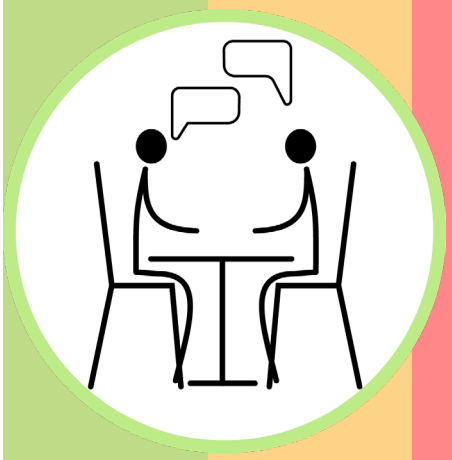
Focusing in flexible offices

A design research exploration into workstyle-based workplace selection in Open Plan Offices



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Abstract

Office work is becoming increasingly dynamic, requiring office workers to perform distinct activities rapidly. These activities range from meetings to individual work. Open plan offices (OPO) facilitate workplaces for office workers in a single hall. This causes office workers who perform distinct activities to share the same workspace. These different activities come into conflict with each other, since they produce different sound levels. Furthermore, the open hall of the OPO causes more co-worker interruptions in comparison with offices which are adjusted to occupants performing distinct activities. This thesis collaboration between Advanced Metropolitan Solutions (AMS) and the Living Office Design Lab (LODL) of the faculty of Industrial Design Engineering TU Delft, explores how to facilitate OPO occupants with distinct activities in achieving focus. Through 5 design interventions, a design guideline for achieving office focus is discovered, consisting of 3 elements. 1) Clustering office occupants based on their workstyle preference, decreases co-worker interruptions. 2) For workstyle-based clustering, office occupants need to communicate one of three workstyle preferences: “focus work”, “team work” or “social work”. “Focus work” workstyle communicates that the users don't want co-worker interruption. “Team work” workstyle communicates that the occupant allows co-worker interruption, as long as the interruption is work related. “Social work” workstyle communicates that the user allows all interruptions, including non-work-related interruptions. 3) Workstyle preferences need to be communicated to the rest of the office by using indicators. Individual indicators are used for desk-to-desk workstyle preference communication. Zone indicators might enable occupants to find workstyle zones within the office. A set of tools that enables OPO occupants to communicate their workstyle preference, through personal and zone indicators, enables workplace selection based on workstyle preference. By enabling occupants to cluster through workstyle-based workplace selection, conflicting activities and co-worker interruptions are reduced.

Acknowledgements

I would like to start of by thanking my chair, **David Keyson**, and mentor, **Tomasz Jaskiewicz**, for their guidance during my project. The feedback you provided always encouraged me to look back at my findings and try to identify what the true meaning is behind the behaviors or interactions with my prototypes. You have also been very flexible for meetings and dates, which was something that enabled me to finish this graduation.

I would like to thank **AMS** for the openness towards the graduation projects at their office. You have always enthusiastically received the prototypes placed in the office and gave good and fair feedback on them. It has been a joy working with you.

Now coming to my living office design lab partners, **Jasper Kunkeler** and **Nazli Yilmaz**. Having you as lab partners during the graduation made me feel less like I was doing this all by myself. It helped me greatly to talk you since we were all in the same situation.

Lastly, I would like to thank my parents, **Ed De Rijcke** and **Janneke Cluistra**. Even though over the years I've become more independent, you are always ready to help me out. Without your guidance and moral support, I would not have been able to complete this thesis.

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1. Exploring focus

An increasing group of office occupants no longer spent their day working from 9 to 5 at their own desk, doing the same task. Dynamic work conditions cause change in work routines. A work day consists of quickly switching tasks like attending meetings, collaborating with co-workers, giving presentations and performing individual work. With distinct activities comes distinct facility requirements. Meetings require rooms that facilitate conversations and presentations. Team collaboration requires workspaces where you can connect to your co-workers. Individual work requires a workspace where you can focus. Activity based-workspace offices (ABW) are specifically designed to provides its occupants with different room layouts to facilitate distinct working activities. Open plan offices (OPO) are more aimed towards connectivity, having all workplaces in the same hall. Due to the lack in variety of rooms, occupants of an OPO encounter problems when performing distinct activities. These problems happen when distinct activities interrupt each other.

Advanced Metropolitan Solutions (AMS), is experiencing these problems. The organization moved to an OPO in early 2019. The goal of the new office is to increase inter-team communication. This is also the reason the new office is constructed according to the OPO concept. However, occupants of the AMS office indicate focus problems within the office, which are in line with problems found in scientific literature.

Rapidly changing work activities and the OPO concept are common features of modern office work. This clashing activities problem occurs therefore in more locations. Exploring the complexities of the focus problems caused by clashing activities within the AMS OPO and researching solutions is the goal of this graduation project. During the project, 5 design interventions explore focus problems within the AMS office. The interventions are introduced in the AMS office, where they are used and evaluated by AMS office occupants. Introducing iterative designs at the AMS office, guidelines for designing for focus are discovered and used in a final concept.

1.1 Design challenge introduction

You arrived early at the office today to make sure that you can finish your presentation before the meeting. When entering the office, you notice that it is still quiet. Rushing to a desk, you set-up your laptop, press the power button and go to the coffee corner to get a coffee. Whilst you are working hard to complete your presentation, more of your co-workers enter the office. Everybody seems to be discussing the weather. The temperatures are of course exceptional for the time of year, but you wonder if a discussion is necessary. Two desks away, Pieter starts a phone call. You reach for your headphones in your bag, but you can't find them. The moment your hand touches the bottom of the bag, you realize that you made sure to charge your headphones for today, since it is important to focus. Yet, you forgot to take them off the charger and put them back in your bag. Frustrated you continue with the presentation. Later, Yvonne passes your desk. "Ready for the presentation?" she asks. You reply by saying that most of the work is done, yet you need to finish up a few more things. "Ah alright" she replies, "I just had a quick question. I can't find a HDMI cable to connect my laptop to a monitor, do you know where I can find one?"

Flexible offices provide facilities to its occupants. Internet, printers, coffee corners and workplaces to name a few. In open plan offices (OPO), all workplaces share the same work hall. In this hall you can find identical desk layouts. If the office is set up to be used flexible, each of the desks is supposed to be left empty and ready to be used by its next occupant. By doing so, the office tries to provide its occupants with workplaces that facilitate all requirements for work.

Since all occupants share the same hall, occupants will share unwillingly their activities. These activities range from writing a report to performing a creative session, having a conversation about the last F1 race to editing video footage. Since these activities produce different sound levels, these activities can clash with one another. This makes the workplace less suitable for some specific activities. Whereas the co-workers discussing a meeting might not be disturbed by the report writer, the report writer might be distracted by their conversation.

