Occasions

Enhancing the psychological well-being of office workers through smart building technologies

Master Thesis
Tobias Froehlich

Tobias Froehlich

Master Thesis
April 20, 2018

Master Strategic Product Design
Industrial Design Engineering
Delft University of Technology

TU Delft & Mapiq

Supervisory team
Academic chair: Dr. Ir. Tomasz Jaskiewicz
Academic mentor: Dr. Rebecca Price
Company supervisor: Anne Wernand
Company mentor: Bouwe de Planque

Occasions

Enhancing the psychological well-being of office workers through smart building technologies

Master Thesis
Tobias Froehlich

Abstract

Over the past few years, workplaces have placed increasing importance on enhancing well-being. The benefits are clear: increased productivity, improved employee engagement, and reductions in health care costs. Another recent development has been the rise of smart office buildings. MAPIQ, a system integration company, is an active player in the smart building ecosystem, and has hosted this graduation thesis to investigate how smart building technologies can be applied be to effectively enhance well-being in the workplace. The research phases of the project identify an opportunity to enhance psychological well-being by stimulating the creation of specific workplace relationships. Consequently, a feature for a mobile application is proposed to bring candidates for such relationships together at a particular time for a particular occasion. The concept is evaluated as being relatively complex, but also as having good desirability and good potential to help Mapiq reach its vision. The thesis makes clear that applying smart-building technologies to build relationships at work is effective in enhancing well-being and in guiding a smart-building system integration company to achieve its strategic objectives.

Contents

List of Figures

Introduction

A. Rise of well-being

Pursuing health and well-being has been a top consumer trend for several years ("Health & wellbeing", 2017, "Megatrend: Healthstyle", 2017). A plethora of products and services are allowing consumers to follow exercise and nutrition plans tuned to their personal biology and life cycles. Consumers are also increasingly seeking moments of mindfulness. Achieving and displaying high levels of health and well-being through these solutions has become a status symbol.

These desire, pursuits, and practices have carried into the workplace, and justifiably so. People spend more than a third of their lives at work, making this time highly influential on well-being. Employers are well aware of this, and over the past several years have placed increasing importance on enhancing well-being in the workplace. In doing so, they are realizing the benefits of increased productivity, improved employee engagement, decreased absences, and reductions in health care costs (Baicker et al., 2010; Berry et al., 2010; Tehrani et al., 2007).

As much of the workforce has shifted from manual labor to more sedentary office work, a new set of challenges to well-being has arisen. Employers and workspaces have taken several approaches to addressing these, by offering healthy snacks, ergonomic work stations, exercise rooms, meditation classes, and more. In such a way, workplaces are matching what employees are seeking outside the workplace. Incentive programs to take advantage of well-being offerings at work have been created, although ultimately, making use of such well-being offerings comes down to an individual decision. Similarly, the offerings mentioned above have the characteristic that they address individually-controllable aspects of well-being, such as physical fitness and nutrition. But well-being is not limited to these individually-driven aspects, as several organizations are already aware of.

Well-being is also influenced by environmental factors in the workplace, such as lighting and air quality. These aspects of well-being are receiving increasing attention by employers and by workspace value providers, such as interior designers and architectural component manufacturers. Correspondingly, well-being has taken central stage at workspace design conferences, and certifications such as the WELL Building Standard have been created.

Yet this is not the complete picture. There are additional factors, particularly social and psychological ones, that influence well-being in the workplace. This graduation project dives into these factors to identify opportunity areas for boosting well-being that have yet to be completely addressed.

B. Connected Technologies and Mapiq

Another recent development of interest has been the application of connected technologies and the Internet of Things to workplaces, creating so-called smart buildings. These technologies hold great potential to create efficiencies and improve the working experience. Occupancy sensors, for example, can automatically control lighting, which reduces energy costs and eliminates the need to control lights manually. Similarly, several organizations are effectively using these technologies to optimize space usage. What is not yet clear, however, is how smart building technologies can be applied to enhance well-being.

One company that is an active player in the smart building ecosystem is MAPIQ, a system integration company whose mission is to empower people to use their office more effectively. Mapiq has created a single software platform through which a multitude of component-level systems can be accessed and controlled. Through its interface, MAPIQ currently offers end users the ability to book conference rooms, find their way around a building, view events, find a place to work, and locate their colleagues. MAPIQ

also provides facility managers with usage data, allowing companies to make the most out of their space. MAPIQ launched its first product in 2013 and now has clients such as Deloitte and the TU Delft library, as picture in Figure 1 .

MAPIQ is aware of the increased attention employers and workspaces are placing on well-being, and is interested in incorporating functionalities that effectively enhance well-being into its value proposition. With such features, Mapiq stands the chance to enhance its desirability among end users, and can help clients achieve well-being certifications.

C. Project Objective

The objective is to develop a concept that effectively enhances well-being in the workplace through smart building technologies, that expands the value proposition of a smart building system integration company, and that enables such a company to meet its strategic objectives.

Deloitte.

"Deloitte wanted to create a workplace that's ahead of its time. This building must be sustainable, innovative and social."
— E. Ubels

TUDelft Delft University of Technology

"One of our goals is to be a pioneer. Mapiq helps us do exactly that. It keeps us one step ahead of all other libraries." — M. van Putten

MAPIQ

Figure 1: Mapiq and its clients
Mapiq is a smart building system integration company that has created a single software platform through which a multitude of component-level systems can be accessed and controlled. Mapiq has been implemented in smart buldings such as Deloitte's The Edge in Amsterdam, and the TU Delft's library. Mapiq is looking for opportunites to enhance well-being for the users of its workspaces.

D. Methodology & Approach

The project objective is addressed in a two stage approach, as visualized in Figure 2. In the first stage, four separate studies are conducted. Studies I, II, and III explore the topic of well-being at work and its dependencies. Through literature and generative research, high value opportunities for enhancing well-being at work are identified. Study IV investigates Mapiq as a company. Through portfolio analysis and interviews with key employees, opportunities for enhancing the company's value proposition and meeting its strategic objectives are identified. In the second stage, a technology-driven concept is developed and presented as a proposal for integrating and addressing the study findings.

Study I
Well-being at work

Literature review

What is the relative importance of the different dimensions of well-being at work?

Contextmapping

Study II
Relationships at work

Literature review

What types of relationships are commonly experienced at work? How do they influence well-being?

Contextmapping

Study III
Trust at work

Literature review

How can office workers be induced to build vulnerability-based trust by sharing life experiences?

Research through design

Study IV
Mapiq

How can Mapiq meet its strategic goals and enhance its value proposition through a new product?

Product portfolio

Interviews

Integration

Integration goals

Idea Generation

Final Concept

Evaluation

Figure 2: Two-stage project methodology
In the first stage of the project, I beganeach study with secondary research methods to identify a knowledge gap and form a research question. I then applied a range of generative research methods to explore the research questions in context and arrive at rich insights. In the second stage, I explored several ideas for integrating the study findings into a technology-driven concept. I developed the most promising idea into a viable concept and evaluated its ability to effectively address the opportunities identified in the studies.

Study I - The different elements of well-being at work

1.1. Overview

To be able to identify areas of high opportunity for enhancing well-being in the workplace, it is of interest to begin by forming a complete picture of well-being. This study does so from theoretical and practical perspectives, by exploring extent literature, and through generative contextmapping research.

1.2. Literature review

1.2.1. Well-being in the global context

Literature proposes several frameworks for describing individual well-being. According to Self-determination theory, as visualized in Figure 3, well-being is fostered by fulfilling three universal psychological needs: Autonomy, Competence, and Relatedness (Ryan & Deci, 2000). Autonomy relates to having control and choice over one's activities, and to being capable of thriving on one's own. Competence relates to the desire for mastery in one's environment. Relatedness reflects our desire to be connected to others, to belong to a group, and to experience the associated feelings of intimacy and caring
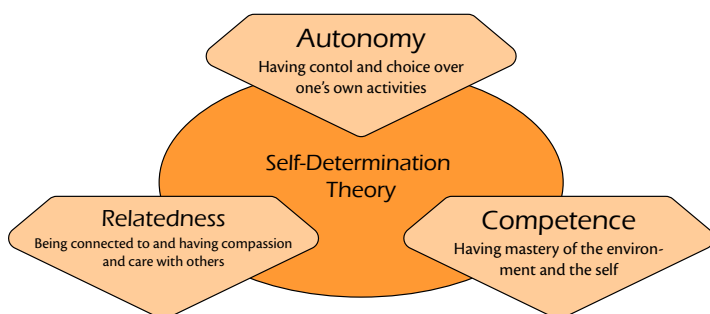
Figure 3: Self-determination theory
Ryan and Deci (2000) describe three universal psychological needs that foster well-being when met. These are Autonomy, Competence, and Relatedness.

(Jimenez, Pohlmeyer, & Desmet, 2015).

A complementary framework to Self-determination is the PERMA framework, visualized in Figure 4. The Framework deconstructs well-being into five dimensions: Positive emotion, Engagement, Relations, Meaning, and Achievement (Seligman, 2011). Positive emotions can arise from appraisals of the past, present, and future. Examples include satisfaction, pride, bodily pleasures, hope, and faith. Engagement relates to experiencing moments of full immersion in the activity of the present moment, known as flow. Relations reflects connections with friends, family, partners, and colleagues. Positive relations are known to be one of the foremost sources of happiness. Meaning describes feelings of purpose in life,

which arise from feeling connected to something bigger than oneself. Achievement describes accomplishing desired goals through deliberate effort (Jimenez et al., 2015). How do these frameworks relate to the context of the workplace?
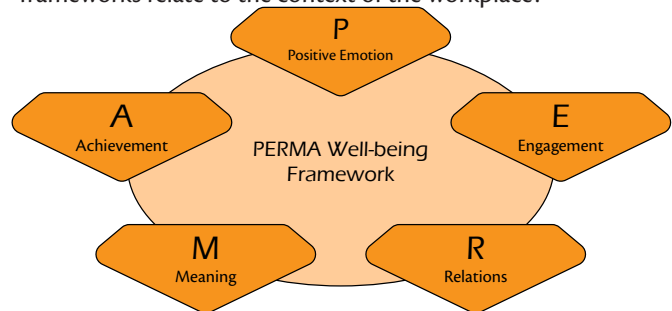
Figure 4: PERMA Well-being Framework
Seligman (2011) describes the above five dimensions as essential to individual well-being. They are not context-dependent, and are desirable to achieve across the breadth of an individual's pursuits.

1.2.2. Well-being at work

Well-being in the work environment has been defined in several ways. According to Tehrani, Humpage, Willmott, and Haslam (2007), employees that are well "are physically and mentally able, willing to contribute in the workplace, and likely to be more engaged at work". Tehrani et al. continue to describe employee well-being as involving:

1. Maintaining a healthy body by making healthy choices about diet, exercise and leisure
2. Developing an attitude of mind that enables the employee to have self-confidence, self-respect and to be emotionally resilient
3. Having a sense of purpose, feelings of fulfillment and meaning
4. Possessing an active mind that is alert, open to new experiences, curious and creative
5. Having a network of relationships that are supportive and nurturing (Tehrani et al., 2007, p. 5)

Arantes et al. (2014) arrive at a similar definition of well-being, which is distinguished into six dimensions: Optimism, Mindfulness, Authenticity, Belonging, Meaning, and Vitality. The dimensions are as visualized in Figure 1.

Optimism refers to one's desire for discovery, eagerness to try new approaches. and propensity to create enjoyment in the present. Mindfulness refers to being fully present in the moment, to being fully involved in and enjoying the activity at hand. Authenticity encompasses the ability to express oneself freely, to be who you are. Belonging reflects the level of connection someone feels to his/her coworkers, the sense of community present in a workplace. Meaning refers to the

Meaning

Authenticity

Vitality

Belonging

Optimism

Mindfulness

aligned on the same goal and meaning

shared understanding

"A sense of purpose"

expressing your own ideas and values

"Really yourself"

people around me believe the same things I do

seeking out the places that feel good to us

"Get up and go!"

the freedom to be who you are

having a best friend at work

taking different postures stimulates the mind

movement is the body language of ideas

feeling useful to others

having close friends and positive interactions at work

"Connected to others"

creating enjoyment in the present

seeing possibilties for the future

"Fostering creativity & innovation"

knowing that others care about you

connect with others one-on-one and eye-to-eye

"Fully Engaged"

eager to try new approaches

full involvement and enjoyment in what you're doing

mindful in the moment of now

Figure 5: The dimensions of well-being at work
This visualization represents the six dimensions of well-being at work, as identified by researchers at office furniture manufacturer Steelcase (Arantes et al, 2014).

sense of purpose one feels at work, and the compatibility of personal purpose with organizational purpose. Vitality encompasses one's physical fitness, and is reached by engaging the body in movement, eating healthy, and exercising.

Both of these models of well-being at work incorporate elements of the global well-being frameworks. For examples, Meaning from PERMA is repeated in the six dimensions framework, and present in Point 3 from Tehrani et al. Engagement from PERMA figures as Mindfulness in the six

dimensions. Relations figures as the underpinning of Belonging in the six dimensions, and in Point 5 in Tehrani et al.

There is not, however, a complete equivalence between the global, and the at-work frameworks for well-being. The well-being at work frameworks include a new dimension that is not present in the global frameworks: Vitality, as in Point 1 from Tehrani et al. (2007).

1.2.3. Knowledge gap

These frameworks reveal that the scope of well-being is broad, and that many elements in a workplace can have an effect on well-being. The frameworks do not, however, shed light on the relative importance of each dimension of well-being. Since the objective of this graduation project is to enhance well-being at work, it is of interest to answer the following research question in contexts relevant to Mapiq.

1.3. Research question

Research Question I: What is the relative importance of the different dimensions of well-being at work?

Sub-Research Question I: Are there factors that underly differences in this importance?

1.4. Method

The research question has been investigated through contextmapping with actual knowledge workers. This generative research method was chosen for its ability to provide insight into the underlying explicit and implicit motivations of participants (Sanders & Stappers, 2012). Three MAPIQ employees participated.

Preceding the workshop, participants were sensitized by answering questions over instant messaging platform Slack. The following questions were answered a total of three times over the course of one work day.

*   *What are you doing?*
*   *Where are you? (sending a photo would be great)*
*   *How are you feeling? Or, what is your emotional state? (a few words and an emoticon)*

The workshop began with an icebreaker exercise with the following prompt:

> *Imagine your situation at work and think of an animal that describes you in this situation. Please draw yourself as this animal.*

The participants presented their drawings to each other, which loosened the atmosphere and provided early insights into how these individuals experienced their working situation.

Following this exercise, the participants were asked to make a collage representing memories of times at work when they felt good, and times when they felt bad. Each participant presented his/her collage to the group, after which the other participants were given the opportunity to ask questions. The collage exercise was followed by a facilitated group discussion centering on the importance of well-being & happiness at work, as well as on factors that influence them.

Questions asked by the facilitator include:

*   *Could you please describe the elements that make you feel well at work?*
*   *This could mean you're feeling emotionally positive, or not stressed, or physically healthy*
*   *How important is your well-being to you at work?*
*   *What conflicts with your well-being at work?*
*   *What interest do you have in improving your well-being at work?*

What could be some ways to enhance your well-being at work?

The script for the workshop can be found in the Appendix.

1.5. Results

All materials created by the participants were collected, digitally scanned, and stored. The workshop was audio recorded in entirety and transcribed.
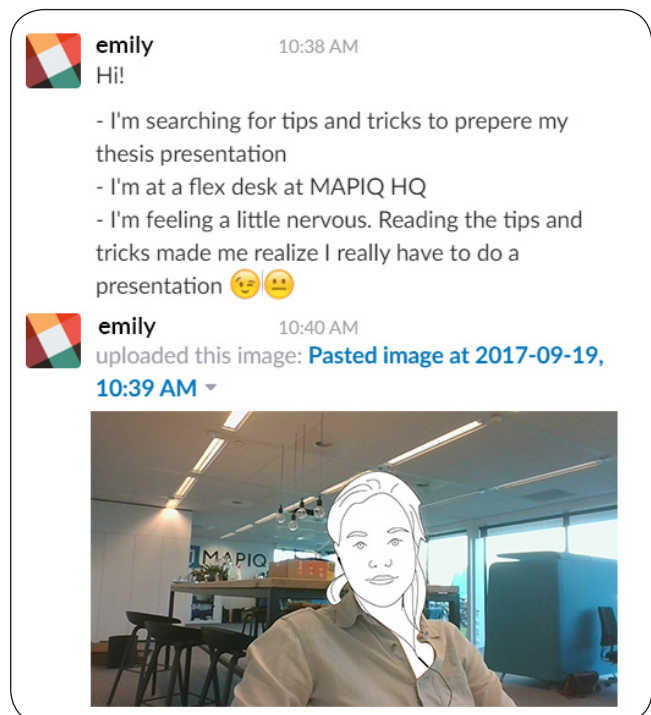
Figure 6: Sensitizing for contextmapping
In preparation for the contextmapping workshop, participants were asked three times over the course of one work day to answer: What are you doing? Where are you? How are you feeling?

Collage 1:
Colleague
Breaks
Cafe
Happy
Concentrate
Building
Desk
Feel good
Chair
Energy

Collage 2:
First Internship
People
Studying while doing a lot of other stuff.
Sleepy
Outside
Productive
Zone
Energy
Weekend

Collage 3:
Hungry
Lunch
Loud
Good
Meetings
Healthy
Mindset

Figure 7: Contextmapping collages
These collages created by workshop participants represents good and bad work experiences.

1.6.   Analysis

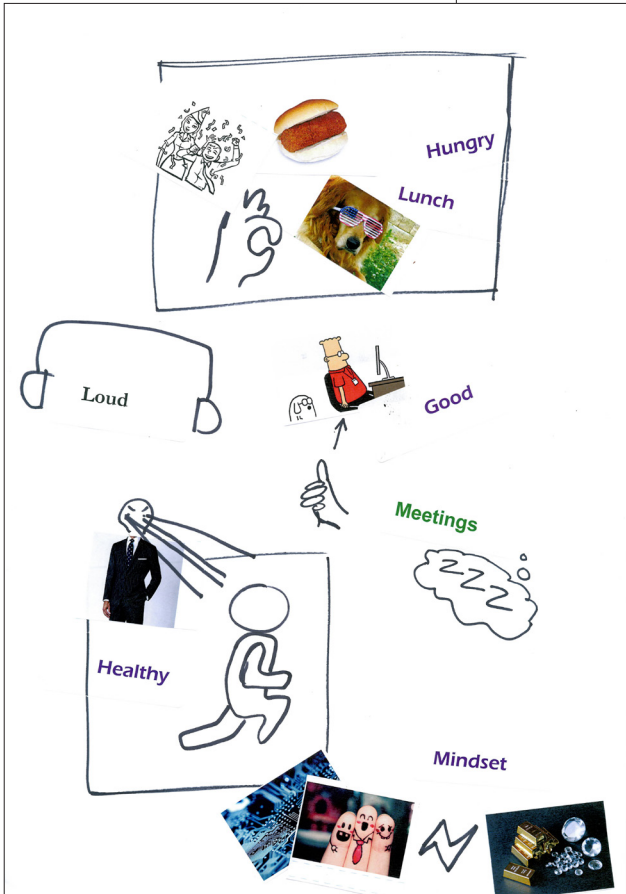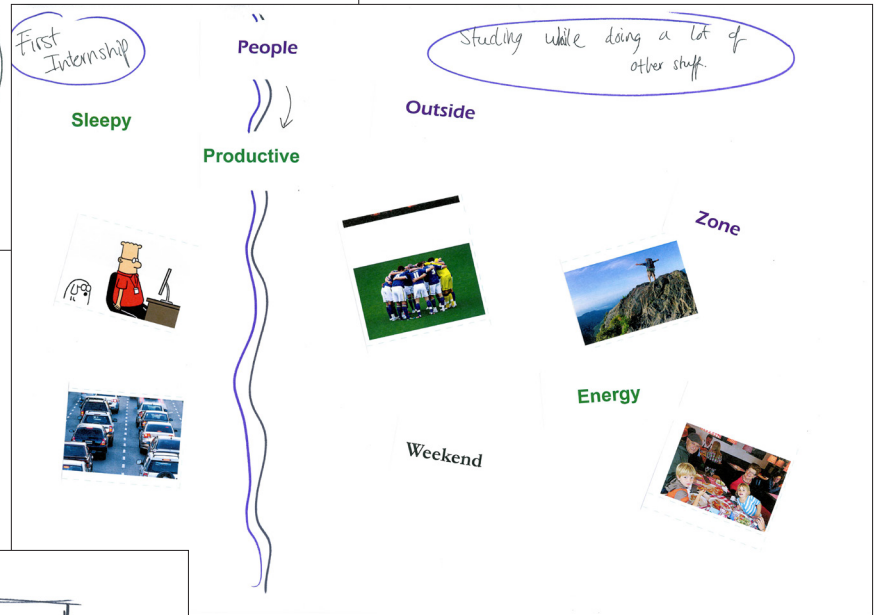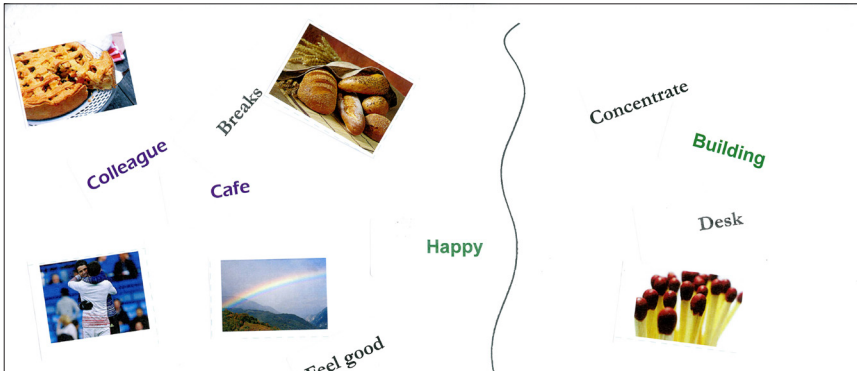The transcript was analyzed side by side with the visual materials, and important quotes were highlighted. Quotes with similar themes were grouped together and a statement was created for each group, using the noun-verb-object form. Iterating on the statements resulted in the following insights.

Insights

1. The definition of well-being differs from person to person
Each individual has a different understanding of well-being. This understanding does not necessarily align with the definition from literature. For some individuals, the understanding of the term is limited to vitality aspects, such as movement and workstation ergonomics, whereas for others the definition is more holistic.

"I was thinking more along the lines of your well-being question. I also sit still quite a lot. A sloth doesn't move very much. And in uncomfortable positions sometimes. I have a lot of trouble keeping myself upright."

2. Person-activity fit influences well-being
Person-activity fit refers to the personal suitability of an activity for enhancing well-being. This fit varies from person to person. For some, taking a walk outside benefits well-being, while for others, doing hands-on work is more effective. Conversely, bad person-activity fit can be detrimental to well-being.

"I don't really care about the competition element. But for some reason in the workplace, sports is always some kind of competitive thing. People like to compare each other, and I don't know, it really doesn't activate me to do any sports whatsoever. "

3. Habits are difficult to change
Successfully getting persons to adopt new habits is challenging.

"It's hard to convince people like me for example to break from my normal routine to do something that's completely out of the ordinary"

4. Unplanned tasks reduce well-being
Achieving Results appears to only contribute to happiness when resulting from planned work. Performing an unplanned work task, especially when requested by others, can produce feelings of frustration. Interruptions from coworkers produce similar frustrations.

"I got a call at 12:30. The meeting wasn't planned for me, and then I had to sit in even though I had a lot of other stuff planned ... after the meeting I could not get back into my work at all"

5. Productivity is not seen as directly proportional to well-being
Individuals have differing views on the relationship between well-being and productivity. Some have the perception that the best results come at the expense of well-being.

"if you don't get like a better result from losing your well-being, there would be no reason to lose your well-being"

6. Vitality is up to the individual
Having a greater availability of tools and more extrinsic motivators to improve Vitality at work does not do much good if an individual is not intrinsically motivated to enhance his/her vitality. This level of intrinsic motivation varies from person to person. Office workers find that offices generally have sufficient tools and external motivators available if this intrinsic motivation exists.

"the whole ergonomics and physical thing. If I really would want to do something about it, I think, all the tools are there."

7. Restorative activities are part of a working day
Being at work is a balance of directly productive times and activities that restore the potential to be productive. In some cases, restorative activities can also produce results. A hands-on hardware installation, for example, can be both productive and restore a knowledge worker's ability to perform focus tasks.

"That's something I really liked when I came here. ... the Friday afternoon projects. We always had Friday afternoon to do something else, And that really just kind of energizes you ... it's a nice way to finish the week, and kind of get everything out."

Figure 8: Presenting contextmapping collages
A workshop participant presents his collage of good and bad well-being experiences at work.

8. Task variety enhances productivity
The amount of time that a person is able to productively work on one type of activity is limited. Knowledge workers feel more productive when they can perform more than one type of work during the day. Changing settings for each type of work also benefits perceived productivity.

"I sometimes like it if you can change work setting and to-dos

totally, like in the morning you can use your brain and uh do something really difficult stuff and then I really like it in the afternoon to do just like the no-brainer practical, even just maybe some physical stuff or some really social. I think that makes me more productive "

9. Having colleagues of a similar age enhances well-being
A lack of commonalities with coworkers has detrimental effect on the well-being of a knowledge worker

"My first internship was not so nice, because I didn't have a friendship connection with all the people that worked there... There were too many people who worked there for 20 years and were 55 years old, and didn't have like any spark at what they were doing. So you didn't really get inspired, or something"

10. Colleague energy level is contagious
A person's mood and energy level spreads to colleagues. A happy coworker can make others happy, and vice versa.

"Well their energy gives me energy, positive energy."

"Well a few weeks ago I was sitting in front of a colleague and he was really, really grumpy all the time, and that affects me really much."

11. Being aligned on purpose benefits well-being
Working toward the same purpose as coworkers positively influences well-being. Inversely, working toward different goals is detrimental to well-being,

"There's always this keeping up with each other and managing expectations, that's very new to me, but it does kind of . I think It affects your mental state a lot, to be in that battle the whole time.

"Well instead of problem solving, development becomes solving problems for sales. ... It gives you the feeling that you're not developing a product for the customer, but a product that sells well, and I want to go one way, and sales want to go another way."
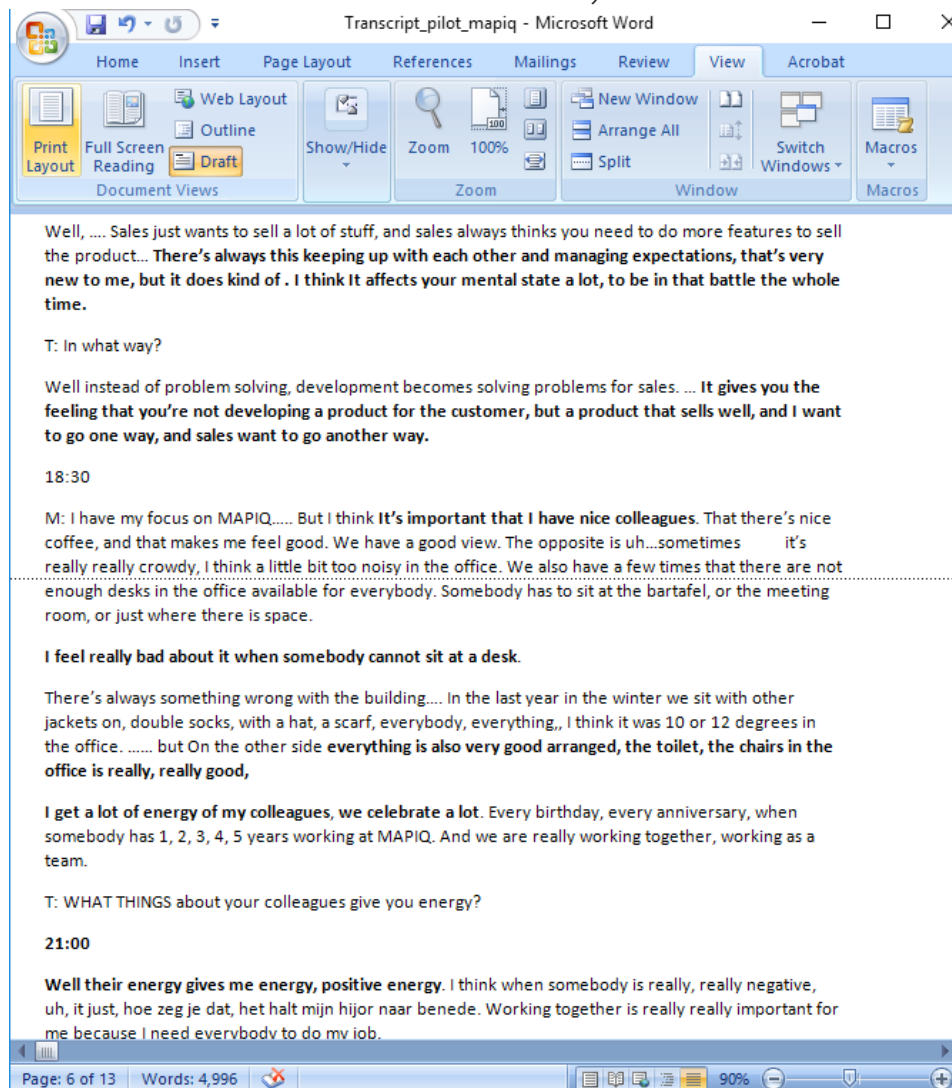

Figure 9: Contextmapping transcript
The audio recording of the workshop was transcribed in entirety. Important passages were highlighted in bold, then grouped into insights.

1.7. Discussion

Insights 2, 9, 10, and 11 from contextmapping reveal that colleagues at work have a significant impact on one's well-being. Colleagues influence a knowledge worker's sense of purpose and energy level. Similarly, the personal attributes of a colleague, such as age and interests, affect a knowledge worker's sense of belonging.
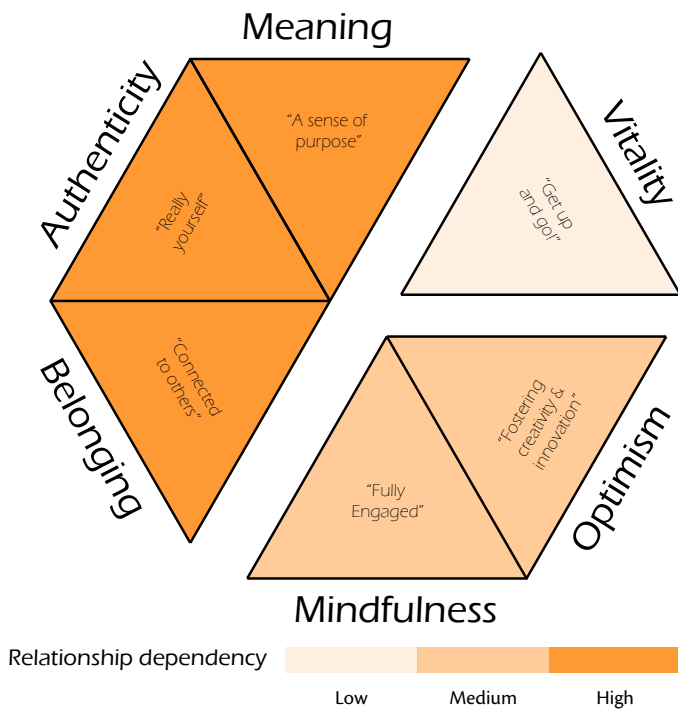

Figure 10: Dependency of well-being dimensions on relationships
Belonging, Authenticity, and Meaning depend highly on relationships at work. Mindfulness and Optimism have a medium dependency, and Vitality has a low dependency.

How does this finding from contextmapping relate to the theory? Figure 10 visualizes how the different elements from the theoretical frameworks depend on relationships and the social environment at work. Belonging is highly dependent on the quantity and quality of relationships a knowledge worker has at work. Authenticity and Meaning are also relationship-driven. Vitality, on the other hand, is primarily driven by the actions an individual takes to engage in movement, to eat healthily, and to exercise. Mindfulness and Optimism fall somewhere in between. Intentions for being Mindful and Optimistic take source in the individual, but are dependent on the social environment at work to flourish.

What does contextmapping say about the individually-driven factors? Insights 1, 2, 6, and 8 reveal that the well-being-influencing activities and factors that knowledge workers have individual control over vary in their impact from person to person. For some, for example, the amount of physical activity engaged in and the quality of nutrition substantially influence well-being, For others, the ability to vary tasks over the course of a day has more of an impact.

Since relationships are the main driving factor for three of the six dimensions of well-being at work, because they have a significant impact on two others, and because individually-driven dimensions have been found to vary in impact from person to person, it can be said that relationships have the broadest-reaching impact on well-being. This is supported the universal well-being frameworks, since relationships appear under the form of "Relations" in PERMA, and "Relatedness" in the three universal psychological needs.

1.8. Conclusion

Through literature research and contextmapping, relationships have been found to play a central role in well-being and happiness at work, and will form the focus for the remainder of this project. This focus is a relevant and contemporary concern. Vivek Murthy, Surgeon General of the United States under Barack Obama, makes the case that loneliness is a growing health epidemic that has adverse effects at work, reducing task performance, limiting creativity, and impairing reasoning and decision making (Murthy, 2017).

The focus on relationships is also supported by the possibilities offered by the features and technology that are part of Mapiq's portfolio, and by the expectations of end users. Mapiq currently offers end users the ability to find colleagues within the office, which is made possible by technology that locates a person based on Wi-Fi or bluetooth signals. Similarly, knowledge workers are already accustomed to services that connect them with others based on location in other contexts, for example in the form of dating services like Happn.

Nevertheless, there is still much to be learned about relationships in the workplace: what are the different kinds of relationships that are in place, and how do these influence well-being? This is the focus of the following study.

Study II - Workplace Relationships and well-being

Overview

The preceding study has shown that relationships between knowledge workers have a high influence on well-being at work. Enhancing relationships is therefore a clear area of opportunity for improving well-being in the workplace. This area is nevertheless still broad, so it stands to ask: What kind of relationships exist at work? How do they influence well-being? This study explores these questions from theoretical and practical perspectives, by exploring extent literature, and through generative contextmapping research.

2.1. Literature review

Literature gives some hints as to what types and what qualities of relationships are beneficial to well-being in the workplace. The Gallup Business Journal states that "trusting relationships ..... [are] a key trait of retention", and that one of the key dimensions shared by high-performing workplaces is that their employees have a best friend at work. ("Item 10: I have a best friend at work", 1999). Kamdar and Van Dyne (2007) have shown that high employee conscientiousness, as well close and supportive relationships between supervisors and subordinates enhance task performance. We can therefore begin to see that support, closeness, trust, and conscientiousness are desirable qualities in all workplace relationships, and that the best friend is one type of particularly beneficial relationship. Beyond the best friend relationship, however, there must be other types of relationships that are beneficial to well-being in the workplace. This forms the basis of the following research question.

2.2. Research question

Research Question II: What types of relationships are commonly experienced in knowledge work environments?

Sub-Research Question II: How do these relationships influence well-being?

2.3. Method

The research question has been investigated through contextmapping, as described in Sanders & Stappers (2012). This generative research method provides insight into the underlying explicit and implicit motivations of participants. Five knowledge workers from different contexts participated. Two were employees at MAPIQ, one of which works in a marketing function, and the other in a design function. Of the remaining three, one was a university faculty member, and the other two were Master students completing their thesis projects within companies in the Netherlands: one in a software company, the other in an engineering firm.

The workshop began with sensitizing and icebreaker exercises, after which the participants created a collage of persons important to them at work, and presented their collage to the group. As facilitator, I then asked questions to foster discussion. Following the discussion, participants created a sketch of their ideal workday, including how relationships fit into this day. The workshop ended with sharing these ideal workdays among the group. The script for the workshop can be found in the Appendix.

2.4. Results

All materials created by participants (sensitizing cards, collages, drawings, notes) were collected. The entire workshop was audio recorded.

