

- How can a remote party (either a group or individual) can stay in touch with their organization or remote team
- How to engage a remote party (either a group or individual) from the central location, stimulating their sense of belonging to the organization

Initial solution

The approach to overcome these challenge will be through testing one or two prototypes with users from the target group, observing and measuring the impact to add to the manifesto. Such a prototype should be designed with an aim to help distribute the hallway information to the remote party. This should be done through improving the approachability which should enable informal conversations.

Target group pivot

It turned out that the individual remote worker is impossible to address with the current Barco product portfolio and strategy. Therefore, the initial target group of telecommuters is left out of scope. Instead of targeting the individual user, the identified challenge has been applied to another market.

The target group of the MX are fortune 1000 companies and organizations with ten or more meeting rooms. The usual buying party is the IT department or facility management. In order to fit the strategy all following steps and decisions were made to address this target group. Since the case company has over ten meeting rooms, the employees can be seen as internal end users.

Adjusted solution

The approach to overcome these challenges will be to test one or two prototypes with users from the target group, observing and validating its value proposition. Such a prototype (tryout) should be designed with an aim to help improve the approachability of remote parties. In parallel, a set of human principles should be set up that act as a guide with developing solutions for a more human digital workplace (figure 12).

Towards a more human digital workplace

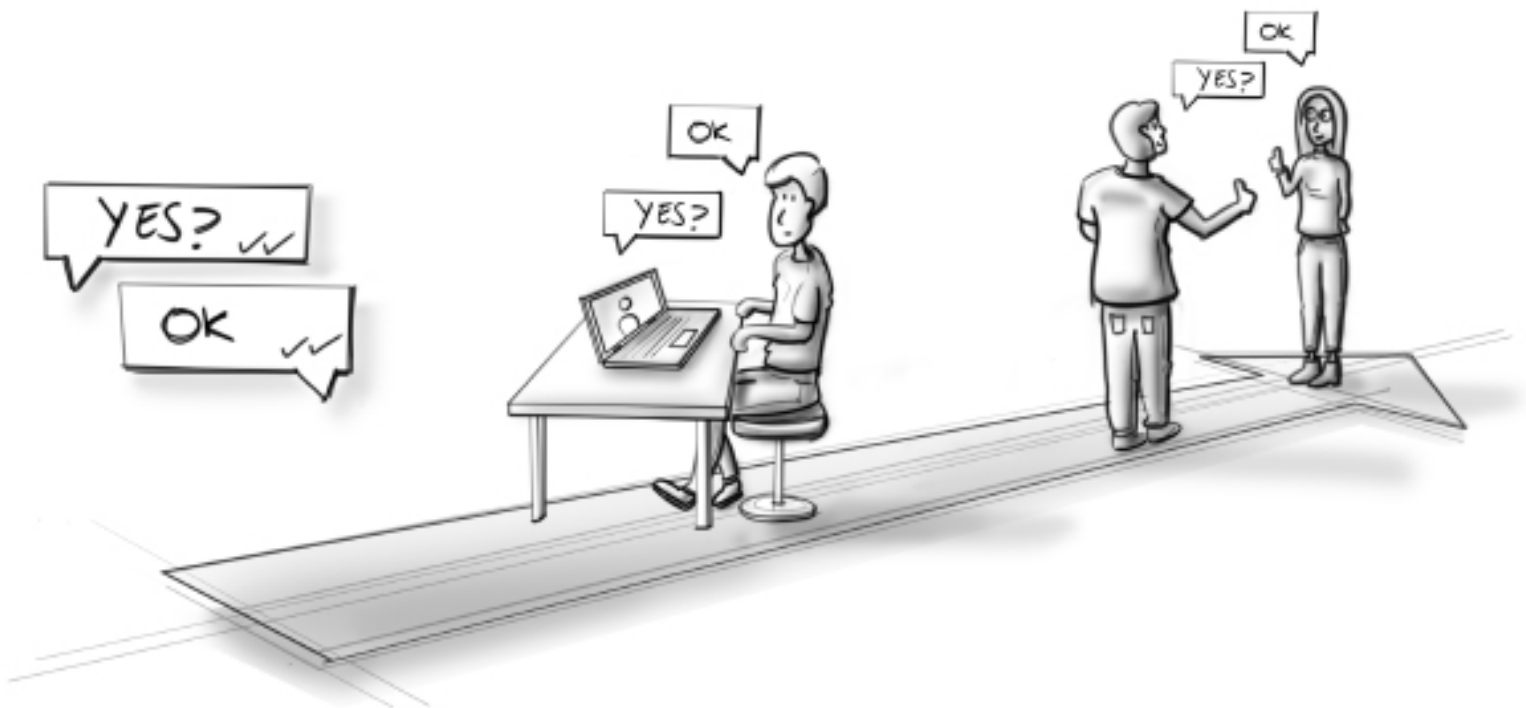


Figure 12: Overarching vision of the thesis

CONCLUSION

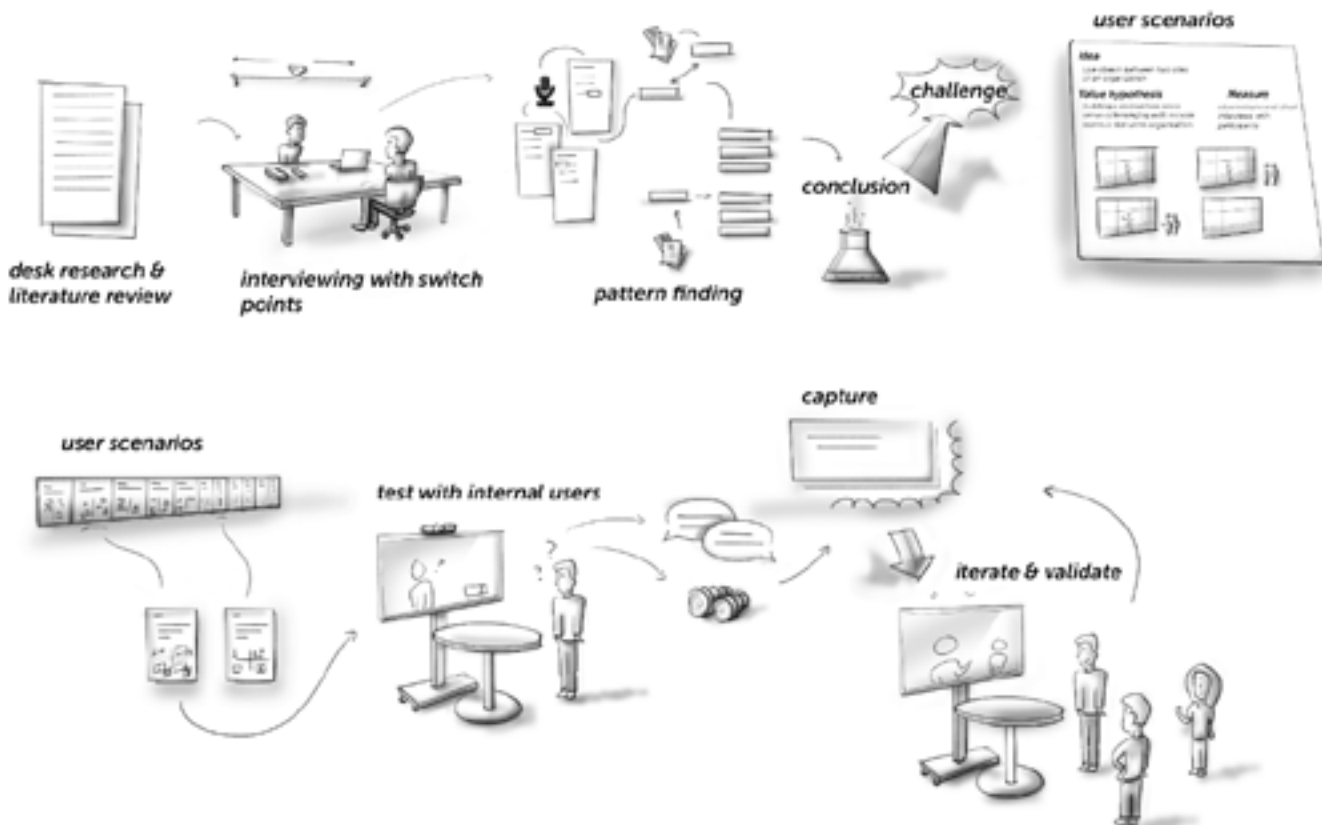
The identified enablers and barriers could be used to improve the current and future telework experience. Based on the findings it seemed that barriers as approachability and losing the connection will be key in improving the telework experience.

The findings of this telework research were based on the individual remote worker. This is not an interesting target group for the case company since it only serves the B2B market. Therefore a target group pivot was necessary to make the solution space more attractive for the case company. The approach was to apply the learnings from the telework research to a B2B context. The aim was to develop solutions, in the form of tryouts, that decrease those barriers.

DEVELOP

In this chapter the process of developing a solution for a more human digital workplace is described. It reasons why the Hotline tryout was the most interesting to deliver as a concept. The process has been important also, since it is a novel way of conducting user research in the fuzzy front end within the case company. For examples of the other tryouts see appendix 3.1: Tryouts.

A tool has been developed to help design for a more human digital workplace. This is a canvas called 'Design for Human Values' and should guide towards more meaningful solutions. It also has as a checklist to reflect on the potential consequences of an idea. This canvas is accompanied with an explanation and examples of use and can be found in appendix 4: Design for Human Values.



Tryouts

A tryout in this project is considered to be a design intervention that tries to frame assumed user value. This assumed value can emerge from research, conversations with potential users or other insights. Ideas of potential solutions were captured in tryout scenarios. This is a template (figure 13) that helps capture and structure ideas.

These tryout scenarios were used in the ideation phase, numerous templates were filled out, a sample is presented in figure 14. During the project these tryout scenarios were used to communicate ideas with various employees. This could be seen as an initial screening for value. In this project the employees were seen as internal end users. The assumption is that testing tryouts with employees provided reliable data. However, there is a bias that needs to be acknowledged. The employees of the case company are predominantly male with an engineering or IT background. There is a chance that other profiles (i.e. backgrounds in economics, sociology or biology) will respond differently to the same tryout.