Furthermore, co-worker interruptions also lower the occupant's focus level. The openness of the hall makes it more appealing to approach your co-worker compared to an office without visual contact with co-workers. However, the opposite is also true when it comes to approachability. Due to the lack of indication if someone can be disturbed or not, occupants can also feel insecure when they need to approach a co-worker.

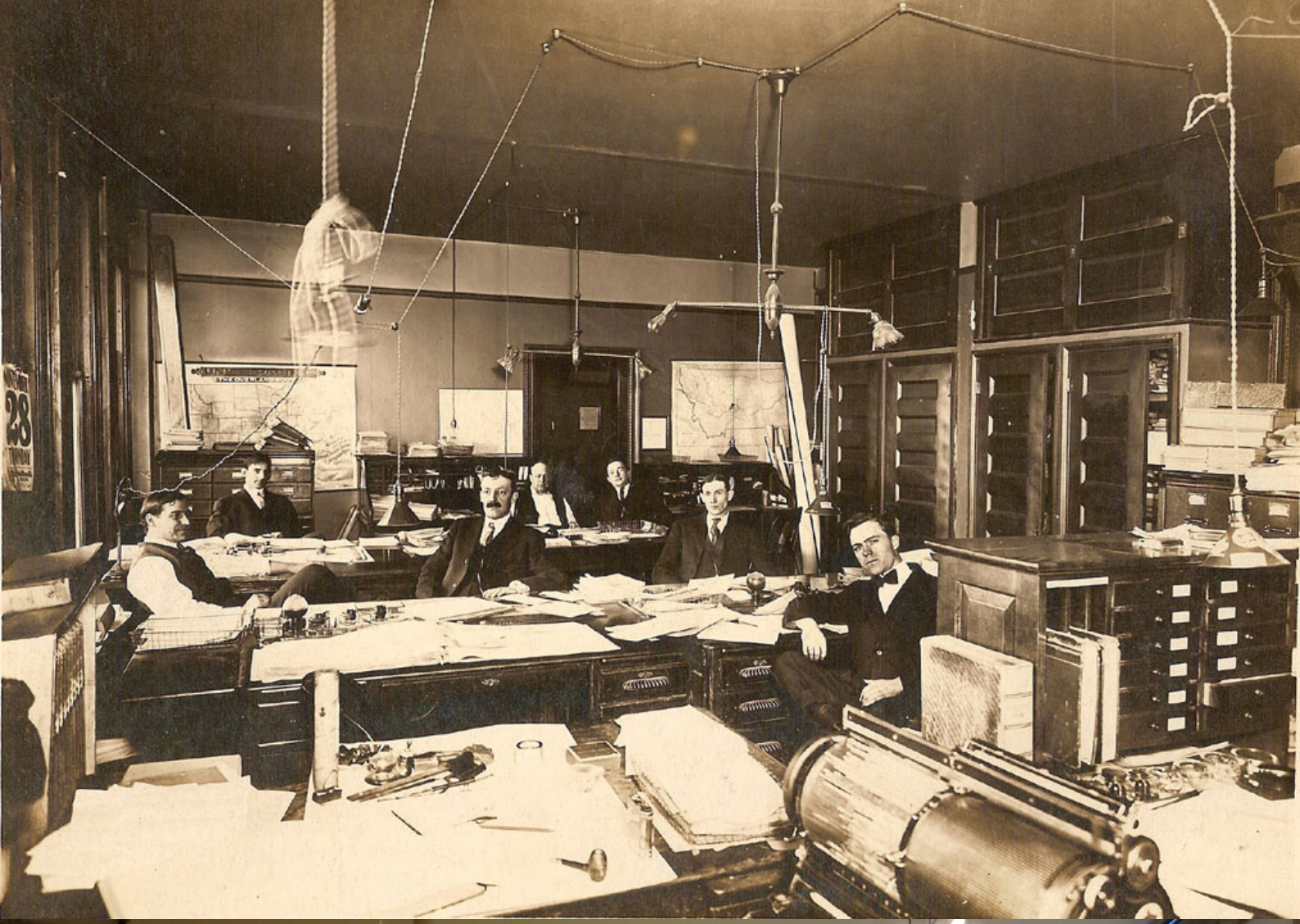
Employees in OPO's are also aware of these problems. It is therefore not uncommon to hear the phrase "if you need to focus, you stay at home" when discussing OPO issues. However, OPOs are often adopted to improve communication amongst co-workers. Working from home actively prevents face-to-face co-worker communication from happening.

The current situation in OPOs, places occupants with distinct activities in an area where they disturb each other, causing a lack of focus. This lack of focus in its place causes employees to work from home, preventing social interaction.

Figure 1.1.1

1.2 Office concept and their influence on focus

Offices have been a hub for workers for more than a century (MORGAN LOVELL, n.d). Since their introduction, work performed in offices has changed. Introduction of new office concepts happen to keep up with the changing office demands. Although the goal of introducing new office concepts is to conform to the needs of new office activities, older office concepts remain, as not all kind of work requires newer offices. What type of work or what office culture is preferred, gives direction to what kind of office concept can be chosen. Cellular Offices are the typical offices of the past century. Open Plan Offices attempt to provide its occupants with improved communication compared to cellular offices. Activity Based-Workspace Offices are designed to facilitate flexible workstyles with rapidly changing activities.



1.2.1 Cellular offices

Shoulder height walls decorated with time tables, lists of phone numbers, network passwords and a family picture. A desk with a desktop PC and a phone next to it. A shelf full of binders. A plant and a coffee mug. Whilst sitting in your desk chair, you hear your co-workers mumbling in the background. One of your co-workers is doing a sales pitch over the phone, whilst two others discuss this month's corporate goals.

The cellular office is an iconic office introduced in the 1980's (MORGAN LOVELL, n.d). Described as dreaded offices, they were so well associated with American office jobs that they were featured in movies about office live. The movie "office space" (Rappaport, Rotenberg & Judge, 1999) main set depicts a cellular office. The main feature of a cellular office is the assigned cubicle for every occupant. In this cubicle is everything the occupants need to perform their daily jobs. This makes a cellular office well suited for work that requires the employee to store physical data or requires the employee to have specific tools. Desktop PCs and phones are examples of these specific tools.

Another key feature of the cellular office is the physical barrier between desks. What these barriers are made of and what the dimensions are, differs per office. Some offices provide the employee with entire rooms, whilst other offices choose to separate each desk with shoulder height walls. These barriers provide limited to full auditory and visual privacy, depending on what type of barrier is in place.