Figure 11: Contextmapping workshop
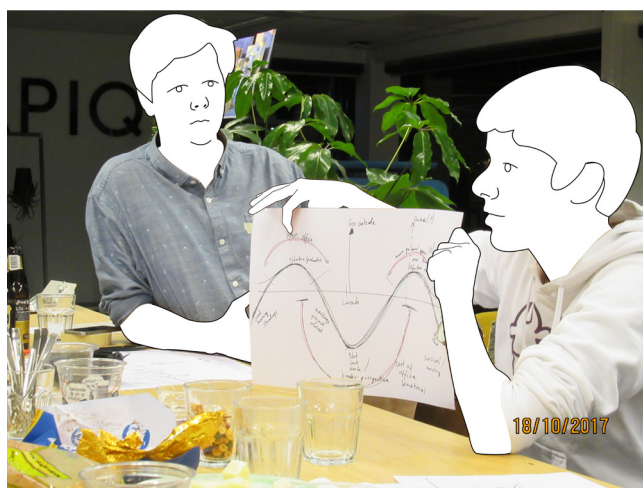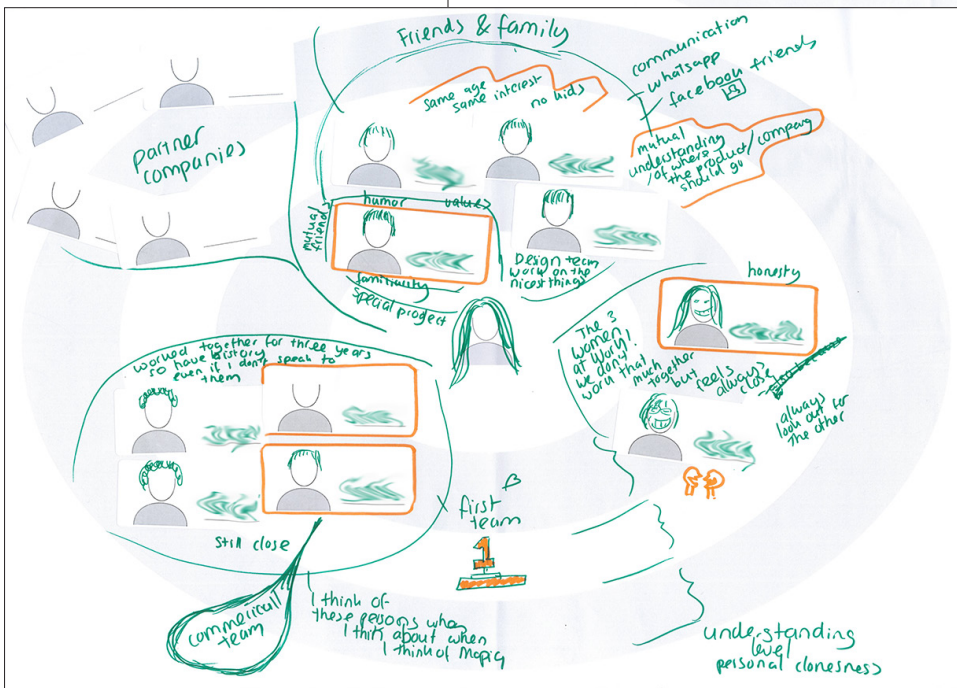*A workshop participant explains her representation of an ideal day at work.*

Figure 12: Relationship map collages
During the contextmapping workshop, participants mapped a set of relationships they experience at work in collage form.
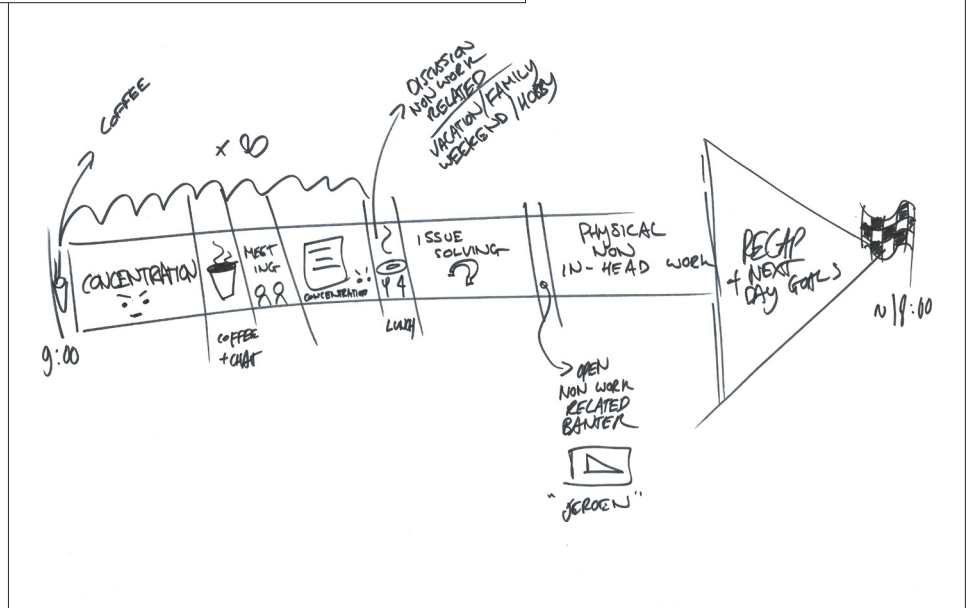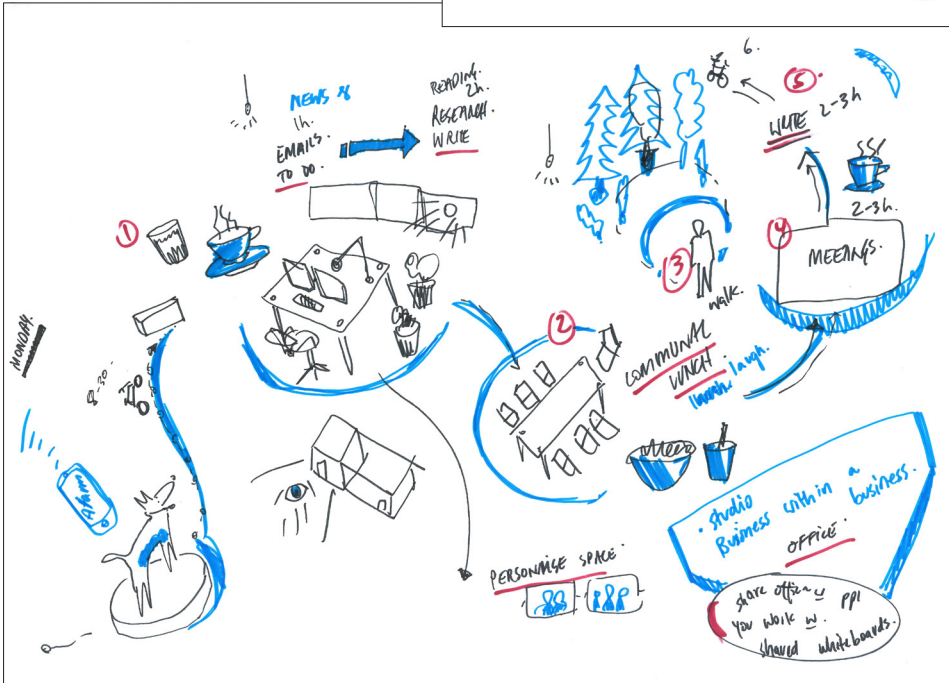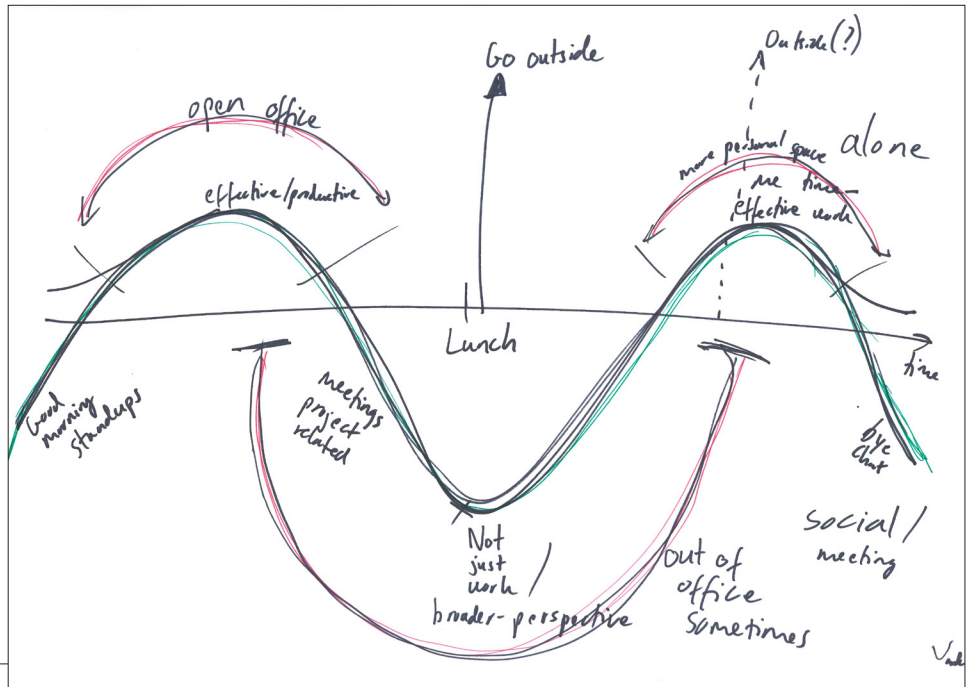
Figure 13: Ideal workday
During the contextmapping workshop, participants visualized their ideal workday, incorporating interactions wtih colleagues.

2.5. Analysis

The Analysis on the Wall technique from Sanders and Stappers (2012) was adapted to draw insights from the audio recordings of the workshop and from the artifacts made by the participants. These "Data" were processed into "Information", and then into "Knowledge", following the DIKW levels of sense-making (Sanders & Stappers, 2012).

Materials created by participants were photocopied, digitally scanned, and posted on a wall. The recordings were listened to in entirety and important quotes were transcribed onto individual sticky notes.

2.5.1. Types of relationships

By matching relevant participant quotes with their relationships maps, the following types of workplace relationships were identified. Each relationship explanation is followed by an illustrative quote from the workshop. While the relationships are listed separately, it is possible for one person to fulfill more than one role for a knowledge worker.

1. Team members

These are persons who work together with a knowledge worker on the same projects. A knowledge worker can be a part of multiple teams at the same time.

"With [him], I did two special projects, so we worked very closely together."

2. Interdependent colleagues

People whose work is interdependent with that of a knowledge worker, but who do not directly work on the same projects as that knowledge worker. Forming trusted relationships with these colleagues is not always highly prioritized.

"the commercial team ... they are actually pretty important in my job when I'm the marketing person, ... They don't feel that close so I don't share that much, and I don't know if that's necessarily good for work."

3. Mentors

Mentors are persons that offer guidance to knowledge workers. This guidance can be specific to certain work tasks, or can be broader, e.g. career advice, interpersonal relationship coaching. These persons can renew motivation for individuals.

"I sort of formed friendships with people who are not involved in my immediate work, but who have maybe a guiding, or a supporting, or a think-a-like mentality, somebody who's a bit older, who can mentor you, help you make some decisions."

4. Mentees

Mentees are persons that receive guidance from knowledge workers. By investing energy into mentees, the mentor can get energy in return.

"I have a lot of energy that I give to my students. I have a couple of master students that I supervise, and you give a lot of energy to them, and it's really nice because you get that energy back as well."

5. Best friend at work

Several of the contextmapping participants identified having a best friend at work. This is the person that a knowledge worker feels closest to a work. This relationship can have existed before working at the same place. It is not necessary that these persons work in the same group or on the same project. Not all knowledge workers experience this type of relationship in their workplace.

"I know her for ten years. We started our bachelor together, but she has been working [at my company] for four years now. She is there for work, for fun, for laugh, for relax, for everything, she's part of that group as well. I'm really lucky to have a friend at work."

6. External Family and Friends

External family and friends are often kept in touch with over the course of the workday. Participants make phone calls to these persons at the workplace and also exchange messages.

"I talk to family on a regular basis, to my parents, at least in the evening. Every evening I give them a call, at precisely 5:30 or 6:00 … It's also a relief for me when I talk to them … The way they speak sometimes gives a lot of strength."

7. Sparring partners

Sparring partners are persons whom a knowledge worker consults for critical feedback on ideas, work progress, and output. These persons are not directly involved in the same work and therefore provide a valued external perspective. These persons can work at the same company or be external contacts, and are valued for their critical minds.

"Today I interacted with a close friend. I discussed my project with him, and it gave me insight into how to the find the solution to the problem I was stuck with."

8. External colleagues at other companies

These are persons that knowledge workers interact with in the course of their work activities. They can be suppliers, clients, and partners. These persons can be interacted with more often than colleagues within one's own workplace.

"When I think about work, I also think a lot about the partner companies we have, and the contacts I have with them. I talk to them sometimes more often than my colleagues for an event, when I do a deep dive for example."

9. Passion-sharers

These are persons with whom a knowledge worker shares a passion for a work-related area of interest. These persons can
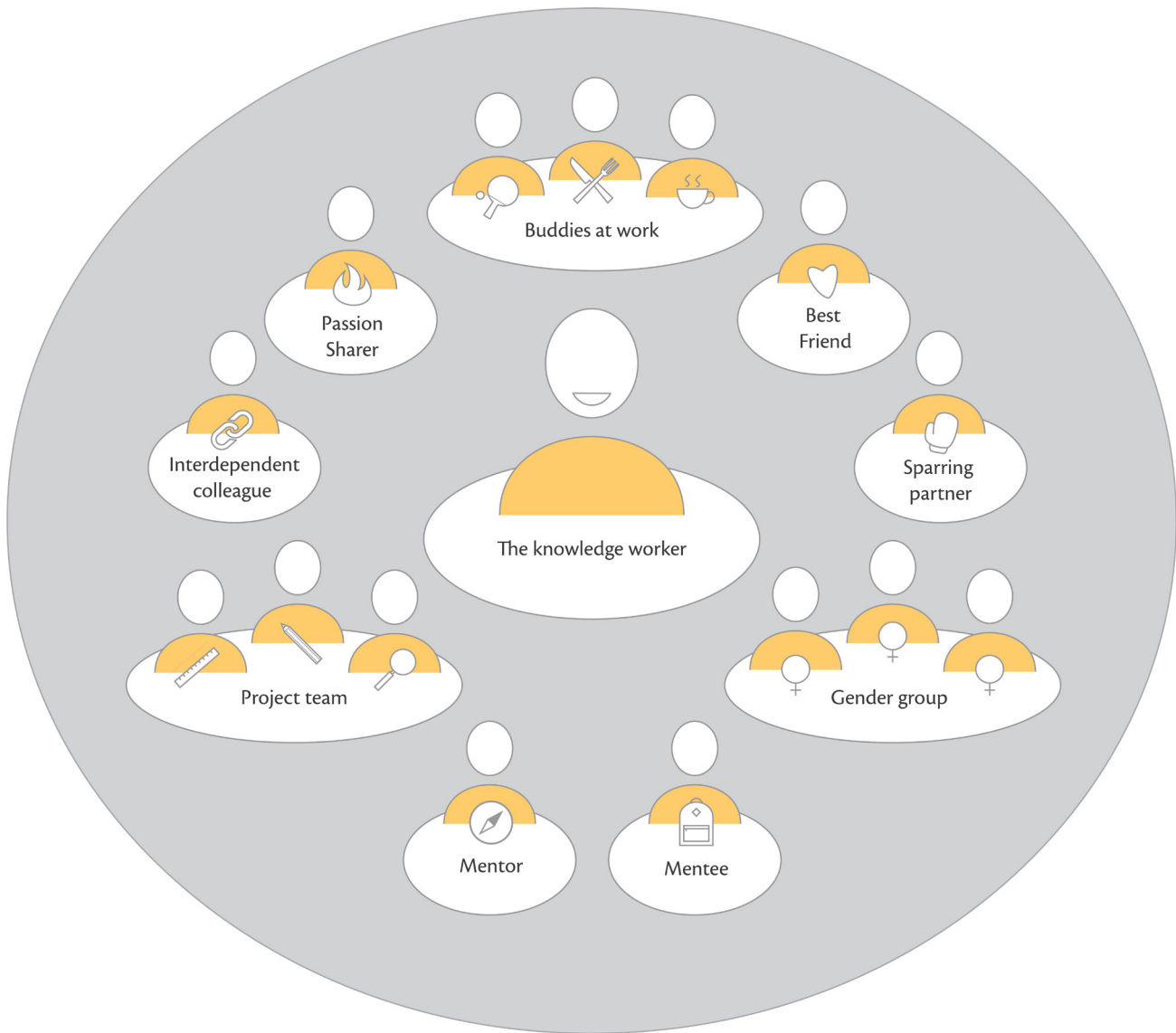
Figure 14: Relationships of a knowledge worker in the workplace
This graphic describes the different relationships that a knowledge worker can have with persons who have a frequent physical presence in the workplace. The existence and quality of these relationships can have a beneficial effect on well-being. One person can fulfill more than one role. A project teammember, for example, can also be a mentee. Not pictured are relationships with those who are infrequently present in the workplace, such as external partners or friends and family.

strengthen one's passion and motivation at work.

> *"Somebody who really shares a passion that I have, a research interest that I have, and also a drive that I have. It's the interest and the passion that's really important. If you just have the drive, but you don't have the same interests, then you sort of tend to not work with them as closely. So we have the same interest and the same, drive, and that's what brings us together."*

10. Buddies at work
These are colleagues that are at similar life stages as a knowledge worker and share common interests. They are friends who happen to also be coworkers. Having such persons at the workplace positively influences belonging.

> *"I think for me those are the people here who are the same age group, like the same things, don't have kids yet, and I feel the closest to this group just in terms of, these persons could be my friends without work. "*

11. Gender group
When a certain gender is under-represented in a workplace, a special relationship forms among knowledge workers of that gender. This kind of relationships positively influences belonging.

> *"Then over here I have the two other ladies. We have a lot of guys in this company, and we have two other [women], we're now four I think. But I don't know, there is some sense of closeness. I think it's only based on gender. Because I don't work with them a lot, I think we have no projects together, but still they feel close ... It's also about keeping track of each other"*

While all of the relationships mentioned above can play a role in the knowledge worker's work day, not all of them have a frequent physical presence in the workplace. External family and friends, for example, rarely physically enter a knowledge worker's workplace. And while at times external colleagues

do visit the workplace, this is rarely on a sustained, everyday basis. These external relationships will be excluded from consideration for enhancement, because of Mapiq's focus on offering products for the physical workplace. The remaining relationships, which can all be formed with persons at one's workplace, are visualized in Figure 14.

2.5.2. Relationship-based well-being drivers

To arrive at manners through which these relationships influence well-being, similar quotes were grouped together during Analysis on the Wall. Themes for each group were identified, and a statement for each theme was developed through multiple iterations, see . Statements took the form of a verb followed by an object and qualifier, e.g. "knowing someone intimately" or "having someone to rely on". These statements can be described as well-being drivers, and are described below. Each driver is followed by an explanation of how and by whom this need can be fulfilled, as well as by an illustrative quote from the workshop. The drivers are visualized in Figure 16.

1. Being able to act authentically
As identified in the well-being at work framework from Arantes et Al. (2014), knowledge workers have a desire to act authentically. Such behaviour can range from openly expressing joy to frankly voicing disappointment. Some knowledge workers are only able to act authentically with trusted colleagues in certain situations. Others are able to act authentically in a broader range of contexts. It appears as though the level of comfort in acting authentically varies with the number and quality of trusted relationships a knowledge worker has in the workplace. Having a Best Friend and other Buddies at Work increases one's ability to act authentically.

> *"When you arrive at the new company, you're a bit shy, and don't know what to do, but when I saw that [my best friend] dared to act like that, then I just started to be myself I think quicker."*

2. Feeling safe to express vulnerability and doubt
A component of acting authentically is to be able to reveal uncertainties and doubts, for which knowledge workers seek trusted colleagues, such as Mentors or a Best Friend, as well as a private space in which to have such conversations. The more intimate and trusted a relationship with a colleague is, the safer a knowledge worker will feel in exposing doubts and vulnerabilities to that person.

> *"I think maybe sometimes you have uncertainties that you're not willing to share with the whole group, and then you always have to kind of be explorative to try and align with someone else first to see if you're making sense in the first place. You're part of a bigger team, but you can't make the decision by yourself, you first have to kind of figure out whether what you're thinking makes sense in the first place, and then you want the personal space sometimes."*

> *"It has to be closed off, yea I think it has to feel like it's private a bit. I wouldn't have this conversation here at this table that much, I think."*

> *"It's also a checking moment. Sometimes I feel very strongly about something, 'I really disagree', but then I choose one of these four persons often to check like 'what do you think about it?', 'is*
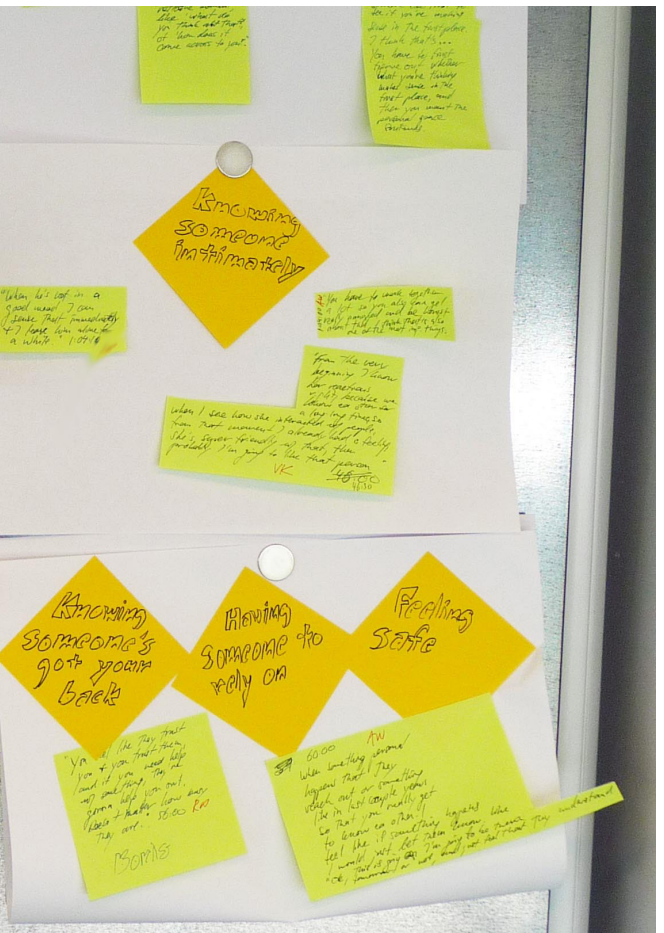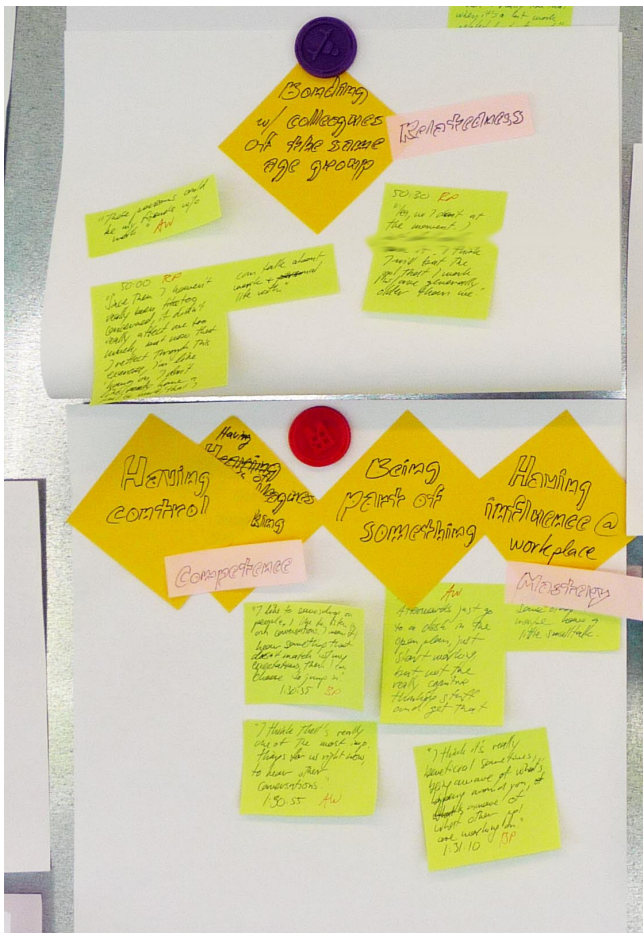
Figure 15: Contextmapping Analysis on the Wall

To analyze the data generated from the contextmapping workshops, I posted all materials created by participants on a wall (top left). I listened to the audio recording of the workshop in entirety and transcribed important quotes onto individual green sticky notes. I then grouped similar quotes together, which allowed me to identify themes (top right). For each theme, I created a statement on yellow diamond sticky notes (bottom). Through multiple iterations, I developed the statements into the well-being drivers described in this section.

*it really worth this strong reaction?', or 'what is your opinion?'
and then adjust mine."*

3. Feeling cared for and supported

This need is a manifestation of the universal psychological need for Relatedness. It is met when a knowledge worker feels that a colleague has his/her best interest at heart. This need can be fulfilled by mentors, coworker Friends, and the Best friend at work. The fulfillment of such a need can take the form of being offered assistance with work-related or personal matters. For matters that involve the work environment, mentors and friends with influence over a knowledge worker's circumstances at work are best suited to assist, for example by easing access to certain resources, or by acting as intermediary between colleagues. Persons without such influence, e.g. the Best Friend and other Coworker Friends can offer valuable support in other forms, such as for personal matters. Often situations arise that affect both work and personal environments. The more intimate a relationship, the broader the scope of support that can be offered.

"You feel like they trust you and you trust them, and if you need help with something, they're gonna help you out. It doesn't matter how busy they are."

"When something personal happens, that they reach out … so that you really get to know each other. I feel like if something happens, I would just let them know…, and just feel that they understand … An example, my boyfriend fell off his bike so he broke his bone, and then Jason just immediately calls me and says, 'Ok, I have this friend. He's also a doctor. What do you need? You can take your day off or stay with him', just give that space, so that you feel like ok, I can take that."

4. Feeling a sense of purpose

This desire is a manifestation of the element of Meaning that is present in both the PERMA framework from Seligman (2011) and the well-being at work framework from Arantes et al. (2014). This desire appears to be best fulfilled by interacting with persons external to a knowledge worker's workplace. This enables knowledge workers to gain perspective and observe the impact of their work.

"Then the roommates, the philosophical talks. They really push my motivation up. That's a very important thing. You need to understand what all of this is going towards, what are we working towards. If you have that clarity, and that peace of mind, then it's always good."

"For me it's not just the getting out. It's more interacting with other people I think. So it's not working outside the office, but get in touch with other people and work with them a little, which I had for example today, which was super cool & energizer."

5. Getting an outside perspective

Knowledge workers seek outside perspectives to advance their work. It can lead to breakthroughs on difficult problems, and can contribute to a knowledge worker's sense of

meaning. Knowledge workers seek out persons not involved in the same day-to-day activities for this perspective. It is most likely that these persons are sparring partners, yet they can also be others, such as mentors or coworker friends.

"Today I interacted with a close friend. I discussed my project with him, and it gave me insight into how to the find the solution to the problem I was stuck with."

6. Releasing tension and gaining clarity through humour

Humour can be experienced with any person a knowledge worker has a relationship with during working hours. Sharing a humourous moment with any of these persons can release tension. Gaining clarity from such a moment, however, appears to be restricted to humourous exchanges related to working topics. Nevertheless, whether the exchange results in new clarity or not, the humorous exchange does contribute to strengthening relationships.

"Sometimes you get tension that builds up, and then after you've had a laugh, you tend to have some clarity, because you realize, we've been too serious, obviously we should just do this."

7. Getting energized & Re-Igniting passion

This need can be fulfilled by mentees, mentors, and passion sharers. What appears is that some form of external validation is necessary for a passion to be fully felt. This validation gives the feeling that one is working toward a purpose that is shared, confirming that one's pursuit is worthwhile. The validation can take different forms, for example through in-person discussions, by reading articles that support someone's pursuit, or by sharing passion-relevant information in correspondence.

"And what do interactions look like with that person? Just a lot of forward thinking, like 'hey what about this?', or have you ever thought about researching this, or "I'm writing a paper and I found this new article that's just been published, it has a finding that relates to some of our work.""

8. Feeling relatedness through games

This need reflects a desire for non work-related play during working hours. Engaging in such play appears to occur most often between established coworker friends. Such play can stengthen existing friend relationships, as well as create new ones. Fulfilling this need strengthens feelings of Relatedness and Belonging.

"I think we do have the most interesting connection where we play foosball every once in a while, so you're the only ones that I have like a sporty, a competitive, a game-based relationship."

9. Having influence in the workplace

Knowledge workers have a desire for influencing the direction that their organization is taking, such as to align it with their own personally-defined purpose. To achieve this alignment, knowledge workers seek to have a say over the activities

Feeling safe to express
vulnerability and doubt

Getting energized &
Re-Igniting passion

Getting an outside
perspective

Feeling cared for
and supported

Feeling respected and
recognized as intelligent

Creating and maintaining
connections

Being able to act
authentically

Having influence in
the workplace

Feeling belonging without
needing to interact

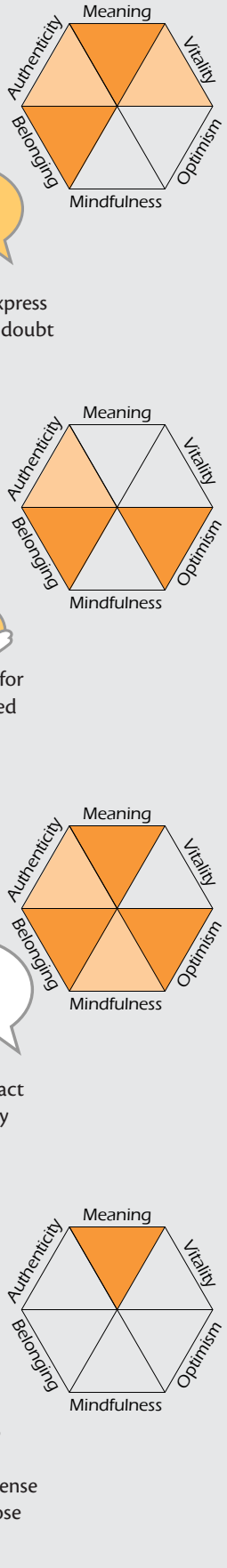Feeling a sense
of purpose

Releasing tension and gaining
clarity through humour

Onboarding quickly
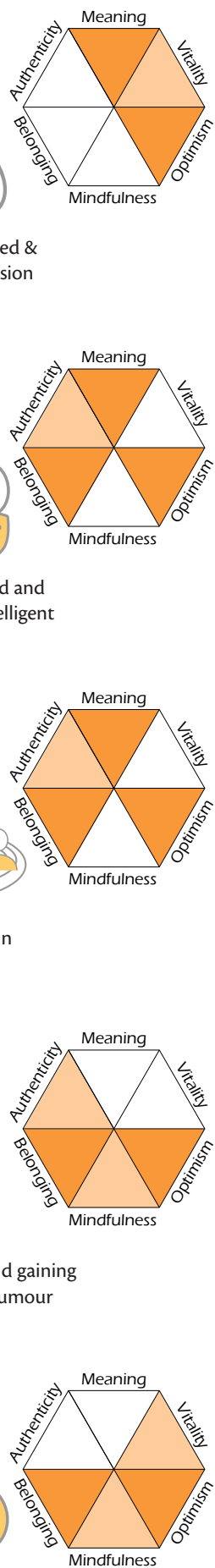
Feeling relatedness
through games

Figure 16: Relationship-based workplace well-being drivers
Knowledge workers experience an array of well-being drivers in the workplace, ranging from safety- and trust-dominant ones like "feeling cared for and supported", to diversion-based ones like "feeling relatedness through games". Each driver enhances a set of well-being dimensions, for example, "getting an outside perspective" enhances Optimism and Meaning.

that their coworkers are engaged in, as well as control over their own activities. This can take the form of jumping in on overheard conversations or taking an active steering role in group discussions. Underlying these actions is the universal psychological need for Competence. This activity is not restricted to being exercised with a particular set of persons. However, being better connected at the workplace appears to lead to a greater ability to exert influence.

"I like to listen in on conversations. I mean, if I hear something that doesn't match with my expectations, then I can choose to jump in."

"I think that's really one of the most important things for us right now, to hear other conversations."

10. Feeling belonging without needing to interact

This desire arises when knowledge workers seek envionments in which they can reach high levels of focus. This is often best achieved in places with some form of isolation, whether audio, visual, or social. Rather than isolating oneself completely, however, knowledge workers seek places where they can feel a sense of belonging from the presence of other persons, but where there is no expectation to engage in social exchange and where interjections from other persons are not expected. It can be difficult to find this environment in a company office, therefore knowledge workers seek external places such as cafes and coworking spaces.

"I know for me depending on what I'm working on, like if I'm writing a paper or something like that, I like to actually go to a cafe or something or go and sit somewhere where it's quite busy, but no one is actually going to interact with me, because then I can really focus on my work, and it's almost like a creative, I get in a creative mood again."

11. Feeling respected and recognized as intelligent

This desire stems from the universal psychological need for Competence. Judging one's own Competence comes not only from self-evaluation, but also from confirmation from others. This confirmation can come in different forms. For example, by a colleague engaging in an non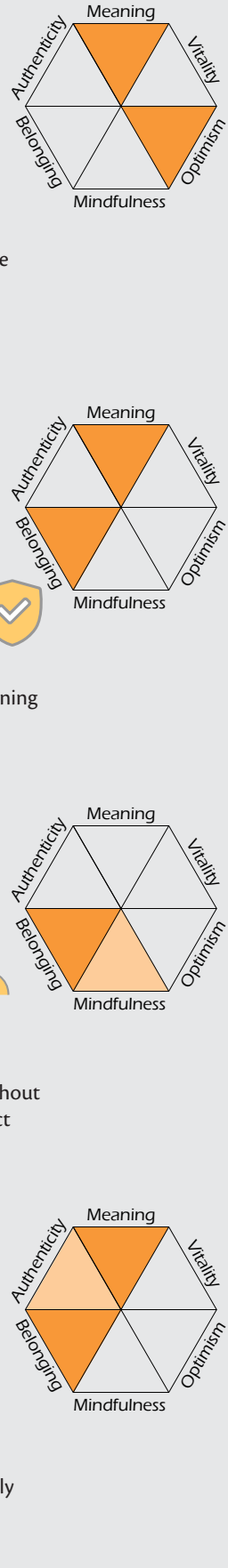-dismissive, rational conversation with a knowledge worker, or by a Mentor giving a knowledge worker recognition for completed work.
"I mean I respect and I like people, even if they have a different point of view, but when we have a discussion and they give me arguments, like 'this is the way I think', so give me reasons, then I 'aah, ok', makes me think."

12. Creating and maintaining connections

The relationships that a knowledge worker has are very valuable in getting to know other people in the workplace. A mentor, for example, can introduce a knowledge worker to influential persons in other work groups. Similarly, trusted persons can act as a liaison between a knowledge worker

and a group of collaborators that are not trusted to the same degree.

"[He] is also really important for me in the connection to the commercial team. [That team is] not on here because I don't talk to them that much, or I don't feel that close to them, but they are actually pretty important in my job when I'm the marketing person."

13. Onboarding quickly

Having Colleague Friends or a Best Friend relationship that pre-exists a knowledge worker's current working circumstances makes the onboarding process much faster than it would be otherwise. This applies not only to starting a new job a new company, but also helps in starting a new role or a new project. The exisiting friends' influence in onboarding is not limited to intentionally introducing the knowledge worker to key persons, places, and resources. It also acts in the following ways. By observing a friend's interaction with an unknown person, including body language and tone of voice, the knowledge worker can learn much about that unknown person and anticipate the kind of relationship that will develop between them. In addition, seeing how authentically a friend acts in the work environment gives the knowledge worker clues into to the type of behaviour that is acceptable, for example into how authentic one can be. The more intimate the relationship between a knowledge worker and a friend at work, the deeper the insights that can be gained from such observations.

"When you arrive at the new company, you're a bit shy, and don't know what to do, but when I saw that [my best friend] dared to act like that, then I just started to be myself I think quicker."

"From the very beginning I know her reactions, right, because we know each other for a long-long time, so when I see how she interacted with people, from that moment I already had a feeling. She's super friendly with that, then probably I'm going to like that person."

2.6. Discussion

The relationship-based well-being drivers can be linked to the relationships that give rise to them as visualized in Figure 17 and Figure 18. Such an analysis gives rise to two groupings. The first grouping is composed of relationships that by nature do not have a clear positive, negative, or neutral effect on well-being, beyond influencing Belonging. They group is visualized in Figure 17, and is composed of interdependent Colleagues, Project Team members, and Gender Group members. The effect of these three relationships on well-being depends on additional factors in the relationship, such as the level of support, closeness, trust, and conscientiousness experienced, as alluded to in the Literature Review.

The second grouping consists of relationships that by their definition have a clear positive effect on well-being. The group is visualized in Figure 18, and includes the following relationships: Mentee, Mentor, Passion Sharer. Sparring Partner, Buddies at work, Best Friend. Because of their beneficial effect, the relationships in this second grouping are desirable to support in the workplace. Among them, Mentees and mentors are relationships that many workplaces already formally encourage, therefore the greatest open opportunity for improving well-being at work may lie in fostering Passion Sharer, Sparring Partner, Buddy at Work, and Best Friend relationships.
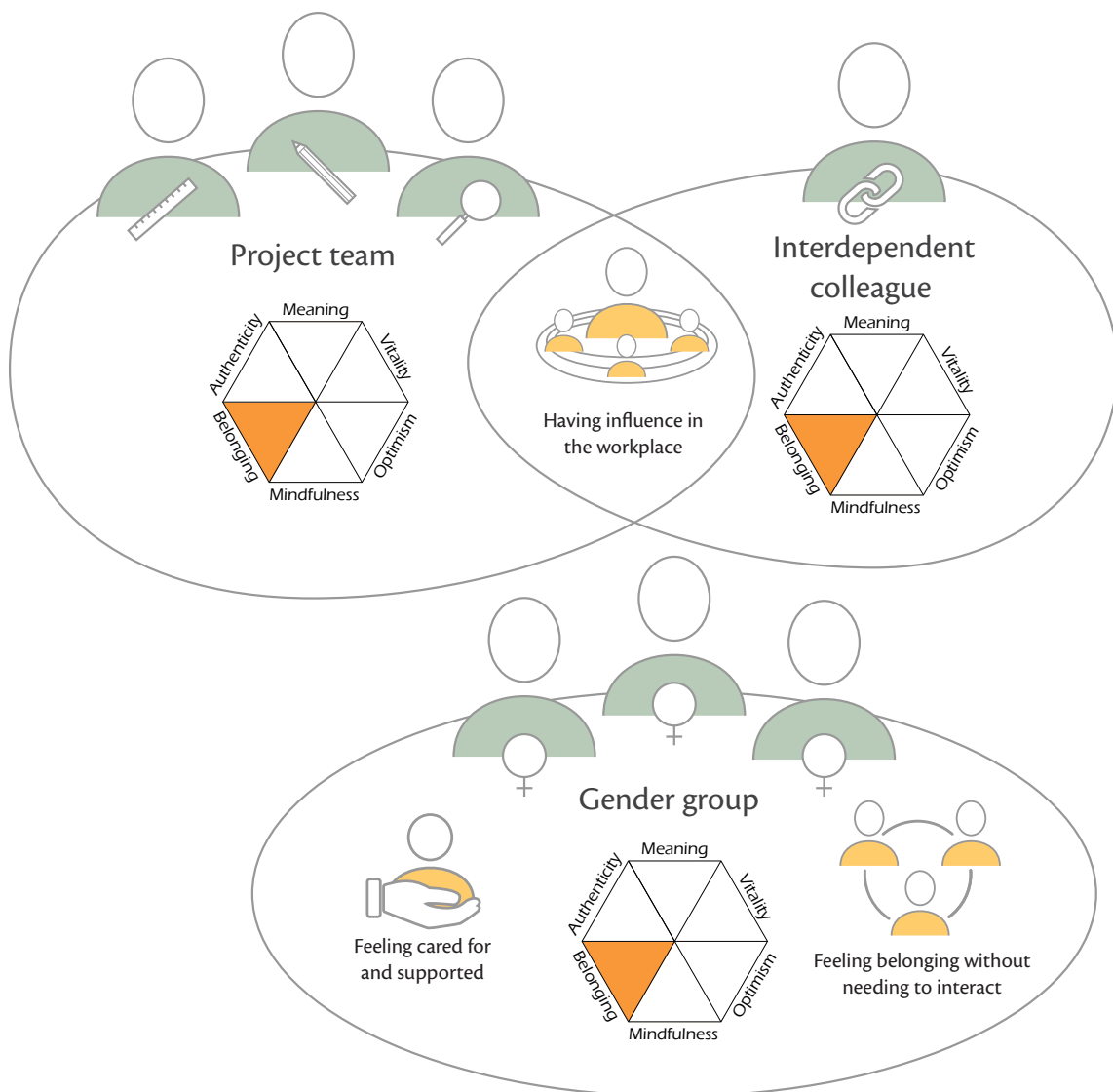
Figure 17: Relationships with unpredictable influence on well-being
By their mere existence, these relationships do not have have a predictable influence on well-being beyond enhancing Belonging. Further influence, which can be neutral, positive, or negative, depends on the quality of the relationships.