Title
Idea
Value hypothesis
Measure

Figure 13: Tryout scenario template

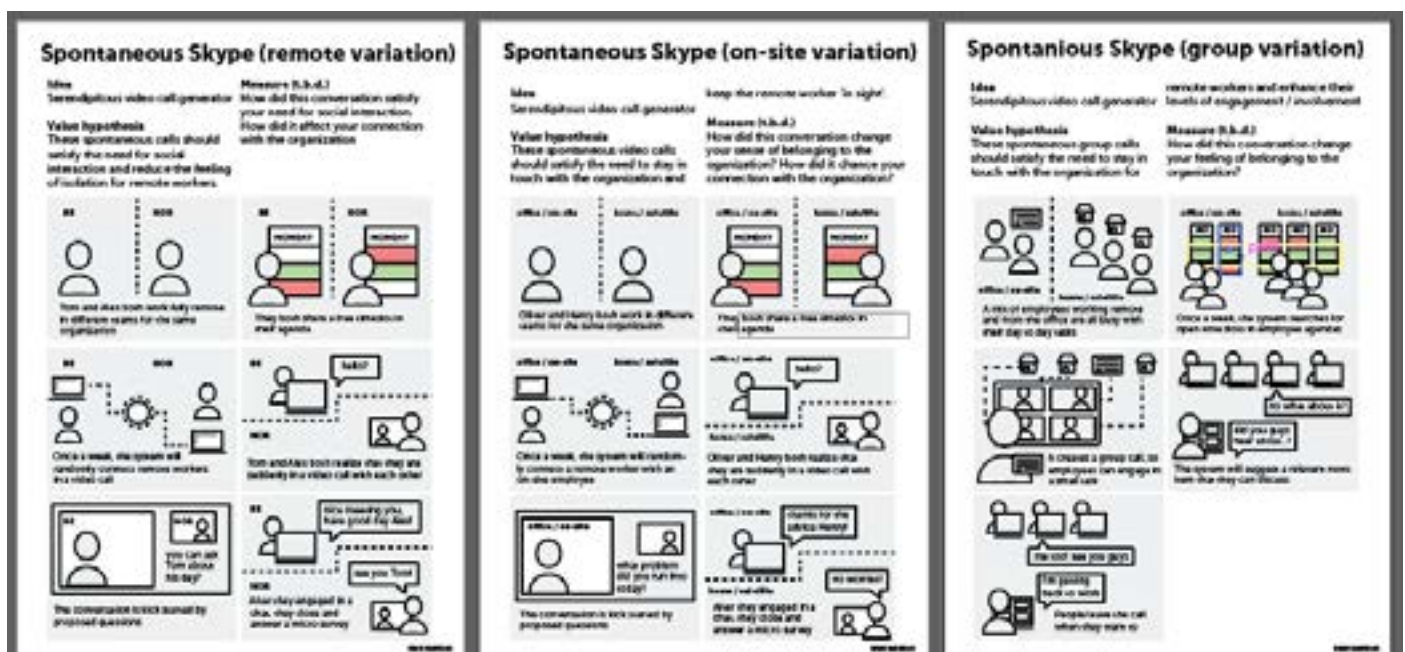


Figure 14: Examples of tryout scenarios

Tryout: window into another location

One of these tryout scenarios called 'Window into another location' emerged a couple of times. The quotes below lead to the exploration of a tryout scenario of connecting two locations with each other by means of a live audio video stream:

"The thing where we do not yet have a solution for, is how do you stimulate interaction with fundamentally different functional groups.. the interaction with service, the interaction with sales and so on" - R&D Director Enterprise.

"We have thought about this idea but we left it out of scope, I think it shouldn't be so difficult to try this out" - Director ICT infrastructure

"What would be a great idea is if you could connect the screens of the coffee machines with each other as if it was a Skype call" - Development engineer software

The most feasible and desirable user scenario was drafted as follows (figure 15):

This tryout scenario was developed and tested within the case company. The first tryout was carried out inside the head office because the resources to test with another office were not in place yet. The internal tryout was also carried out to pilot the setup and to explore the unknown unknowns.

Window into another location

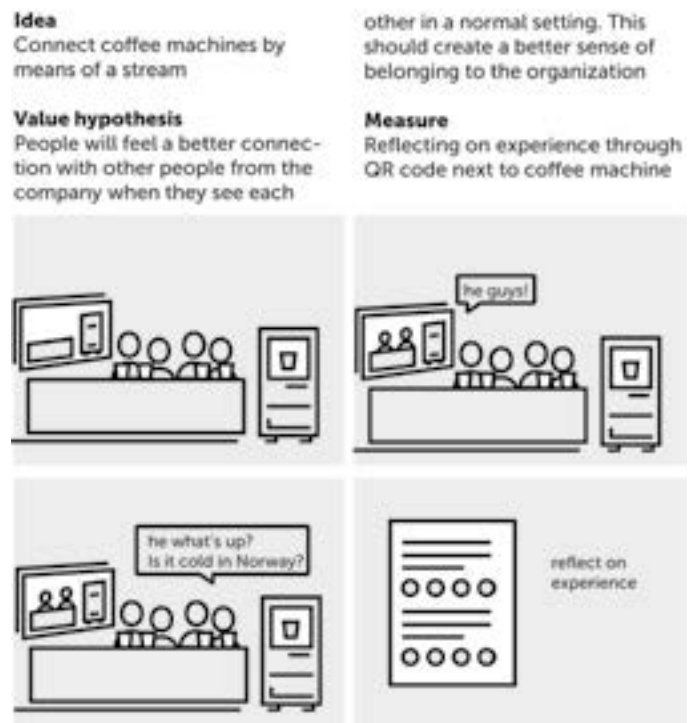


Figure 15: Tryout scenario

Internal tryout findings

The first tryout was carried out by connecting two coffee corners via an audio video call. There were two laptops that were calling into each other creating the live stream. The laptops were connected to a TV monitor with additional camera, speakers and microphones. Figure 16 and 17 show how the tryout was set up.

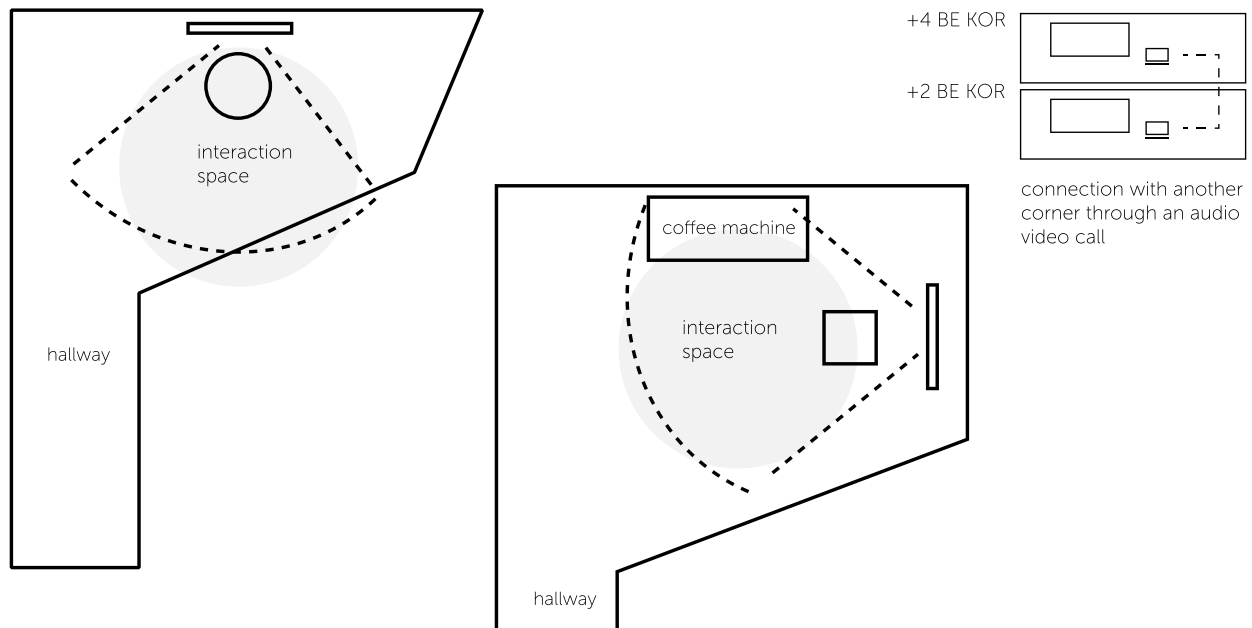


Figure 16: Schematic overview of the tryout

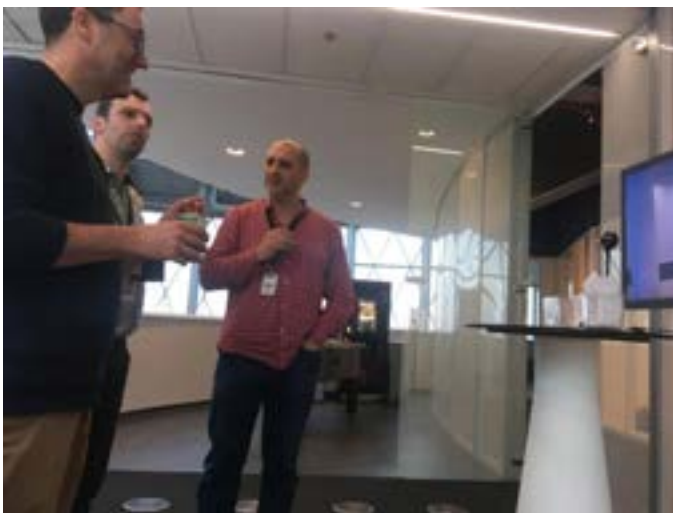


Figure 17: Users interacting with the tryout pilot

The tryout was placed in various coffee corners and ran for roughly a week. In general the employees were curious, thought the try out was fun but did not seem to see any additional value making it more some sort of a gimmick. There were also people who did not enjoy the experience because of privacy issues. The tryout in the smaller coffee corners were too intrusive and intimidating for some. There was less control and freedom for people to be on the screen or not. Some showed their disliking by 'sabotaging' the set up. In various occasion there were papers in front of the camera or the audio was disabled (figure 18).

The second location combination gave people more freedom to choose whether they wanted to interact which did result in fewer interactions. This freedom to choose whether to be on screen or not appeared to be an important (lacking) feature of the tryout.



Figure 18: Someone had sabotaged the Tryout

The third location combination worked best since there was a more constant flow of people. These areas were also more spacious giving people a bit more freedom to interact. But, concerns still remained with regard to privacy issues. This confirmed that the coffee corners were not ideal locations for a window into another location due to its perceived confidential environment. The setting for the tryout should be carefully selected and created. The findings of the initial tryout could be summarized with the following takeaways:

- People need to have the choice to interact with the portal
- The interaction space should cover the whole area (no blind spots)
- Camera and monitor should be positioned at eye height for a more natural interaction
- The portal should provide an 'always on experience' lowering the threshold to interact

Next steps

The following insights occurred which caused it to be continued internationally. Out of various conversations with participants it became clear that there was a genuine interest to set up such a connection with another office of the case company.

A lead user has been identified as well. This R&D director tried to improve communication with another Barco office by hanging up a poster of the employees working over there (figure 19).

Another reason to continue the tryout internationally was the willingness of a vice president and an R&D director of a division to host the tryout at their floor (internal communication, 2019):

"Cross-site collaboration is high on the agenda" - Vice President of the division

"Absolutely in it for the next tryouts Norway-Belgium would be a good one to start with"
- R&D director

The last reason, being a practical one, was the availability of the set up material in both locations and the secure audio video connection provided by the IT department. The tryout was carried out in the head office located in Kortrijk, Belgium and the office in Fredrikstad, Norway. The interested division closely collaborated with the office in Fredrikstad therefore making it a logical next step up the connection between these offices.



Figure 19: A lead user trying to improve communication between offices

Tryout: International digital portal

The identified need was to improve communication between offices. In this tryout the connection was between the headquarters in Belgium and an office in Norway. The previous tryouts yielded the main insight that the setting of both points was important. The takeaways were validated or evaluated. The goal was to validate whether this tryout had user value and whether it was decreasing one or more barriers that came out of the telework research.

The set up in Belgium can be seen in figure 20. This was a non bookable small meeting room. This location seemed to better fit the takeaways. There were less blind spots and people had the choice to interact with the setup because it was contained in a dedicated space.