Figure 1.2.1.1; Scene from the movie "office space", showing a typical cellular office

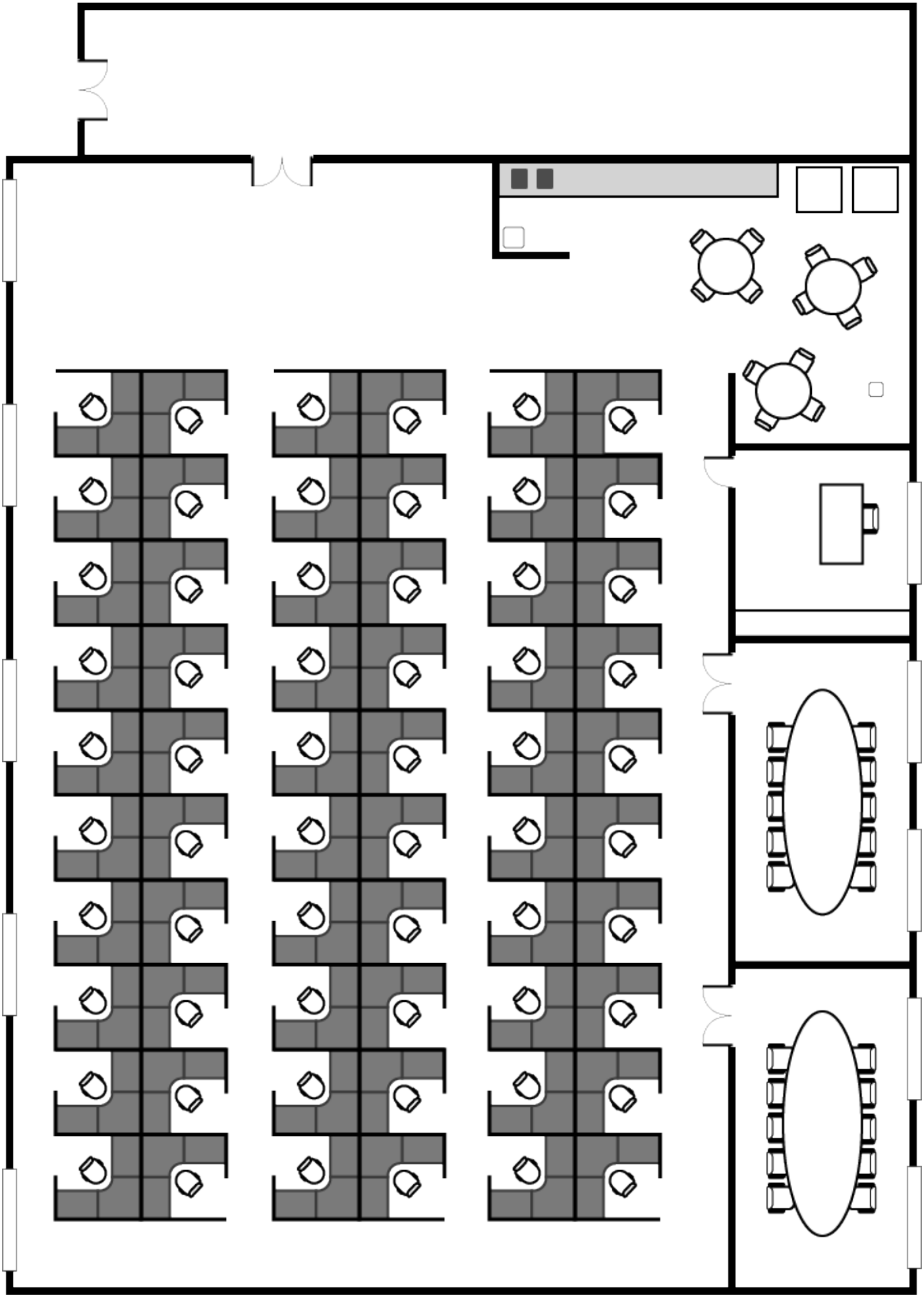


Figure 1.2.1.2; Cellular office floor plan

1.2.2 Open plan offices (OPO)

You arrive at work, a little late since you had to visit your dentist. Your co-worker already arrived and sits to the opposite of you. You greet her whilst hanging your coat on the coat-hanger. You turn on your pc, open your drawer to take out some half-finished paperwork. Whilst continuing with the paperwork, a co-worker comes to your desk to ask you about your progress on the report you are collaborating in.

Professions that require higher levels of communication between co-workers don't benefit from the barriers between co-workers provided by the cellular office. Instead, those professions require an office concept that enables higher levels of occupant interaction. This is what the current Open Plan Office's goal is.

The OPO concept consists of a single hall where all desks are located. The desks are commonly arranged in groups with co-workers sitting adjacent and/or opposite of each another. The lack of physical barriers makes it possible for co-workers to easily communicate with each another, at the cost of reduced visual and auditory privacy.

In the late 20th and early 21st century, technological developments changed how office work was performed. With increasing accessibility and quality of laptops, internet and cloud services, more paper work was being digitalized. This meant that office occupants were no longer required to store documents in binders at their desk trays. Furthermore, for professions that require out of office activities (like client meetings, conferences, etc.) laptops became increasingly popular, since their hardware became more comparable to that of average office desktops. These technological developments eventually enabled flexible office work, where the employee does not have to be physically in the office to perform his/her job.

Flexible work gives employees more freedom. They can plan their days more freely both in location and time. Employees who want to start working before office hours can work from home, whilst parents of young kids are enabled to drop their kids at school without having to rush to work afterwards.

The increased freedom of the employee also provides the employer with possibilities. Since there is a lower desk occupation, due to employees working from home, employers could decrease the desk-to-employee ratio (Danielsson & Bodin, 2008). However, to support this style of facilitation management, the employees who visit the office should still be able to work at a desk. This comes into conflict with the concept of assigned desks. If two employees get the same assinged desk due to the lowered desk-to-employee ratio and both decide to work in the office, one of them won't be able to work at that specific desk. This issue was solved by the introduction of clean desk policies, which require employees to leave their desk with no personal or work-related objects on it. This also implies that all desks in the office could be used by all employees. This clean-desk policy concept can therefore only be adapted when specific physical objects are not required for employees to fulfill their jobs.