Mentee
- Getting an outside perspective
- Being able to act authentically
- Feeling respected and recognized as intelligent
- Feeling a sense of purpose
- Having influence in the workplace

Meaning / Vitality / Optimism / Mindfulness / Belonging / Authenticity

Mentor
- Feeling cared for and supported
- Onboarding quickly
- Feeling safe to express vulnerability and doubt
- Feeling respected and recognized as intelligent
- Being able to act authentically

Meaning / Vitality / Optimism / Mindfulness / Belonging / Authenticity

Passion Sharer
- Feeling a sense of purpose
- Getting energized & Re-Igniting passion
- Feeling respected and recognized as intelligent

Meaning / Vitality / Optimism / Mindfulness / Belonging / Authenticity

Sparring partner
- Feeling respected and recognized as intelligent
- Getting energized & Re-Igniting passion
- Getting an outside perspective

Meaning / Vitality / Optimism / Mindfulness / Belonging / Authenticity

Buddies at work
- Onboarding quickly
- Feeling relatedness through games
- Releasing tension and gaining clarity through humour
- Being able to act authentically
- Feeling belonging without needing to interact
- Feeling cared for and supported

Meaning / Vitality / Optimism / Mindfulness / Belonging / Authenticity

Best Friend
- Onboarding quickly
- Feeling cared for and supported
- Creating and maintaining connections
- Releasing tension and gaining clarity through humour
- Feeling safe to express vulnerability and doubt
- Being able to act authentically

Meaning / Vitality / Optimism / Mindfulness / Belonging / Authenticity

Figure 18: Relationships with high positive influence on well-being
By their mere definition, these relationships do not have influence on well-being beyond enhancing Belonging. Further influence, which can be neutral, positive, or negative, depends on the quality of the relationships.

2.7. Conclusion

This study investigated the types of relationships that are commonly experienced in the workplace, and evaluated the influence of these relationships on well-being. The intent has beeb to identify an area in which smart building technologies can be applied to add value.

Nine different relationship types were defined, and were shown to drive well-being through thirteen different factors, including "Onboarding quickly", and "Feeling cared for and supported". Among the nine relationships, six were shown to have a positive influence on workplace well-being, and are therefore desirable to foster. These are the:

• Mentee
• Mentor
• Passion Sharer
• Sparring Partner
• Buddies at work
• Best Friend

Within these six, smart building technology has the highest potential to foster the Passion Sharer, Sparring Partner, Buddy at Work, and Best Friend relationships, because mentorships programs are already in place in many workplaces.

Beyond identifying these specific relationship types, the study also found that support, closeness, and trust influence the quality of a relationship. The following study further investigates these factors and their effect on workplace culture, relationships, and well-being.

Study III - Trust in workplace relationships

3.1. Overview

As found in Study II, a key determinant of the quality of relationships between coworkers is the level of trust that they have for each other. Trust has multiple benefits. It has been found to improve perceived task performance, relationship commitment, and team satisfaction; trust has also been shown to negatively correlate with stress (Costa, Roe, & Tailleu, 2001). This section investigates the topic of trust at work through literature research, then explores via research through design how such trust can be stimulated.

3.2. Literature review

Defining trust at work

Literature has identified two types of trust that can exist between persons in work contexts. Drawing on the work of previous scholars, Blomqvist (1997) defines trust as "an actor's expectation of the other party's competence and goodwill". Competence trust encompasses the expectation one has of another's skill- and knowledge-based competence, while Goodwill trust encompasses the morality-based, open commitment that persons have between each other. McAllister (1995) makes a parallel distinction, referring to the two types as cognition-based and affect-based trust. Cognition-based trust is based on expectations of a peer's reliability, dependability, and competence, whereas affect-based trust reflects the existence of emotional bonds between individuals. Affect-based trust is built on the expression of genuine care and concern for the welfare of peers, on the belief in the extrinsic value of such relationships, and on the belief that these sentiments are reciprocated (McAllister, 1995). Organizational consultant Lencioni (2006) similarly distinguishes trust into two categories in the following description:

> In the context of building a team, trust is the confidence among team members that their peers' intentions are good, and that there is no reason to be protective or careful around the group. In essence, teammates must get comfortable being vulnerable with one another. This description stands in contrast to a more standard definition of trust, one that centers around the ability to predict a person's behavior based on past experience. (p. 195)

In this passage, the first, vulnerability-based type of trust is analogous to Goodwill trust, whereas the latter, more standard type is analogous to Competence trust. Lencioni's work further makes the case that goodwill, vulnerability-based trust has greater influence on team dynamics and work relationships than competence, predictability-based trust (2006). The passage above also shows that when vulnerability-based trust is in place, colleagues are able to act authentically with

each other, without being careful or protective. In Study I, Authenticity has been defined as a central dimension to well-being at work; therefore, it can be deduced that the existence of goodwill- & vulnerability-based trust between colleagues benefits well-being.

Building trust at work

Since vulnerability-based trust between coworkers positively influence well-being, it is highly relevant to investigate how this type of trust can be established. In 1997, Blomqvist acknowledged a research gap in this field, stating that "it would be most challenging in the future research to study how trust is assessed, signalled and created" (p. 284). Since then, academics and practitioners have shed some light on this question.

One such practitioner is Vivek Murthy, former Surgeon General of the United States under Barack Obama. To build such trust, Murthy suggests that leaders set the example, "demonstrating that vulnerability can be a source of strength, not weakness" (2017). Murthy also recommends creating opportunities for colleagues to learn about each others' personal lives, through formal or informal approaches.

One such opportunity for workers to demonstrate vulnerability and reveal elements of their personal lives is to tell stories. Arnaud Collery, founder of happiness agency Kikai Mining, supports this, stating that the only way to create trust between employees at work is to share stories (TEDx Talks, 2015). Further support comes from Heinen's multi-step model for building intimacy- and trust-based relationships (2017), in which sharing individual life experiences is the first step. One form of sharing such individual experiences, named "personal histories", is practiced by Lencioni (2012). In this exercise, each member of a newly-formed team answers the following three questions:

1. Where did you grow up?

2. How many siblings do you have and where do you fall in that order?

3. Please describe a unique or interesting challenge or experience from your childhood. (p. 28)

Lencioni finds success with this exercise, stating that even colleagues who have worked together for a considerable amount of time invariably learn something about each other (2012). Murthy integrated a similar session into his weekly staff meetings when serving as Surgeon General (Murthy, 2017). Each week, one member of his team would take five minutes to share something about themselves through pictures. During one session, for example, a former military man spoke about

his complex relationship with his father. Murthy observed several positive effects of these sessions, including that traditionally quiet team members began speaking up, that team members felt more connected to their mission, and that the team felt less stressed.

Heinen has also investigated the effectiveness of specific interventions to improve trust (2017). One of her concepts for encouraging cabin crew at KLM to act with more vulnerability towards colleagues and passengers was to show a video on the topic of vulnerability during pre-flight briefings. In this video, KLM colleagues discussed the positive effect of acting with vulnerability. This video, however, was not found to have much effect on cabin crew behavior and passenger interactions during a flight. Another action by Heinen, however, did. Heinen participated as a cabin crew member during two flights, wearing an "observer" pin, not an everyday sight during flights. The pin triggered curiousity among passengers, and led to interactions between passengers and the crew. This shows that introducing an unfamiliar person with an out-of-ordinary role into a known context is an effective measure for increasing interactions that lead to intimacy and trust.

The effective measures described above all involve an active, person-initiated intervention. The one more passive intervention, the video for cabin crew briefings, was not found to be effective. While the benefits of active interventions have been shown, they also require a resource commitment, often taking the form of a facilitator spending time preparing an activity, then convening the targeted persons for a specific time block to complete the intervention. This raises the question, can situations for sharing life experiences with colleagues be created with less active, less resource intensive stimuli?

3.3. Research question

Research Question III: How can office workers be induced to share life experiences and take emotional risk with each other through stimuli that do not require an active, person-based intervention?

Figure 4.2: Storycubbies concept
The intention is for each cubby to contain an object or photograph that a knowledge worker has a personal association with. The cubby shelf is placed in an area where knowledge workers already gather for social exchanges, in this case above the tea bags.

Method & Results

The above question has been investigated through Research through Design. In this method, designerly activities are applied to approach messy situations. The method provides the advantages of focusing on future preferred states, rather than on present or past states (Zimmerman, Stolterman, & Forlizzi, 2010).

Three concepts to investigate the research question were developed and tested in consecutive iterations. Each investigated the effectiveness of a different form of stimulus in a real office environment: Mapiq's workplace in Delft.

3.3.1.   Concept 1 - Story Cubbies

The concept is a physical shelf consisting of separate cubbies, in which knowledge workers can display an object that tells something about them. The cubbies are visibly displayed in a place where colleagues already gather for social exchanges. The objects are intended to trigger office workers to ask their colleagues about the personal association with their object.

Accompanying the cubbies is a sign that gives instructions for how to participate in the activity. In addition, when the concept is introduced, instructions for participating are given out loud to all office workers in a group setting.

The instructions are:

1. Think of an object or a photograph that tells a story about you.

2. Bring the object to the office and place it in a cubby of your choice. Label the cubby with your name.

3. Be ready to tell the story about your object when a coworker asks about it.

Assumptions

a. Seeing an unfamiliar object will prompt office workers to ask about it.

b. People will have an interest in participating.

c. People will make the effort to bring something from home.

Assessment & learnings

This concept was abandoned before launch, because of the challenges identified in getting office workers to bring an object from home. A person would need to remember to search for an object once removed from the office, and then remember to bring it to the office. This object could also be an object of daily use, in which case a knowledge worker would have reservations about bringing it to work and leaving it on display for several working days. These two moments are likely to take place outside of working hours, when a knowledge
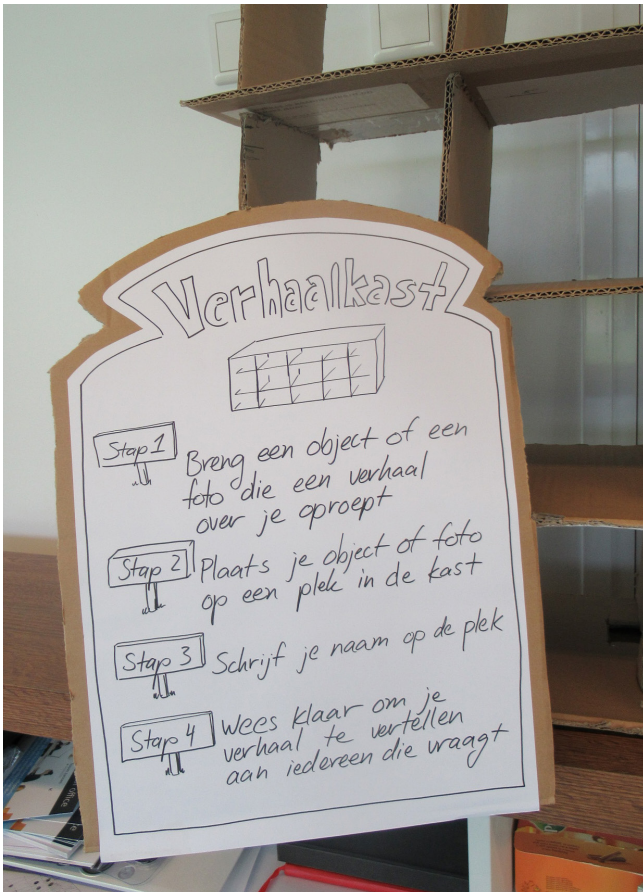
worker's mind can be far removed from the workplace. The task therefore has a high likelihood of being forgotten, and would require a facilitator to send reminders during non-work hours. These reminders, especially if sent through work communication media, are likely to be unread. Sending reminders through personal channels would also require the facilitator to have the knowledge worker's personal contact info, which is not always the case.

3.3.2.   Concept 2 - Storyboard

To reduce the hurdles identified for participating in Story Cubbies, the Storyboard was developed. Instead of bringing a physical object to the office, knowledge workers are requested to print and pin a photo to a whiteboard. The photo hints at a life experience of the knowledge worker. The whiteboard is displayed in an area where knowledge workers already gather for informal interactions. As with Story Cubbies, the intention is for the photos to trigger colleagues to ask each other about the life experience behind the photo.

The advantages with respect to Story cubbies are the following. In contrast to bringing an object from home, a knowledge worker can search for and print a photo at the workplace. Photos can also be sent digitally to a facilitator/curator for printing. Because searching and sending a photo can be done at work, the facilitator can also remind persons to participate during working hours, instead of outside working hours, as with Story Cubbies. Knowledge workers can be reminded in person, or through work communication channels. The work-time reminders are more likely to be received and acted upon than reminders sent outside of working hours.

Assumptions

a. Office workers will be comfortable publicly displaying a personal photo
b. Seeing a photo displayed by another person will prompt participants to ask the photo owner about the photo

Results

The Storyboard was piloted at the Mapiq office, it was initially placed at the rear of the office, where Mapiq employees gather to get tea bags. I announced the Storyboard concept and guidelines for participating at one of Mapiq's weekly Monday standup meetings.

The storyboard did not gain much traction. I placed a photo of myself with my grandfather on the board first. One of my thesis supervisors followed a few days later by posting a photo she had taken during a whale-watching trip. After a week at the rear of the office, I moved the storyboard to the

Figure 4.3: Storyboard Concept
The storyboard is a collection of personal images submitted by users of a workplace. The images act as invitations for people to ask about the personal lives of others, and for sharing details of their own. On this board, the author has placed an image of himself with his grandfather, and a coworker has placed a photograph from a whalewatching trip.

Figure 19: Storyboard Placement
The storyboard was placed in two different locations in the Mapiq office.
Top*: The storyboard began at the rear of the office, where employees gather to get tea bags and have occasional conversations. Two workplace users posted an image to the board in this location. No discussions about the posted images were observed here.*
Bottom*: The storyboard was later moved to the front of the office, where ad-hoc meetings and the weekly standup meeting takes place. One additional workspace user posted an image in this new location. No discussions were observed here either.*

bar table at the front of the office, in an attempt to increase participation. Mapiq employees regularly gather there for the weekly standup, for ad-hoc meetings, and for informal conversations. Nevertheless, the new placement did not significantly increase participation. Only a few days later did a Mapiq colleague post the third photo on the board.
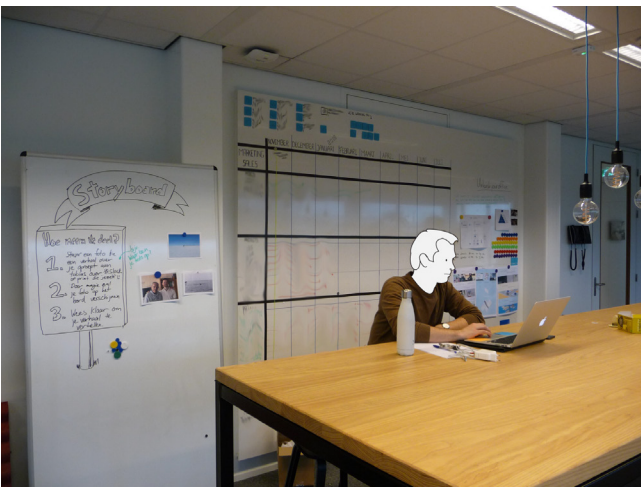
Part of this lack of picture submissions participation can be attributed to the lack of reminders. Beyond the initial announcement at the Monday standup, I did not make an effort to remind my colleagues at Mapiq to participate. Nevertheless, some did ask me if they should send me a photo, which only one person actually followed through on. The board did have some staying power, however, since after taking the board down, another colleague with whom I have a closer relationship asked me if he should still send me a photo.

The lack of participation can also be attributed to the public visibility of the photos. Some mapiq employees expressed reservations about posting a personal photo in a publicly visible space. In the Mapiq case in particular, the storyboard was placed in an area that is visible not only to colleagues, but also to visiting clients and external partners.

Beyond lackluster performance in receiving photos, the Storyboard was not successful in reaching the overarching goal of successfully triggering Mapiq employees to share life experiences with each other either. The only somewhat successful interaction I did experience was with my supervisor. I was standing in front of the board wondering about her photo, at which point I noticed her walking by to exit the office space. I chased her into the hall to ask her about the whale-watching photo. We walked up to the coffee machine, where she told me about how proud she was of capturing this shot with her analog camera. Now although I did feel that this exchange made us closer, it certainly did not take place at the Storyboard, and did not happen without me making a deliberate effort to initiate it. Besides this exchange, I did not observe anyone else exchanging stories triggered by the storyboard.

 Assessment & learnings

The physical Storyboard in itself was not successful in triggering employees to share life experiences with each other. It can be postulated, however, that combining the physical board with facilitator-based interventions could increase the likelihood of success. Two interventions in particular are proposed. The first   intervention involves motivating and reminding colleagues to contribute a photo. The second intervention consists in arranging moments to share the stories behind the photos.

In the experiment, I did conduct the first intervention, reminding colleagues to contribute, but with little success. The persons who did post photos were colleagues with whom I had an established, closer relationship. This suggests that if facilitation is to be done by a person, then that person will be able to generate more participation when he/she is more familiar and trustworthy to colleagues. This insight can be extended to suggest that a non-personal facilitator, such as a digital medium, will be more successful when it is familiar and trusted.

The second intervention, creating a moment to talk about the images, I did not actively test in this iteration. Creating such moments, however, is the focus of the next concept, which also takes into account the learning that people are hesitant to share personal information in a widely visible manner. More participation could be found by sharing experiences in a more transient manner. The following concept therefore explores the viability of impermanence through a story-telling session.

3.3.3. Concept 3 - Story Session

The third concept for enticing knowledge workers to share life experiences with each other consists of an actively facilitated session. Knowledge workers are gathered for a specified time period, approximately 30 minutes, and led through a story-telling activity using a worksheet. The stories are to be about non work-related topics.

Participants are divided into groups of four to five people and invited first to recall the different elements of their story using a worksheet. The worksheet calls attention to the context, to the events, and to the effects of what took place (see Figure 20). After a few minutes of preparation, each participant tell his/her story to the group. After all stories are told, each participant shares something that they have learned about another person in the group.

Results

The tested version of this concept revolved around telling a story about an accomplishment or an occurrence that participants are proud of. The session took place with Mapiq employees at a company-wide, off-site teambuilding event. After an afternoon of playing ice hockey and curling, employees gathered at a bar in Amsterdam for happy hour. After everyone had arrived and had their first informal conversations, I introduced the Story session with the assistance of one of my colleagues. Participants formed groups themselves, mostly with colleagues whom they were already engaged in conversation with. Group size varied from four to six people.

Figure 20: Story Session worksheet
Top: *The worksheet guides participants to recall elements of an achievement or an occurrence in their life that they are proud of.*
Bottom: *Mapiq employees fill out the worksheet at a Story Session during a company outing*

The session went on longer than the allotted 30 minutes. This was not an issue. Rather, I welcomed it as a sign that participants were enjoying the activity. We were in a relaxed environment with no time pressure: the session was the final planned activity for the day.

The storytelling did not stop after everyone went through their worksheet-based story. Some participants continued on to tell more intimate stories to their colleagues on a one-on-one basis. Ultimately, the session succeeded in reaching the overall goal of building stronger relationships between colleagues. Mapiq colleagues felt more connected to their peers after the session, as illustrated by the three following quotes :

> "The story made that person more friendly. I now understand why that person is that way. I want to help that person more as a result. I want to make sure everything is perfect for that person."

> "The effect was much greater than the session itself. Sharing stories was nice, but afterwards people told even more personal stories for the rest of the evening. That way I got to know one of my colleagues very well."

> "The people whose stories I heard are no more a blank canvas. The stories built their credentials and my respect for them. I see them as more of a person now."

Assessment & learnings

While the Story Session was successful in enhancing relationships, it did require a non-negligible resource commitment of time and people. Participants had to be assembled at a pre-determined time for a specific duration. In the tested case, two human facilitators were required to lead the activity.

Moreover, the success of this concept has negligible research value. It can be seen as a control concept, which verifies what Murthy (2017) and Lencioni (2012) have shown, that via a purposefully-designed & time-specific activity, sharing life experiences does improve trust.

Figure 21: Story Session with Mapiq
Mapiq employees share stories about a non-Mapiq related accomplishment or occurence that they are proud of. The session succeeded in building closer relationships between colleagues.

3.4. Discussion

The following are the key takeaways from the three tested concepts.

1. Completely passive stimulus is not effective

A posted photo or placed object still requires much active effort to lead to a meaningful conversation. A person would need to first find themselves in a situation with the owner of the stimulus, then would need to make an active effort to recall the content of the stimulus, and then would need to specifically ask about it. This is a rather specific procedure, that if left up to take place organically, is unlikely to be engaged in when work priorities abound, except perhaps by persons with a deliberate intention to improve relationships at work.

2. Contribution needs to be made quick and easy, and possible on the spot

In any case, making a personal contribution, such as submitting a photo for a storyboard, needs to be possible on the spot, for example by uploading a photo from a mobile device. Otherwise again, the barriers for participation are too high when taking into consideration work priorities.

3. Visibility of stimulus should be bound to the people who are there, and limited to the time intended for the activity

Participants expressed hesitation about posting personal information publicly for other office occupants to see at any time. It is therefore recommended that any information submitted only be shown at the most relevant moments, i.e. when the owner of the information is present.

4. People are more comfortable sharing personal stories in non-work settings, particularly outside of work hours

This implies that most forms of stimulus can be expected to be more effective when shown in informal settings, when the mind is not intending to work. Such setting can include break areas, cafeterias, happy hours, and off-site activities.

3.5. Conclusion

This research study addressed the gap in knowledge about how to create vulnerability-based trust among knowledge workers. In particular, through research through design, different levels of analog stimuli were tested for getting knowledge workers to share stories of life experiences with each other. The stimulus ranged from passive office furniture to a workshop facilitated by two persons.

The study found that the tested passive means were not able to stimulate exchanges of personal stories, but that a person-facilitated workshop was. This confirms findings from Heinen (2017).

These findings could be interpreted to imply that smart-building technology will have a difficult time replacing skilled persons in fostering vulnerability-based trust in the workplace. This study, however, explored only a limited range of non-person stimuli, which were both analog. Digital technology, in contrast, has the potential to provide more active stimuli, therefore it is recommended to conduct additional studies that test such stimuli and take into account the learnings of this study. The resulting findings can build toward the formation of a consensus about the effectiveness of technology in fostering vulnerability-based trust.

Study IV - Mapiq Company Analysis

4.1. Overview

As identified in the project introduction, a primary objective of this graduation project is to add value to Mapiq's product offering through a concept that enhances well-being. The preceding studies focused on areas of opportunity within well-being, and this study focuses on Mapiq. By analyzing Mapiq's existing product portfolio and gaining insight into the company's strategic goals, this study identifies opportunities to enhance Mapiq's value proposition.

4.2. Company background

Mapiq takes root in Virtualock, a software product envisioned by two TU Delft alumni in 2009 to address laptop theft on university campuses. Virtualock used motion sensor technology in laptops to detect unexpected movements. When engaged, a laptop unexpectedly lifted off a table would sound an alarm, and notify laptops nearby that a theft was underway. Virtualock used Wi-Fi technology to identify which laptops were nearby.

Despite signing up some university clients, Virtualock did not present sufficient market potential, so the founding teammembers looked for other opportunities to apply their expertise. They saw an application in workspaces, and created what would later become Mapiq. In 2013, Mapiq piloted a workplace availability solution at the faculty of Industrial Design Engineering at TU Delft. Later the same year, Mapiq launched a room booking solution at the TU Delft library.

Since then, Mapiq continues to provide its product to universities, as well as to municipalities, but has shifted its focus to large, modern corporate office spaces. Notable clients in this target group include Deloitte, with its office in The Edge, coined the world's most sustainable building, Mapiq is continuing to grow both its client base and number or employees.

4.3. Product portfolio

Mapiq offers both software and hardware products. Mapiq's software portfolio can be distinguished into three different products, two that are relevant from the perspective of an office space user, and one that is geared toward facility managers. The first, Web, is an application that is accessible from browsers on most internet-connected devices, including laptops, tablets, and smartphones. The second, Mapiq Now, is a native application for iOS and Android devices. For facility managers, Mapiq offers an analytics dashboard that is accessible via Microsoft's Power BI platform.

Behind these products sits Mapiq's core software platform, which integrates a variety of information and control capabilities from other value providers into one user interface, using the power of Application Programming Interfaces. Such integrations, for example, can allow a Mapiq user to control the lights in a workspace, even though the lights and their control systems have not been provided by Mapiq.

4.3.1. Mapiq Web

The web application is offered to clients with one core module, to which several optional modules can be added. The modules delivered are chosen during the sales process, and vary from client to client (more details in section).

Modules

1. Core
The standard module is a custom-built 3D map of a client's office space. In the map, key places and resources such as meeting rooms and printers are individually labeled. Included in the core is wayfinding functionality, which provides users with step-by-step instructions for reaching key places.

2. Places

The places module offers users the ability to perform several functions, namely:

a. Room Booking

When implemented at a client, users can reserve meeting rooms for specified time periods with Mapiq. Users input a specific time and date for a meeting, and Mapiq returns a list of all meeting rooms, in which meeting rooms that are not available have been grayed out. Mapiq does not function as a stand-alone booking system separate from other offerings. Instead, Mapiq's integrations allow it to read from and write to a client's pre-existing room-booking systems, such as Microsoft Exchange.

For clients that have occupancy sensors installed in meeting rooms, Mapiq can display real-time use. Meeting rooms that have been reserved but are not being used appear as no-shows to MAPIQ users, who can choose to use the space. This results in more efficient use of physical space in an office.

b. Workplace finding

To make it easier for an office user to find an available workplace in flexible work environments, Mapiq can show a measure of the occupancy of certain zones. This measure is based on the number of persons detected in a zone compared to the total number of workplaces. The level of detail of this measure varies from client to client. Mapiq can locate persons using bluetooth beacons, Wi-Fi, or its self-developed desk occupancy sensor.

3. People

In the People module, a user can see a list of colleagues that have checked into the workplace using Mapiq. Alongside a person's contact information, Mapiq also shows where that person was last "seen" by Mapiq. Persons are localized using bluetooth or Wi-Fi technology, but not by default. Users must opt into the feature. Users can also manually check into places with a button in the web application.

4. Events

In the Events module, users can see public events that are scheduled at their workplace. The location of the event is shown, which a user can click on for wayfinding instructions. Here again, the event information is made available through integration with other software plaforms.
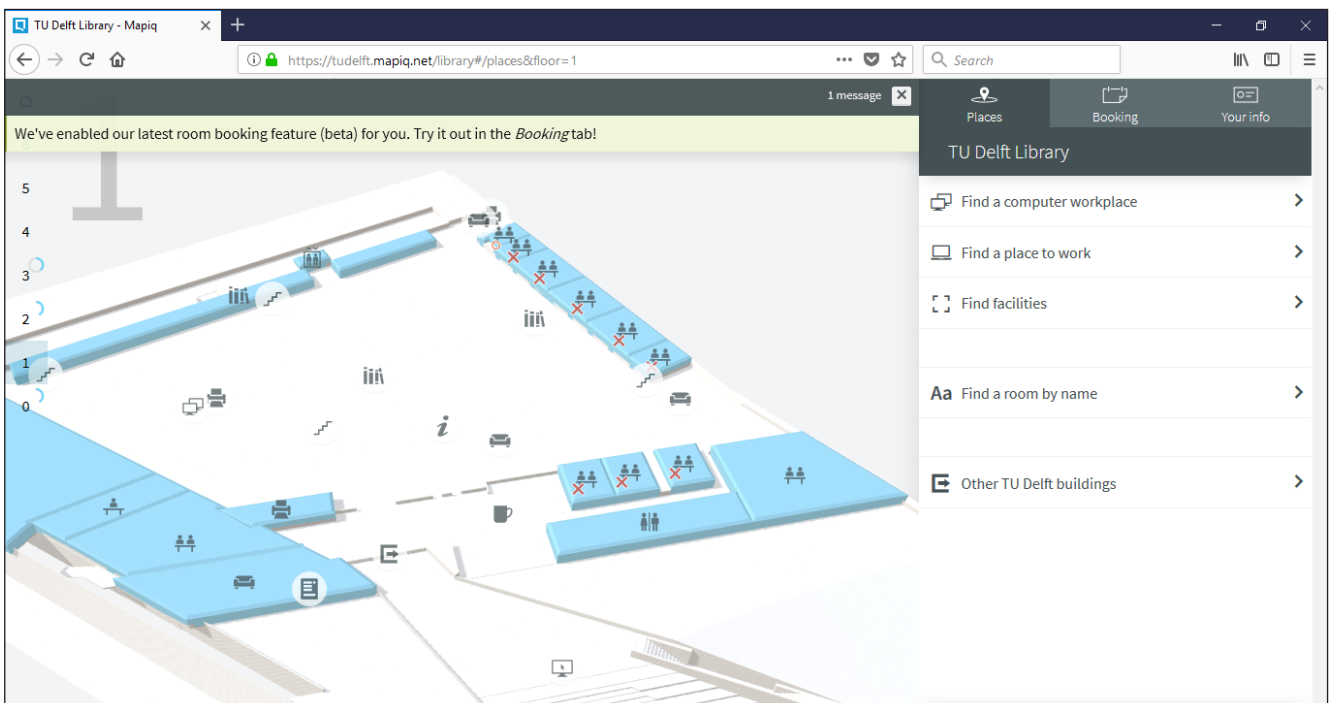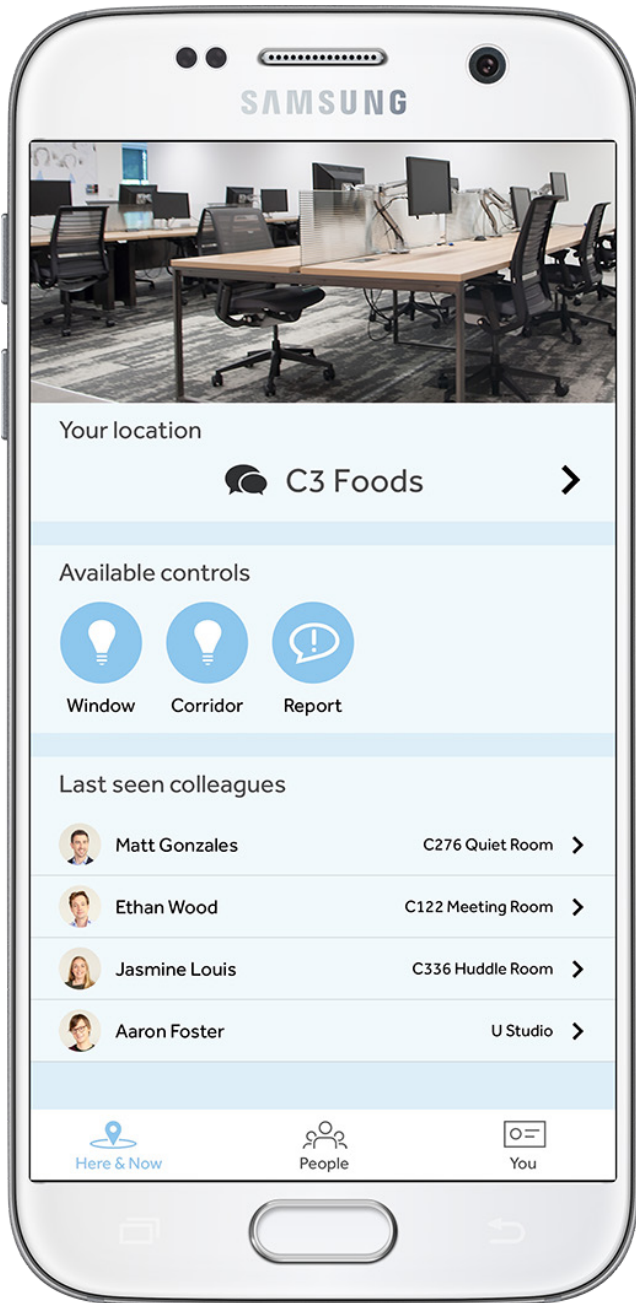

Figure 22: Mapiq Web at the TU Delft library
The Mapiq core product is a 3D visualization of a building, in this case of the library at TU Delft. It is accessible via internet browsers. Each floor can be viewed separately. TU Delft has elected for the Mapiq Booking module, which allows students to book conference rooms in the library.

Figure 23: Mapiq Now

Mapiq's recently launched native application, which runs on iOS and Android devices, offers office end users personal, need-based capabilities. For example, a knowledge worker can adjust lights above her workspace, or find a place to meet with colleagues at a moment's notice.

4.3.2. Mapiq Now

Mapiq Now is a more recent offering, with focus on providing personal, need-based solutions to the knowledge worker. It is a native application that runs on Android and iOS devices. At time of writing, Mapiq Now is being piloted with several clients with limited functionalities. As with Mapiq Web, the functionalities offered to end users in Mapiq Now vary from client to client. The vision is for Mapiq Now to offer the following functionalities:

1. Comfort control - control your environment: lights, temperature, blinds.

2. Issue reporting - report problems or opportunities you see in the workplace

3. Meeting places - find a place to meet with your colleagues today
Based on user inputs such as number of people, meeting duration, and required equipment, Mapiq suggests places to meet closeby.

4. Workplace finding - find the best place for to get your work done
Based on the type of task a user wants to get done, the people he needs to get the task done, and other relevant factors, Mapiq Now provides a curated selection of available workplaces determined to best suit his needs.

4.3.3. Analytics

Mapiq's analytics dashboard, which is accessible via Microsoft's Power BI platform, presents room occupancy, workspace availabilty, and other relevant data in graphical form. Facility managers can use this information to make more efficient use of the office space, for example by turning an under-used meeting room into an open, flexible desk area.

Currently, the data displayed in Analytics is primarily centered around room occupancy and workspace use. With Mapiq's integration capabilities, however, there is potential to show a greater variety of data, which could be of interest to parties other than facility managers.

Figure 24: Mapiq Analytics
Mapiq presents historical meeting room, workspace, as well as other resource utilization data in Microsoft's Power BI platform. Facility managers can use this information gain insights into how their workplace is being used, and get ideas for how to increase efficiency.

4.3.4. Physical touchpoints

Mapiq Now and Mapiq Web are commonly accessed from personal devices, e.g. smartphones, tablets, and laptops. Besides these personally accessible interfaces, Mapiq offers three touchpoints that are more publicly accessible and visible. The first is the desk sensor, a physical presence sensor with a signal light installed under individual desks. When the sensor detects someone sitting at a desk, it turns from green to red, indicating the desk is occupied. Users can also manually change the status of the sensor with a button, e.g. to free a desk when it is no longer needed. Beyond the physical light, the occupancy information is also relayed to the Mapiq software to be used for workplace availability calculations.

The second publicly accessible touchpoints are digital screens installed outside individual meeting rooms. These screens show the availability of the meeting room, and allow users to book time slots anonymously.