International tryout findings

Reactions were similar to the previous tryouts. People were generally positive and curious and the amount of complaints decreased. The takeaways for the setting seemed to hold true since almost no 'sabotaging' occurred.

However, the location in Norway was not ideal because it was located in a hallway at the moment. There were not enough people walking by for the employees in Belgium to interact with. This means that both settings need to have a constant flow of people.

Conversations with participants

Another interesting insight occurred. One of the respondents in Belgium wanted to meetup with one of their colleagues in Norway. When asking their colleague to meet at the tryout, the Norwegian colleague did not know where it was located in his office: "Where in the other building is it located, I just said it's near the blue lockers but he also doesn't know where it is" - Participant. This means that in both places it needs to be clear where both portals are located.

In the meantime a minimum viable product (mvp) was built and launched. This was an attempt to validate the problem solution fit of improving cross-site communication. The findings of this mvp can be found in Appendix 3.2 Landing page mvp.



Figure 20: Set up of the tryout between Belgium and Norway

Try out iteration

In the following attempt the setup was located in a coffee corner in Norway. This location had more people passing by which provoked more interactions. The employees in Belgium quickly recognized the coffee corner and knew where the other setup was located. However, the interactions were still too few and the tryout did not seem to offer real value to the participants.

Conversations with participants

When asking a Norwegian employee his thoughts about the tryout he indicated that there might be a bit of a mismatch caused by the differences of both settings. One was in a coffee corner, the other a meeting room. This feedback caused the second iteration, which consisted of placing the TV monitor in Norway in a meeting room as well.



Figure 22: Set up of the first iteration

Hotline concept validation

The second iteration consisted of placing both TV monitors in meeting rooms (figure 23 & 24). Now both setups were in the same setting, obeying the guidelines. This caused the tryout to pivot from being a causal place to strike up a conversation to becoming a meeting room for quick questions: a Hotline. To satisfy the guideline “both points need to be known in both locations” an email was sent out to inform the employees.

There was also a fourth iteration where both monitors were placed in coffee corners, see Appendix 3.3 Coffee corner iteration.



Figure 23: Hotline set up in Norway



Figure 24: Hotline set up in Belgium

Results

Below, an overview of the reactions of participants has been gathered:

"It's a bit more loose, people walk in: 'ah how are things going'? that's great as well. There were also other people there, that wasn't a problem. I like that, you can see each other 'ah how are things over there?'" - Participant A

"I think the threshold is very low now, you only have to send a short message to each other. And if you're sitting here it's as if you are sitting face to face." - Participant A

"I think it's strange, if you're setting up a video conference and you plan that in advance, dialing in etcetera. Once the meeting started you're in the exact same situation. Video, you see each other, but still.. This feels different because it's just there. That you walk in and you're already in the environment." - Participant A

"I went upstairs, I didn't know where the meeting room was, but suddenly I hear Bert's voice in the hallway and I could simply walk into that meeting room. And that was very nice. And Bert was just talking to other people that happened to be in that meeting room" - Participant B

"For me, I didn't have to do anything I didn't have to dial in any numbers, I didn't even have to look for the meeting room, I heard it" - Participant B

"There was a whiteboard as well, I think that's also important. So that you can sketch something" - Participant B

"Its for me the first time using it, and for me it was quite valuable. You don't have to mess around 'how are we going to call? via cell phone, Teams or via Link?' You step in and you can begin, for me that's super practical". - Participant C



Figure 25: A Belgian and Norwegian colleague decided to meet at the Hotline instead of using Skype



Figure 26: An employee called his colleagues from Belgium (who were visiting the Norwegian office at the moment) to meet at the Hotline.

"Usually when you try something new it's 'ah what do we have to do' but we didn't have to do anything and it was super efficient. We could simply start the meeting. So yeah I think it's very good". - Participant C

"It was my first experience, I'll use it more often. I'll also start making a bit of promotion around it as well" - Participant C

"And here we don't have to plan anything in advance, you just walk in. It's adhoc I want to talk to someone in Norway and you can quickly start your meeting without having to call" - Participant C

"It was just to check out how it was here. Otherwise you wouldn't see them for the whole week while they are there. Now you can shortly talk about how it is there and how things are going there." - Participant D

"I think the set up was good, but in the first few minutes there were some echo issues. I think it could be the wifi or something" - Participant E

"I think I'm not required to bring my devices, I can just walk in freely come and talk here. But that person whom I want to talk to should also be there. So I have to have some sort of arrangement before I come and talk here. Otherwise I think it's quite good" - Participant E



Figure 27: A remote informal interaction, which is quite unique

Tryout findings

Not every takeaway was relevant for the Hotline iteration. Also, new takeaways emerged. This is probably caused by the different purposes the tryouts had. The first tryouts had the purpose of a 'digital portal', meant for serendipitous interactions. The hotline tryout was meant to be used as a meeting room for quick questions, which is a clear call to action. The following benefits could be derived based on the data captured during the conversations with participants:

Lower effort to meet

"I think the threshold is very low now, you only have to send a short message to each other. And if you're sitting here it's as if you are sitting face to face." - Participant A

A more natural way of meeting remotely

"For me, I didn't have to do anything I didn't have to dial in any numbers, I didn't even have to look for the meeting room, I heard it" - Participant B

More flexible way of meeting remotely

"And here we don't have to plan anything in advance, you just walk in. It's adhoc, I want to talk to someone in Norway and you can quickly start your meeting without having to call" - Participant C

Participants agreed via a chat platform to meet at the hotline. Most of the interviewed participants decided to meet at the hotline because they read the email encouraging them to do so. In the timespan of roughly a week the Hotline tryout was used on average once or twice a day. The majority of the participants were convinced about the ease of use and acknowledged that it was a more effortless way to meet colleagues from the other office.

The tryout was successful in delivering value which consisted of: a lower effort to meet, a more natural and more flexible way of remote meeting. However, more people have to start using the concept since it would be a waste

of electricity and bandwidth to maintain a constant stream for only one meeting a day. But, despite that the average use of the hotline was about once a day this number is not as low as it seems. At the time it was the end of a project which means there is less interaction within the teams. Also the pool of people that have to interact with each other was not that large either (roughly 30). Also, the tryout ran for about five working days and already more than four pair of people changed their behaviour and used it. If the tryout ran for a longer period more people would have start using it. Multiple participants were planning to tell other coworkers to use it. Considering these factors the hotline was used quite frequently for the beginning phases.

The reason why more people used this iteration could be because they understood when and how to use it. Different settings create different interactions. For the Hotline concept the following takeaways seemed to be validated.

Takeaways

- The hotlines should be located in a dedicated (meeting) room
- Both spaces need to have the same setting
- Employees in both sides need to know both locations of the hotline
- As few blind spots as possible
- Always on experience
- Non bookable
- Decent audio & video connection
- Clearly communicated & understood purpose
- Maximum of two (maybe three) individuals per location

Hotline reflection survey

A survey was sent to the employees working in the Norwegian and Belgian offices. The goal was to quantify the perceived value of the Hotline. The survey was fully completed by nine respondents. The questions and corresponding answers can be found below:

The survey can be found [here](#)

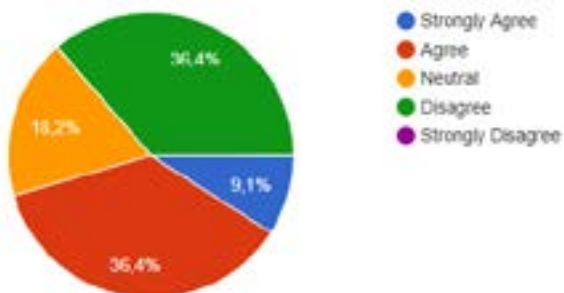
Or here <https://docs.google.com/forms/d/1wz83AHyVaFEwajLVZoEhgKWJYQrwb0XYU6pkuN2q6Z0/edit#responses>

Results

Question

I preferred the hotline over a Skype or Teams call

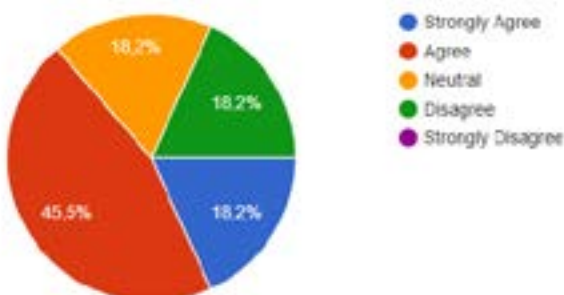
11 antwoorden



1

The hotline made it easier to communicate with the other office

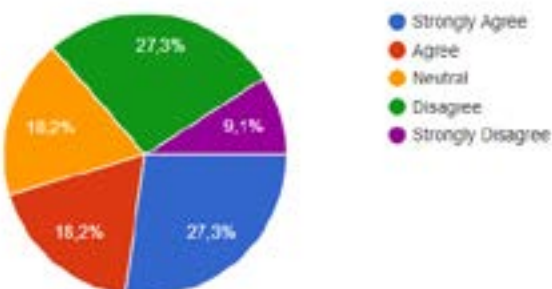
11 antwoorden



2

The hotline made my colleagues from the other office more approachable

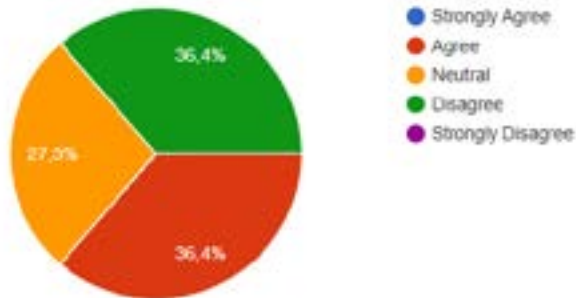
11 antwoorden



3

The hotline helped me build a better relationship with my colleagues from the other office

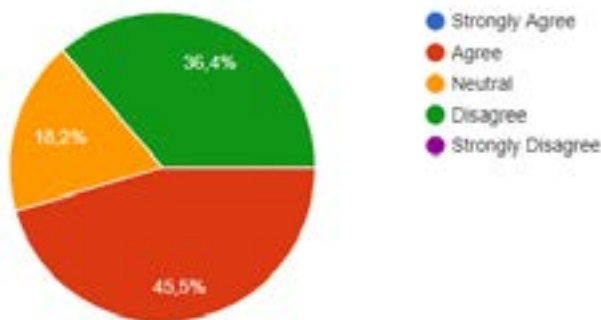
11 antwoorden



4

The hotline helped me with staying in touch with the other office

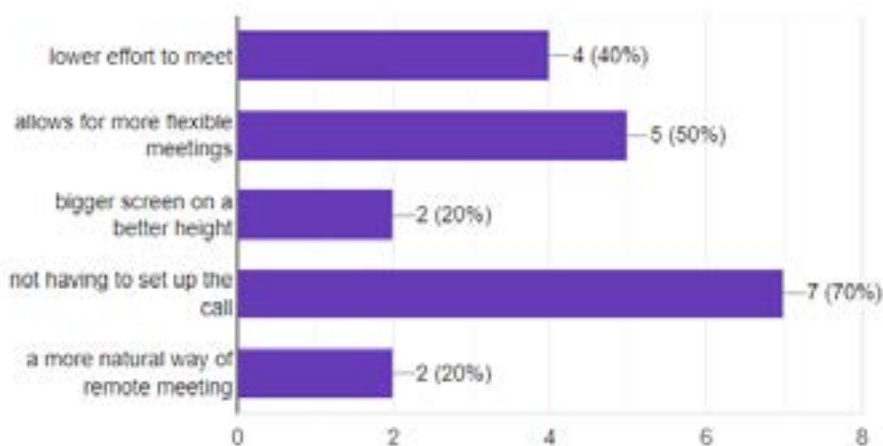
11 antwoorden



5

Which advantages of the hotline were most important to you (pick 1 or 2)