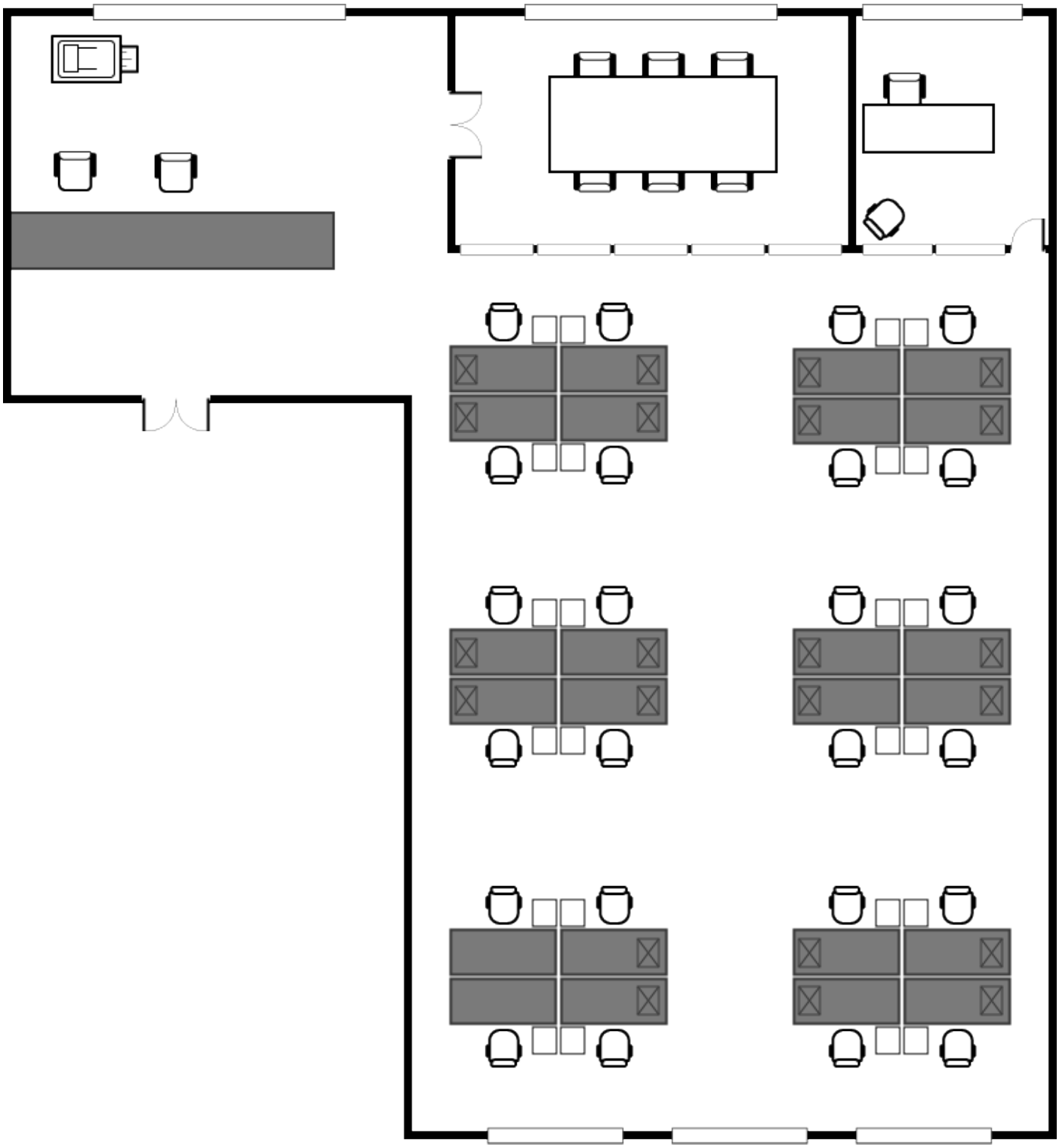


Figure 1.2.2.1; OPO floor plan

1.2.3 Activity Based Workspace offices (ABW)

With your notebook in your hand, you arrive at the office. The client-meeting went great and you received valuable input for your project. You get yourself a coffee before going to an individual workplace. Before the next meeting this afternoon, you would like to process the feedback from this morning. You finish just in time before the next client arrives at the office. You proceed to pick him up at the counter. To make sure you can have a private conversation, you walk to an available meeting room and start to discuss the process on your project.

Flexible OPO's were also challenged with a problem caused by dynamic work conditions. Office employees no longer perform the same task for the entire day. A more dynamic workstyle came up where an office employee performs several distinct activities during a day. This new dynamic work interpretation makes office work more challenging and satisfying for the employee. Dynamic working also requires the employee to both be connected to the co-workers as well to perform work individually.

Since there are no “connecting” and “production” shifts, people perform these activities throughout the day with one another in the same hall. Productive office occupants would sit next to communicative office occupants. Whilst the communicative occupants are not disturbed by their productive co-workers, the other way around is a source of problems. Furthermore, meetings with groups discussing private issues are also indirectly shared through the entire office since there is no auditory or visual privacy.

The Activity Based-Workspace office (ABW) concept is an attempt at solving this specific problem. The ABW office provides its occupants with rooms, which are assigned to specific activities. These rooms range from individual focus rooms, to small open areas with desks and meeting rooms. This enables workspace selection based on the activity the occupant is going to perform.

Like the OPO clean desk policy concept, this concept requires professions to be performed fully flexible. It also requires the office building to be (re)build with this type of office in mind. The specific rooms in the office can only be build during the building's construction or during a rebuilding of the office space. These are costly endeavors and therefore less attractive to smaller companies, who also have less use for this office concept.