The third publicly accessible touchpoints are stand-alone kiosks. These are installed at certain clients in key traffic areas, such as building lobbies or entrances to meeting centers. Currently these kiosks offer users access to Mapiq Web, but without log-in capabilities.
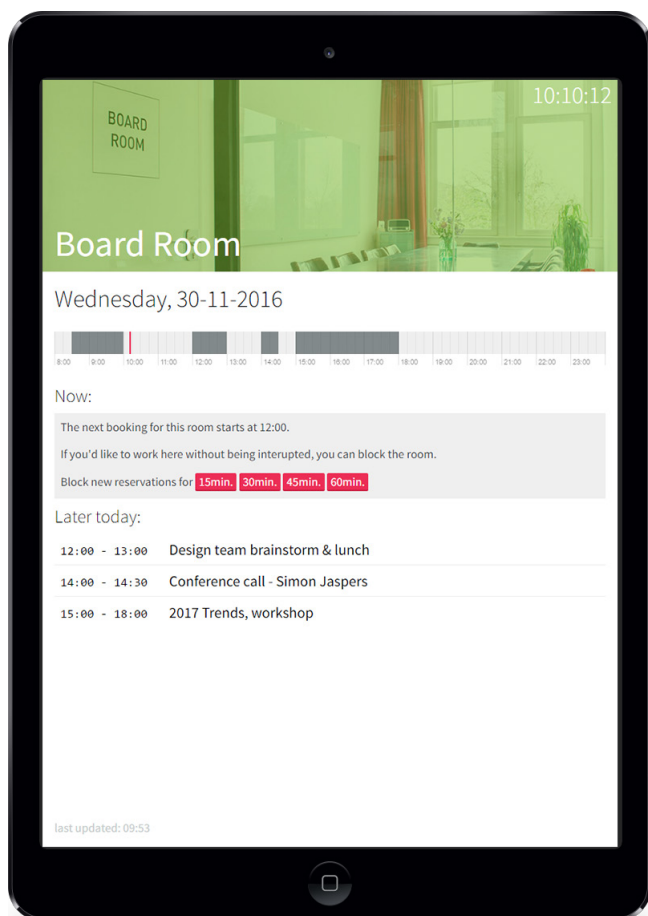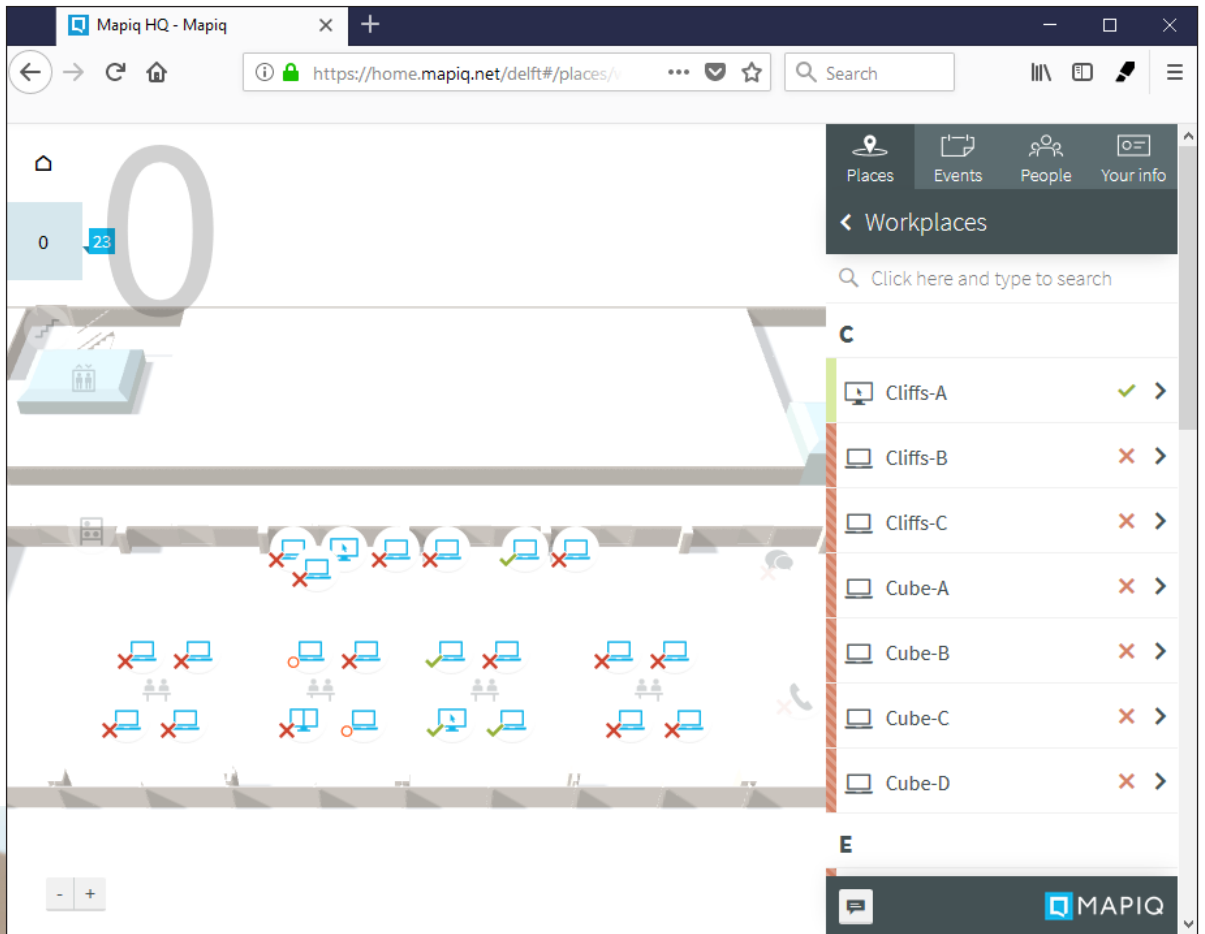

Figure 25: Meeting room screens
For clients that have digital screens installed outside of meeting rooms, Mapiq displays the availability of the meeting room, and allows users to book time slots anonymously.

Figure 26: Mapiq Kiosks
Some Mapiq clients opt for physical touchscreen-based kiosks, on which Mapiq Web is accessible to all passers by.

Figure 27: Mapiq desk sensor

The sensor is installed under individual desks and detects presence of a person. Shining red indicates occupied, and shining green indicates free. The sensor also relays the information to Mapiq's software platform, which allows an end user to browse for an available workplace in three ways: on Mapiq Web, through Mapiq Now, and by visually scanning an area looking for green lights. The occupancy data is also stored to give occupancy insights in Mapiq Analytis.

4.3.5. Portfolio Analysis

Figure 28 differentiates Mapiq's products & touchpoints according to their level of visibility and the level of personalization in their content. In the top right are Kiosks installed in central locations, which currently provide users the same capabilities as Mapiq Web, but without logging-in. On the other extreme is Mapiq Now, which provides personalized information on one's private smartphone. This mapping shows that Mapiq is not yet providing any personalized functions in a publicly visible way.

Another distinction between the products can be made according to the amount of control given to the end-user and the immediacy the products provide. On one end lies Mapiq Web, which can be likened to a mission control center where anything is possible, but where a user also needs a certain level of expertise to make the most out of the application. To make a room booking, for example, users need to sort through all available options and make a choice themselves. This control level of control can be handy for planning in advance, when there is time to consider the options. It risks, however, overwhelming users with choice, particularly when a place needs to be found at moment's notice.

On the other end lies the vision for Mapiq Now, which is to be the go-to resource for office users to resolve their immediate needs. Such needs can include:

- I need to make a phone call now, where can I find a quiet place?
- I need to quickly discuss this graphic with my colleague. Where can we do this without bothering others?
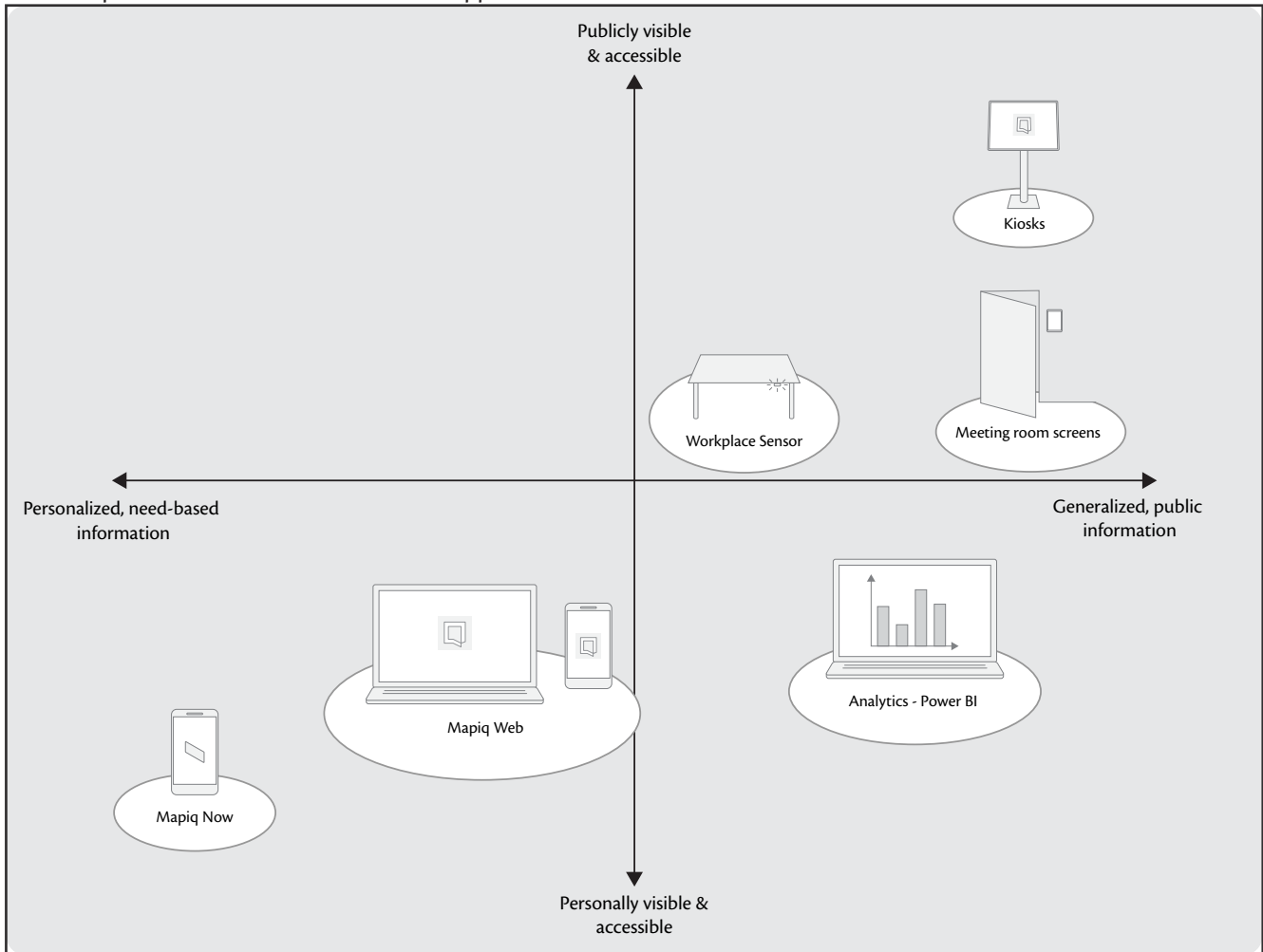- I want a quiet place now to work on my report. Please take me there!

While a user may know his way around Mapiq and be familiar with the different places in his office, he may not have the expertise to choose a place that will best suit his or a group's needs. Mapiq, however, is building this expertise and plans to apply it in Mapiq Now. The native application is intended to provide a curated set of options that is best suited to a user's personal preferences and task-based requirements, rather than displaying an exhaustive list of options. The mission is to cut through the clutter so that office workers can focus on getting things done.

While such need-based curation is not yet offered in Mapiq Now, Mapiq has taken a first step in this direction by piloting suggestion-based room booking at the TU Delft library, beginning in December 2017 in the Web application. To book a room with this new function, a user inputs the length of time she wants to meet for, the number of people she will meet with, and a span of during which she would like to meet. Mapiq then returns suggestions for meeting rooms that take into account all of the inputs above, plus the user's location. This is the first step in facilitating users in making ad-hoc, day-of use of office resources. Mapiq intends to continue to lend its expertise to guide workplace users in making choices that best suit their needs.

4.4. Company mission & positioning

Mapiq's mission is to be the go-to resource for office workers to get the most out of their smart office. The company vision and mission are interpreted visually in Figure 29.

> "The big idea of Mapiq is to make the agile workplace really work, and provide people with the facilities they need. It's about finding where your teams are, where your workplace is, whether there's a parking place available" - Mapiq CEO

Mapiq wants its touchpoints to make end users happy and to generate word of mouth. In such a way, desire for Mapiq can be driven from the ground up.

In addition to providing products, Mapiq is positioning itself as a subject matter expert and thought leader in ways of working. Mapiq publishes white papers, writes blog posts, and speaks at conferences to share its knowledge and views on developments in the field. With this angle, Mapiq establishes its credibility in the field, which in turns leads facility stakeholders and end users to trust that Mapiq is the solution for making the agile, activity-based workplace really work.

Figure 29: Mapiq vision and mission

An overarching vision for Mapiq has been arrived at by having conversations with Mapiq executives and employees about their own individual visions for Mapiq. The overarching vision can be distinguished into two categories: product vision, and company vision. The vision for the product is to be the go-to resource for office workers to get the most out of their smart office. The product is to be highly desirable and generate word of mouth, such that it is known and wanted by office workers who do not yet have Mapiq. The vision for the company is to be the trusted building system integration partner for clients to reap the most benefits from their flexible and activity-based workspace.

4.5. Discussion

Mapiq has a strong vision, yet faces several challenges, as visualized in the SWOT in Figure 30. Mapiq is striving to be the go-to resource for knowledge workers to make the most out of their agile workplace. One key challenge is to increase end use of Mapiq touchpoints, and a key opportunity for doing so is to increase end use cases. Mapiq is currently enabling primarily practical and tangible use cases, e.g. finding a place to work and booking meeting rooms. Mapiq does offer some softer use cases, such as finding colleagues or viewing upcoming public room bookings, yet these can be greatly expanded upon.

Another step in creating happy end users is to make the actual end use cases enjoyable. Mapiq has identified a key strategy for doing so: reducing decision load by providing intelligent suggestions. This capability is already in pilot form for room bookings, making it easier for knowledge to focus on their work rather than on sorting through endless options. Continuing to build such functionality into additional Mapiq modules and use cases is a key opportunity to make Mapiq the solution of choice among end users.

An additional key opportunity for Mapiq to increase end use is to unify the experience across its touchpoints. The various touchpoints currently afford varying depths of end use cases and are sometimes interpreted as disparate systems. Booking room screens, for example, allow only for booking one room anonymously without giving any other Mapiq options. Similarly, the desk sensor's feedback to the Mapiq platform is not obvious to end users. By making the connections between these touchpoints more clear, and by creating more overlap between the possibilities afforded by each, Mapiq stands the chance to increase end use.
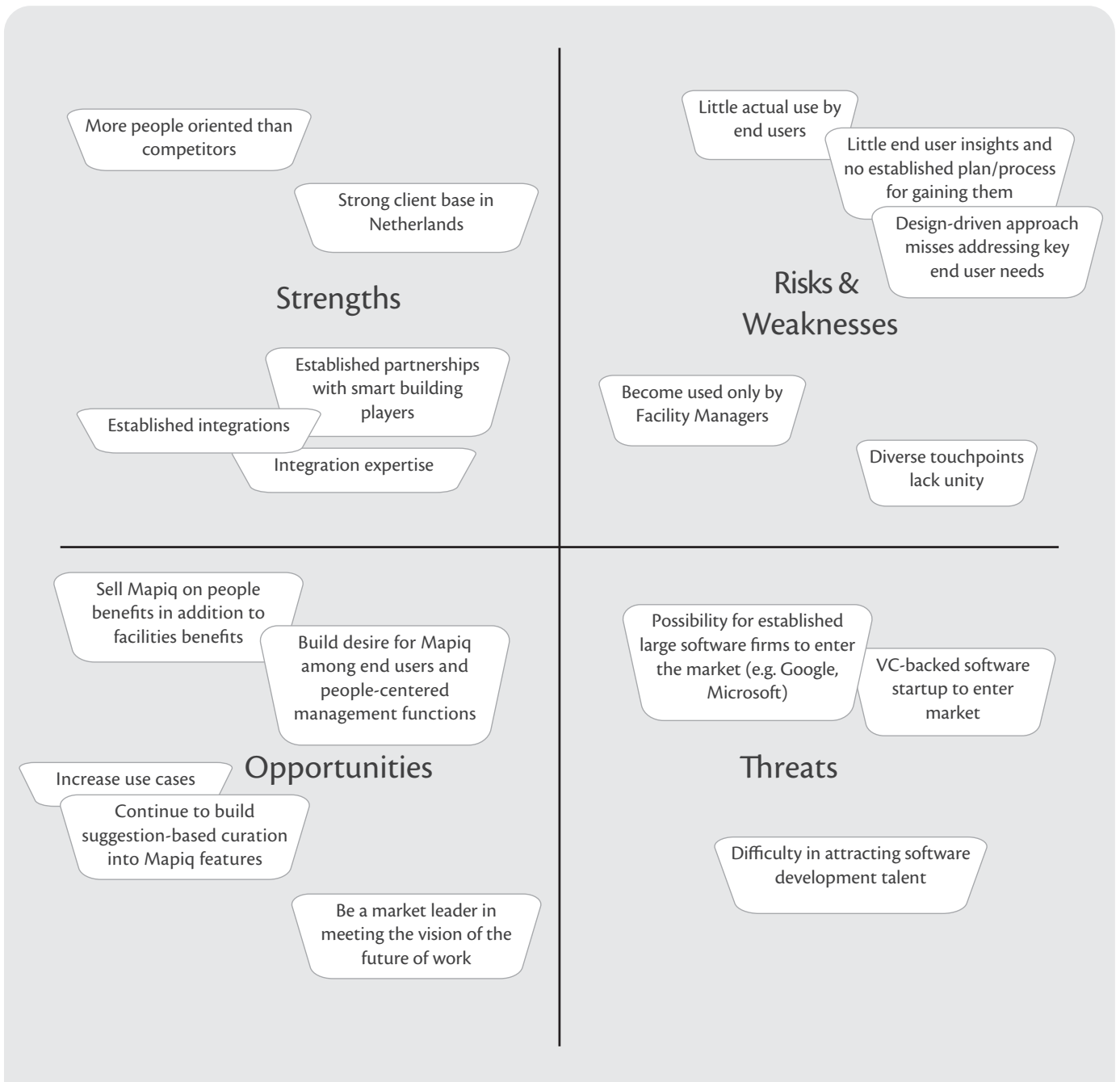
Another challenge that Mapiq faces lies in the sales rationale. Currently, decisions to buy Mapiq are made primarily by Facility Managers and Executives interested in making more efficient use of their resources. These parties are drawn by

Mapiq's Analytics platform, which enables them to optimize the use of their space in the face of high real estate and energy costs. Business cases for Mapiq are straightforward to make based on this rationale. Correspondingly, these business cases form the main content of Mapiq sales materials, such as sales pitch decks. Mapiq, however, also wants to be desirable for its people benefits. The challenge is that the business case for Mapiq's people benefits is hard to make. It lies primarily in increased productivity, which Mapiq finds hard to quantify. An alternative, then, is to creating desire among parties that are driven by people benefits. Such parties can include not only other management levels, such as Human Resources, but also the base level of knowledge workers. The key opportunity to drive potential clients to choose Mapiq for its people benefits is then to appeal to people-centered top level management functions as well as ro the grassroots organization.

4.6. Conclusion

This study's objective has been to identify opportunities to enhance Mapiq's value proposition and to meet its stategic objectives. Through product portfolio analysis and interviews with key employees and executives, several key opportunities were identified. From the product perspective, these opportunities are to increase the number of soft end use cases, to expand suggestion-based capabilities, and to unify the experience across touchpoints. From the commercial perspective, the opportunity is to drive desire for Mapiq from people-focused management parties and from the grassroots level of client organizations.

These opportunities stand the potential to be addressed through several different approaches. This graduation project explores the avenue of product development. The previous studies have identified that enhancing relationships is a key opportunity to benefit well-being. In the following section, therefore, a concept is developed both to enhance relationships and to act on the opportunities for benefiting Mapiq.

Strengths

More people oriented than competitors

Strong client base in Netherlands

Established partnerships with smart building players

Established integrations

Integration expertise

Risks & Weaknesses

Little actual use by end users

Little end user insights and no established plan/process for gaining them

Design-driven approach misses addressing key end user needs

Become used only by Facility Managers

Diverse touchpoints lack unity

Opportunities

Sell Mapiq on people benefits in addition to facilities benefits

Build desire for Mapiq among end users and people-centered management functions

Increase use cases

Continue to build suggestion-based curation into Mapiq features

Be a market leader in meeting the vision of the future of work

Threats

Possibility for established large software firms to enter the market (e.g. Google, Microsoft)

VC-backed software startup to enter market

Difficulty in attracting software development talent

Figure 30: Mapiq Strengths, Weaknesses & Risks, Opportunities, and Threats

Mapiq's strengths lie primarily in its integration expertise and experience. Weaknesses and risks are derived mainly from inconsistencies across the team and sparse end user knowledge. This current lack of user insights presents an opportunity to wrap end users into Mapiq's current practices. While products that compete with Mapiq do exist, they do not pose a directly felt threat. Instead, looming threats include the potential for established multi-national software firms or heavily-funded startups to enter the market. Mapiq is in quite a favorable market position with a considerable client base, hence the companies' main challenges lie in scaling & hiring, making a desirable product, and delivering a consistent message.

Integration

5.1. Integration objectives

As defined in the project introduction, the objective of this graduation project is to develop a concept that effectively enhances well-being in the workplace through smart building technologies. This concept shall add value to a smart office building system integration company's value proposition, specifically to Mapiq's.

Initial research revealed that well-being in the workplace encompasses many elements, therefore several studies were conducted to identify a clear area of focus that can be addressed by a smart building integration company such as Mapiq.

Study I found that well-being at work is highly dependent on the type and quality of relationships that exist between knowledge workers. Of these relationships, Study II found a particular set to have a positive impact on well-being. This set is composed of the Mentee, Mentor, Passion Sharer, Sparring Partner, Buddies at work, and the Best Friend at work.

Study III found that an essential element of relationships that support well-being is vulnerability-based trust. Establishing such trust can be done by getting knowledge workers to share personal stories with each other. This was shown to be possible through person-facilitated activities, but not via less active stimuli.

Study IV revealed that Mapiq wants to be the go-to resource for office workers to get the most out of their smart office. Mapiq wants to have happy end users, to increase use frequency, and to sell its people benefits. The key opportunities to meet these goals were identified as: increasing the number of soft end use cases, expanding suggestion-based capabilities, unifying the Mapiq experience across touchpoints, and driving desire from people-focused management parties and from the grassroots level of client organizations.

The goal of this section is to develop and evaluate a concept that integrates these findings into a product or feature to be offered by Mapiq. Such a concept should therefore strive to achieve the objectives visualized in Figure 31, namely to:
• Create or strengthen the set of well-being-enhancing relationships at work
• Establish or improve vulnerability-based trust
• Increase soft end use cases for Mapiq
• Unify the Mapiq experience across touchpoints
• Apply suggestion-based capabilities
• Be desirable to people-focused management parties and to base-level knowledge workers

The section begins by exploring product opportunities through ideation, from which two concepts are developed. One concept is then selected for refinement into a final design. This design is then evaluated from interaction and strategic business perspectives.

Meaning

Authenticity

Vitality

Well-being

Belonging

Optimism

Mindfulness

Positive relationships

Create or strengthen
well-being-enhancing
relationships

Increase soft
end-use cases

Unify the user
experience across
touchpoints

The go-to resource for knowledge
workers to get the most out of
their smart office

Increase
desirability among
knowledge workers
& HR

Establish or improve
vulnerability-based trust

Trust

Product

Mapiq

5.2. Ideation

The design process began with broad ideation. Ideas were generated by following the How-To method (van Boeijen, Daalhuizen, Zijlstra, & van der Schoor, 2014). The How-Tos chosen were :

- How to get people who don't know each other yet to meet?
- How to trigger people who know each other to reveal vulnerabilities and/or discuss more personal topics?

For each How-To, I generated ideas on individual post-its and placed them on a poster. As I grouped ideas together, I saw the following clusters appear.

Figure 32: Initial ideation
An initial ideation was conducted to address the following How-Tos:
How to get people who don't know each other yet to meet?
How to trigger people who know each other to share personal stories?

Clusters

1. Discussion triggers

Ideas for inciting individuals to share personal stories with each other. These range from stimuli such as a heat sensitive mug that reveals a question when filled, to a screen that displays personal photos of knowledge workers when they are next to the display.

2. Matching

Ideas that promote networking across organizations through intelligent match-making, e.g. by shared professional interests.

3. Games

Ideas for creating new connections through games. E.g. lunch musical chairs, or meeting room roulette.

4. Onboarding

Ideas aimed at helping new hires meet new people. E.g. a card deck with personal questions that a new hire must ask people she meets at specific places.

5. Scavenger hunt

Ideas for getting knowledge workers familiar with new places in their workplace. E.g. a memory game based on finding matching plants in different places in the office.
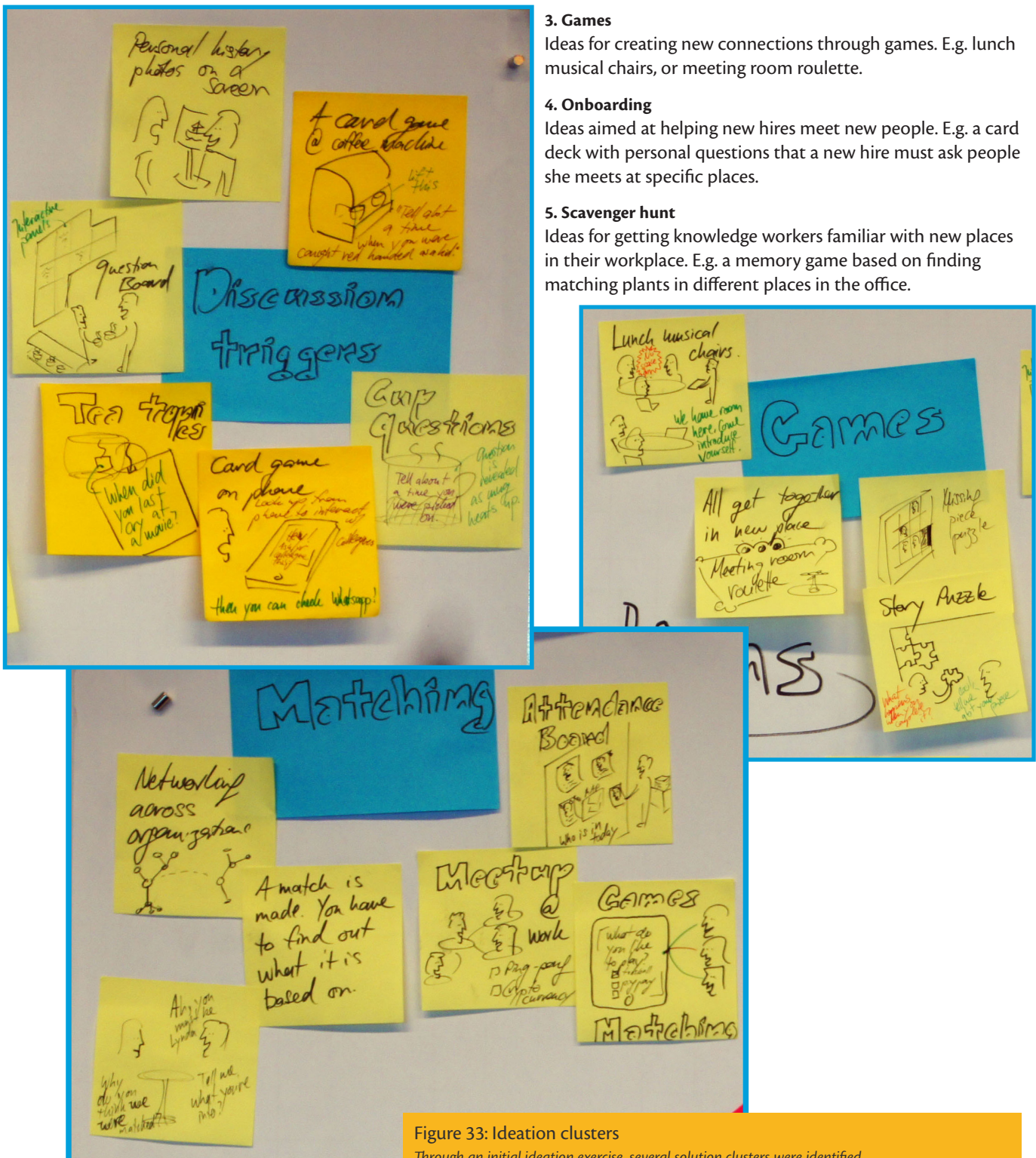
Figure 33: Ideation clusters
Through an initial ideation exercise, several solution clusters were identified.

6. Access unlocking
Ideas that restrict access to certain places, such as coffee machines, or laboratories, until after a meaningful discussion has taken place.

7. Scheduled activities
Ideas for getting people to share vulnerabilities at a specific time, with varying degrees of facilitation. E.g. a weekly Vent Event.
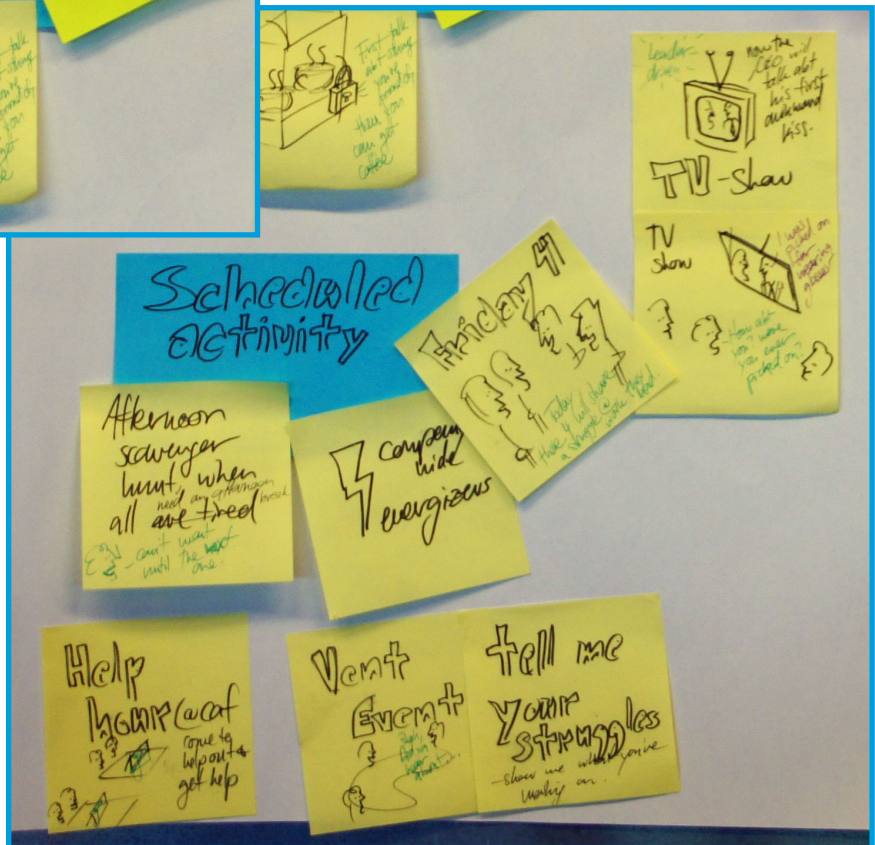
Priority-setting

The scope of this ideation is broad and calls into question the objectives of this integration. In particular, can all objectives be expected to be achieved? Should certain objectives take priority?

Due to the difficulties identified in forming vulnerability-based trust through non-person stimuli, this objective will not receive priority. Instead, creating the set of well-being-enhancing relationships through increased end use of Mapiq touchpoints becomes the main priority.

Still, the range of scenarios in which these relationships can be facilitated is broad. They can facilitated for experienced hires, for freelancers, or for top brass. They can be facilitated at co-working spaces, at consultancy firms, or at large corporations.

The cluster encompassing Onboarding for new knowledge workers is an area of opportunity in which a solution can provide high value. One of the key activities of any person new to a workplace is to meet people, and smart building technology can play a key role in assisting in this process. Onboarding will therefore be the focus area for the remainder of the design process. This focus area has a high likelihood of success and high value for Mapiq for the following reasons.

▪ **Lower barriers to adoption**

Existing employees can be expected to already have a range of social relationships, as well as established habits for engaging in them. This poses a challenge for a new way of socializing, since research show that new habits to take an average of 66 days to be adopted (Lally, Van Jaarsveld, Potts, & Wardle, 2010). Therefore, a newly-introduced solution for connecting employees at a workplace has a higher likelihood to be effective for new employees than for existing employees.

▪ **Increase Mapiq use**
An onboarding solution driven through existing Mapiq touchpoints can lead to increased use of Mapiq, which is a key design goal. Knowledge workers new to a workplace are now incentivized to use Mapiq to get connected to people at work, in addition to using Mapiq to book a meeting room and to find a workplace. In that manner, new hires can be the vehicle for spreading Mapiq use across an organization.

▪ **Increase People value**

Creating a solution for onboarding increases Mapiq's People value proposition by creating happy end users, another design goal. This increases Mapiq's ability to promote its people benefits, a key company objective, and can get additional client decision makers, such as Human Resources, interested.

Onboarding scenario
To guide concept development, an onboarding scenario was imagined. The context is that of a workplace spread over several levels of an office building, and occupied by employees of a single company, such as a large engineering firm or a telecommunications company. The new hire is a young professional of the millennial generation. The scenario is described in more detail in Figure 35. It draws on my personal experiences in such contexts, as described in Figure 34.

This scenario was chosen for the following reasons:

▪ **Resemblance to many Mapiq clients**
While Mapiq's clients range from academic institutions to real estate developers, its core target group consists of single-tenant office spaces spread over several floors of a building.

▪ **Most time spent in building**
Compared to other scenarios such as consulting, corporate office workers spend more time at their home. This provides more opportunity to build connections with colleagues in the office. In addition, in this scenario there is higher potential for there to be unique resources in particular places in the building, such as laboratories, or special supply cabinets.

▪ **Lack of active connection making**
Onboarding can be particularly poor in corporate scenarios. Meeting new people at such companies is not commonly an activity that is formally facilitated. In contrast, coworking spaces often employ people specifically to perform that function, in roles such as Community Managers.

▪ **Increase appeal for millennial talent**
Millennial are favoring workplaces with well-integrated digital experiences, and employers are spending increasingly on such integrations (DeNisco Rayome, 2016). Similarly, millennial are looking to fulfill social needs at work, and are valuing social media freedom at work (Harrison, 2013). Therefore, a technology-based solution for socializing at work can clearly set employers apart in the eyes of millennial candidates.

Multi-national technology company - 5,000 person single-company campus in the countryside

When I started in this context, they told me there were a bunch of new hires my age, recent college graduates who had started at this company in the last year. But when I arrived, I remember thinking, "They told me there were people my age here, and in my situation (new college grads), but I don't see them." Everyone around me is 45+ and has been working here for what seems like 15+ years. My first few lunches I spent with colleagues in my work team. The second or third day of my job, while sitting outside with my team, I saw a couple young people walk by to a table toward the rear of the patio. I was curious to get to know them, but honestly intimidated. They looked so cool. Particularly this one guy with dark, slicked back hair, wire-rimmed glasses, khakis, and dark boat shoes. A shoe in for Clark Kent. Would I have the courage to approach them? It reminded me of the many times in my life when I was the new kid at school.

A day later, I worked up the courage to approach the table with those young people. With my cafeteria tray in hand, I walked up to them, and introduced myself, "Hi, I'm Tobias". After that, I remember looking for some way to establish my relatedness to them. I stumbled on my words, expressing something along the lines of, "I just started here, can I join your table?". I was quite anxious about whether they would say yes or no. After what seemed like forever, they acquiesced. But that did not end the somewhat awkward tone of our interaction. The conversation was still stunted after that. "um, when did you start here?".

Eventually, this group of new hires became my social circle in this new town I had just moved to. We went out for drinks together on Fridays, went cliff-jumping, (all communication managed over a Facebook group). But it took a while to establish. Outside of lunch hours, I did not meet these new hires for any occasions at work. We would meet only at the caf or outside of work.

One particular member of this group of new hires enjoyed playing foosball. We occasionally played a match after having lunch, but we never gathered to play outside of the lunch context. Beyond our similarity in age and our affinity for foosball, we did not share another point in common.

Pharmaceutical company - 1,500 people on a campus spread over five buildings on 5 city blocks

I started working at the company on a contractual basis. On my first day, I got a desk facing a wall in an area where others had individual cubicles. I got to know some of my coworkers that sat next to me. i.e. in a 5meter radius through informal introductions. My colleague Sam, a couple years younger than me, but already at the company for about a year, was my guide to getting to know the place. We were on the same team, and conducted experiments together. Our lab was in a different building than our desk. When we had experiments, Sam and I would often lunch together at the lab building, where not many other coworkers worked.

At my desk building. I wasn't quite sure whom to lunch with. One day, when I did not recognize anyone I had already been introduced to at the cafeteria, I decided to approach one of the groups sitting at a table. I had seen one of their faces around the office before, so I thought that would be enough to be able to sit with them. I said "Hi, I'm Tobias, can I join you?". They agreed, and I had a seat with them. To the woman I had recognized, I said, "I recognize you from the halls, what group do you work in?". She said something about Chemical Development, and to my dismay, the conversation promptly died out. The remaining persons continued conversing among themselves, and I was stuck eating my lunch in silence with no real other entry into conversation. The others at the table did not make an effort to include me either.

After this unsuccessful foray into meeting new people through my own direct means, I did not make any further efforts to boldly introduce myself to persons I had no clear work-tie to. Instead, I would speak to and have lunch with my colleague Sam, people from my Formulation development team, or colleagues from our hardware installation project, generally depending on the location.