10 antwoorden

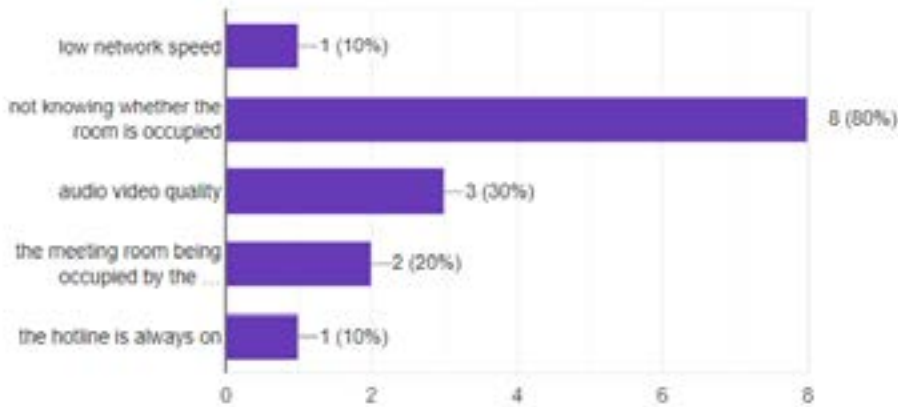


6

7

Which were the most relevant disadvantages (pick 1 or 2)

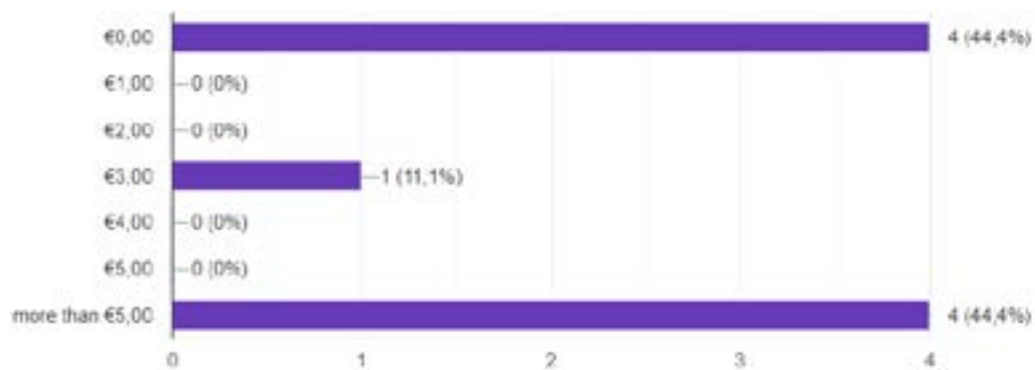
10 antwoorden



8

For such a service, I would be willing to pay each month:

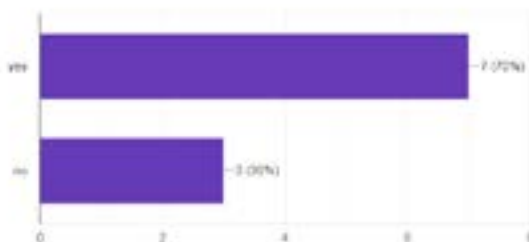
9 antwoorden



9

I would like the hotline to stay

10 antwoorden



10

Other things you would like to mention about the hotline

2 antwoorden

A/V quality in any meeting is essential and highly underrated in value. regarding the hotline specifically; perfect for 3-4 people. if 1 to 1; skype has better A/V in my (low) exp.

easy to have an 'ad hoc' one-to-one with a colleague; not usable when you need more than 2 people

Findings

There were five respondents willing to pay monthly for the Hotline service (question 8). Four of them were willing to pay more than five euros each month. The three most important benefits were (question 6):

- Not having to set up a call
- Low effort to meet
- Allows for flexible meetings

The majority of the respondents agreed that the Hotline made it easier to meet colleagues from the other office (question) and wanted it to stay (question 2).

Link with theory

Out of the telework research (Define: Telework research findings) it became clear that the approachability influences other phenomena that are major barriers of the telework experience. This makes it important to improve the approachability of colleagues in the digital workplace. The survey showed that the barrier 'approachability' was improved for 45,5% of the respondents (question 3) which is a good improvement.

The barrier 'losing the connection' in the survey formulated as 'staying in touch' (question 5) was improved for 45,5% of the respondents. This was also a significant barrier to telework (Define: Telework research findings). Staying in touch is important because it provides the people involved with important information that is mostly distributed via face to face communication and does not enter the digital workplace.

This makes the assumption more credible: When the barrier to approach someone is lower, it becomes easier to stay in touch. The approachability was most likely improved by the always on experience of the Hotline. The participants rated 'not having to set up a call' as the most important benefit.

Disadvantages

There were also a few respondents who were not in favor of the Hotline and wanted it to leave (question 9). One the meeting rooms was occupied for over a week which might have caused irritations with some employees. This is not considered to be a problem since it is impossible to design something that 100% of the population enjoys.

There were also disadvantages to the Hotline. Especially 'not knowing whether the meeting room is occupied' seemed to be the biggest problem. This shows that there are still a few guidelines left that are necessary for the experience to be flawless. This is normal since the tryout was aimed to determine the value of a live stream between two offices. If the Hotline has to be developed further these disadvantages should be taken care of.

CONCLUSION

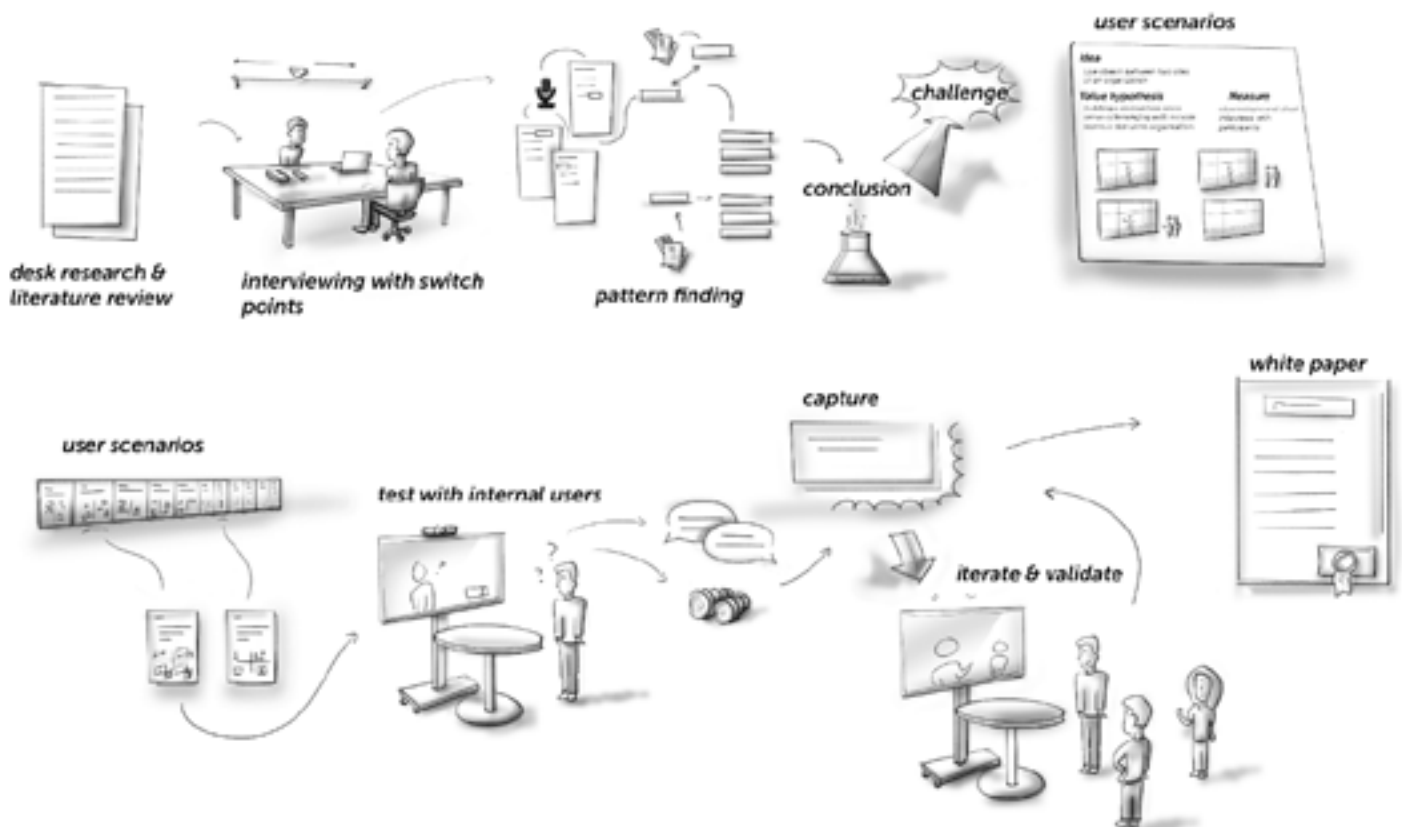
The Hotline is the most interesting concept to deliver based on the reactions of participants, research insights and available resources. The participants saw the benefit of using the Hotline over other media. The majority of the survey respondents would have liked it to stay and half of them were willing to pay for it on a monthly basis.

Secondly, the telework research indicated that improving the approachability is key in improving remote communication. Based on the survey results it was capable of doing so for almost half of the respondents. This indicates that the qualitative insights might apply to a larger group of people.

Lastly, the case company has the resources to develop such a concept since they are experts in image processing and connectivity technology. Therefore the concept is proposed in a whitepaper that case company receives as the main deliverable.

DELIVER

The decision was made to deliver the Hotline as a product service concept to the case company. Processing the learnings in a white paper seemed the most logical choice since the goal was to inform the client about the learnings. A white paper is also convenient to share with others because of the pdf format. This increases the chances of the project becoming better absorbed in the company.



THE HOTLINE

Towards a more human
digital workplace

White paper



Executive Summary

This whitepaper introduces a concept called the Hotline. It is a step towards a more human digital workplace that could be taken tomorrow. The concept serves as a means to communicate the learnings.

Why

The digital workplace is new and here to stay. This brings along pain points but also opportunities. Miscommunications cost companies a fortune and are preventable. Better digital communication is valuable for people, can greatly save costs and reduce environmental impact.

What

Cross-site collaboration is a challenge for larger organizations. The digital workplace does not provide a solution for ad hoc and flexible meetings. Setting up a call, especially with more than two people takes effort which increases the chances of miscommunications. The Hotline is an innovation that lowers the effort to meet for cross-site teams.