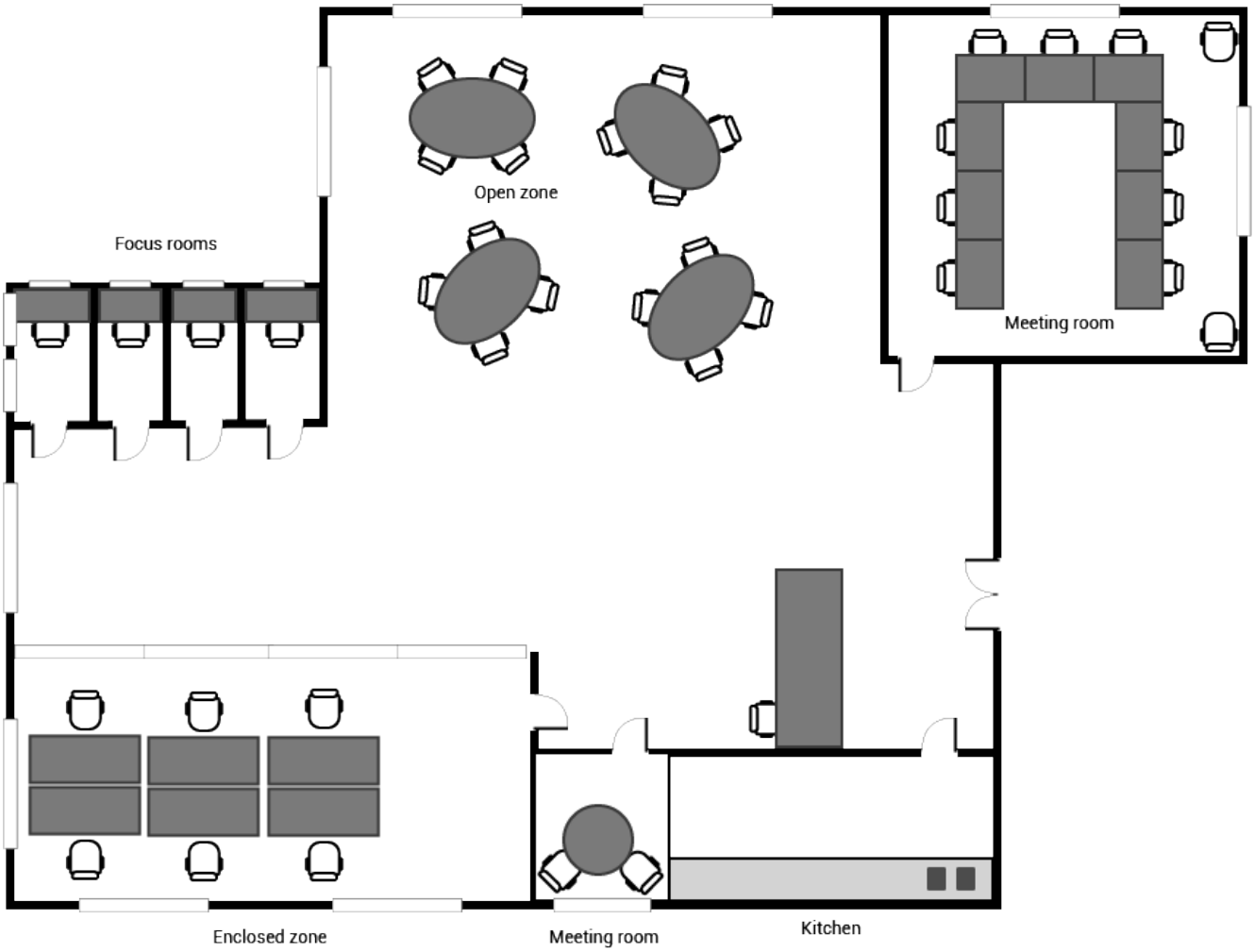


Figure 1.2.3.1; Activity based office floor plan

1.3 Support for activity-based workstyles

Activity-based workstyles become more common for office employees. However, not every employer is able to (or wants to) provide a company with the ABW office concept. Having a mismatch between office concept and office workstyle can cause issues.

An example of such a mismatch is the Advanced Metropolitan Solutions (AMS) institute's office. Early 2019, AMS institute moved to a new office in Amsterdam. This new location provides several floors for different purposes. The second floor of the AMS institute is dedicated to office work. AMS employees, research fellows, contacts and more can make use off this workspace. With the move to a new office, the institute was also able to choose a new office concept. In their previous office, the employees experienced a lack of inter-team communication. To improve communication, AMS chose an OPO concept for their new office.

To further improve inter-team communication, the office occupants decided to adapt an office culture that focuses on social interaction. In practice, this means that everybody working at the office should be approachable for questions. Furthermore, no designated silent areas were created to support this communication style.

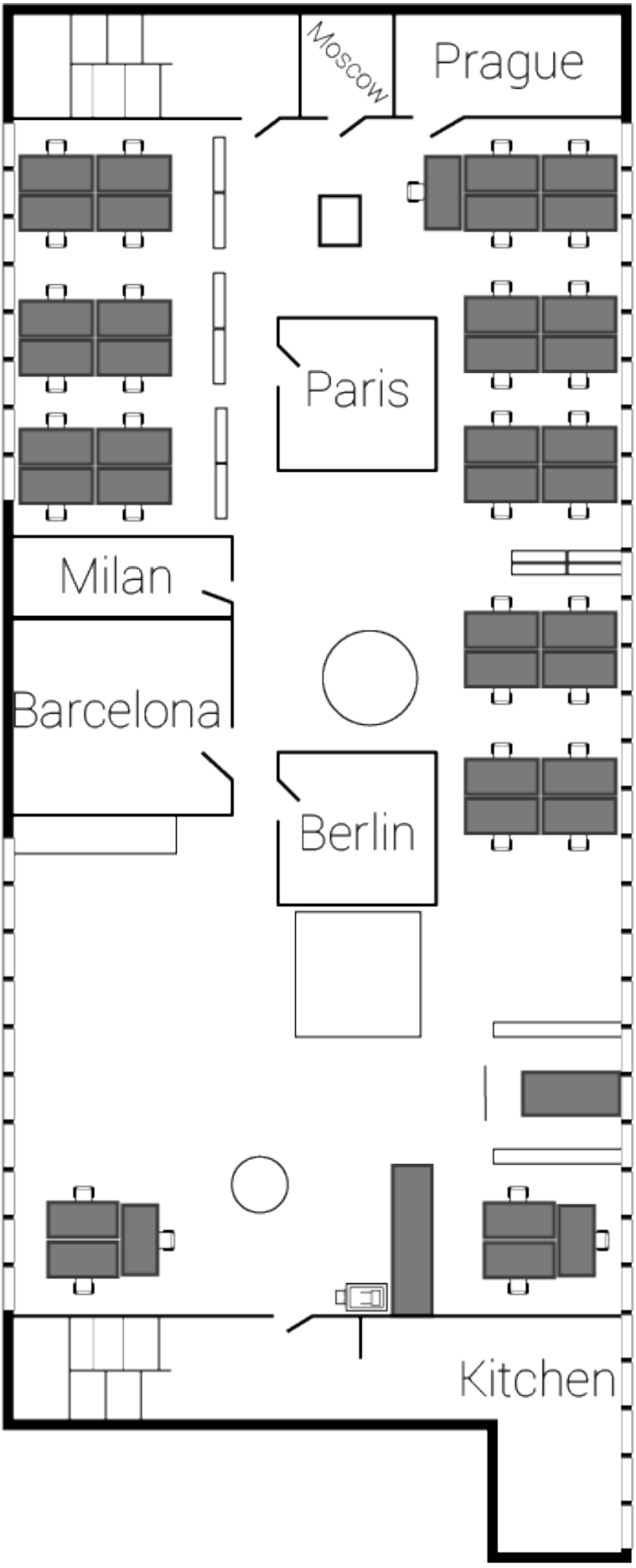
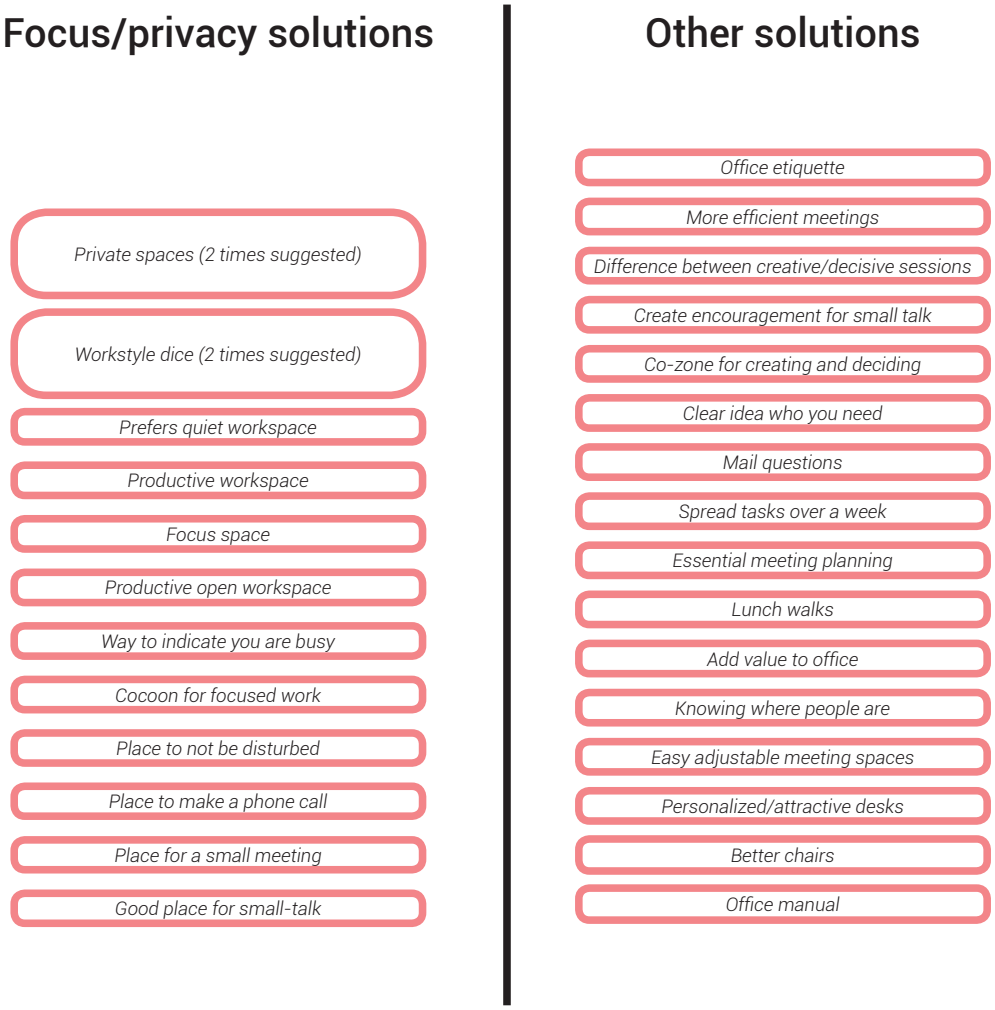