Here neither, I did not participate in a coffee break culture. Eight months into my tenure, I took a permanent position at the company. On my first day in that position, I gathered in a room with approximately 20 other new hires to sign some documents and hear a presentation about the company. We went around the room to introduce ourselves, giving our name, our previous job, and what we would be doing in our new company. After this meeting, we all went our separate ways, and did not make an effort to reconnect.

Figure 34: My personal onboarding experiences
The above describe two experiences in which I was a new hire. These inform the Shiftech onboarding scenario.

Onboarding at Shiftech
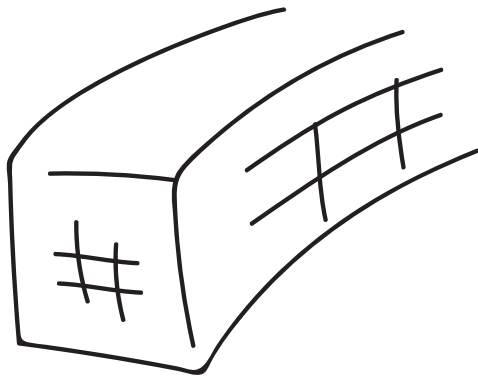
Workplace characteristics

-People are a bit shy to blatantly introduce themselves
-They can use something to break the ice, some entry into discussion
-There are different places to get to know in the building
-It's a hot-desking environment
-There are at least three new employees every month
-There are more than 150+ employees, because that's the Dunbar number, i.e. the limit of people you can naturally have a social relationship with (Gladwell, 2000)
-People work primarily from this office. Otherwise sometimes at home, but not much work is done at clients, or from third or fourth places

Shiftech characters

Mark — New employee

I'm excited to get started at Shiftech. It's my second job and from what I gathered in the interviews, it will be much more invigorating to work here than at my previous company. They said there's a lot of energy around here, and quite a few people my age. I'm not sure how long I will stay here, perhaps two years. But who knows, if the environment is right, I could be here for a long time.

Bob — Mark's manager

I'm glad Mark will be joining our team. He has the drive and smarts we were looking for. We'll just have to make sure we get him up to speed quickly, so that he can contribute individually. He should meet key people and learn what his job is about. Mark has the potential to re-invigorate our group.
I know Mark has quite a few connections from his studies and previous job. If we do our best so that he likes his job here, he's quite likely to influence others to join Shiftech as well.

Susan — HR partner

I was happy Mark joined us here at Shiftech. At our interviews he was energetic and I'm sure he will bring some good experience from his first job.

When Mark first gets here, I will need him to sign all contracts and agreements.I also need to provide him with information to sign up for benefits, like health insurance and commuter benefits.
Eventually, we should get some career planning in place. He should also feel well in our environment. It would be great to have Mark stick around for a while. We should make sure he likes it here. That way he can spread the word abour our company, and be a sort of spokesperson.

Paul — A coworker

Who is this new guy in my office?
Can he help me with my projects?
What is he good at?
What could I learn from him?
How is he going to impact my work?
Is he friendly?
How should I connect with him?
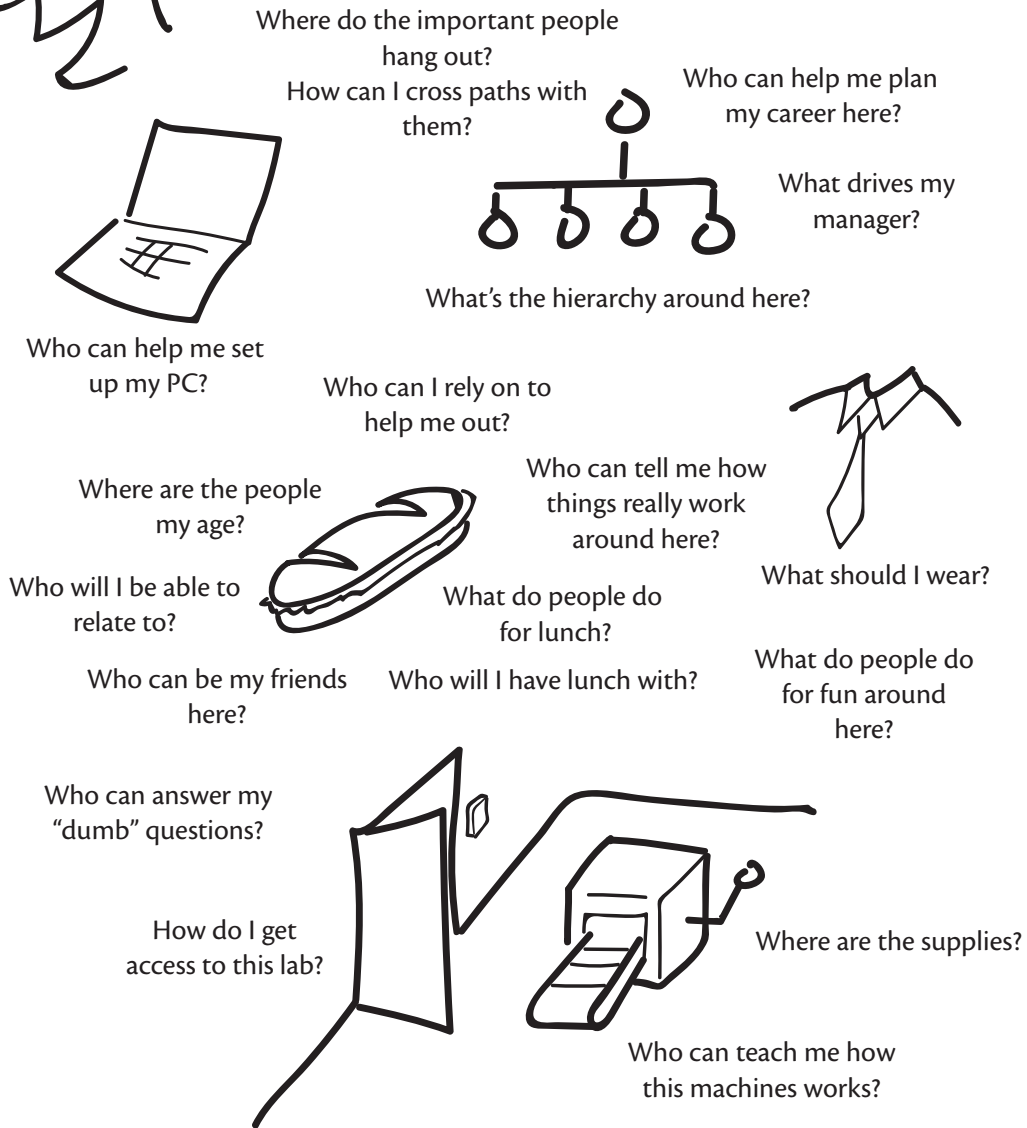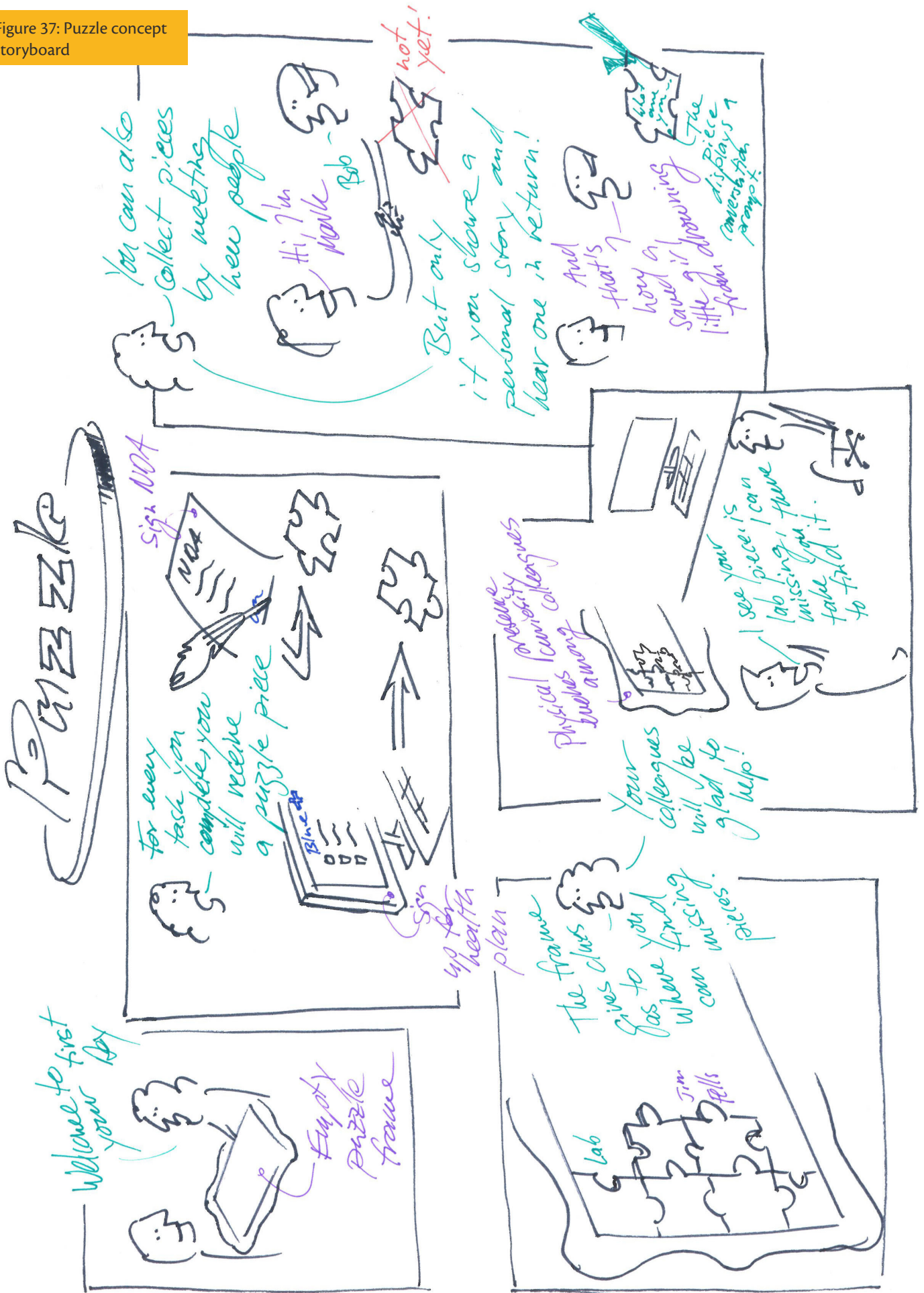
Mark's people questions

Where do the important people hang out?
How can I cross paths with them?

Who can help me plan my career here?

What drives my manager?

What's the hierarchy around here?

Who can help me set up my PC?

Who can I rely on to help me out?

Who can tell me how things really work around here?

Where are the people my age?

What should I wear?

Who will I be able to relate to?

What do people do for lunch?

What do people do for fun around here?

Who can be my friends here?

Who will I have lunch with?

Who can answer my "dumb" questions?

How do I get access to this lab?

Where are the supplies?

Who can teach me how this machines works?

5.3. Concept development

Two ideas from the ideation clusters were selected and developed into concepts to aid in onboarding of new employees. The Onboarding Puzzle concept originates from the Games idea cluster, and the matching concept arises from the matching cluster.

Onboarding puzzle

This concept is aimed not only at connecting new employees with their colleagues, but also at helping new employees complete administrative tasks, and at incentivizing them to discover new places. New employees can gain pieces for their puzzle by completing any of the three above-mentioned activities. The concept is described in Figure 36 and Figure 37.

Figure 36: Onboarding Puzzle mockup
New employees are to complete a puzzle as part of their onboarding process. A piece can be awarded for completing a range of different tasks and activities, e.g. setting up retirements savings, reading SOPs, or joining a sports team.

Figure 37: Puzzle concept storyboard

Matching

This concept connects employees based on commonalities.
The principle is described in the architecture sketch in Figure
38, and in the storyboard in Figure 39.

Figure 38: Matching concept architecture sketch
The basic flow of the concept is:

1. Users self-identify personal and work interests

2. The system matches persons with the same interests

3. The system arranges meetings between matched persons
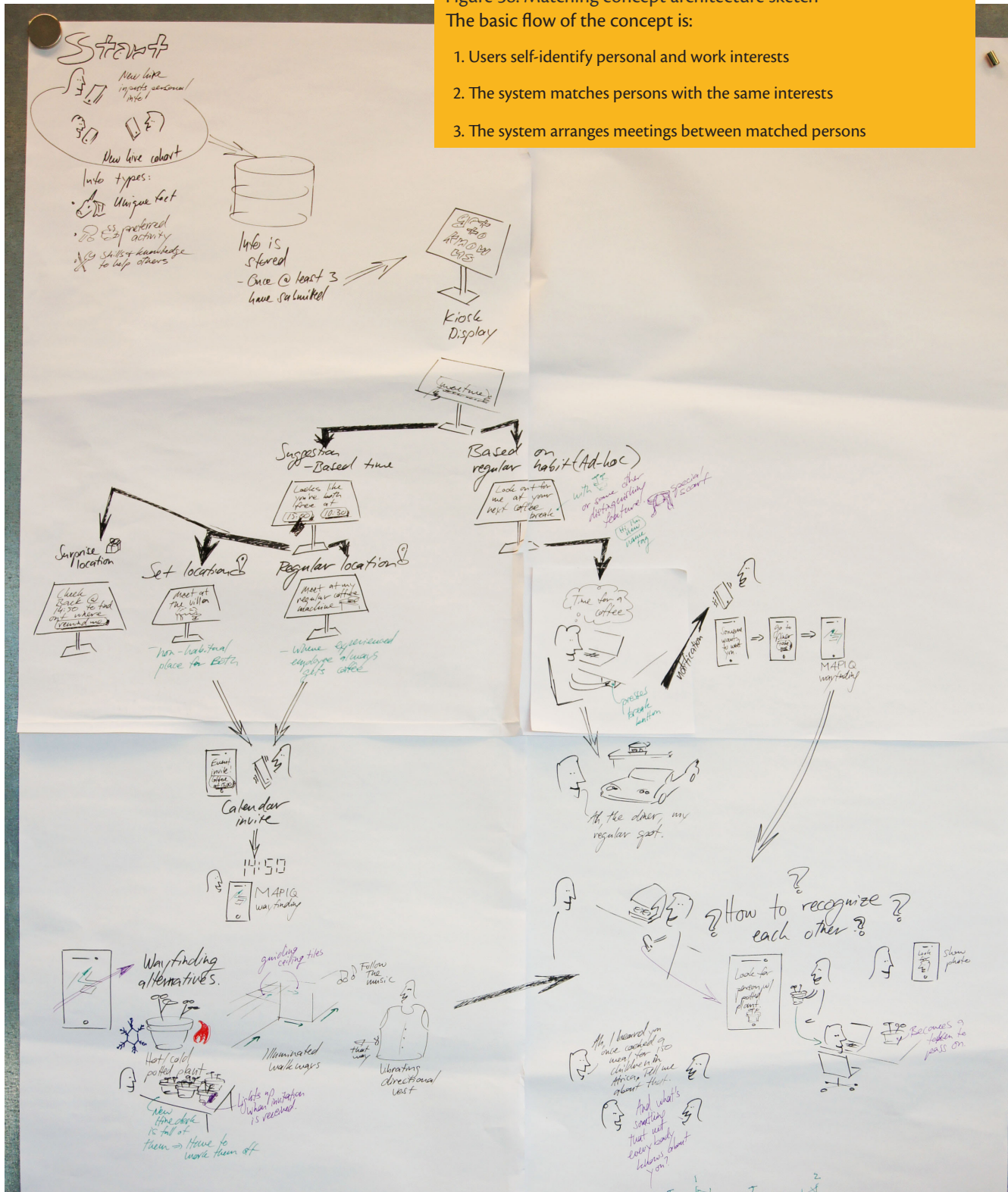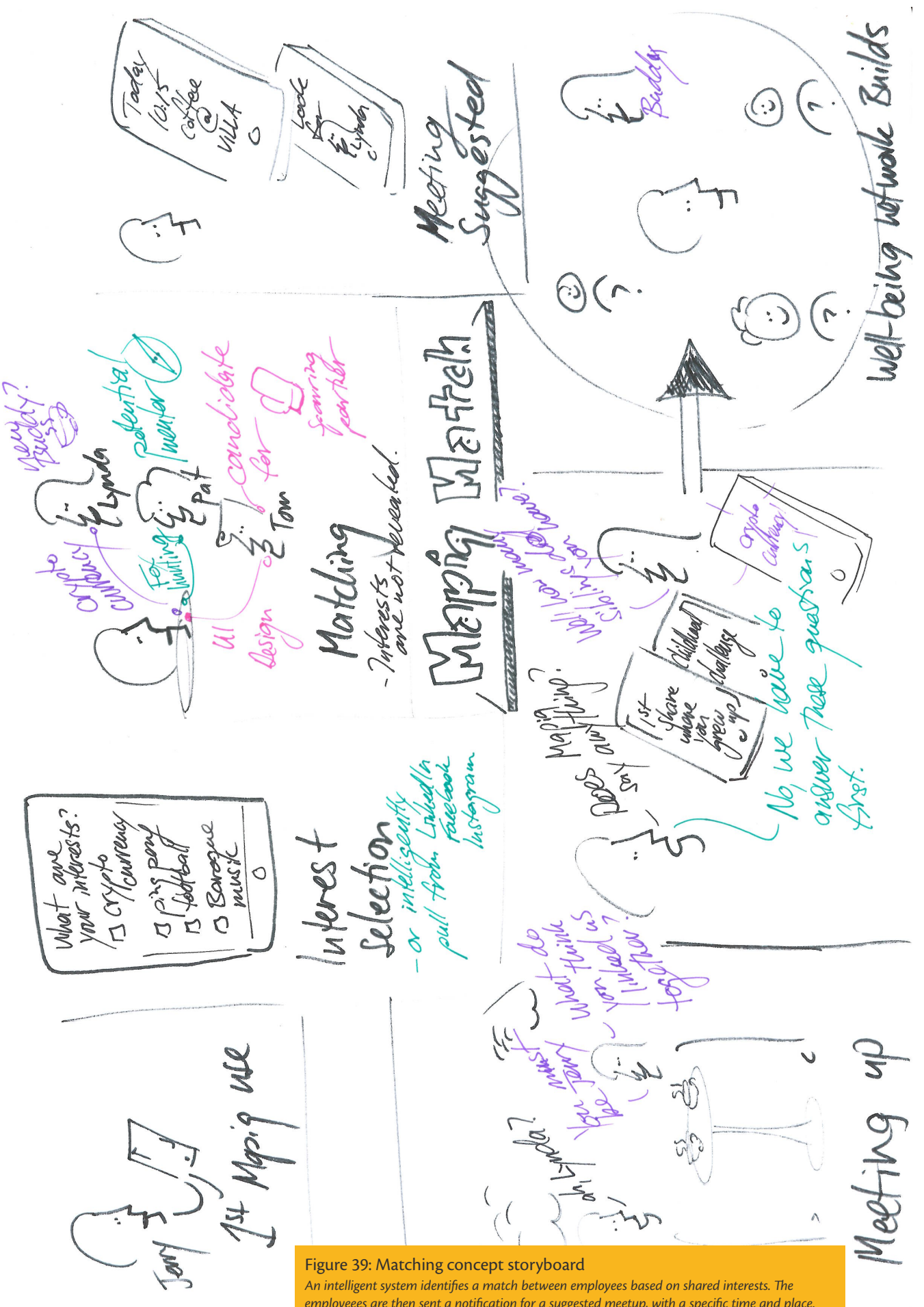
5.4. Concept evaluation & selection

The Puzzle and Matching concepts are evaluated against the design goals to select one concept for further development.

1. Increased use of Mapiq

Both concepts provide increased use cases for Mapiq interfaces. In both cases, the use cases are strong for new hires. For the Puzzle, however, the use case for the concept essentially disappears after a puzzle is complete. For existing hires, the Puzzle concept provides little use incentives. In contrast, the Matching concept provides more use cases and greater longevity. One can imagine an existing hire using the Matching concept to find people with certain skills with project turnover or shifting responsibilities. Similarly, one can imagine a not-so-new hire staying going back to the Matching feature to meet fresher hires.

2. Happy end users

Both concepts provide opportunity to create happy end users. But, with increased use cases, the Matching concept has higher opportunity to lead to more happy end users and more word of mouth.

3. Scalability & ease of implementation

The Puzzle concept provides challenges to implementation. Client specific puzzle pieces would need to be created, for example for specific training modules or administrative procedures. The matching concept has fewer such hurdles, requiring customization based primarily on workplace layout, which is already configured as part of standard Mapiq implementations. It would be beneficial to build in a database of personal and work interests that users can choose from, but such a database can be integrated from platforms such as LinkedIn, then tailored to individual clients through machine learning.

Due to the Matching concept's greater use cases and use longevity, as well as its greater scalability and ease of implementation, it is selected for further development.

5.5. Concept refinement

To refine the Matching concept, it is of interest to dive into the research findings from Study II. This study identified several relationships that by their existence have a positive impact on well-being. These are the Mentee, Mentor, Passion Sharer, Sparring Partner, Buddies at work, and the Best Friend at work. This is a set with varied characteristics, therefore the following questions arises: Which of these relationships are most valuable to create through a solution enabled by smart building technology?

The answer is to focus on creating Passion Sharers and Buddies at work. Compared to the other well-being boosting relationships, these two relationships have a lower barrier to entry. The fundaments of these relationships are easier to explicitly define and ask for as input from knowledge workers. For example, a Buddy at Work can be identified by common out-of-work activities, but a Best Friend relationship requires multiple shared experiences for formation. Nonetheless, Passion Sharer and Buddy at Work relationships can turn into Mentor, Best Friend, and Sparring relationships with increasing shared experiences,. Therefore, by focusing on this subset, there is potential to build the broader range of well-being boosting relationships.

Selecting matching criteria

The fundaments of the Buddies at Work and Passion Sharers relationships can be defined from the research in Study II. The relationships are visualized in Figure 40.

Buddy at work fundaments
- Similar life stages - e.g. young kids at home, buying a house, single & dating
- Common out-of-work activities - e.g. skiing, same music festivals, LAN parties, game design
- Playing games together - e.g. ping pong, foosball
- Similar backgrounds - grown up in the same place, speak same languages, or expat experience

Passion Sharer fundaments
- Shared passion for work-related topics, or topics that have some applicability at work.
- Mutual respect through recognition of intelligence
- Shared personal purpose and meaning.
-

From these fundaments, the following have been selected as matching criteria for the concept:
- Shared out-of-work activities & interests
- Shared passion for work-related topics

These selection criteria been selected for the relative low privacy concerns related to sharing such information over a software platform such as Mapiq. Sharing such information is already common practice on platforms such as LinkedIn, Facebook, and Meetup.
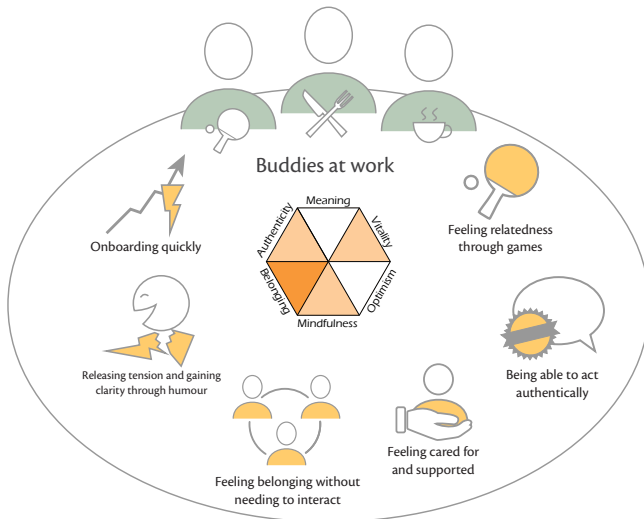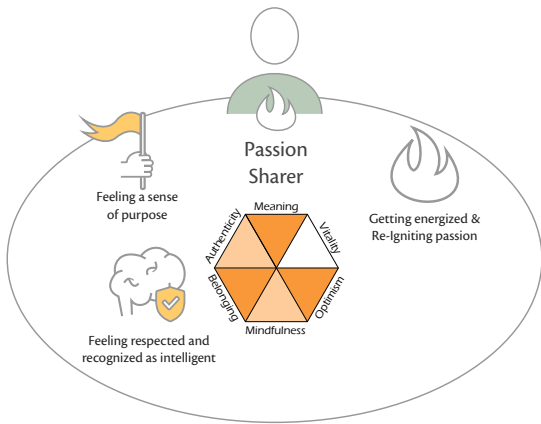
Figure 40: Relationships to create
The design goal for this project is to connect knowledge workers who are new to an organization to people who can become their Passion Sharers and Buddies at Work.

Interaction inspiration

The following experiences serve as inspiration for the interaction to be achieved through the concept.

- **Meetup platform**
People organize events to get together to have talks about the same interests, or to enjoy the indulge in shared hobbies. E.g. wearable technology, improv theater

- **WhatsApp group of friends that all work at the same place**
A messaging group in which anyone can propose an activity, e.g. lunch or a coffee, and it is nearly certain that at least one other person will join, and that the resulting encounter will be enjoyed.

- **House party**
A party where it is easy to approach anyone because conversation starters are easy to come by. It is nearly certain that you will know someone in common, and people are open to others walking up and introducing themselves.

Primary iteration

The first iteration on the Matching concept envisions the design as a separate mobile application. The basic principle is to create occasions for people to meet up. An occasion is defined by:

• An activity
• A time
• A place

People are matched for occasions based on shared:

• Work interests/passions - "Professional"
• Outside of work interests - "Leisure"
• Break activities they enjoy - "Fun"

The storyboard in Figure 41 brings the concept to life by depicting its use among new and existing employees at Shiftech.

On the morning of the first day

I'm glad we got everyone's laptop set up properly. You're just about ready to get started. We have one last thing to cover.

Getting to know people who work here will be key to having a great start. And we have an application to help you connect with like-minded people.

It's called Mapiq Now. Go ahead and download it.

Now that you've gone through the intro screens, you can choose to:

-suggest an occasion to meet with others
-join in on what others have suggested

You'll always have something in common with the people who have come up in suggestions, whether it's that you both enjoy ping pong, or that you both enjoy traveling

Figure 41: Mapiq Match storyboard
The screenshots show the three criteria for matching individuals: professional interests, leisure activities, and preferred break time activities.
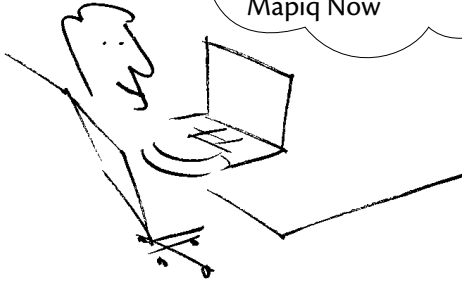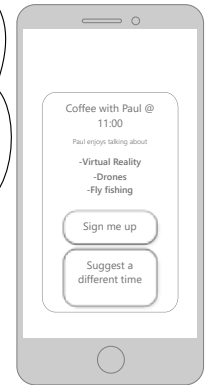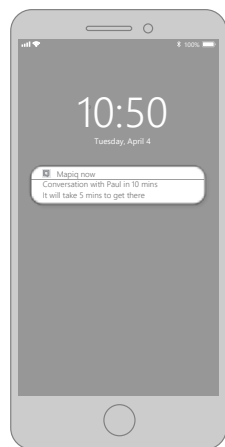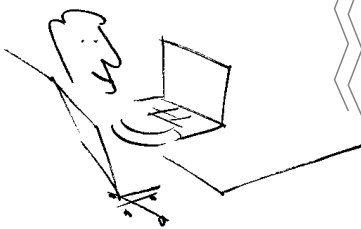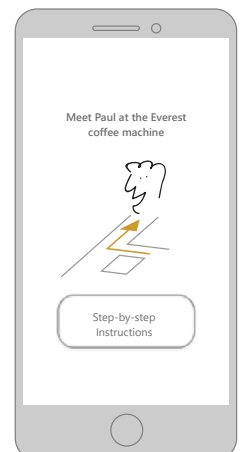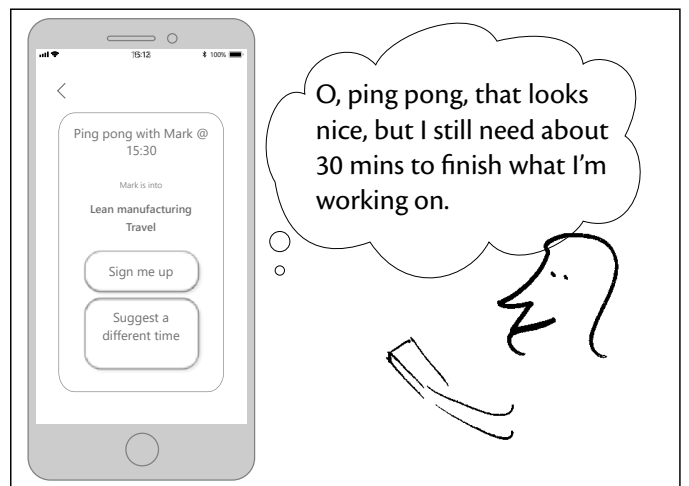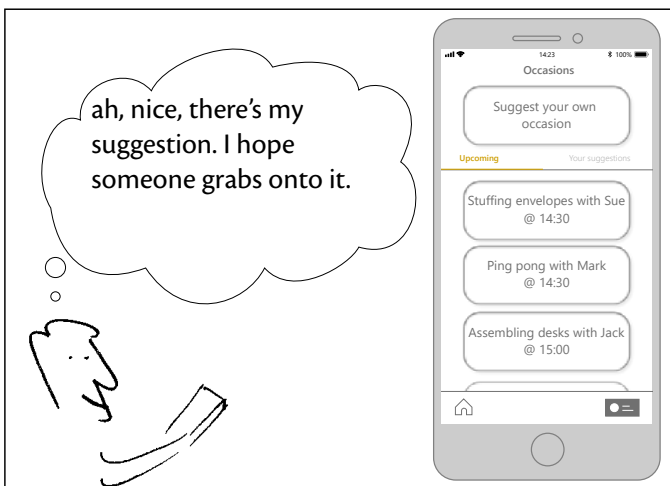
Mapiq chooses a coffee machine conveniently close by.

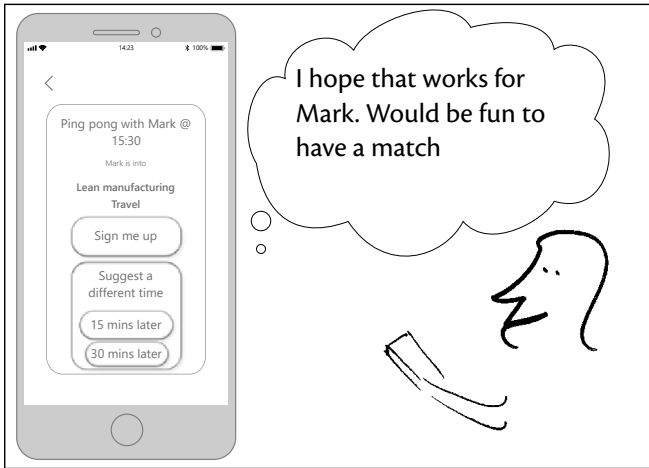Hey, you must be Paul.
I'm Mark. So you're
into drones?
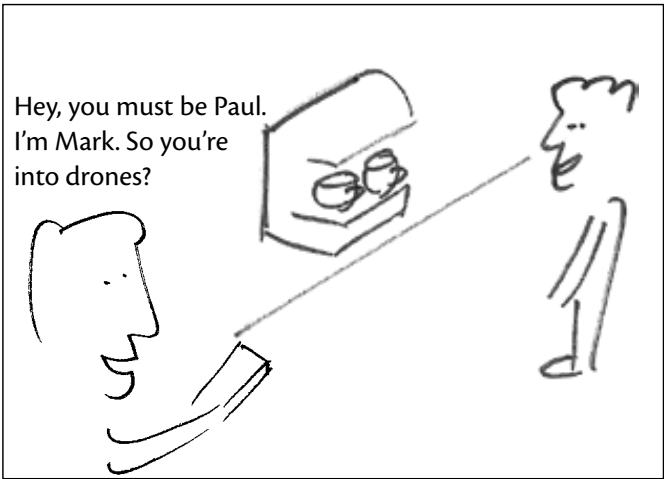
Mark recognizes Paul based on the
photograph in the app.

Yea, that's right. I film my
buddy's football games
from above.

O, cool
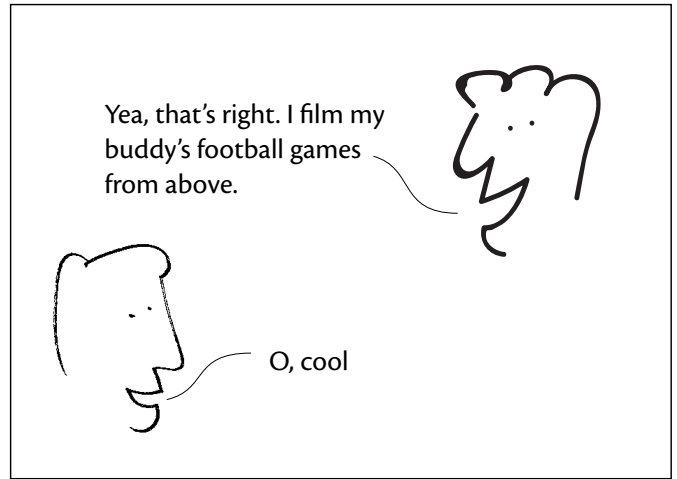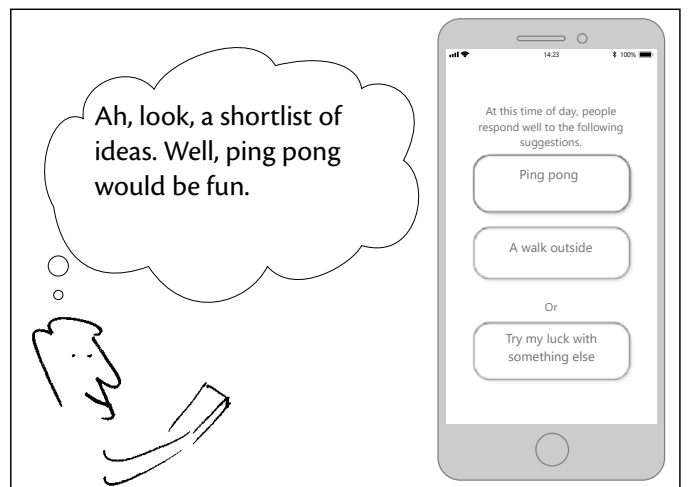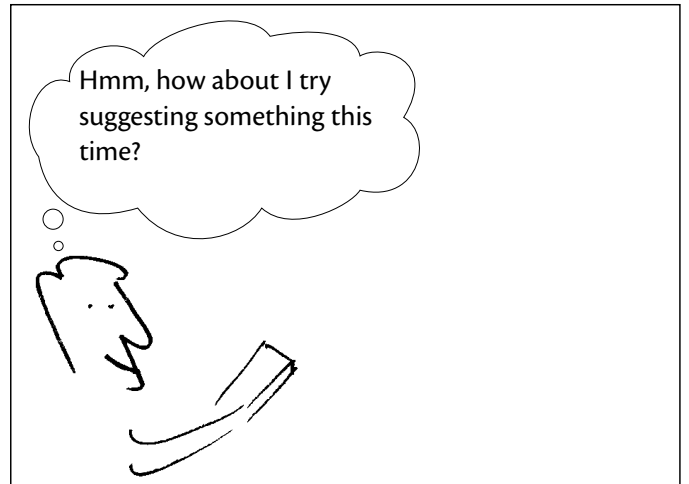
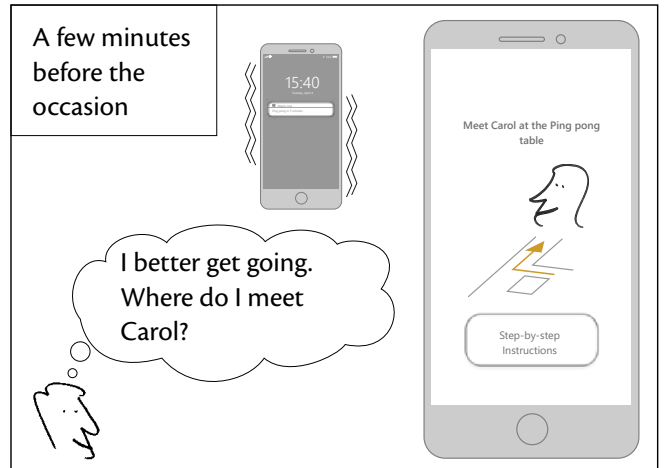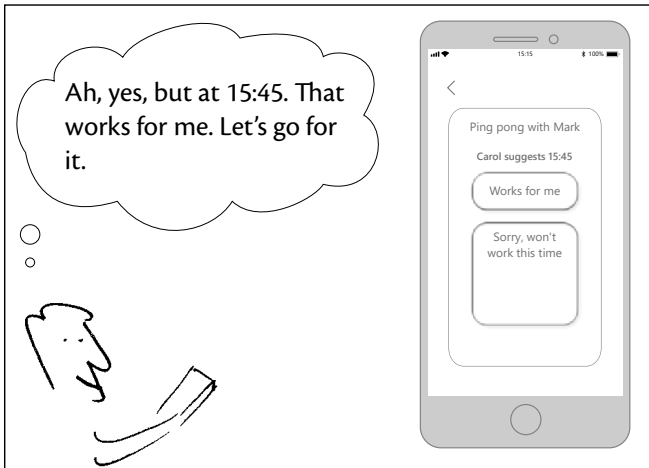Carol browses the app and is interested in ping pong

Carol suggests a new time

Mark receives a notification

Mapiq gives Mark wayfinding instructions

Mark recognizes Carol based on the photograph in the app

The concept retains the architecture described in Figure 38, which is embodied into the concept as follows:

1. Users self-identify professional passions, leisure interests, and break activity preferences
This takes place in a series of application onboarding screens, as described in Figure 43. On these screens, users are presented with a list of options to select from. The list is intelligently populated to show a range that is both broad and includes items that existing users have already selected, so as to increase likelihood of a match. After onboarding is complete, the screens are accessible via a profile section.