How

A Hotline is a live audio video stream that connects two huddle rooms together. Each huddle room has a video wall equipped with a camera, microphone and speakers. The Hotline provides an "always-on experience". It automatically activates when there is movement which means employees can simply walk into the room to start their meeting, just as in the real world.

\$62.4_{million}

annual cost of miscommunications for companies with 100.000 employees (SHRM, 2019)

44%

of respondents were willing to pay more than €5,00 per month for the Hotline (Hotline reflection survey)

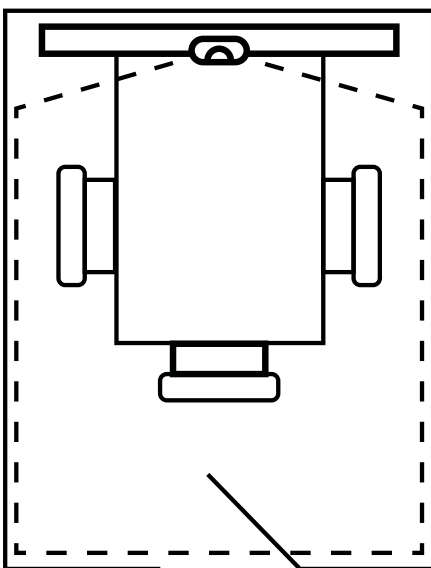


What is a Hotline?

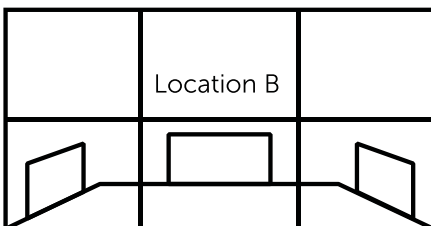
A Hotline is a live audio video stream that connects two separate huddle rooms together. Both locations are continually streaming to each other which creates a 'window into another location'. The screen of Location A streams the room of Location B and vice versa (figure 1). The product itself consists of a video wall with integrated microphone, camera and speakers.

The stream is established via a secure connection using an app which requires only one party to set up the stream. This stream provides an 'always on experience'. This means that the stream automatically goes on when there is movement in or near the room. To save electricity and bandwidth, the stream goes into sleep mode when there is inactivity.

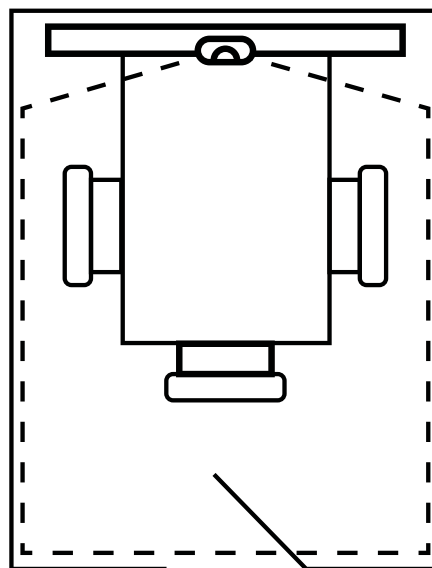
Location A



Screen A



Location B



Screen B

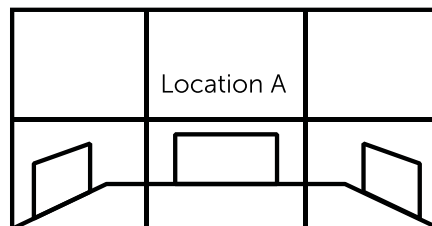


Figure 1: schematic overview of a Hotline

Hotline User Scenario

A Hotline can be used for various types of meetings between two or more colleagues working in separate offices. The meetings can either be scheduled or spontaneous.

The following scenario describes the most common use (Develop: Hotline concept validation). Here, the Hotline connects two offices of the same company in different countries.

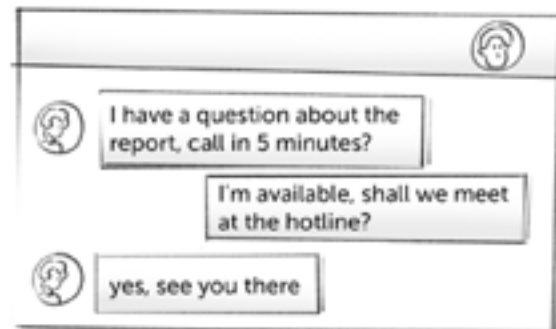
1

Peter



Björn

Peter and Björn are working together on the same project. Peter works in the Belgian office, Björn in the Norwegian office.

2

Peter asks his Norwegian colleague, who knows a lot about the report, if he is available for a quick question.

3

They decided to meet at the Hotline. Both colleagues walk to the hotline in their office.

4

Björn is first to arrive, activating the stream by opening the door.

Hotline User Scenario

5



Peter joins two minutes later and sees Björn is already there. They can start the meeting right away.

6



They quickly resolve the issues which saved time and unnecessary emails.

During the tryout out it turned out that the setting of the Hotline was important. The following guidelines could be derived (Develop: Hotline concept validation):

- The Hotlines should be located in a dedicated (meeting) room
- Both spaces need to have the same setting
- Employees in both offices need to know both locations of the Hotline
- As few blind spots as possible
- Always on experience
- Hotline should be non bookable
- Decent audio & video connection
- Communication of purpose to employees
- Maximum of two (maybe three) individuals per location

The most common use of the Hotline is to quickly meet a colleague from another office.

User Quotes

"It was my first experience, but I'll use it more often. I'll also make a bit of promotion around it"

"Works great, and no need for booking? I hope this will be kept!"

"I think the threshold is very low now, you only have to send a short message to each other. And if you're sitting here it's as if you are sitting face to face."



Why a Hotline?

Strategic Rationale

The workplace is changing fast in various ways. A new generation is joining the workforce bringing along different values and influencing the ways of working. The workplace has also changed with the rise of the digital workplace. The digital workplace is set up by various technologies which are developing fast. But at the end of the day humans have to use this space and they determine which innovation gets to stay.

Digital workplace

In this whitepaper the term digital workplace describes “the collection of all the digital tools provided by an organization to allow its employees to do their jobs” (Freed, 2015). This definition is easy to use and understand which is the reason why it was chosen. The digital workplace is also new. The

term has been used starting from 2009 and has later been adopted by larger organizations (Freed, 2015). Research and advisory firm Gartner (2014, 2018, 2019) made numerous hype cycles around the digital workplace and other prominent organizations actively engage in the topic. The digital workplace enables employees to collaborate from anyplace, anywhere. Exchanging knowledge, communicating and collaborating becomes extremely important.

Especially in knowledge economies that employ mostly white collar jobs. These activities are more and more carried out in the digital workplace. Although the digital workplace is new it seems to stay relevant in the future. The flexibility and speed it provides are satisfying the demand of the modern workplace.





Cross-site collaboration

More and more organizations are setting up offices across the world. This brings along a communication challenge as it becomes more difficult to communicate from a distance. Cross-site collaboration requires more effort than on-site collaboration but it is a necessity. It is not an option to travel to an office in another country for asking a quick question, therefore people have to collaborate in the digital workplace.

Environmental impact

Another development that has to be mentioned is the need for sustainable solutions. The digital workplace is a great way to prevent a commute or travel. People start to prevent taking flights due to environmental concerns (Frangoul, 2019; Timperley, 2019). This means that an increasing number of people are starting to accept lesser alternatives to minimize their environmental impact. The digital workplace offers opportunities that greatly reduce the impact of the workforce.

The digital workplace is new and here to stay. This brings along pain points but also opportunities.

Why a Hotline?

Human Rationale

Technology and 'the social' are always interrelated. That means that technology always has a human using it in some sort of way. Without use, a technology is literally useless. This means that for innovation to be successful it has to be used. That is why it is important to start from a human perspective and why there has been a major focus on how people used the tryouts. The Hotline is an example of an innovation that solves a current problem with existing technology.

Human centeredness

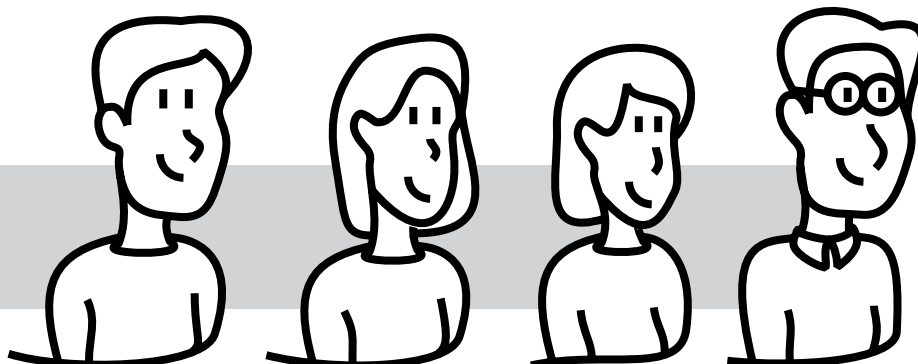
This 'human centeredness' has been recognized in various industries, also in relation with the digital workplace. Matt Cain, vice president at Gartner, stated that "Humans will still be at the center of work, even as intelligent software and machines become our co-workers" (Gartner, 2017). Also telecommunications provider KPN advises their clients to put the employee first and distinguish which means certain groups need (White Paper KPN).

Start with why

In the golden circle model (Sinek, 2018) the 'use' can be placed in the 'why' circle. Because people use something to satisfy their needs, which is the answer to the 'why' question. Technology can be considered to be the answer to the how question. Technology should be seen as the medium through which the user finds value. Technology should not be the value on its own. That does not mean technology is not important, but the value starts with the user.

The future is human

Organization are starting to understand that 'the future is human' (Venture Spirit, 2019). A solution that plays into the natural behaviour of people will be essential. The biggest innovations solve current problems with existing technology (Sonck, 2019). That makes it interesting to look at day to day issues of the digital workplace.



An aerial, high-angle photograph of a busy city intersection, likely in New York City. The scene is captured during the day with warm, golden-hour lighting. A large group of pedestrians is crossing the street at a crosswalk. Several yellow taxis are visible, some stopped at a red traffic light. A white bus is also present, moving through the intersection. The street is marked with white lines and traffic signs, including a 'West Side Highway' sign. The overall atmosphere is one of a bustling, urban environment.

**The future of work is human.
The Hotline is an innovation
that solves a current problem
with an existing technology.**

Why a Hotline?

Financial Rationale

Miscommunications among staff is an unforeseen cost. For a company of 100.000 employees the cost of miscommunications are on average \$62.4 million per year. For smaller companies of 100 employees the cost is \$42.000 dollar a year. This issue is rooted in the communication skills of people (SHRM, 2019).

Digital miscommunication

Poorly written emails are an infamous example of a miscommunication. Miscommunications can lead to small misunderstandings but might also build up tension and affect employee morale. Time is a precious resource for organizations and any time spent on the aftermath of repairing the damage done by a miscommunication is preventable. (Medium, 2019).

Body and social cues

As is well know, a large part of communication is conveyed with body language and social cues. With digital communication these cues are cut off. This makes it more difficult for people to explain what they mean which might be the cause why digital miscommunications occur so frequently.

Business travel

One important reason for business travel are the human interactions. Face to face meetings reduce miscommunication and help build a productive relationship (Tripit, 2016). These relationships are important but business travelers are twice as profitable for airlines as opposed to regular travelers (Investopedia, 2019). Business travel is still necessary to prevent miscommunication and build a relation. A number of these flights might be preventable with better digital communication.