Figure 1.3.1; AMS' second floor

The living office design lab, consisting of graduation students Jasper Kunkeler, Nazli Yilmaz and myself, organized a co-creation session to identify initial problems in a flexible office. In this session, the AMS office occupants discuss a regular office day and what problems they encounter. Designing solutions for these problems with the office occupants gives an insight into what they perceive as problems and how they would address them. A more detailed documentation of this session can be found in appendix II.

The most frequently reoccurring solutions solved problems for privacy or focus issues. These solutions suggested specific areas/rooms for distinct activities, illustrating that the AMS OPO's occupants lack facilities provided by ABW offices. Figure 1.3.2 compares the number of solutions given by the occupants relating focus or privacy, to all other given solutions. Almost half of the given solutions concern either focus or privacy.

The problems found in the co-creation session reflect problems found in scientific literature. The lack of auditory and visual privacy are predictors for workspace dissatisfaction (Kim & De Dear, 2013). The office occupants also indicated a need for focus spaces, signaling that there is a lack of rooms in which an occupant can focus (Haapakangas, Hongisto, Varjo, Lahtinen, 2018). The lack of enclosure also predicts a lower experienced privacy, environmental satisfaction and increased stress (O'Neill & Carayon, 1993). Furthermore, studies report a 70% decrease in face-to-face contact after moving to an OPO (Bernstein & Turban, 2018).



1.3.2 Proposed ideas in the context mapping session for improving a workday within a flexible office

1.4 Approach

1.4.1 Design cycles

From the collaboration between AMS and TU Delft, three graduation positions were made available to continue with projects created during the minor Interactive Environment. One of the Interactive environments project's focus was enabling office occupants to indicate that they are performing focus or social work, and for how long (Figure1.4.1.1). This project eventually led to the design goal of:

Facilitating AMS' OPO-occupants with distinct activities in achieving focus

The project explores complex issues about performing activity-based work within an OPO through 5 design interventions. Each intervention cycle is set in 3 faces figure 1.4.1.2:

- A conflict is explored, providing new knowledge
- From the gained knowledge, a prototype is designed
- Testing the prototype enables the exploration of new conflicts