2. The system matches persons with the same interests
Once a user submits preferences in all three categories, the system identifies people that have at least one matching Professional or Leisure interest, as well as one matching break activity preference. This process takes place in the background and is not visible to users.
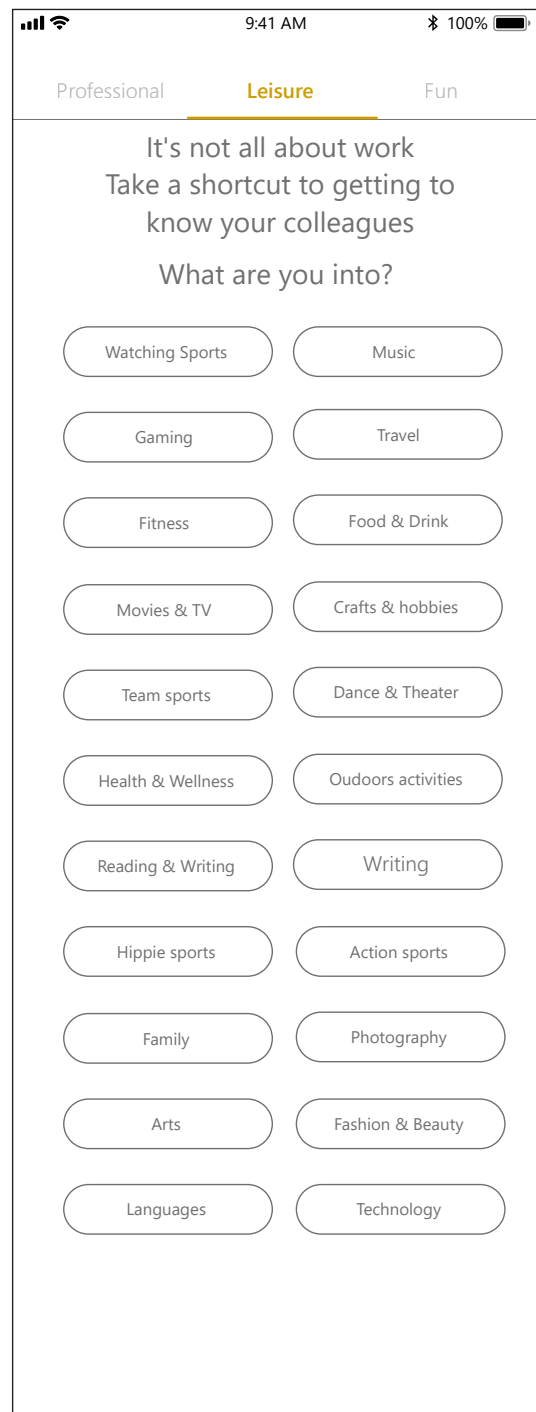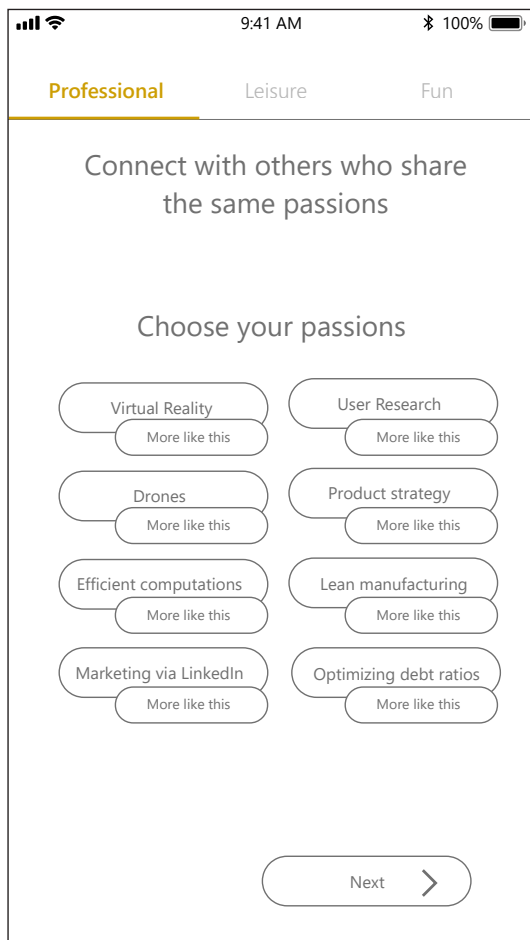
3. The system shows occasions proposed by matching persons
Occasions proposed by others with matching interests are presented in the application Home screen, depicted in Figure 44. This screen also allows a user to suggest an Occasion.
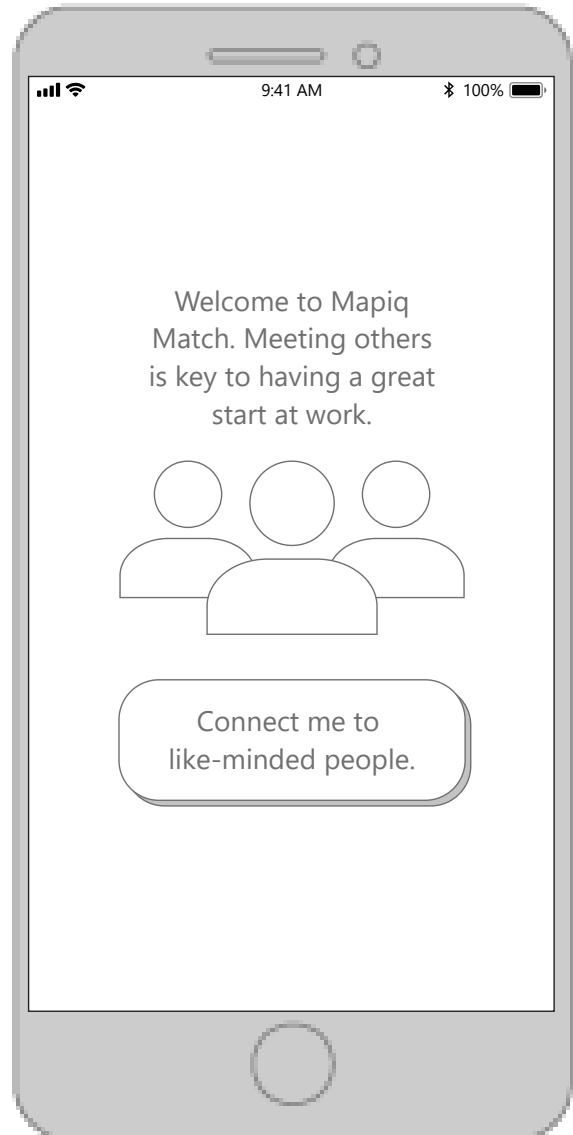
Figure 42: Mapiq Match splash screen
This startup screen introduces users to the value of the application: to have a great start at a new workplace by connecting with like-minded people.

Left screen:

Professional | Leisure | Fun

Connect with others who share
the same passions

Choose your passions

Virtual Reality
More like this

User Research
More like this

Drones
More like this

Product strategy
More like this

Efficient computations
More like this

Lean manufacturing
More like this

Marketing via LinkedIn
More like this

Optimizing debt ratios
More like this

Next

Right screen:

Professional | Leisure | Fun

It's not all about work
Take a shortcut to getting to
know your colleagues

What are you into?

Watching Sports | Music
Gaming | Travel
Fitness | Food & Drink
Movies & TV | Crafts & hobbies
Team sports | Dance & Theater
Health & Wellness | Oudoors activities
Reading & Writing | Writing
Hippie sports | Action sports
Family | Photography
Arts | Fashion & Beauty
Languages | Technology

Figure 43: Mapiq Match application onboarding screens
Users navigate through a series of onboarding screens upon initially launching the application. These screens allow users to share: professional interests, leisure activities, and preferred break time activities.
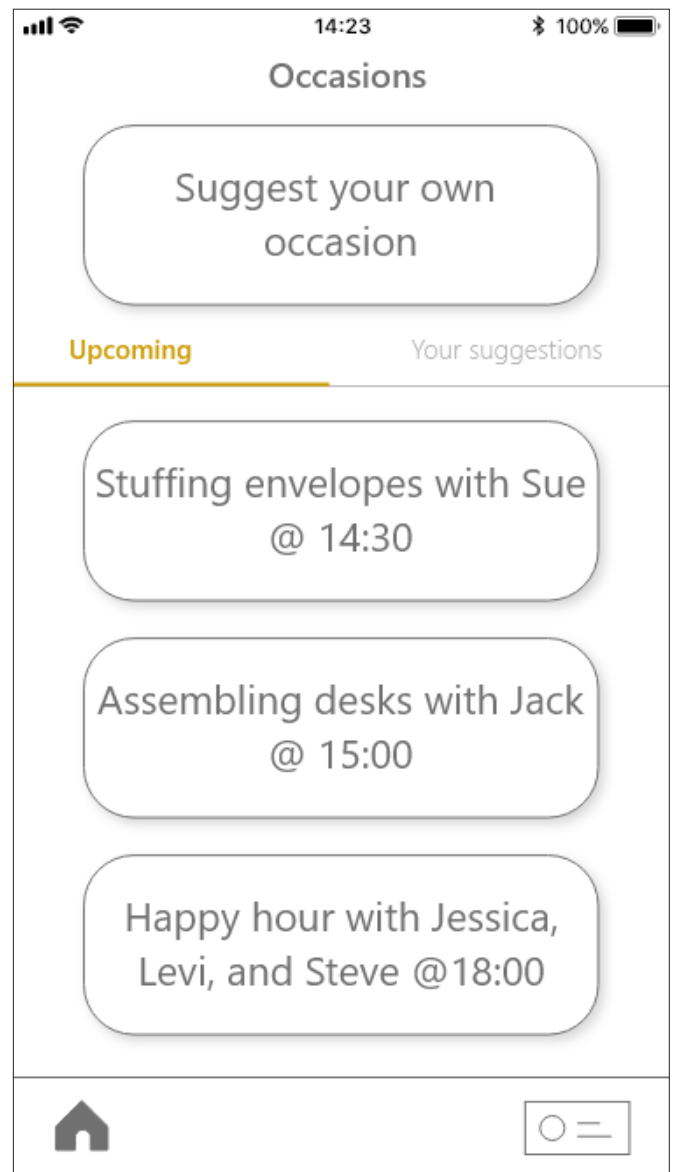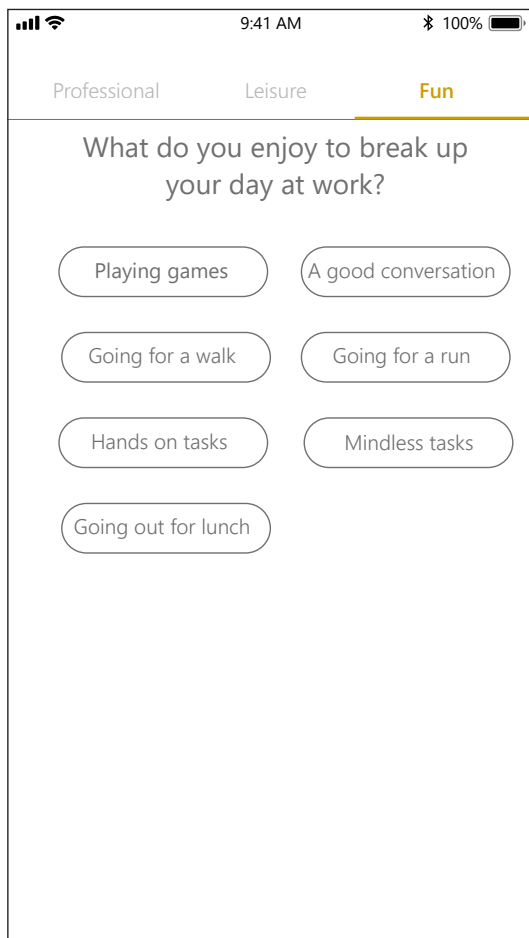
Professional   Leisure   **Fun**

What do you enjoy to break up your day at work?

- Playing games
- A good conversation
- Going for a walk
- Going for a run
- Hands on tasks
- Mindless tasks
- Going out for lunch

Occasions

Suggest your own occasion

Upcoming   Your suggestions

Stuffing envelopes with Sue @ 14:30

Assembling desks with Jack @ 15:00

Happy hour with Jessica, Levi, and Steve @18:00

Figure 44: Mapiq Match home screen

On the home screen, users see meetup events suggested by fellow employees. All events shown include at least one attendee that has an interest in common with the user. The navigation tab at the bottom of the screen gives access to the profile section, where interest selection can be modified.

5.6. Assumption verification

The Matching concept rests on several assumptions, namely:

Assumption 1 – People see the value in connecting with persons who could be Buddies at Work.

Assumption 2 – People see the value in connecting with persons who are potential Passion Sharers.

Assumption 3 – Users will be comfortable openly sharing their personal and professional interests on the platform.

Sub-assumption 3.1 – People will have hesitations about what interests to list, either being unable to self-elicit their interests or being unsure of what types to list. Therefore, users be presented with a list of interests to select from.

Sub-assumption 3.2 – Users should be asked to select personal and professional interests separately.

Assumption 4 – People will be interested to join both social and professional occasions.

Assumption 5 – Connecting over the means of this concept will be desirable to alternatives.

Assumption 6 – Knowledge workers would continue using this concept to arrange meeting occasions after initial contact has been made.

Assumption 7 – People are comfortable approaching others they have not met before at a pre-convened place and time.

Assumption 8 – People will only want to see Occasions for people they match with and activities they like.

Assumption testing

To verify the above assumptions, I made a paper prototype of the concept and tested it with 9 unique users. Paper prototyping was chosen for the following reasons:

- Participants are open to give feedback and criticize because of the unfinished nature of the prototype
- Feedback is more about the overall concept and value proposed than about visual design and UI details
- Rapid iteration is possible, even within a session
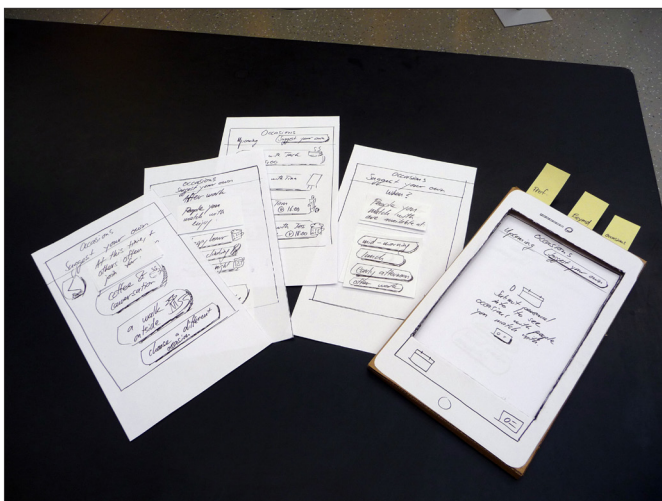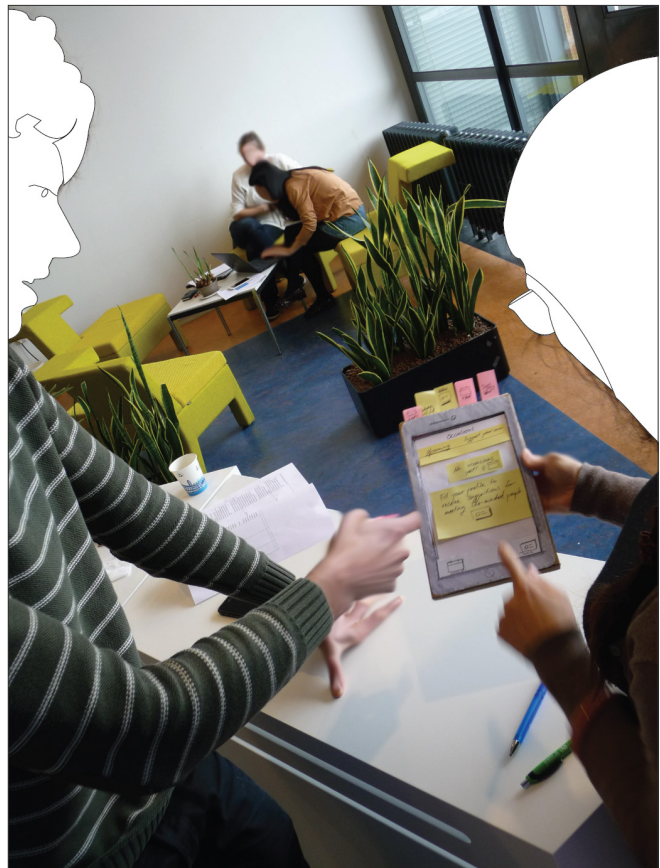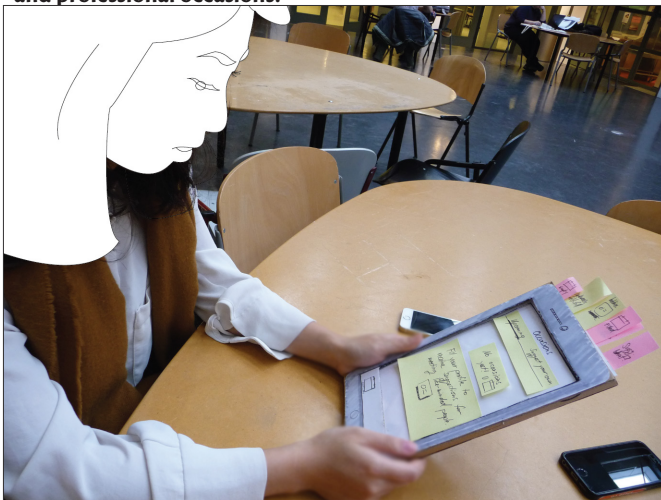- The method promotes collaborative design (Crespo, 2015)

Figure 45: Extended user tests with the paper prototype

Extended user tests

Four long duration sessions were conducted, each lasting between 30 minutes to an hour. Participants included:

- A recent hire at a software company with ~300 employees on site,
- A young professional who recently completed a graduation project at a large telecommunications company with an activity-based work environment,
- A young professional who recently completed a half-year traineeship at a design consultancy and who had completed a student project at a large telecommunications company one year prior
- Two PhD candidates from the Faculty of Civil Engineering at TU Delft, one of whom had started within the last six months.

During these sessions, users interacted with the entirety of the concept, personally navigating through the prototype with the available buttons and seeing all screens and features. I took the role of computer and interviewer, asking the following questions:

- *What is your level of interest in using the application?*
- *In your organization, are there currently alternatives that accomplish the same function?*
- *What kind of effect do you see this application having on your experience of getting to know people in your work environment?*

Quick user tests

Five shorter sessions were conducted, with company representatives that were attending the 2018 IO Business Fair at the Faculty of Industrial Design Engineering. Participants worked in environments ranging from 25 to 200 plus employees. Each session lasted between 5 and 15 minutes. I gave a product demonstration, showing the range of screens and explaining the available features. I then asked participants the following questions:

- *What alternatives exist in your organization for what this concept proposes to accomplish?*
- *To what extent, if at all, do you find the concept I showed you interesting or unique?*

Results

The tests were audio recorded, video recorded, and photographed. The following pages show the iterations that the different screens of the prototype went through. The concept can be divided into the following three key sections, each with its own subset of screens.

9. Select Your Interests (Figure 35)

10. Occasions Home (Figure 39)

11. Suggest your Own Occasion (Figure 38)

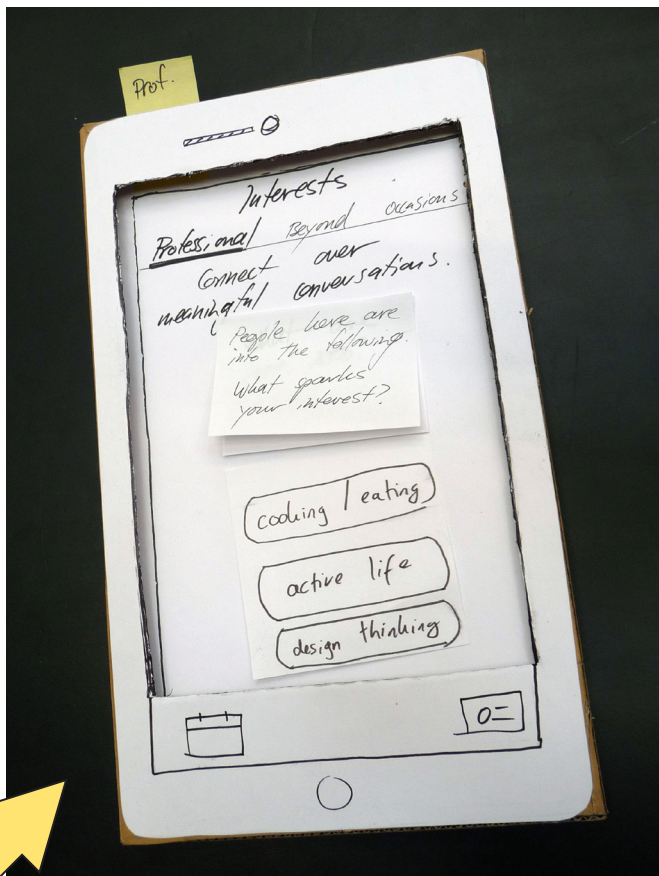Figure 46: Quick user tests with company representatives at the 2018 IO Business Fair
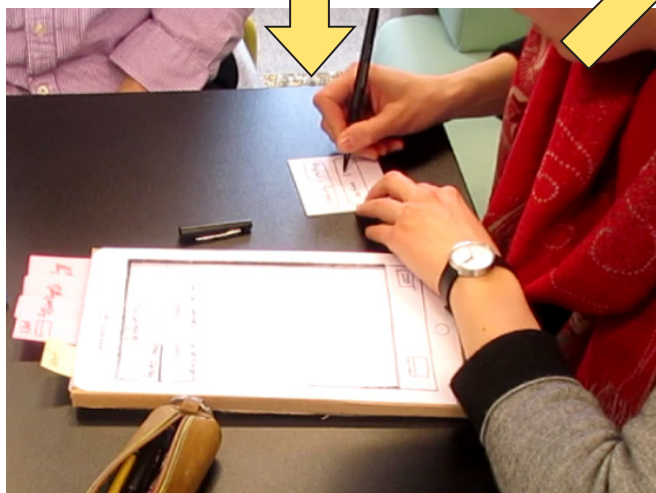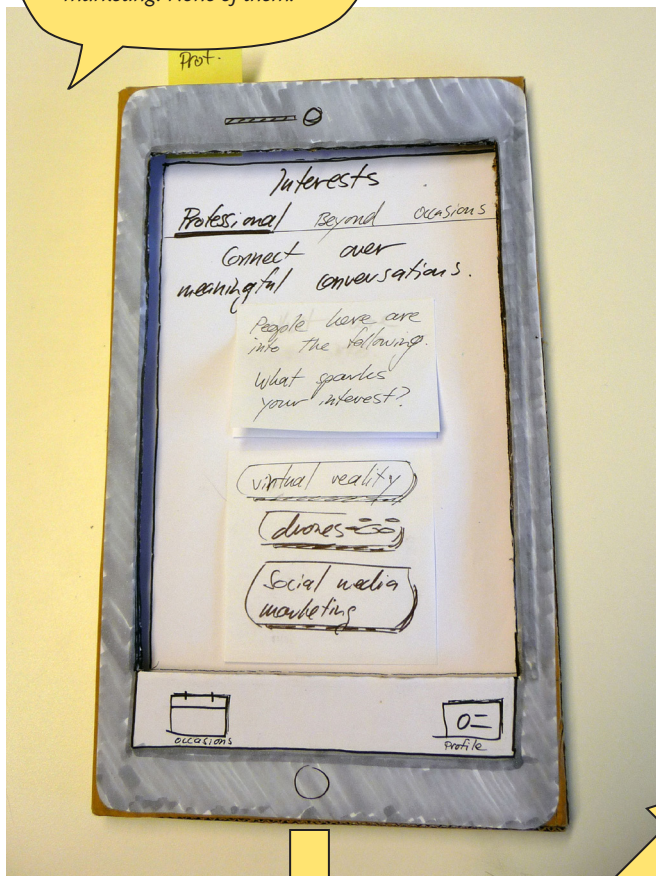
Figure 47: Evolution of Select your Interests screens
The "Interests" screens of the concept began with a list from which participants were to choose (top left). The first user found no shared interests among the list and suggested to replace the list with a manual entry field. After I implemented the field, that same user was able to identify interests without hesitation (bottom left & top right). Subsequent users were also promptly able to list interests (opposite, top). These iterations led to the screens demonstrated for the short duration tests (facing, bottom).
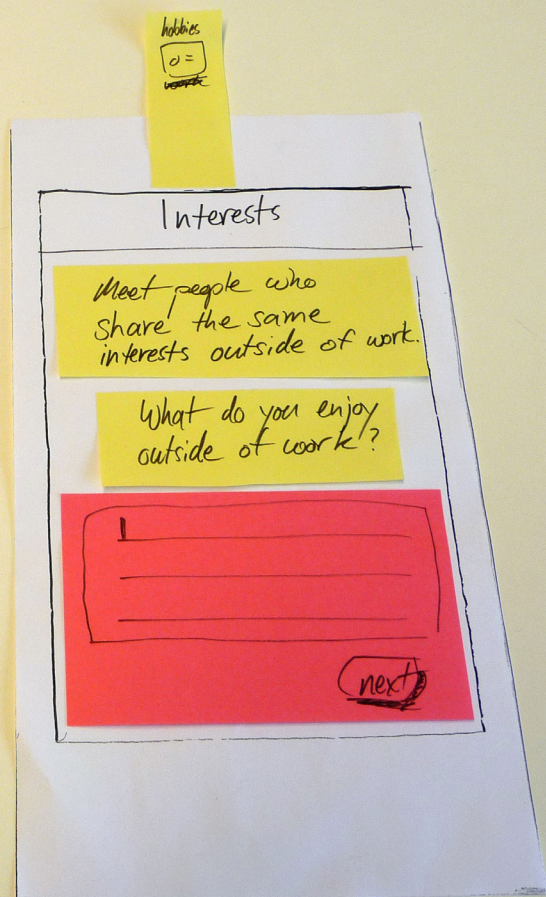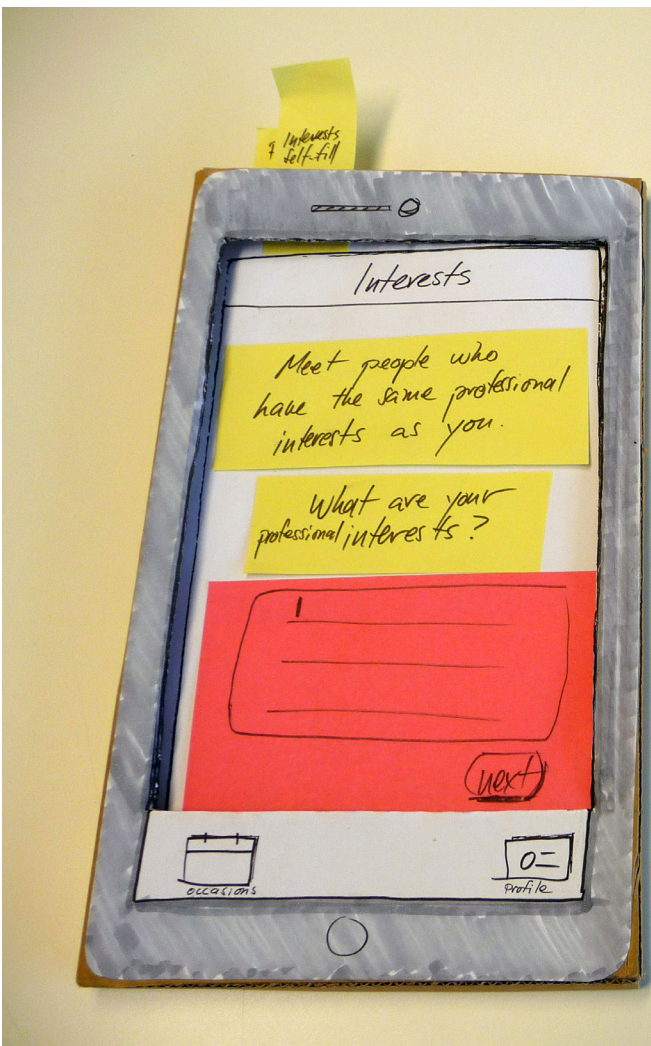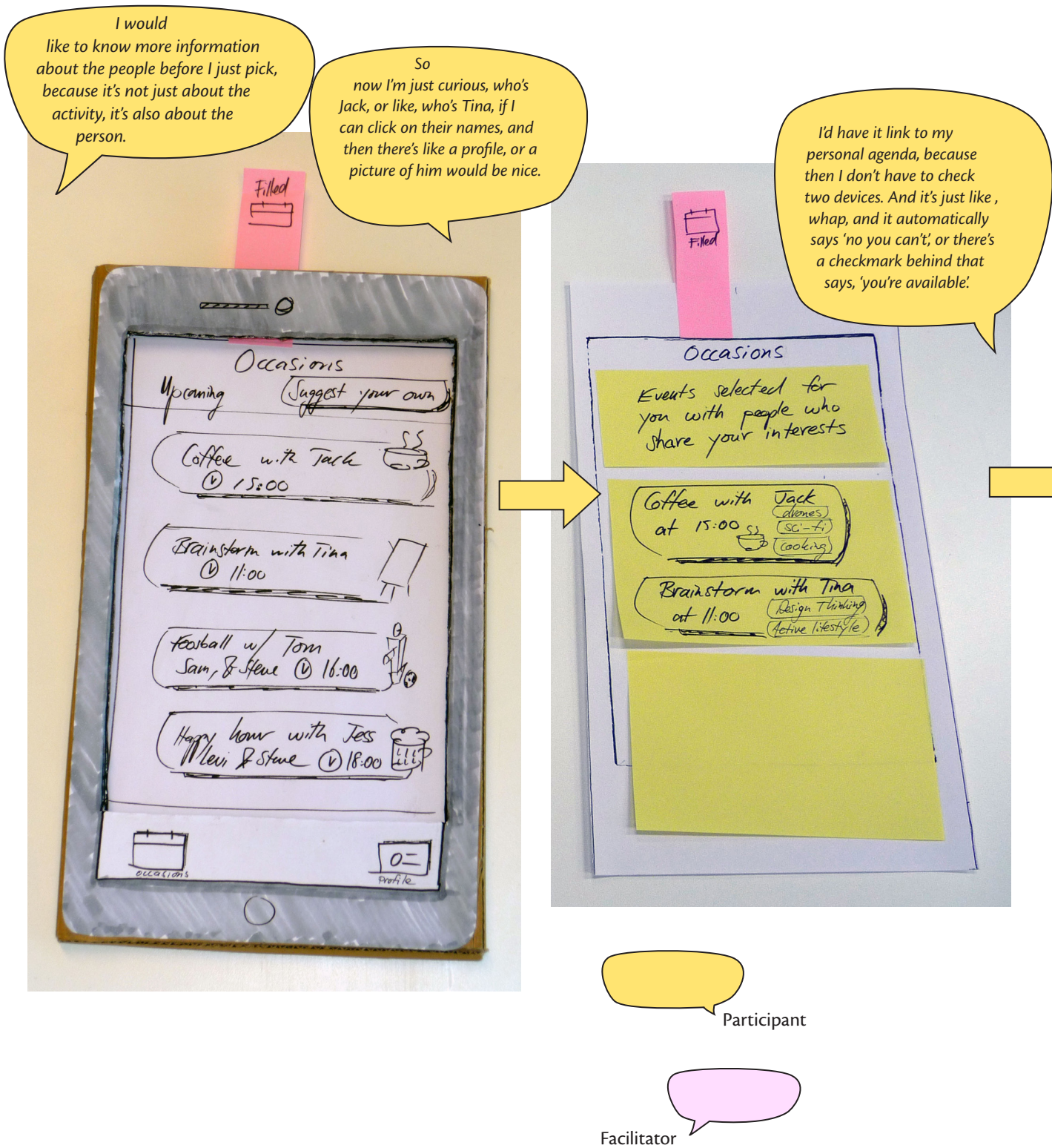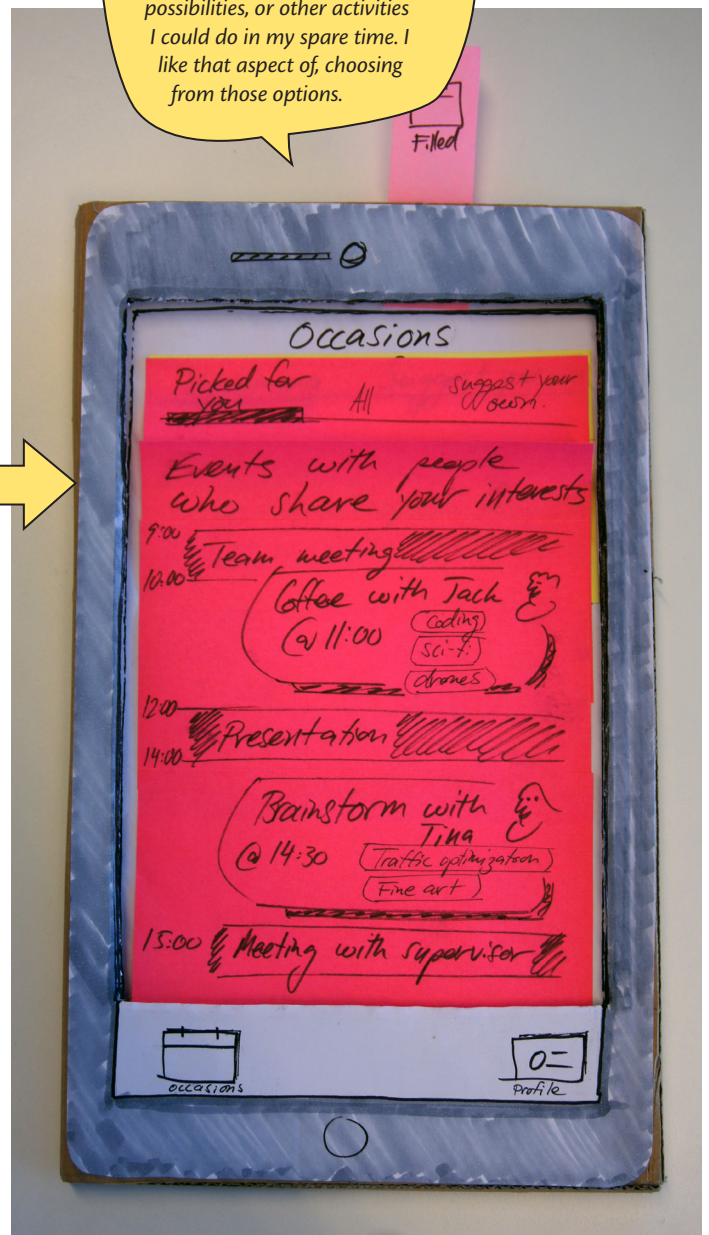
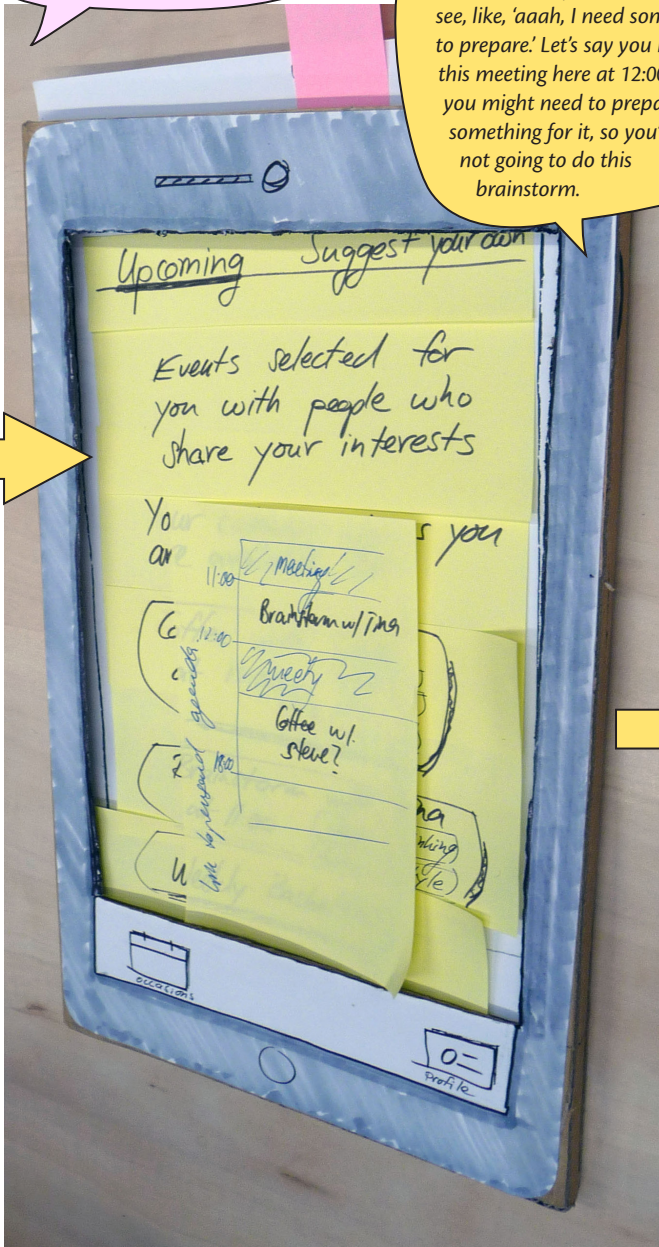Figure 48: Evolution of Occasions Home screen
The initial screen contained occasions with a time and name of attendees. After participants expressed interest in knowing more about the attendees,
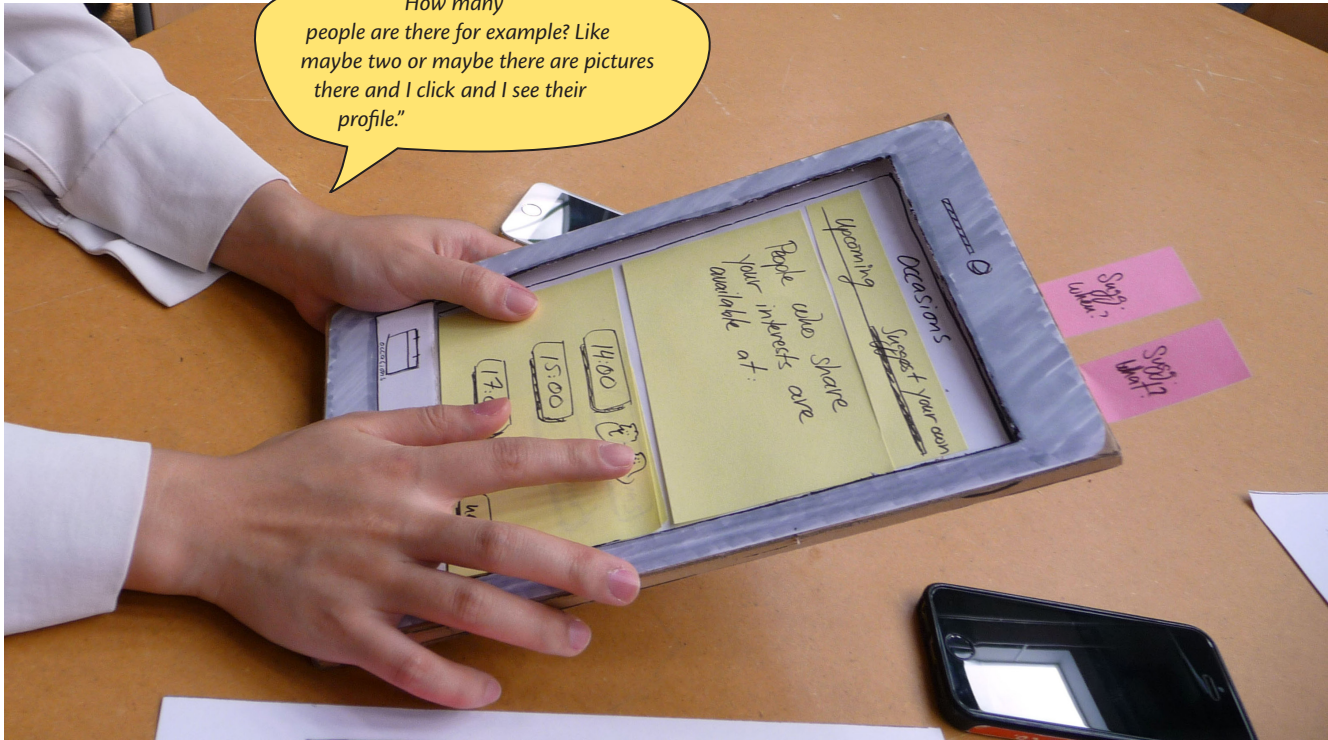Beginning with suggestions for acca

Figure 49: Evolution of Suggest your Own Occasion
The Suggest your Own Occasion feature began with a simple time selection screen (top left), followed by a short selection of potential activities (top right). During the tests, participants expressed a desire for more transparency into their own calendar, into other people's calendars, and into other people, resulting in the final time selection screen (bottom left). Similarly, the activity selection screen evolved to include a "Create your Own" option (bottom right). The facing page illustrates the iterations that occurred on this feature during one user test.