Miscommunications cost companies a fortune. Better digital communication is valuable for people, can greatly save costs and reduce environmental impact.

\$42.000

**annual cost of misscommunications
for a company of 100 employees**

\$62.400.000

**annual cost of misscommunications
for a company of 100.000 employees**



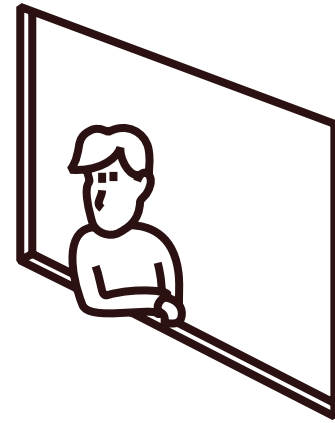
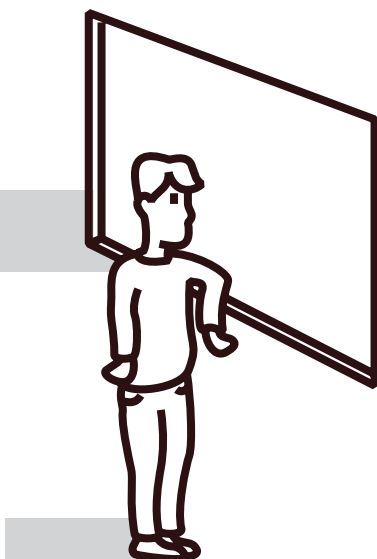
The Issue

Digital vs. physical

As previously discussed, the digital workplace is here to stay. But, the digital workplace is much different than the physical which causes problems.

Natural behaviour

The natural behaviours that are supported in the office are not present in the digital world. To give an example, in order to know if someone is available in the digital workplace there are mainly three options: green, yellow or red. In the physical workplace you can get a much more detailed picture of how available a colleague is. Indications as whether they are walking through a hallway, standing in the coffee corner or wearing headphones all convey important information.



The task and the social

But, there are more reasons to acknowledge the importance of the social element in the digital workplace. In the digital workplace, the social is often separated from the task which is a problem. A frequent concern is that remote workers suffer from isolation because the social aspects are cut off (Hafermalz & Riemer, 2016).

Barriers and enablers of telework

Based on research towards the barrier and enabler factors of telework the phenomena 'approachability' and 'losing the connection' seemed to be important barriers to telework. This means that being remote raises the barrier to communicate and increases the chances of miscommunications. Approachability refers to being available to receive and distribute important hallway information. This hallway information is important for not losing the connection with the team or organization (Define: Telework research findings).

Towards a more human digital workplace



The vision

The digital and physical workplace are much different. Numerous aspects of the digital workplace are not ideal, it is better to meet in the physical world. But, meeting in the physical world brings along problems as well.

Traveling has a significant impact on the environment but also the individual. Commuting and flying are not necessarily fun or efficient activities. The digital workplace could

be the solution. Work can happen from anywhere at any time, providing efficiency and flexibility.

If the digital workplace was as natural as the physical workplace, organizations would be more efficient and have less impact on the environment and their employees.

A more human digital workplace is the solution for the future of work. It could provide organizations with more efficiency and greatly reduce their impact on the environment and individuals.

The Issue

Cross-site collaboration

Based on internal research it turned out that there was an unsatisfied need for better cross-site collaboration. The approach for the thesis was to go in depth into one solution with the given time and resources. The process has been documented and can be found in chapter Develop: Hotline concept validation.

Finding the problem

The first indication was that numerous people in the first half of the project came up with the same idea: "What if we connect the coffee corners with a live stream?". A second indicator were the good responses to the ideas from other employees. A common remark was "We should do this with another Barco office". A third indicator was the identification of a lead user. This manager tried to improve the cross-site collaboration by hanging up pictures of colleagues from the other offices.

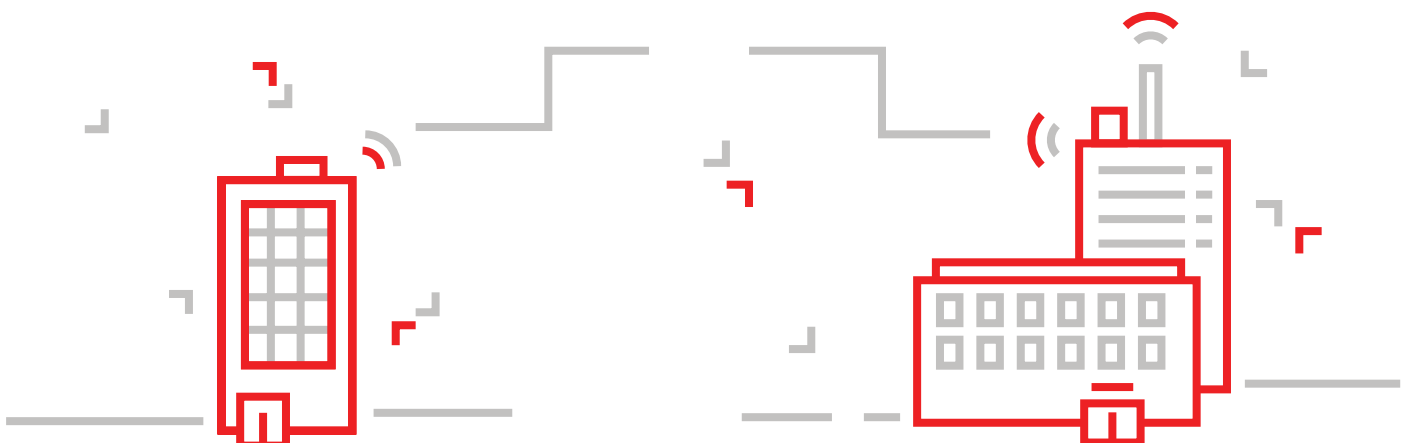
Describing the problem


Certain crucial information does not leave the hallway which is a problem. This type of information has two purposes: functional and emotional.

It is the type of sensitive information that is essential for the work that has to be carried out. But, these informal interactions also establishes a relation between the employees, improving communication efficiency. This is in line with the previous findings that the task and the social are not inseparable. A low effort communication solution could greatly improve communication efficiency of cross-site teams.

Link with research

In cross-site teams communication becomes a challenge due to the approachability barrier. Not setting up a Skype call for asking a seemingly unnecessary question can result in a problem that shows up too late. In the physical workplace colleagues are more approachable. One can simply walk to a desk and ask a question in person, which is much quicker. This flexible way of meeting seems to be missing in the digital workplace.





Cross-site collaboration is a challenge for larger organizations. The digital workplace does not provide a solution for ad hoc meetings.

The Solution

The Hotline serves as a step towards a more human digital workplace that could be taken tomorrow. But, the Hotline should also serve real existing pain points. The following overview provides insight into how a Hotline covers multiple pain points for the end user.

Issue

Solution

Setting up a call takes effort and can cause frustrations such as having to search dial in numbers and looking for silent room (Develop: Hotline concept validation).

The Hotline provides an always on experience. There is nothing left to do other than simply walk into the room.

There is not a good solution that allows for ad hoc and flexible remote collaboration.

The Hotline is non bookable and always ready to use, perfect for asking a quick question that is too complex to ask in a chat (Develop: Hotline concept validation).

Remote work increases the chance of problems showing up too late because remote colleagues are less approachable.

The Hotline can help cross-site colleagues to become more approachable (Develop: Hotline reflection survey).

Video conferencing is a formal way of meeting, providing minimal space for informal interactions.

The Hotline provides room for informal interaction, just as in an on-site meeting (Develop: Hotline concept validation)

Communicating via a call or mail can build up tensions between cross-site colleagues.

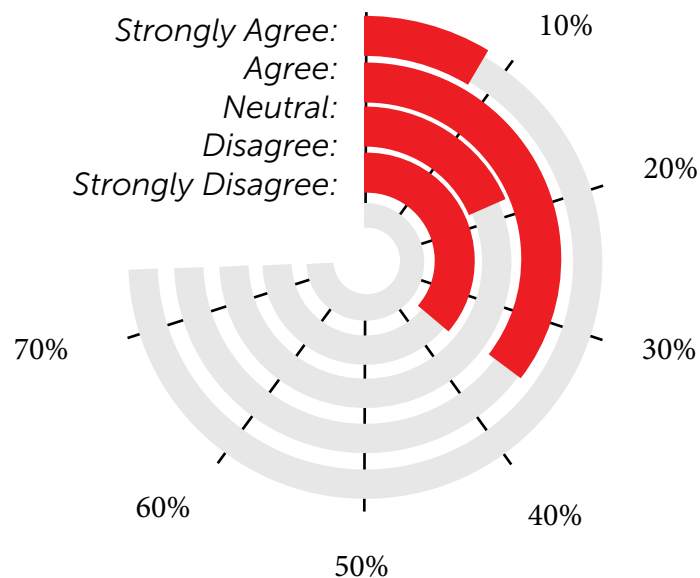
The Hotline can help create a better relationship between cross-site colleagues (Develop: Hotline reflection survey).

User validation

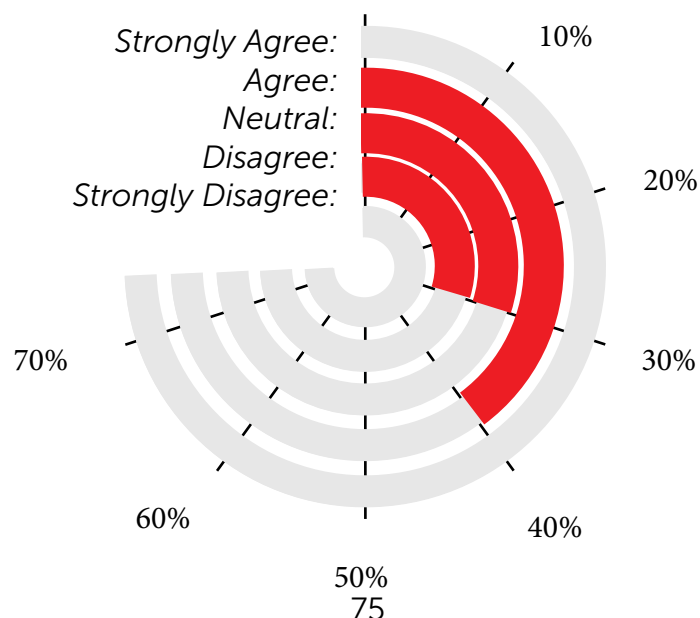
Fortune 1000 companies and organizations with more than ten meeting rooms are target customers of Barco. Interesting fact is that Barco itself has more than ten meeting rooms, which transforms their employees into (internal) end users. The pain points employees experience might apply to

a larger target group. These pain points served as an important basis for this concept. It is also the reason why the tryouts have been carried out internally. Employees, the end users, interacted with the tryouts which provided rich data. A follow up survey was completed by ten people with the following results:

I preferred the Hotline over a Skype or Teams call:

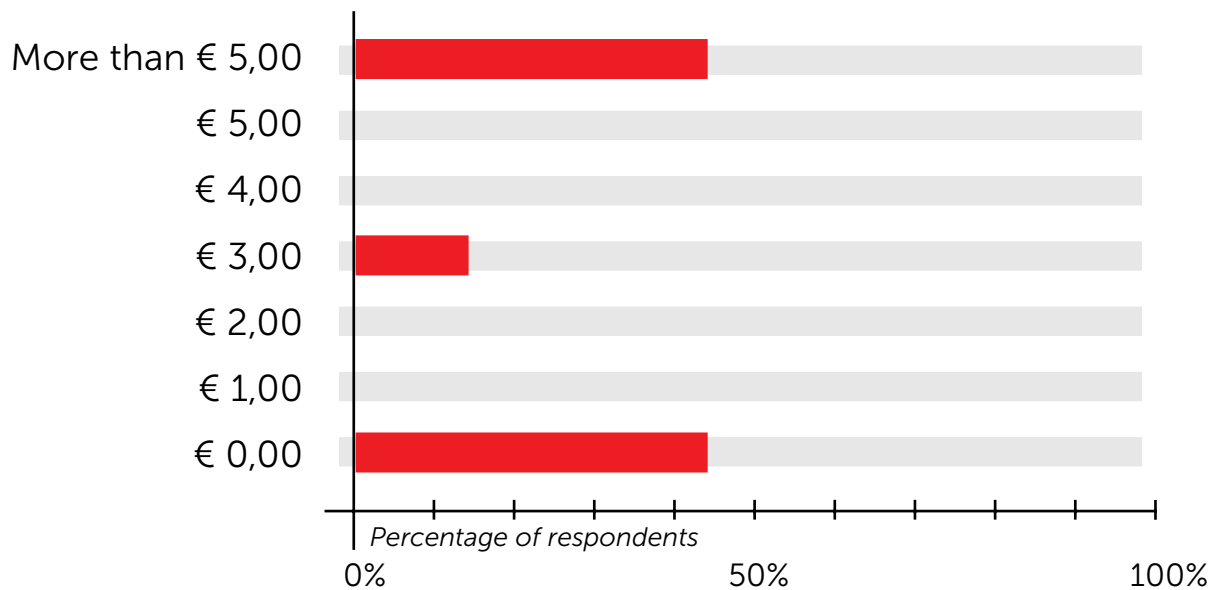


The Hotline helped me build a better relationship with my colleagues from the other office:



User validation

For such a service, I would be willing to pay each month:



The survey was fully completed by ten employees. This is not a statistically valid number. But, half of the respondents indicated a willingness to pay. Four of them were willing to pay over five euros each month. This is interesting since the respondents merely interacted with an experiment.

There were also respondents that did not enjoy the Hotline. The Tryou occupied a meeting room for over a week. Some employees might not have been happy with that. In general the majority (70%) of the respondents wanted the Hotline to stay. For more results see chapter Develop: Hotline reflection survey.

The Hotline concept has been validated with end users. A willingness to pay has been identified.

70%

**of the respondents
want the Hotline to
stay**

44%

**of the respondents are
willing to pay more than
5 euro's a month**



Customer Segments

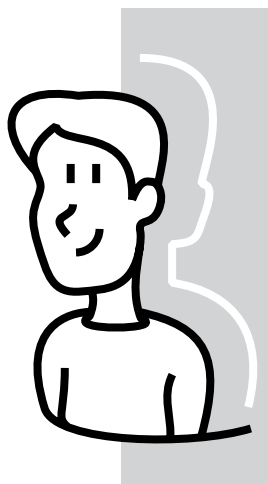
The target group are fortune 1000 companies or organizations with ten or more meeting rooms. In an interview with a director segment marketer the customer segments were briefly discussed. In most cases the buying customer is an employee in the IT or facility department. However,

departments such as HR can maintain strong advisor roles while they are not the end user. The end user of this potential product service are the managers and their teams.

Customer segment overview

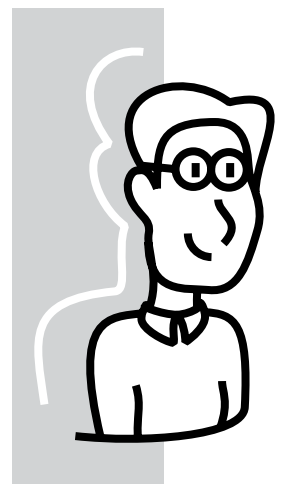
IT & Facility management

"I need to make sure my organization is equipped with the right resources"



Manager

"Cross-site collaboration is high on the agenda"



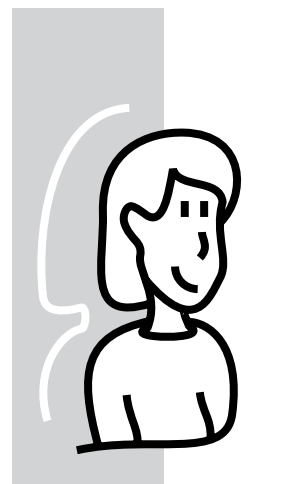
Human Resources

"I am losing people because they don't feel like they're part of a team"



Team member

"I need to ask a quick question but I don't want to set up a call for that"



Value Propositions

The value for IT & Facility management is in the ease and time of installing. These departments are most likely going to be responsible for installing the product service. HR needs to make sure the employees are satisfied with working for the organization. Then there are the directors and managers who are responsible for managing the teams distributed over two or more locations. They need the individual

team members to improve their communication. The individual team member needs a solutions for better digital communication. The value propositions are summarized in the following overview:

IT & Facility management

Job to be done:

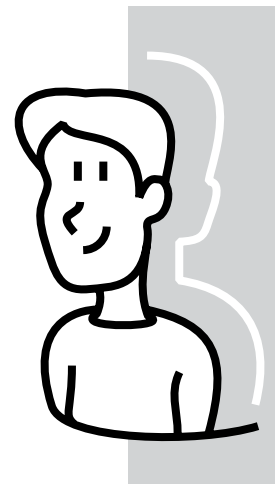
Spend budget to invest in the office and keep processes running at acceptable cost. Make sure all solutions are connected securely.

Pain reliever:

Quick and easy installment, advice on which locations to choose for the Hotline.

Gain creator:

Good service.



Human Resources

Job to be done:

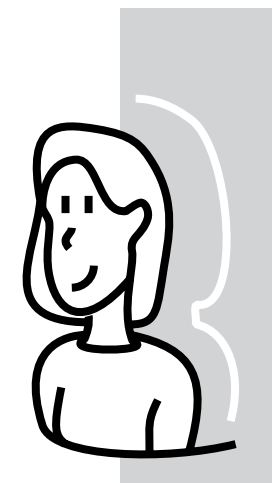
Recruit the best people and make sure they can perform.

Pain reliever:

Employees feeling part of a team or the organization.

Gain creator:

Happy and engaged employees.



Value Propositions

Manager

Job to be done:

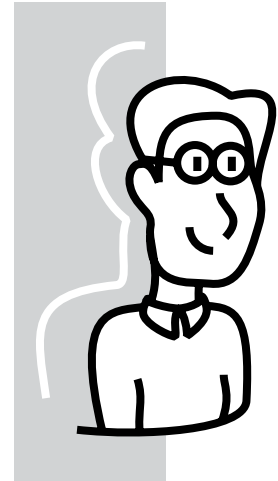
make sure the team works together efficiently and deliver results.

Pain reliever:

Discovering problems earlier, prevent miscommunications.

Gain creator:

People seeing each other in a more informal setting, good relations between team members.



Team member

Job to be done:

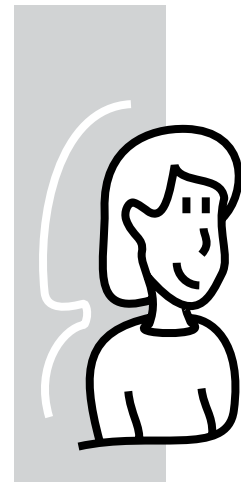
collaborate with a team member in another office.

Pain reliever:

A lower effort to meet resulting, preventing unnecessary emails.

Gain creator:

A more informal setting, better relations between team members, increased communication efficiency.



Take the next step towards a more human digital workplace



DISCUSSION AND REFLECTION

Overall, the Hotline seemed to have had a positive impact on the participants since seven out of ten respondents wanted the Hotline to stay. A willingness to pay has been identified proving the concept has actual value to people.

Limitations

Whether this concept should be developed is a different story. There are numerous challenges that need to be overcome for this concept to become feasible. There are some disadvantages that came out of the survey that need to be solved. For example, it needs to be clear whether the room is occupied. Also the audio video quality needs to improve and there needs to be a sustainable solution to provide the 'always on experience'. During the tryout a Teams call ran for the whole day.

There are various ways to realize the concept, the white paper only introduces one. Developing such a concept would cover other disciplines such as engineering, hardware development, software development and user experience design for example. which was left out of scope for this project.

Connection with initial challenge

The initial challenge had the primary focus on developing solutions for the individual teleworker. This was not an interesting target group for the case company. This strategic misfit could have been identified earlier. Nevertheless a pivot was made and the project delivered results in the end. Besides, pivotal changes as such are common practice in design projects. Therefore this change is not considered as something negative.

Connection with research

Whether the framework is statistically significant is the question. It has only been validated quantitatively. The correlation between different phenomena are not validated with a substantial number of respondents. This means that it is an assumption that solving the barriers will lead to more telework. There has been validation in a small sample. However, it remains unclear if a concept as the Hotline could improve the barriers from the framework. This has to be tested for longer periods of time with a larger number of participants.



Next steps

There was internal interest to continue the Hotline. One R&D director already showed his enthusiasm to the IT department in an email: "We are definitely in favor for a permanent Hotline between FRE and KOR" (internal communication, 2020). Whether (and how) this concept will be continued is up to the case company. It can also be possible that the learnings from the white paper serve as input for future innovations in connectivity technology or image processing solutions.

Personal reflection

As a learning objective the ambition was to successfully innovate in a professional and technological context. This has been achieved to a certain extent. The Hotline is an innovation, even if it is a small one. It was the implementation of something new in an existing context. People in the end changed their behaviour and the Hotline was successfully put to use by its intended users.

One thing that could have been better was embracing failure. Failure is key especially in innovation, but nobody wants to fail even if it is a small experiment. The process of dealing with failure could have been better. The time wasted on wondering whether a tryout would work or not was not worth it. In some cases failure was seen as a problem while actually there was interesting data to be captured. In future endeavours failure will be celebrated and seen as a way of acquiring knowledge. Maybe this should be called 'efficient failing'.

Secondly the concept still has a few gaps to be filled, there could have been room for improvement to better define the concept. What type of TV monitor should be used, how should the interface of the app look like, what is the estimated cost price and subscription fee. These are examples of questions that need answers. Currently the concept is probably not clearly defined enough for the case company to continue it. But, they now know what works and does not work with concepts as a 'window into another location', which is also valueable.