Figure 1.4.1.1; GEMMA timer

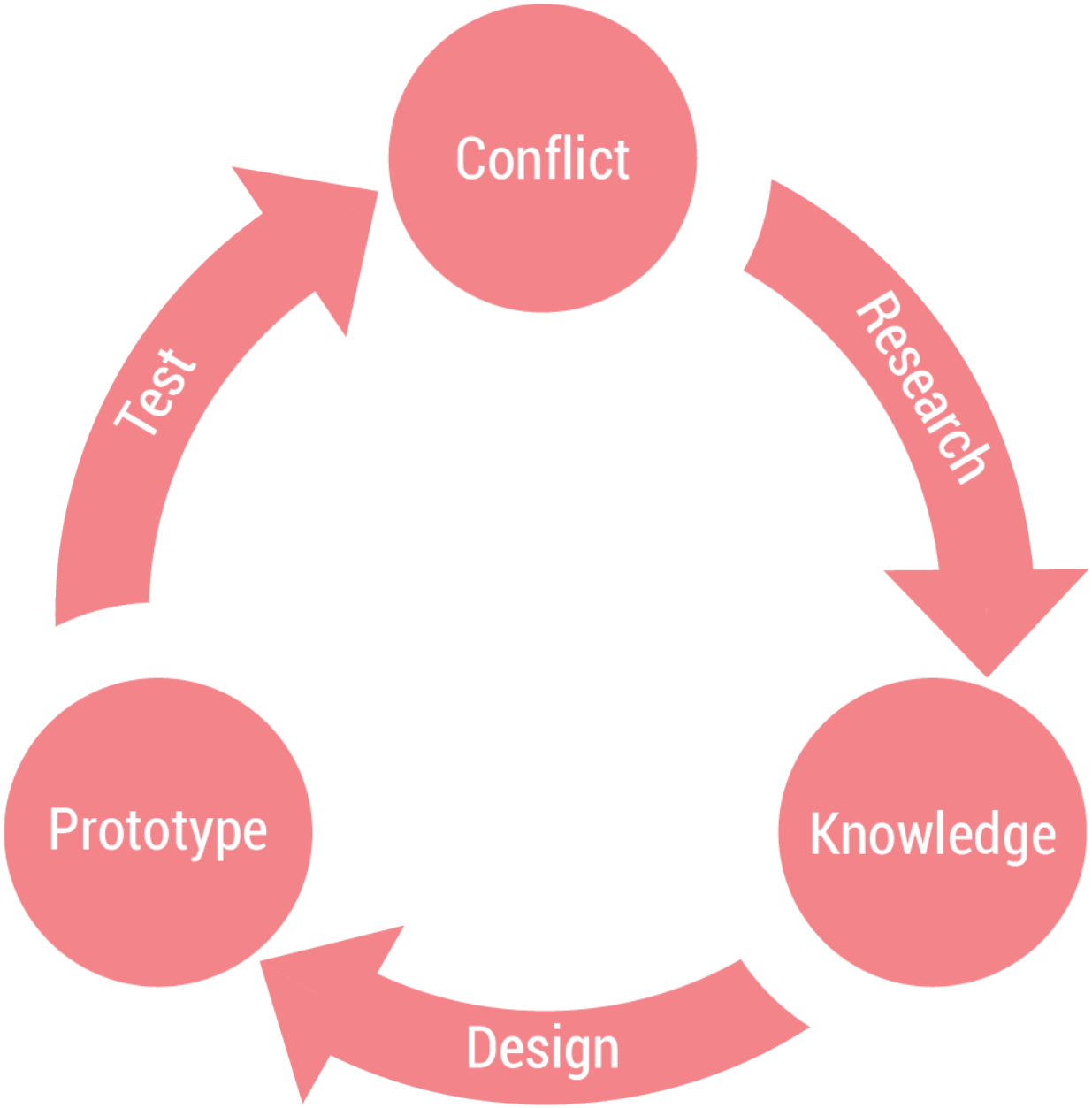


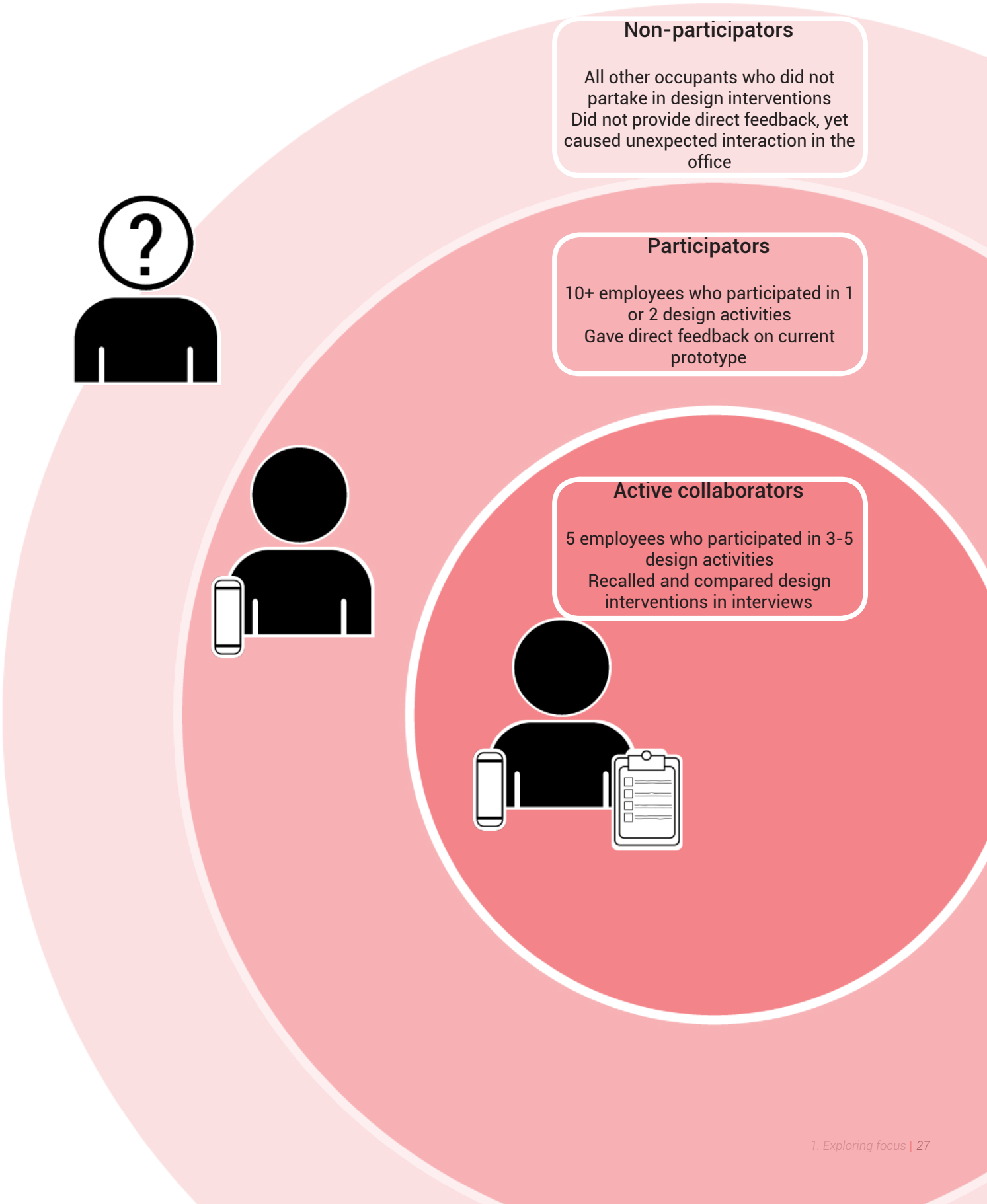
Figure 1.4.1.2; Iterative design process

1.4.2 Context

The research is performed in close collaboration with the AMS office. AMS gave the Living Office Design Lab (LODL) access to their OPO for prototyping. This close collaboration also allowed for co-creation opportunities with a select group of AMS employees, who were volunteering to test and evaluate prototypes. This group of consists of 5 employees who participated in at least 3/5 design activities at AMS. This group is revered to as active collaborators. More employees were involved during testing and gave feedback on individual prototypes, this group is revered to as participators. The last group did not interact with the prototypes present at the office, this group is the non-participators. Figure 1.4.3 illustrates how the dynamic at the AMS office worked. A more detailed explanation of the role of AMS and its office can be found in appendix I.

1.4.3 Non-chronological reporting

Each design intervention gives new insights into previously performed interventions. Through discussing with active collaborators, attributes of older interventions were given new perspectives. Making prototypes happened parallel with testing prototypes. Instead of reporting on each design intervention chronologically, the relevant part of each design intervention is discussed per section. Insights from design interventions are always on the right page. From appendix III forward, the chronological order of each design intervention is given.


Non-participators
All other occupants who did not partake in design interventions
Did not provide direct feedback, yet caused unexpected interaction in the office
Participators
10+ employees who participated in 1 or 2 design activities
Gave direct feedback on current prototype
Active collaborators
5 employees who participated in 3-5 design activities
Recalled and compared design interventions in interviews

2

Whilst leaving the meeting room, you feel a little disappointed. Not being fully prepared for the presentation caused you to forget to mention a few key points you wanted to address. But oh well… Those things happen. Determined to take this presentation as a learning opportunity, you decide to directly go back to work after grabbing a coffee. Whilst your hands are being warmed by the coffee cup, you look for a workplace in the work hall where you can focus. A few of your favorite co-workers are there. Although you enjoy your discussions with them, today you really need to step up and be more productive. Unfortunately, it is really crowded today, making no particular spot in the office attractive to work. Maybe I should go home instead.