The audio and video recordings were reviewed, and relevant passages were transcribed. This led to the following assessment of the design assumptions. Fictional names for participants have been used to protect identities.

Assumption 12 – People see the value in connecting with persons who could be Buddies at Work. - *Unverified*
Participants expressed mixed desires to connect on the fundaments of the Buddies at Work relationship. Connecting with people who share non-work interests was not desirable for all.

> *"when I started working here, I have friends besides the company, so I'm not looking for desperately new friends at the company. It's really nice when you meet them, but **for me in the beginning it was about how to find the people who are useful for my job.**" - Lisa*

Connecting with people in the same life stage, however, was desirable.

> *"I mean if I see a picture, that maybe Tark is a 60ish guy, Tina is a 20-something girl, then there is a chance that I would go first with Tina, I mean I'm not saying that I would ignore Tark, **maybe I would pick somebody who is closer to my age or my department**, because for example in my case, **when I started working, I wanted to connect first with the team where I worked,** so that was my priority." - Lisa*

These somewhat conflicting findings can be seen in a couple ways: they can put in question the definition of the Buddy at Work, or can suggest that knowledge workers are not explicitly aware of their desire to meet Buddies at Work.

These quotations do show, however, that participants have an explicit interest in getting to know people who are part of their team or directly involved in daily work.

> *"I wouldn't necessarily be interested in having like a coffee to talk about a similar interest. **Only if it applies to my job at that point**, or that it serves as an input for inspiration." - Patrick*

Assumption 13 – People see the value in connecting with persons who are potential Passion Sharers. - *Unverified*
Participants did not explicitly show interest in meeting with people who share the same passions. They did, however, explicitly express interest in getting to know their team members and other colleagues who are involved in their daily work.

> *"… When I started working here it was not just creating personal contacts, like, looking for friends. **It's also creating meaningful professional connections.** Again, if Tina is from consultancy, and Tark is from Development, then if I work in development, the chance is bigger that I'm going to go with Tark, .. because he works in the department where I at that time work." - Lisa*

Assumption 14 – Users will be comfortable openly sharing their personal and professional interests on the platform. - *Verified*
During the first session, a list of interests to choose from was shown. The participant found this design challenging, particularly, because she shared none of the listed interests. Instead, she proposed that the application have a fill-in feature. We promptly added this feature, and the participant showed no hesitation in self-identifying professional and personal interests. For all subsequent user tests, the fill-in feature was presented.

In these subsequent sessions, all of the participants were able to self-identify interests. There were nevertheless some hesitations, concerns, and suggestions. In the second test, the prototype prompted for interests in general, i.e. not requesting professional and out-of-work separately, which triggered some hesitation:

> *"I'm still not so sure what kind of application this is, so I'm not sure if I should fill out my private ideas in or my private interests, or business skills," - Jan*

I made a distinction in following sessions, requesting professional interests on a first screen, then requesting out-of-work interests on another. This was still not obvious to all.

> *""What do you enjoy outside of work'? Wait, then what was the other one? What's different actually? Ah, professional interests. … Then .I just move party to out of work, and write design/service design [in professional]." - Helen*

> *Sub-assumption 14.1 – Should personal and professional interests be requested individually?* **Yes**

Several participants expressed interest in the ability to see examples of interests that others have submitted. These entries could give a hint of what is acceptable to input, and can help a person recall what he or she may be interested in.

> *"Because I don't know what my professional interests are, so if I can checkbox something, like these are my professional interests" - Richard*

> *"I think **you will feel a little bit lost at the start if you have to say your interests out of the [blue].** Ok, but maybe you can put some names, like other interests … like what your department is mostly interested in. Because why do you want to share that you like curling if nobody does curling? .. Also, if you read others, you can see, 'ah, yea, I had that passion, I just forgot it'" - Jessica*

> *Sub-assumption 14.2 – Should users be presented with a list of interests to select from?* ***Yes with fill-in option***

Users should see suggestions for interests. These can aid in recall, can give an idea of what kind of input is expected, and can themselves be options to select. In addition, a fill-in field should be provided.

Assumption 15 – People will be interested to join both social and professional occasions.- *verified with caveat*

Participants did express interest in joining both social and professional events through this platform, but with a preference for professional-minded events during the work day, and primarily social events outside the work day.

> *What would be something that you would dedicate time to during the work day?*

> "**Getting to know the company, helping people to give input to their work, getting input for my work, yeah because you're working**, and of course you meet people, but that's the work person that you meet, I mean that's how it should be, I think." - Patrick

Assumption 16 – Connecting over the means of this concept will be desirable to alternatives. *Verified*

Participants did see unique value in connecting with colleagues via the concept, although primarily in large office contexts.

> "It looks a little bit corporate style, we're with 25, so if you get a coffee, you've seen everybody. So **if you have more people with different floors and different departments, and people with the same interests are not in your department,** which is always an interesting way, **then I guess these kinds of things help.**" - Jan

> "but **the cool thing here is you can really find others, and others in the whole building**, because that's really blocking us a bit here, to, I mean **we know everyone from the Transport group, but that's let's say one tenth of the whole building. There might be a lot of fun people as well with similar interests,** and you never speak to them, so I think there is not a real alternative for this kind of thing." - Brian

Assumption 17 – Knowledge workers would continue using this concept to arrange meeting occasions after initial contact has been made. - *Inconclusive*

Insights into continued use of this solution past initial contact was unclear. Further research is required, and a longer range study is recommended.

Assumption 18 – People are comfortable approaching others they have not met before at a pre-convened place and time. - *Unverified*

Participants expressed that approaching others completely blindly at an occasion would be daunting, but they did provide suggestions for how to make the process more comfortable.

> "I would really appreciate if he has the same notification, 'hey, a new member is joining today, so that when I step in, at least in the first quarter of an hour, I know he will say, 'oh hi, welcome you are the new one joining.' Because if they are already all having coffee and I join, they probably won't even notice probably that I'm in." - Jessica

> "For me I should feel **I think or experience that I'm really welcome in this occasion**, this event, so that's if this guy says if I come 'ah, you must be the guy who just accepted my invitation'. And that it's not like me saying 'ah, hey, are you Fred, or Jack?', and he says, 'yes, yes, yes', and I responded on your occasion, and he says, 'o which one? Ah yes, the one I put in a year ago that is recurring every Monday, but no one is ever responding to it. Ah, yes but I'm not really having time now.' "- Brian

Assumption 19 – People will only want to see Occasions for people they match with and activities they like. - *Disproven*

In addition to seeing a curated list of selected Occasions, participants expressed interest in seeing all occasions that have been suggested. This would enable them to try new things, and not be limited to occasions within their self-identified interests, which may not be complete.

> "I also want to see everything, probably like 'Suggested', then it's a few, like 5, then I can click on also 'Others' or something, because **I don't want to miss out on anything**. I'm a new employee, and **just in case I wrote [my interests] wrong**, I might be interested in something else. Maybe it's like, 'Suggested', then Explore', and then 'Manage your Own', or something"
> - Helen

Key Learnings

1. More transparency into time availability is required

Participants expressed a desire for more transparency in the application. For example, to be able to see their personal calendars when considering potential occasions or when suggesting their own. This reveals that integration with a calendar application such as Outlook can be of great value.

2. Interests are to be indulged in, not discussed

It's about doing the activity, not talking about it. For example, there is no great value in having coffee with someone who shares your interest in rock climbing. Instead, there is much more potential to build a valuable connection by going rock climbing with that person. Similarly, meeting with someone to talk about coding over coffee does not have as much value as going to a lecture with that person over an aspect of coding, and connecting over a discussion of the event afterwards.

> "I make real friends when I really do something with somebody .... This seems forced, like 'hey, we both are interested in the same thing', therefore we should be friends, or we should have a social connection. I'd much rather do something and then establish, 'hey, this is a good guy.'" - Patrick

3. People go to work to work

Participants expressed a bias toward using the concept for professional gains, e.g. getting quickly started in a job, or contributing to a project.

> *"I would use it if it would be about the professional interests"*
> *- Jessica*

4. Occasions need more clarity

Participants had several questions about Occasions, namely:

▪ Are the occasions actually suggested by colleagues, or automatically suggested by the system, for example when both of the involved parties have an opening in their calendars?

> *"I'm not sure who decides what in timing. Here I would assume that I also have these available, so you and them are available at this time. And I'm not sure to how many people I share this. Is it broadcasted, and can anybody in the office see this and join me?" - Jan*

▪ Are the events recurring?

▪ What will happen during an Occasion?

> *"But do you want to know if [the occasion] is just to talk about coding in an abstract way, or it's coding because people have question and answer sessions?" - Jessica*

5. Communicate value of the concept sooner and more clearly

This will guide users in inputting their information by giving them insight into what it will be used for.

> *"I'm still not so sure what kind of application this is, so I'm not sure if I should fill out my private ideas in or my private interests, or business skills," - Jan*

6. Seasoned employees will need to be stimulated to engage in Occasions

> *"So for me as a starter I think it's ok, because then I get to know quite some people, but I think especially the other side, people who have already been working and then **they should be forced or asked to at least have once a week sometime available for new people to get acquainted**." - Jan*

Discussion & Implications

One of the main findings is that participants did not express an explicit desire to connect with Buddies at Work and Passions Sharers. Participants did, however, identify the following categories of people as desirable to meet:

• Team members
• Interdependent colleagues
• Experienced colleagues
• Higher up colleagues
• Other recent hires
• Colleagues around the same age
• Existing connections from other contexts

> *"I think these are the three things, people who are like-minded, people who are just starters, people who have some expertise, maybe if there is a hierarchy, team lead, depending on what my role is at the company, and people I know from other places"*
> *- Jan*

> *"Maybe just meet new people, like people arrived at the company same time as me, they might also look for someone to talk to, get familiar with the environment together," - Helen*

Despite these first two assumptions being verified, the tests did reveal a clear appeal to connecting with colleagues through the concept, and suggests that the concept's value can be increased by facilitating the connections identified above.

Another key implication comes from Key Learning 2, that interests are to be indulged in, not talked about. This suggests that the Occasions arranged through the concept should more organized than casual conversation. Option suggested by participants for more organized occasion include:

• Question and answer sessions
• Interest lectures followed by a social hour
• Sports league matches

Finally, the impressions shared by the participants demonstrate that the concept has unique value with respect to alternatives. This value comes particularly from:

• Learning about colleagues who are not regularly sharing the same space
• Getting to know the culture of the office
• Providing a grassroots means of organizing events

5.7. Final Design

The final design gives a finished form to the screens resulting from paper prototyping, and incorporates improvements in response to the implications. In contrast to the primary iteration, the final design is envisioned as a feature within the Mapiq Now native mobile application, and therefore takes on matching aesthetics.
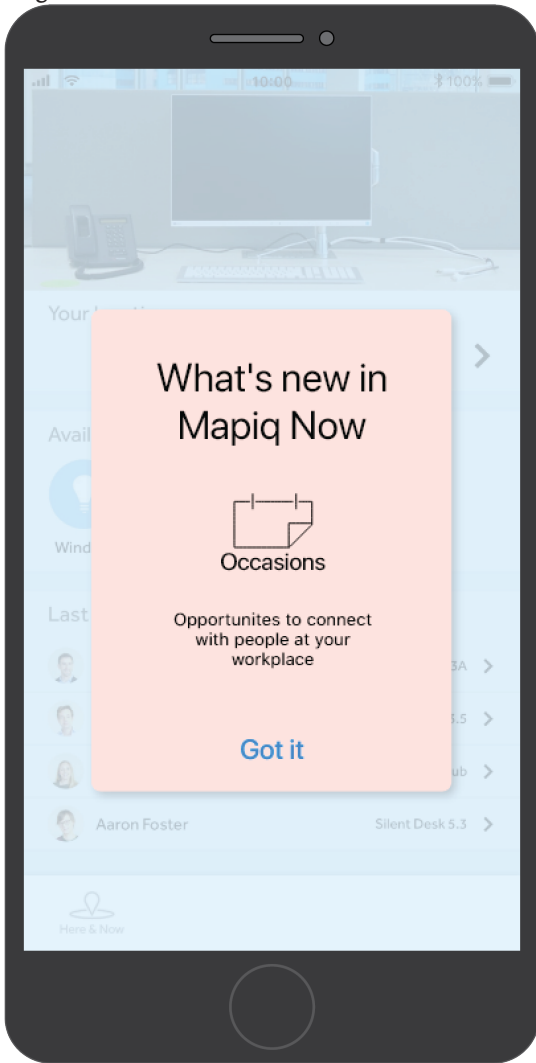

Figure 50: Occasions introduction
The final design takes the form of a feature within the Mapiq Now application. It is imagined as packaged into a future release of the application, and introduced to a user through an update introduction screen

The feature takes on the name Occasions. An occasion is defined as "a suitable or opportune time for doing something" (Occasion, 2018). The name is fitting because the design's main function is to find a suitable or opportune time for people with shared interests to meet.

The core of the feature is the Occasions main screen, pictured in Figure 52. Users are presented with a calendar view of upcoming occasions for meeting up with people in their workplace. Within each hourly slot, all available occasions can be scrolled through horizontally. They are sorted based on relevance to the end user, and can be optimized by entering professional and out-of-work interests into the system. This is completed in the You section of Mapiq Now (Figure 35 - Figure 39). Users are also able to create their own occasion, as detailed in Figure 61 - Figure 65.
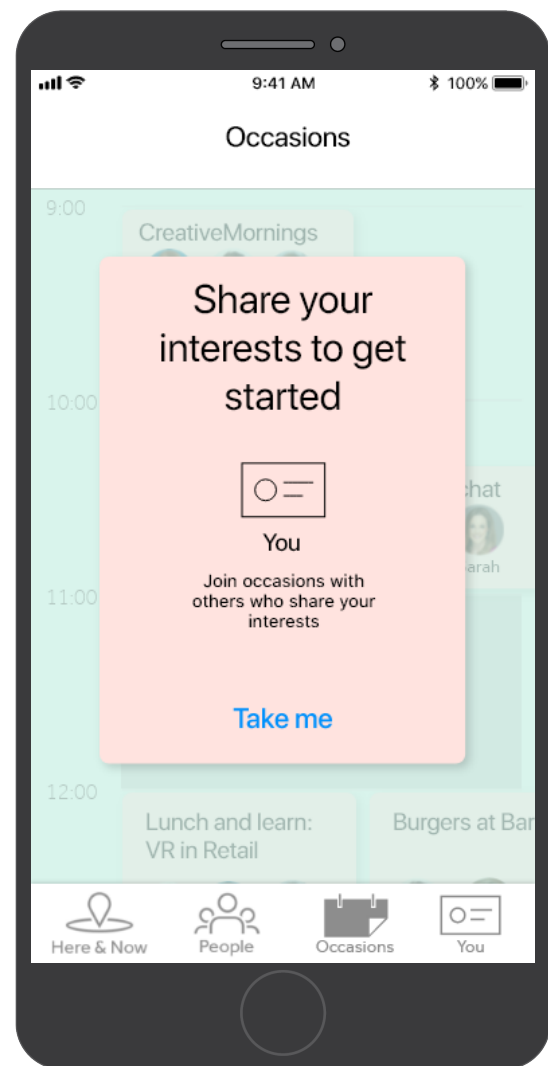
Figure 51: Occasions intro pop-up
Upon first visiting the Occasions feature via the tab bar, users are greeted with a pop-up, prompting them to share their interests on the You section.

Prompt to create Occasion

9:41 AM 100%

< Upcoming Create

9:00

CreativeMornings

Tina Tony Jess

Attendees with shared interests

10:00

Xamarin Q&A

Paul Chris

Coffee chat

Kate Sarah

11:00

Existing meetings

Tech review

12:00

Proposed Occasions can be scrolled through horizontally. The Leftmost occasions are best matches based on the matching algorithm

Lunch and learn: VR in Retail

Chris Tina Jess

Burgers at Bar

Tony Jim

13:00

Yearly goalsetting

14:00

To create Occasion (Figure 38)

Create

15:00

Project work

16:00

Create

17:00

Figure 52: Occasions main screen
Users see an overview of their calendar, as integrated from applications such as Outlook. In openings in the calendar, Occasions with matched people are suggested. In openings where there is not yet an Occasion proposed, users are prompted to create an occasion.

18:00

Happy hour at Blue note

Tony Paul

19:00
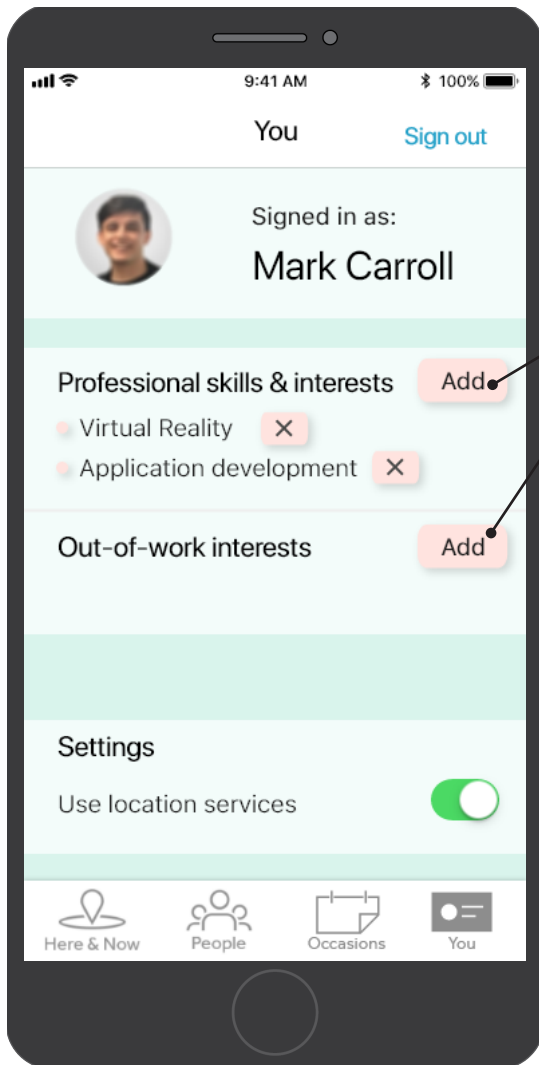
Buttons to add interests
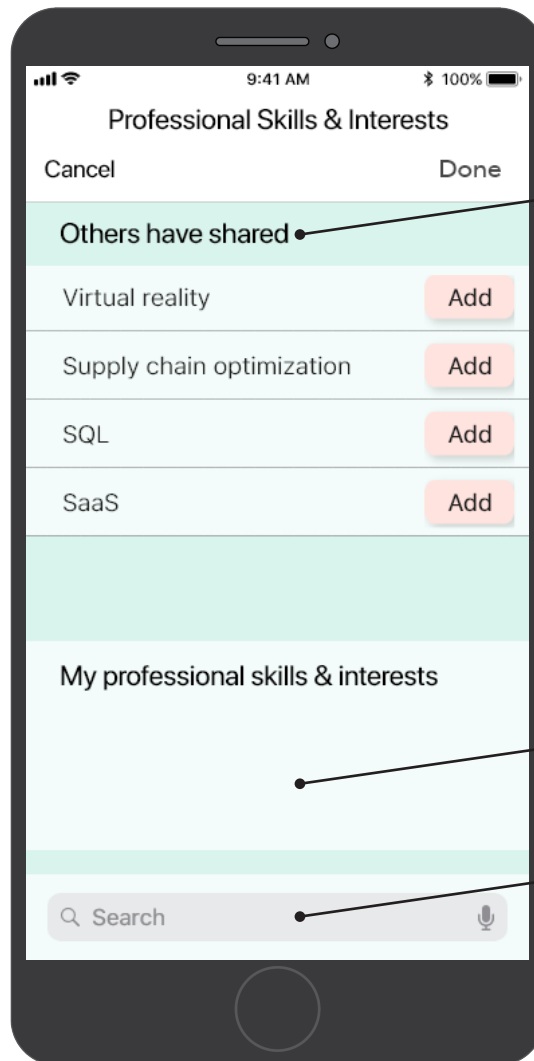
Gives users an impression of what is accepted practice to share

Interests added show here

Interest search function

Figure 53: Main You screen
Users can add interests by clicking the Add button. Professional and out-of-work interests are listed separately based on learning from the assumption verification.

Figure 54: Professional interest selection
Users can select interests from a pre-populated list, or can search for specific interests.

Search suggestions

An interest chosen from the pre-populated list
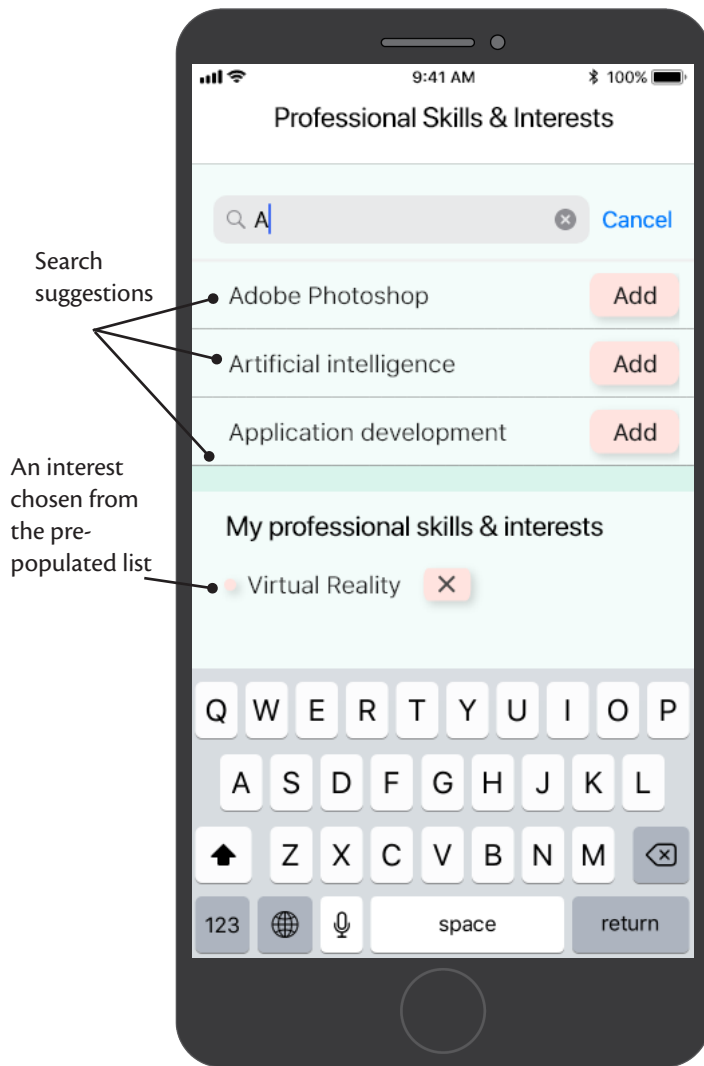
Figure 56: Professional interest search
As a users begins to type, search suggestions are made, based on a database of skills.
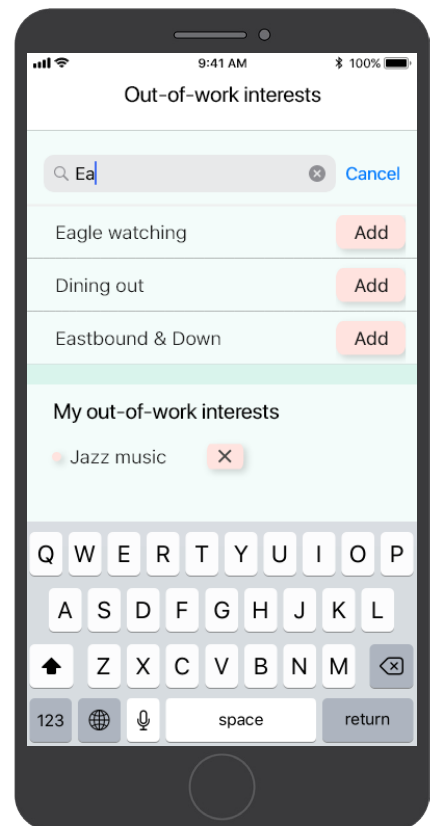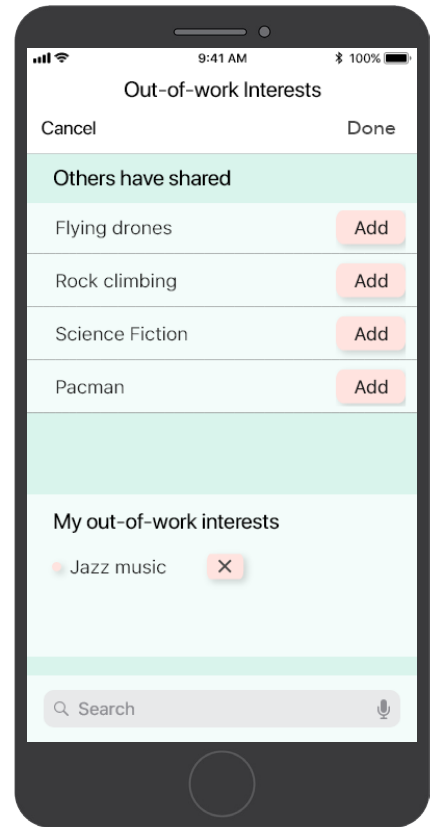
Figure 55: Out-of-work interest selection
Users follow the same logic for selecting out-of-work interests as for professional interests, selecting from a pre-populated list or searching for specific interests.

Proposed Occasions can be scrolled through horizontally. The Leftmost occasions are best matches based on the matching algorithm

Existing meetings

To create Occasion (Figure 38)
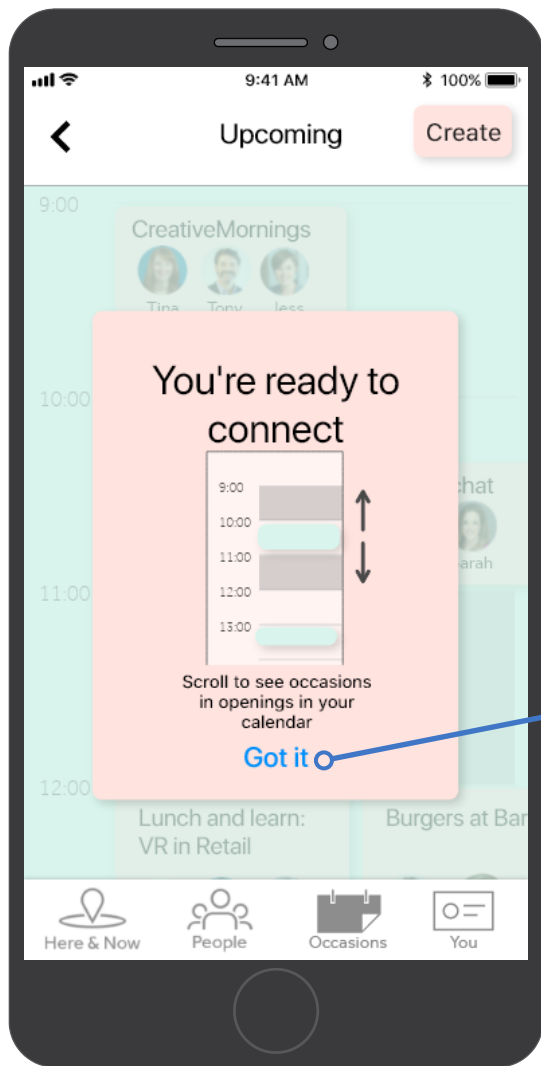
Figure 57: Occasions explanation pop-up
*Once users have shared interests, they are greeted with an explanatory pop-up when first visiting the Occasions section.*
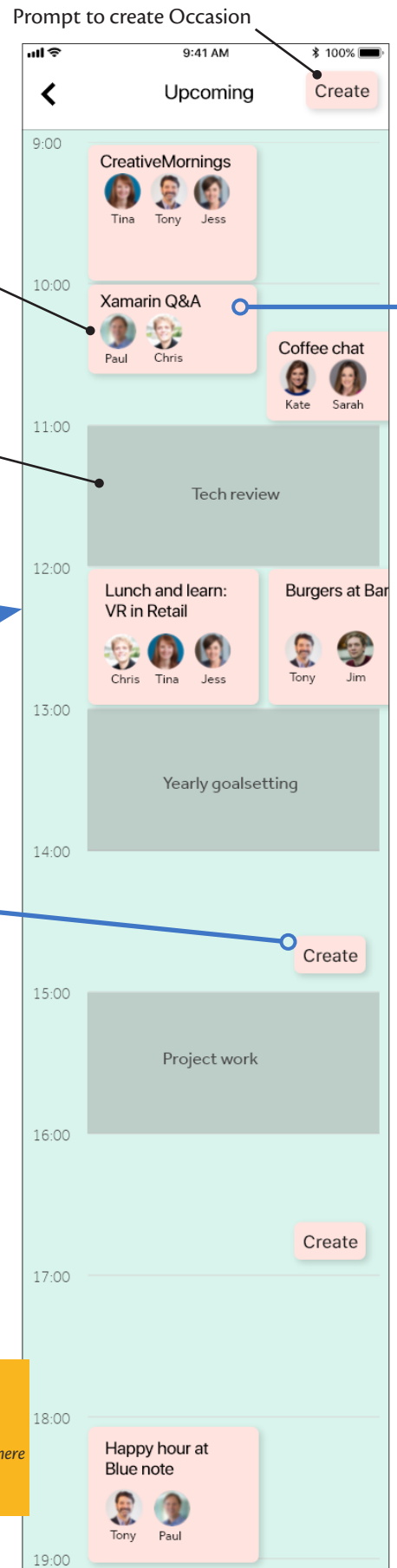
Figure 58: Occasions main screen
Users see an overview of their calendar, as integrated from applications such as Outlook. In openings in the calendar, Occasions with matched people are suggested. In openings where there is not yet an Occasion proposed, users are prompted to create an occasion.

Link to Mapiq
Wayfinding

Persons with
matching
interests
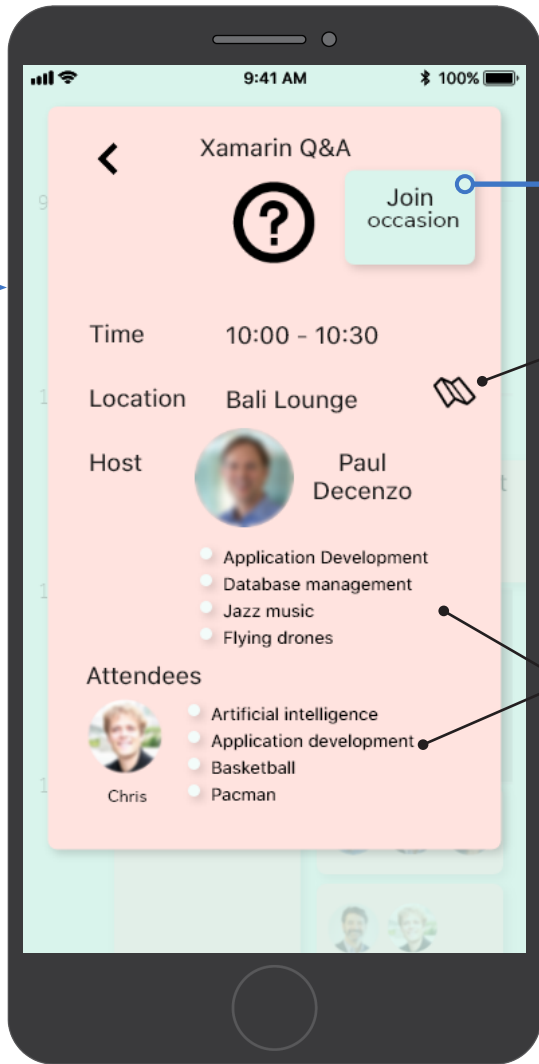
Figure 59: Occasions details.