REFERENCES

Aguilera, A., Lethiais, V., Rallet, A., & Proulhac, L. (2016). Home-based telework in France: Characteristics, barriers and perspectives. *Transportation Research Part A: Policy and Practice*, 92, 1–11. <https://doi.org/10.1016/j.tra.2016.06.021>

Albright, D. (2019, 16 juli). Facebook Ads CTR: Benchmarks and Best Practices. Geraadpleegd op 11 februari 2020, van <https://databox.com/average-facebook-ctr#average>

Allen, T. D., Golden, T. D., & Shockley, K. M. (2015). How Effective Is Telecommuting? Assessing the Status of Our Scientific Findings. *Psychological Science in the Public Interest*, 16(2), 40–68. <https://doi.org/10.1177/1529100615593273>

Barco N.V. (2018). Barco annual report. Geraadpleegd van <https://www.barco.com/en/about-barco/investors/company-results>

Bartel, C.A., Wrzesniewski, A. and Wiesenfeld, B. (2007), "The struggle to establish organizational membership and identification in remote work contexts", in Bartel, C.A. (Ed.), *Identity and the Modern Organization*, Lawrence Erlbaum Associates, Mahwah, NJ, pp. 253-72.

Beaumeister, R.F. and Tice, D.M. (1990), "Anxiety and social exclusion", *Journal of Social and Clinical Psychology*, Vol. 9, pp. 165-95.

Boell, S. K., Cecez-Kecmanovic, D., & Campbell, J. (2016). Telework paradoxes and practices: the importance of the nature of work. *New Technology, Work and Employment*, 31(2), 114–131. <https://doi.org/10.1111/ntwe.12063>

Cambridge English Dictionary. (2019, 11 september). MEETING | meaning in the Cambridge English Dictionary. Geraadpleegd op 12 september 2019, van <https://dictionary.cambridge.org/dictionary/english/meeting>

Care Connect and Age UK. (2018). The difference between loneliness and isolation - and why it matters. Geraadpleegd op 19 september 2019, van <https://www.ageuk.org.uk/our-impact/policy-research/loneliness-research-and-resources/loneliness-isolation-understanding-the-difference-why-it-matters/>

Choo, S., Mokhtarian, P. L., & Salomon, I. (2005). Does telecommuting reduce vehicle-miles traveled? An aggregate time series analysis for the U.S. *Transportation*, 32(1), 37–64. <https://doi.org/10.1007/s11116-004-3046-7>

Coltrane, S., Miller, E. C., DeHaan, T., & Stewart, L. (2013). Fathers and the flexibility stigma. *Journal of Social Issues*, 69, 279–302.

Cooper, C. D., & Kurland, N. B. (2002). Telecommuting, professional isolation, and employee development in public and private organizations. *Journal of Organizational Behavior*, 23(4), 511–532. <https://doi.org/10.1002/job.145>

Cropanzano, R., & Mitchell, M. S. (2005). Social exchange theory: An interdisciplinary review. *Journal of management*, 31(6), 874-900.

REFERENCES

DeWall, C.N. and Baumeister, R.F. (2006), "Alone but feeling no pain: effects of social exclusion on pain tolerance and pain threshold, affective forecasting, and interpersonal empathy", *Journal of Personality and Social Psychology*, Vol. 91, pp. 1-15.

Flexjobs. (2017). Exclusive Insights on the State of Telecommuting. Geraadpleegd 25 juni 2019, van <https://www.flexjobs.com/2017-State-of-Telecommuting-US/>

Frangoul, A. (2019, 21 november). Coldplay's Chris Martin says band will not tour its new album due to environment concerns. Geraadpleegd op 31 januari 2020, van <https://www.cnn.com/2019/11/21/coldplay-will-not-tour-new-album-due-to-environment-concerns.html>

Freed, E. (2019, 4 september). Which of these 8 definitions of "digital workplace" works best for you? Geraadpleegd op 31 januari 2020, van <https://digitalworkplacegroup.com/2015/03/31/which-of-these-8-definitions-of-digital-workplace-works-best-for-you/>

Gajendran, R. S., & Harrison, D. A. (2007). The good, the bad, and the unknown about telecommuting: Meta-analysis of psychological mediators and individual consequences. *Journal of Applied Psychology*, 92(6), 1524–1541. <https://doi.org/10.1037/0021-9010.92.6.1524>

Gartner. (2019). Hype Cycle for the Digital Workplace, 2019. Geraadpleegd op 31 januari 2020, van <https://www.gartner.com/en/documents/3953515/hype-cycle-for-the-digital-workplace-2019>

Gartner. (2018). Hype Cycle for the Digital Workplace, 2018. Geraadpleegd op 31 januari 2020, van <https://www.gartner.com/en/documents/3883163/hype-cycle-for-the-digital-workplace-2018>

Gartner. (2017). Gartner Releases "Hype Cycle for the Digital Workplace, 2017". Geraadpleegd op 31 januari 2020, van <https://www.gartner.com/en/newsroom/press-releases/2017-08-17-gartner-releases-hype-cycle-for-the-digital-workplace-2017>

Gartner. (2014). Hype Cycle for Digital Workplace, 2014. Geraadpleegd op 31 januari 2020, van <https://www.gartner.com/en/documents/2810217>

Glenn Dutcher, E. (2012). The effects of telecommuting on productivity: An experimental examination. The role of dull and creative tasks. *Journal of Economic Behavior & Organization*, 84(1), 355–363. <https://doi.org/10.1016/j.jebo.2012.04.009>

Golden, T.D., Veiga, J.F. and Dino, R.N. (2008), "The impact of professional isolation on teleworker job performance and turnover intentions: does time spent teleworking, interacting fact-to-face, or having access to communication-enhancing technology matter?", *Journal of Applied Psychology*, Vol. 93, pp. 1412-21.

Hafermalz, E., & Riemer, K. (2016). The work of belonging through technology in remote work: A case study in tele-nursing.

Harari, Y. N. (2015). *Sapiens: A Brief History of Humankind*. Vintage Books.

REFERENCES

Investopedia. (2019, 15 juli). Which Passengers Make the Most Money for Airlines? Geraadpleegd op 31 januari 2020, van <https://www.investopedia.com/ask/answers/041315/how-much-revenue-airline-industry-comes-business-travelers-compared-leisure-travelers.asp>

Jones, W.H. (1990), "Loneliness and social exclusion", *Journal of Social and Clinical Psychology*, Vol. 9, pp. 214-20.

KPN Whitepaper. (n.d.). Digital Workspace: talent, techniek en topprestaties. Geraadpleegd op 30 januari 2020, van https://marketing.kpn.com/ContentRenderer/default.aspx?ID=V5aJnDnUOZc_rVJlDRwTsL3o6QSimlFpx5KOb6NtuGu8xd5Ul4dONJXJxcV9boHvIb%2BjMUG7moyVC

Mann, J. (z.d.). A Digital Workplace is Crucial to Digital Transformation. Geraadpleegd op 31 januari 2020, van <https://www.gartner.com/en/doc/3909082-a-digital-workplace-is-crucial-to-digital-transformation>

Medium. (2019, 22 februari). The Tragic Unseen Costs of Digital Miscommunication. Geraadpleegd op 1 februari 2020, van <https://medium.com/@turalt/the-tragic-unseen-costs-of-digital-miscommunication-b6f188ef2bf8>

Meymandpour, R., & Bagheri, Z. (2017). A study of personality traits, viz., extraversion and introversion on telecommuters burnout. *Telecom Business Review*, 10(1), 1-7. Retrieved from <https://search.proquest.com/docview/2024123599?accountid=27026>

Miller, P. (2012). *The Digital Workplace: How Technology Is Liberating Work*. Indianapolis: Dog Ear Publishing, LLC.

Moeckel, R. (2017). Working from Home: Modeling the Impact of Telework on Transportation and Land Use. *Transportation Research Procedia*, 26, 207–214. <https://doi.org/10.1016/j.trpro.2017.07.021>

Mokhtarian PL and Varma KV. (1998) The trade-off between trips and distance traveled in analyzing the emissions impacts of center-based telecommuting. *Transportation Research Part D* 3: 419-428.

Montreuil, S. and Lippel, K. (2003), "Telework and occupational health: a Quebec empirical study and regulatory implications", *Safety Science*, Vol. 41, pp. 339-59.

Morganson, V. J., Major, D. A., Oborn, K. L., Verive, J. M., & Heelan, M. P. (2010). Comparing telework locations and traditional work arrangements. *Journal of Managerial Psychology*, 25(6), 578–595. <https://doi.org/10.1108/02683941011056941>

Rasmussen, Erling and Corbett, Gareth. Why Isn't Teleworking Working? [online]. *New Zealand Journal of Employment Relations*, Vol. 33, No. 2, 2008: 20-32. Availability: <https://search.informit.com.au/documentSummary;dn=946660458301479;res=IELB US>ISSN: 1176-4716>. [cited 16 Sep 19].

Shabanpour, R., Golshani, N., Tayarani, M., Auld, J., & Mohammadian, A. (Kouros). (2018).

REFERENCES

Analysis of telecommuting behavior and impacts on travel demand and the environment. Transportation Research Part D: Transport and Environment, 62, 563–576. <https://doi.org/10.1016/j.trd.2018.04.003>

SHRM. (2019, 16 augustus). The Cost of Poor Communications. Geraadpleegd op 1 februari 2020, van https://www.shrm.org/resourcesandtools/hr-topics/behavioral-competencies/communication/pages/the-cost-of-poor-communications.aspx?utm_source=TheBriefLab&utm_medium=blog&utm_campaign=08102017

Sinek, S. (2018, 9 oktober). The Science of WHY. Geraadpleegd op 31 januari 2020, van <https://simonsinek.com/commit/the-science-of-why/>

Smulders, F.E., De Caluwé, L., & Van Nieuwenhuizen, O. (2003). Last stage of Product Development: Interventions in existing processes. Creativity and Innovation Management, 12 (2), 109–120.

Sonck, J. (2019). Vooraleer u digitaal begint te innoveren, Abiss technology conference. Abiss, Kortrijk, Xpo.

Spitzberg, B.H. (2006) Preliminary Development of a Model and Measure of Computer-Mediated Communication (CMC) Competence. Journal of Computer-Mediated Communication, 11, 629–666. <https://doi.org/10.1111/j.1083-6101.2006.00030.x>

Tate, T. D., Lartey, F. M., & Randall, P. M. (2019b). Relationship between Computer-Mediated Communication and Employee Engagement among Telecommuting Knowledge Workers. Journal of Human Resource and Sustainability Studies, 07(02), 328–347. <https://doi.org/10.4236/jhrss.2019.72021>

Timperley, J. (2019). Why ‘flight shame’ is making people swap planes for trains. Geraadpleegd op 31 januari 2020, van <https://www.bbc.com/future/article/20190909-why-flight-shame-is-making-people-swap-planes-for-trains>

The Free Dictionary by Farlex. (2015). stay in touch. Geraadpleegd op 2 oktober 2019, van <https://idioms.thefreedictionary.com/stay+in+touch>

Toussaint, L., Shields, G. S., Dorn, G., & Slavich, G. M. (2014). Effects of lifetime stress exposure on mental and physical health in young adulthood: How stress degrades and forgiveness protects health. Journal of Health Psychology, 21(6), 1004–1014. <https://doi.org/10.1177/1359105314544132>

Venture Spirit. (2019). Whitepaper Barco Future of Work [Whitepaper].

Verhasselt, P., & Boucart, N. (2018). Hyperscale and Microcare. Brugge, België: Die Keure.

Weiler Reynolds, B. (2019, 27 augustus). FlexJobs 2019 Annual Survey: Flexible Work Plays Big Role in Job Choices. Geraadpleegd op 13 september 2019, van <https://www.flexjobs.com/blog/post/survey-flexible-work-job-choices/>

REFERENCES

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