By selecting an occasion from the main screen, users can see details, such as the Occasion host, confimed attendees, and occasion location. When the Occasion is joined, it is added to the user's calendar.
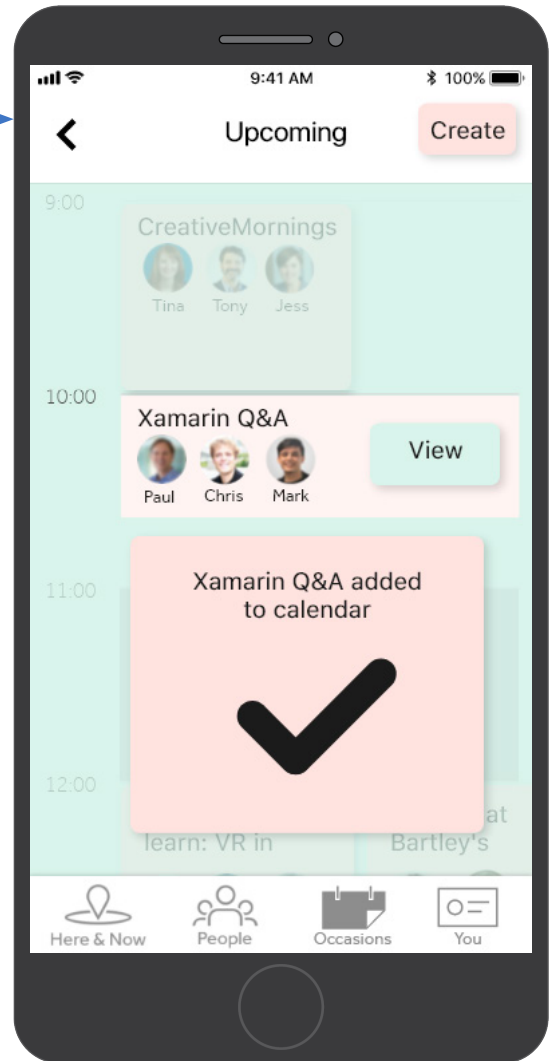
Figure 60: Occasion joined

A joined occasion figures as fixed in the occasions main screen.
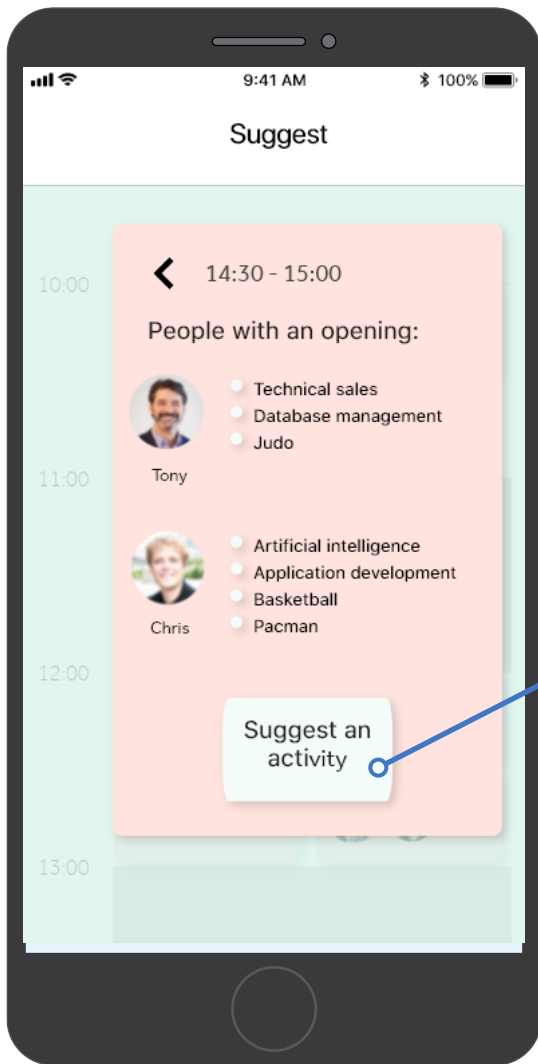
Figure 61: Create Occasion timeslot

By selecting "Create" from an opening in the Occasions calendar, users see the matched persons available during that time, and can then choose to select an activity.
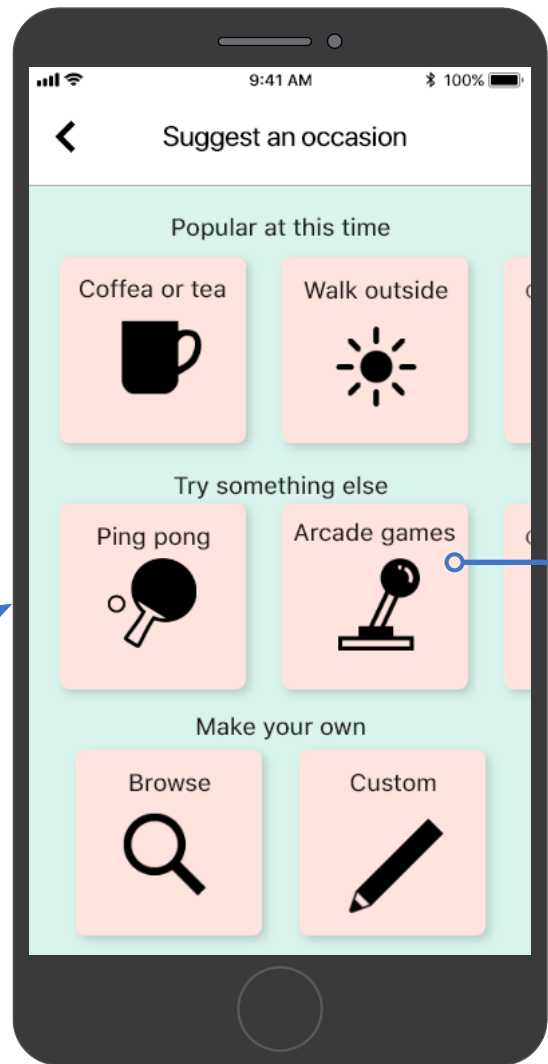
Figure 62: Suggested activities

The system suggests Occasions that are fitting based on the interests of the available persons, and on the activities that are popular at that time of day. Users are also given the option to create a custom event or to browse other categories
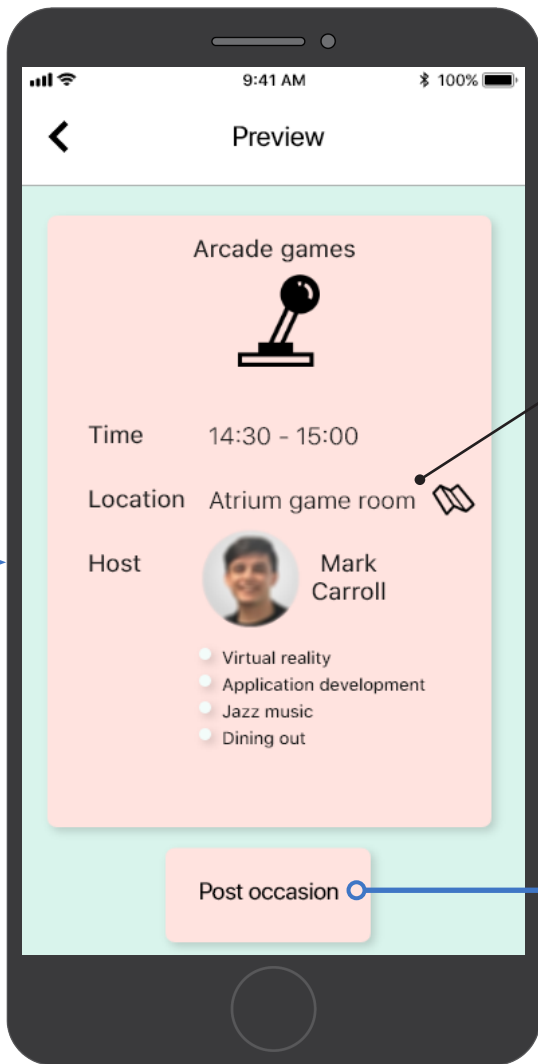
Location automatically filled in
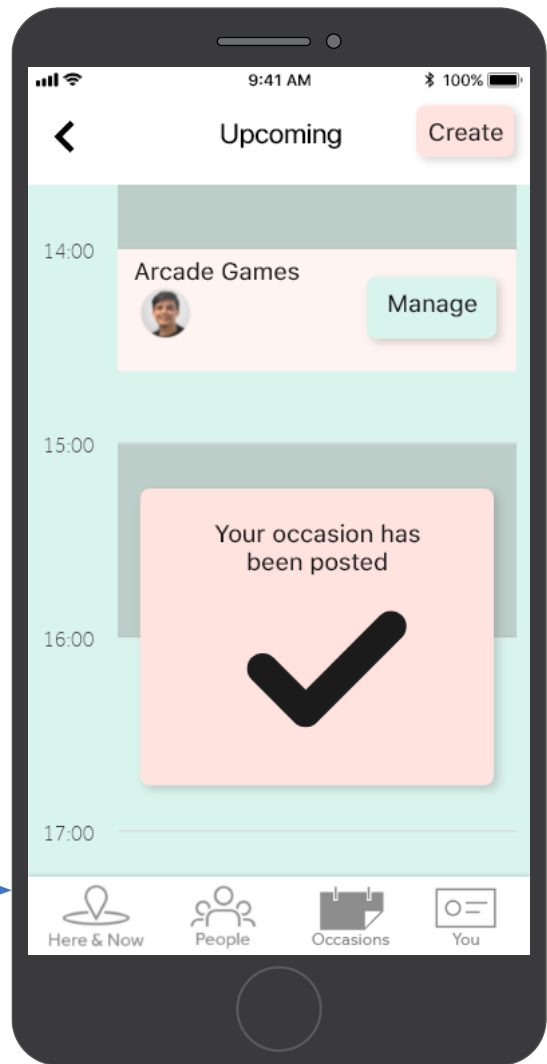
Figure 63: Create Occasion preview

Upon selecting an activity, the application gives a preview of the Occasion details. The location is auto-populated based on the selected activity and resource availability.

Figure 64: Occasion posted

A user-created Occasion is posted and visible to the creator in the Occasions main screen, with option to manage the Occasion.
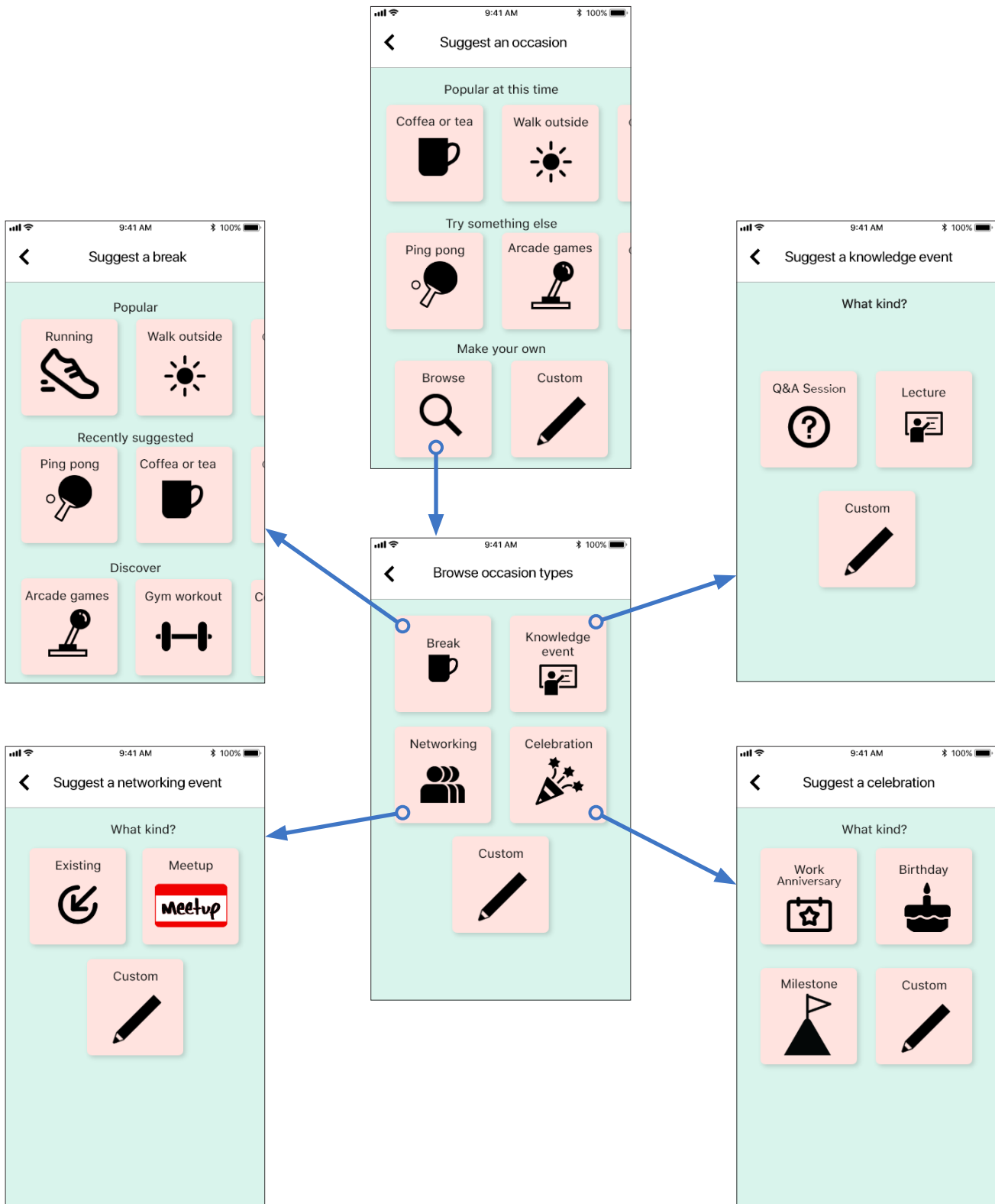
Figure 65: Occasion options architecture
By selecting the Browse function, users are able to
explore a range of available occasions to suggest.

5.8. Evaluation

The Occasions concept is now evaluated along the following dimensions.

- **Strategic**
  - How does it fit in Mapiq's portfolio and vision?
  - What types of workplaces will it appeal to most?
  - How and to whom would the concept be sold?

- **Interaction**
  - What are existing concerns about the design?
  - How can it be improved?

Method

To form answers to these questions, four group evaluation sessions were held. Each session began with a product demonstration illustrating the case of a new employee using the feature for the first time. The demonstration was followed by the questions above. The sessions were attended by the following Mapiq employees and stakeholders:

- Strategic Session 1: Business developer, Customer success manager
- Strategic Session 2: CEO, target user
- Interaction Session 1: Interaction Designer, Multi-media Designer
- Interaction Session 2: IOT engineer, Design Lead

All sessions were audio recorded and listened to. Important passages were transcribed.

Insights & Recommendations

The evaluation sessions resulted in the insights below.

- **How does it fit in Mapiq's portfolio and vision?**

The final concept provides a good strategic fit within Mapiq's value proposition. It is within the technical capabilities of the company, and fits with the company vision.

> *"I think it fits in perfectly. The big idea of Mapiq is to make the agile workplace really work, and provide people with the facilities they need. It's about finding where your teams are, where your workplace is, whether there's parking place available, that sort of stuff, and I think the next step for us would be to also advise people, to really assist them, and say 'Hey, maybe Utrecht is a good location for you today'. That's the same way we're heading also with the room booking stuff, for you to as an end user really provide your wishes, and Mapiq to take care of it, and I think that's where this fits in perfectly. It's really about providing with suggestions, and that's something I like a lot" - CEO*

> *"I think that's a logical next step, you know if you got the people feature, you got events, you can do this ... it's a kind of marriage of the two things we already do technically, so I think that's a good thing"*   -Interaction Designer

- **What types of workplaces will it appeal to most?**

Occasions has been evaluated as having good appeal to the following three types of workplaces:

a. Co-working spaces

One of the key values offered by co-working spaces is networking. To maximize this value, these spaces often employ Community Managers to link people together and organize events. Occasions can take over some of these responsibilities.

> *"especially the coworking space, that's a prime example of more looking into the social aspect, the connecting aspect between strangers who don't know each other, and that is a lot more relevant there," - Design Lead*

b. Consulting firms

One of a new consultant's primary objectives is to get staffed on a project. A crucial step in this process is for new consultant to sell their professional skills to key decisions makers. Using Occasions can be an effective way to do so.

c. Workplaces with high turnover

One of the concerns identified with the Occasions feature is the potential for use to drop once new knowledge workers build their networks. In places with high turnover, each influx of new people can generates a spike in use. Since one of the objectives is to drive use of Mapiq touchpoints, workplaces with high turnover form a key target group for Occasions.

> *"I think for me that's really a strong selling point of the concept as well. Especially if you kind of introduce it in the setting of a big consultancy company with a high turnover, every month there's a new workforce. Because then that also keeps the app alive as well."   - IOT Engineer*

- **How and to whom would the concept be sold?**

The commercial Mapiq teammembrs echoed the challenges identified in selling people-centered features such as Occasions to traditional client contacts. In particular, the business case around Occasions is hard to make to Facility Managers and executives. Instead, the commercial team indicated they would take a different approach when speaking about Occasions, focusing on its benefit to end users and Human Resources organizations.

> *"Maybe within their own minds they want to buy it because of the latent benefits, but **in the end they have the feeling that they have to build up a business case**. The key thing is that **they won't be able to put money on the table for this functionality, right now**, but they do want to pay money for a room booking system." - CEO*

> *"You're talking generally, you're speaking to management , either facility management, sometimes the CEO or something, so **I would probably try to sell it in a way that's it's probably something that we do extra with a focus on end users**, just make sure that end users get up to speed quicker ... **so we don't***

only think of the hard things, but we also focus on the soft side, which is just as important, I think I would say something like that. So now we have data for facility managers, we have for the end user the rest, and maybe this one is for HR/end users."

- Business Developer

"*Yeah I think HR would be most interested, but these aren't currently who we sell to " - CEO*

The participants indicated that Human Resources would see value in the concept in its contribution to new employee onboarding, and in continuous development.

What values does HR see in this?

"*Getting new people up to speed quicker, taking a bit of load off knowing your colleagues, taking a bit of load off their onboarding program, maybe like it continues development of your people because if it's knowledge-based then you would do this just every now and then, just have a look, maybe see if there's something that you like, and then just attend the presentation or something, I would do that.*"

- Business Developer

- **What are existing concerns about the design?**

The following concerns about the design were raised.

a. Lack of clarity surrounding suggested occasions
Throughout the paper prototyping and the final concept demonstrations, it was not clear whether the occasions listed in the agenda were actively suggested by others or automatically suggested by the system.

b. Potential for social anxiety
In its current design, users attending an occasion with previously unknown persons can face social anxiety. While the final concept does improve a user's ability to recognize an Occasion attendee by sharing a photo, it does not yet build in a clear social icebreaker or bridge into conversation.

c. Complexity in adding skills and creating occasions
The steps involved in adding skills to a profile were identified as straightforward and logical. As embodied, these steps are currently required to be able to see the upcoming occasions. Despite the clarity, the length of the setup process was identified as a potential detractor to using the Occasions feature. Similarly, the steps required to create an occasion were also found to be complex.

"*it's rather complex to me ... in my opinion we should strive to make it simpler and more straightforward and maybe easier to use or more self explanatory. " - CEO*

- **How can it be improved?**

The participants indicated the following manners in which Occasions could be improved.

a. Integrate skill databases
The likelihood that interests listed under "Others have

shared" match with that of an end user can be expected to lessen with growing organization size and diversity. Therefore, to provide skill & interest search suggestions, it is recommended to begin by building a database of such items into Mapiq Now. As use of the feature builds, Mapiq can then sort the suggestions based on factors such as popularity and workplace, similarly to how Google sorts its Autocomplete search suggestions (Sullivan, 2011). It is also recommended that Mapiq offer integration options with professional social networking site, such as LinkedIn, from which skills & interests listed by users can be automatically synchronized.

b. Build in intelligent suggestions
The system can be designed to have the capability to automatically suggest occasions for users. As an example, the system could recognize that a certain set of users with matching interests are located near each other, and automatically suggest an occasion at a nearby break area, such as a coffee corner or game room. Such a solution fits well within Mapiq's strategy of providing intelligent suggestions.

"*For the usability, I think it's quite a big step for people to create an event, and maybe that also should be more suggestion based. Like 'hey, you have a gap after lunch, shall we try to schedule you a coffee break?'*" -CEO

c. Lower barriers to viewing Occasions
The complexity and requirement of sharing interests prior to viewing occasions was identified as a potential detractor to use of the feature. To alleviate this concern, it is recommended to make occasions viewable to any end user, and to nudge the user to share interests by highlighting the added benefit, namely improved relevance of occasion-sorting.

Advantages & Testimonials

Throughout the paper prototyping and evaluation sessions, several testimonials on the desirability of the feature were gathered. These provide primary evidence that Occasions is desirable among knowledge workers.

"It feels a little bit like some kind of professional social media/ LinkedIn platform for companies, where I can get to know my peers more. Like I can have a bit more interaction, and better relationship with my coworkers... I like how it's very open for your own implementation of what you can do, what your interests are, so I would be curious if other people who are connected to this have the same interests."" - Richard

"If it's a feature in LinkedIn, or linked to LinkedIn, it might be interesting, or linked to your canteen or coffee shop in your company, linked to your credits." - Jan

"This would be great to learn what goes on at the office, what people already do with each other, maybe I can just already connect to that." - Patrick

"Actually, I can see the potential in this thing, really ... Yea, what I say, the make visible the things otherwise people just know by the word of mouth, because now you are connected with people because others are connecting you, and of course it's cool and good, but in a big organization, sometimes those are hidden information, like very hidden information." - Lisa

"if it's knowledge-based then you would do this just every now and then, just have a look, maybe see if there's something that you like, and then just attend the presentation or something, I would do that." - Mapiq Business Developer

5.9. Recommendations

The following recommendations are proposed to address the concerns and findings from the evaluation. They can be split into two categories, design-based recommendations for the concept, and implementation & commercial recommendations for Mapiq.

Design-based recommendations

The concerns raised around the concept during paper prototyping and interaction evaluation can be addressed by the following recommendations.

▪ Build in more spontaneity by integrating localization technology and touchpoints

Using Occasions in its current from is rather regimented. The possibilities offered are strictly defined, i.e. occasions are set at strict times and always created by a person. Everyday social interactions at a workplace, however, often originate spontaneously. Examples include sparking up a conversation with a new person at a coffee machine, or passing by a colleague in the hallway. Occasions can benefit by facilitating such spontaneous encounters, and Mapiq can harness its current technologies to do so. One can imagine, for example, that Occasions could apply localization technology to detect two people with shared interests that are sitting close to each other, and send a notification to one of them when the other vacates her desk, as detected by a Mapiq desk sensor.

▪ Integrate with existing social media services

There are several parallels between adding skills and interests within the concept and building a profile on other social media platforms. Taking advantage of these through integration can address the concern surrouding the complexity of building a profile in the concept. For instance, knowledge workers already share professional skills on LinkedIn. Similarly, people submit their interests to receive personalized recommendations on Meetup. Mapiq can build integration with these platforms to simplify the profile building sections, and to be able to draw new connectsions. One can imagine, for example, that Occasions could detect that a new employee was not aware that an existing LinkedIn connection works at his new workplace, and the feature can suggest an occasion for them to meet.

▪ Run experiments to investigate social anxiety

A key concern identified with the concept was the potential for knowledge workers to face social anxiety when attending an occasion, particularly when the other attendees are not yet known. It is then highly recommended to design and test such situations to investigate potential variables, such as one-on-one vs. group occasions, or knowledge vs. purely social occasions.

Implementation & commercial

▪ Build Occasions in as standard functionality

The evaluation identified difficulty in making a business case for the concept. Therefore, proposing Occasions as an individual module for purchase is not recommended. Instead, it is recommended to build Occasions in as standard functionality within existing Mapiq touchpoints, not as an option. This is well in line with Mapiq's strategy.

> *"The key thing is that they won't be able to put money on the table for this functionality, right now, but they do want to pay money for a room booking system. So our strategy for how to get there is, right now, selling room booking systems, selling workplace finder, selling workplace analytics, at the same time work on our vision to really increase productivity, make the office a better place, that sort of stuff, ... and then it will prove itself, and then in the end, I hope employees will say, we need this app in our office, it's really nice." - CEO*

▪ Build MVP to pilot & validate

The desirability of the concept and its contribution to meeting Mapiq's objectives have been shown to be significantly positive. A large challenge, however, is to convince client decision makers to choose Mapiq for its people benefits, because of the difficulty in building the business case. It is therefore recommended to create some quantitative data that can be used to build the case. This can be done by piloting a minimally viable version of the feature at an existing client. Data to be shown to potential clients could include number of occasions attended, and number of new connections made.

5.10. Discussion

The goal of this integration section has been to propose and evaluate a concept that integrates the research findings into a product or feature to be offered by Mapiq. Such a concept was to:

• Create or strengthen the set of well-being-enhancing relationships at work
• Establish or improve vulnerability-based trust
• Increase soft end use cases for Mapiq
• Unify the Mapiq experience across touchpoints
• Apply suggestion-based capabilities
• Be desirable to people-focused management parties and to base-level knowledge workers

The final concept has taken the form of a feature within Mapiq's Now native mobile application. It proposes event-style Occasions for meeting people with shared interests in the workplace. It takes concrete steps toward, but does not meet all of the objectives above.

In particular, instead of explicitly addressing the full set of well-being-enhancing relationships, Occasions focuses on sowing the seeds for a subset of them: Passion Sharers and Buddies at Work. As embodied, the concept goes as far as bringing potential matches to a certain place with the anticipation of meeting each other, and with potential icebreakers in the form of shared interest. It does not, however, facilitate interaction during the actual Occasion. Instead, it relies on the social skills and confidence of the participants to complete the in-person interaction on their own. It does not offer clear follow-up functionality either. Because of this limitation, the concept cannot be said to be fully effective at creating those relationships. Nevertheless, it does improve the likelihood and speed at which users can form Passion Sharer and Buddy at Work relationships, therefore the concept still does add value. Moreover, the connections created by Occasions can build into the other well-being-boosting relationships through additional shared experiences, which can themselves be facilitated through Occasions.

Concerning the second objective, Occasions does not explicitly facilitate the establishment of vulnerability-based trust, but does set the scene for moments that can contribute. In particular, the concept does provide hints for eliciting personal stories by showing the out-of-work interests of other knowledge workers, but the process of actually asking for those stories is left up to individuals and their interest in doing so.
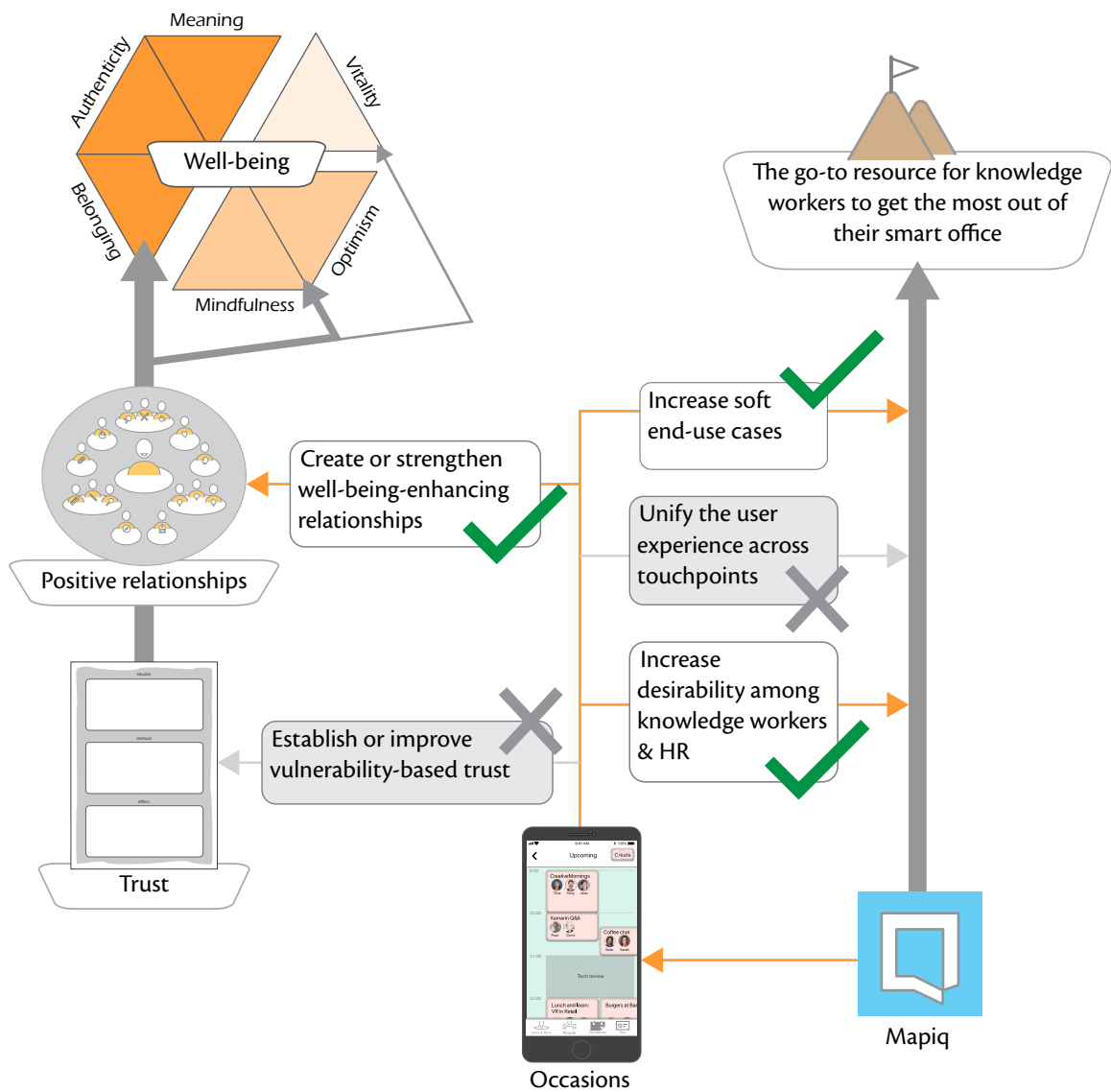
As far as increasing soft use cases for Mapiq, the concept does present an additional use case of the Now application:

to look for occasions for meeting like-minded colleagues. The frequency of this use case and its longevity have yet to be quantified, but the use case has been shown to be desirable among knowledge workers during evaluation sessions. Regarding the desirability among people-focused management parties, such as Human Resources, the Mapiq commercial team has predicted good appeal for the feature, but this has not been evaluated directly with partners or clients.

In its current form, Occasions does little to integrate multiple Mapiq touchpoints. The concept has been embodied as a feature in Mapiq Now, a platform exclusive to mobile devices. The use premise for Occasions, however, does hold real potential to take form on additional touchpoints, which can considerably improve the likelihood that knowledge workers will actually join an occasion. For example, kiosks and other forms of digital signage could show nearby Occasions relevant to persons passing by, as detected by localization technology.

Similarly, the concept can be more suggestion-based. This curation philosophy is currently built into how Occasions are sorted, and into the options presented when creating an occasion. Despite this limited application, there is good potential to apply the suggestion-based approach to additional areas of Occasions. The system could, for instance, automatically suggest an occasion to knowledge workers with shared interests that are detected to be working near each other.

Altogether, the concept can be said to effectively set the stage for enhancing well-being through relationships, and has good potential to lead Mapiq toward its vision.

Meaning

Authenticity

Vitality

Well-being

Belonging

Optimism

Mindfulness

The go-to resource for knowledge workers to get the most out of their smart office

Increase soft end-use cases

Create or strengthen well-being-enhancing relationships

Unify the user experience across touchpoints

Positive relationships

Increase desirability among knowledge workers & HR

Establish or improve vulnerability-based trust

Trust

Occasions

Mapiq

Figure 66: Evaluating Occasions against integration objectives
Occasions achieves several, but not all integration objectives. Notably it does not unify multiple Mapiq touchpoints, but does effectively set the stage to form well-being-enhancing relationships.

Conclusion

The primary question of this graduation project has been: how can smart building technologies be applied to effectively enhance well-being in the workplace? The research phases identified an opportunity to enhance psychological well-being by stimulating the creation of specific workplace relationships. Consequently, a feature for a mobile application has been proposed to bring candidates for such relationships together at a particular time for a particular occasion. Use of the concept has been evaluated as relatively complex, but clear recommendations have been made to make the feature more intelligent and user-friendly. The concept was also shown to have good desirability and good potential to help Mapiq reach its vision of being the go-to resources for knowledge workers to get the most out of their smart workplace. While the concept as presented may not be implemented, this thesis has made clear that applying smart-building technology to enhance relationships at work is unquestionably a direction that Mapiq should take.

Organizational implications

The Occasions concept as presented arranges a particular time, place, and occasions for people to connect. What takes place at such occasions, however, has been left up to the social aptitude and vested interests of the participants. The implication is that fostering psychological well-being is cannot that can be left entirely up to technology. People at all levels within an organization need to be actively invested to foster a culture of well-being. As in most change processes, the first step is awareness. Knowledge workers need to recognize the value of forming genuine connections, of being vulnerable with their workspace co-occupants. Leaders can play a key role by setting the example, to make others aware that this is accepted and desired behaviour. In concert, specialized activities can be facilitated by skilled persons to trigger such sharing, and informal social get-togethers to stimulate such exchanges should be encouraged.

Even if not all occupants of a workspace are actively invested in creating such a culture, it is important to intersperse the population with well-being stimulating people. These are people who recognize the importance of forming genuine relationships with their peers, who know to be vulnerable, who know how to ask the right questions to get others to open up, people who will organize occasions for others to get together. This exposes that a key differentiator in creating such a culture lies in hiring. Candidates should be assessed on their cultural fit, on their potential to form well-being supporting relationships with their future peers, on their capability to be vulnerable with others.

Along a similar vein, to stimulate well-being, decisions influencing the work environment should not be made exclusively on business cases. Decision makers should apply a more qualitative, intuitive approach when evaluating options. It is likely that key decision makers already have a gut feel that certain features, such as Occasions, can benefit their workplace, is which case choosing such options becomes a matter of trusting one's intuition.

Altogether, the research and design conducted have shown that technology can set the stage to improve phsychological well-being by bringing people together, but that human social aptitude, skilled persons, and organizational investment are still irreplaceable.

Future Research

The studies conducted in this thesis have made headway toward, but have not completely closed knowledge gaps relating to workplace well-being. In particular, methods for establishing vulnerability-based trust through technology can be further explored. This study explored only person-facilitated exercises, shown as effective, and passive analog stimuli, shown ineffective. Digital technology can provide stimuli in between these extremes, therefore it is recommended to conduct additional studies to test the possibilities.

Two key variables that have been hinted at, but not investigated in this thesis are the influence of organizational culture and personality profiles on well-being. Some cultures can be more conducive to building vulnerability-based trust, while others may not support certain positive relationships. Similarly, knowledge workers differ in their ability to form trust and build positive relationships. By investigating the influence of organizational culture and personality profiles on relational well-being, more effective, workplace-specific solutions can be developed.

References

Arantes, B., Butler, K., De Benoist, N., Leiserowitz, N., Bader, S., Redshaw V., & Buman, M. (2014). Wellbeing: A bottom line issue. *360*, (67). Retrieved September 07, 2017, from https://www.steelcase.com/research/360-magazine/wellbeing-a-bottom-line-issue/

Blomqvist, K. (1997). The many faces of trust. *Scandinavian journal of management, 13*(3), 271-286.

Crespo, A. (2015, December 15). 5 Reasons to use Paper Prototypes in UX Design. Retrieved March 08, 2018, from https://www.nomensa.com/blog/2015/5-reasons-use-paper-prototypes-ux-design

DeNisco Rayome, A. (2016, September 7). Why companies spend 3X on tech than they did a decade ago: Attract talent. Retrieved March 26, 2018, from https://www.techrepublic.com/article/why-companies-spend-3x-on-tech-than-they-did-a-decade-ago-attract-talent/

Gladwell, M. (2000). *The tipping point: How little things can make a big difference*. Boston: Little, Brown.

Harrison, K. (2013, June 24). Maximizing Millennials: The Who, How, and Why of Managing Gen Y. Retrieved March 26, 2018, from https://onlinemba.unc.edu/blog/geny-in-the-workplace/

Harter, J. K., Schmidt, F. L., & Keyes, C. L. (2003). Well-being in the workplace and its relationship to business outcomes: A review of the Gallup studies. *Flourishing: Positive psychology and the life well-lived, 2, 205-224.*

Heinen, R. (2017). *Creating customer intimacy and increasing employee engagement* (Master's thesis). Retrieved from TU Delft Repositories. (uuid:5c12877e-84c9-49b1-b033-8974c3813f12)

Item 10: I Have a Best Friend at Work. (1999, May 26). *Gallup Business Journal*. Retrieved February 19, 2018, from http://news.gallup.com/businessjournal/511/item-10-best-friend-work.aspx

Jimenez, S., Pohlmeyer, A., & Desmet, P. (2015). *Positive design reference guide*. Retrieved from https://issuu.com/delftinstituteofpositivedesign/docs/issuu

Kamdar, D., & Van Dyne, L. (2007). The joint effects of personality and workplace social exchange relationships in predicting task performance and citizenship performance. *Journal of applied psychology, 92*(5), 1286.

Lally, P., Van Jaarsveld, C. H., Potts, H. W., & Wardle, J. (2010). How are habits formed: Modelling habit formation in the real world. *European journal of social psychology, 40*(6), 998-1009.

Lencioni, P. (2006). *The five dysfunctions of a team*. John Wiley & Sons.

Lencioni, P. (2012). *The Advantage, Enhanced Edition: Why Organizational Health Trumps Everything Else In Business*. John Wiley & Sons.

McAllister, D. J. (1995). Affect-and cognition-based trust as foundations for interpersonal cooperation in organizations. *Academy of management journal, 38*(1), 24-59.

Murthy, V. H. (2017, September). Work and the loneliness epidemic. *Harvard Business Review*. Retrieved October 4, 2017, from https://hbr.org/cover-story/2017/09/work-and-the-loneliness-epidemic

Occasion. (2018). Retrieved March 27, 2018, from https://en.oxforddictionaries.com/definition/occasion

Rath, T., & Harter, J. (2010, August 19). Your friends and your social wellbeing. Retrieved October 04, 2017, from http://news.gallup.com/businessjournal/127043/friends-social-wellbeing.aspx

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American psychologist, 55*(1), 68.

Sanders, L., & Stappers, P. J. (2012). *Convivial design toolbox: Generative research for the front end of design*. BIS.

Seligman, M.E. (2011). *Flourish: A visionary new understanding of happiness and well-being*. New York: Free press.

Sullivan, D. (2011, April 6). How Google Instant's Autocomplete Suggestions Work. Retrieved March 29, 2018, from https://searchengineland.com/how-google-instant-autocomplete-suggestions-work-62592

Tehrani, N., Humpage, S., Willmott, B., & Haslam, I. (2007). What's happening with well-being at work. London, England: *Chartered Institute of Personnel and Development.*

van Boeijen, A., Daalhuizen, J., Zijlstra, J., & van der Schoor, R. (Eds.). (2014). *Delft design guide: design methods*. BIS publishers.

Zimmerman, J., Stolterman, E., & Forlizzi, J. (2010, August). An analysis and critique of Research through Design: towards a formalization of a research approach. In *Proceedings of the 8th ACM Conference on Designing Interactive Systems* (pp. 310-319). ACM.