2. Achieving focus

Work that requires focus has always been part of office work. Office occupants and organizations developed their own methods for achieving focus in an office setting. Flexible workstyles create new opportunities for employees to achieve focus. Exploration into focus methods reveal that there are three approaches for achieving focus when working with a flexible workstyle: avoiding disturbance, applying physical barriers and workstyle indication. Avoiding disturbance is achieved by working somewhere else than the office. This approach increases focus level for employees who have access to a space where they can focus better than in the office. However, this approach requires the employee to have access to such a location, which is not the case for all employees. Furthermore, the goal of an OPO is to increase communication amongst co-workers. This goal won't be achieved when people visit the office less frequently. Applying physical barriers is common in ABW office concepts in the form of focus rooms. However, OPOs often don't have access to these rooms. Flexible barriers can improve the visual privacy, if the tool provides visual privacy from behind and above. This form of flexible blocking however, does not prevent the main source of disturbance; co-worker interruptions. Workstyle indication allows for non-verbal communication of preferred workstyle, facilitating a focus, teamwork or social zone. By enabling office occupants to cluster in these workstyle zones, co-workers can identify if an office occupant can be interrupted, decreasing the influence of co-worker interruptions.

Office occupants, organizations and research reveal the three main methods being used to achieve focus which are avoiding disturbance, applying physical barriers and workstyle indication.

By working from home, performance and job satisfaction can improve. However, social interaction with co-workers decreases, which is the goal of adapting an OPO in the first place. Furthermore, it relies on employees having access to a room in which they can achieve a higher level of focus.

Physical barriers implemented as focus rooms positively influence environmental perceptions, perceived collaboration and negatively impact employee stress (Haapakangas et al., 2018). However, it requires focus rooms to be built during construction. Visual flexible blocking can be achieved by providing a barrier which covers the back of an occupant. However, physical barriers for visual privacy don't prevent the primary source of disturbance: co-worker interruption.

Individual workstyle indication decreases perceived co-worker interruption. Zone workstyle indication enables workstyle clustering with office occupants who have a similar workstyle preference. Since all occupants in the workstyle zone share the same workstyle preference, perceived interruption decreases.

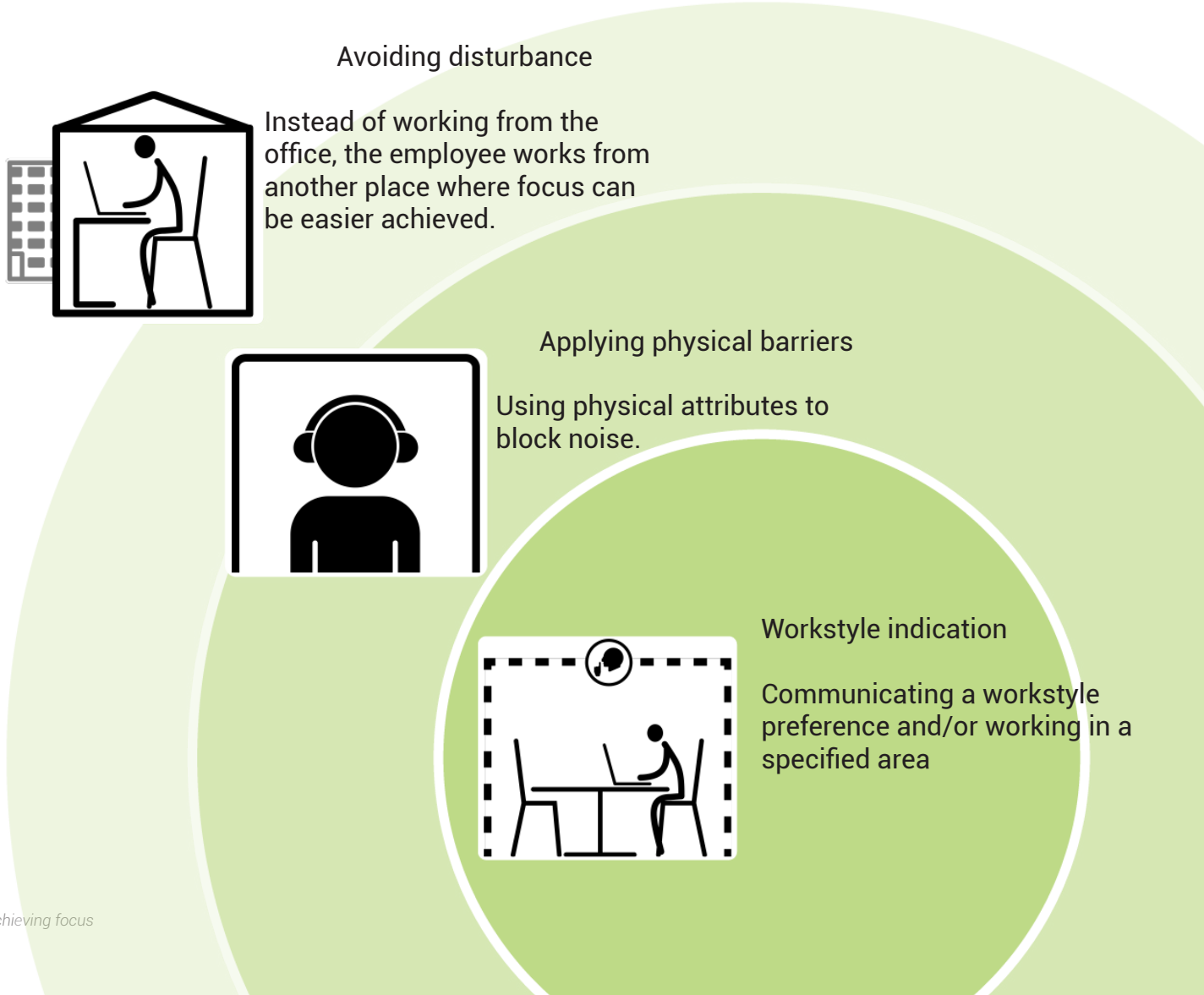
Co-worker interruption is indicated the main source of disturbance in the AMS office. Individual workstyle indication, zone workstyle indication and avoiding disturbance prevent co-worker interruption. Avoiding disturbance achieves this by avoiding all face-to-face interaction with co-workers, whilst workstyle indication retains face-to-face interaction.

2.1 Approaches of achieving focus

Neither the OPO concept nor a lack of focus are new. OPO occupants have worked in these conditions over the past century. During that time period, OPO occupants and organizations have come up with approaches of achieving focus. The effectiveness of these methods is being debated (Jahncke, Björkeholm, Marsh, Odelius & Sörqvist, 2016). The applicability of these solutions is also a relevant factor in determining which method to choose.

When it comes to achieving focus, there are 3 approaches identified in the AMS office (appendix II).

Approaches for achieving focus



2.2 Avoiding disturbance

"If you need to focus, you stay at home"

The statement above is shared by flexible office occupants from different companies. Working from home has been proven as a successful approach to decrease co-worker interruptions. The decrease in co-worker interaction improves the productivity of the employee (Golden & Veiga, 2008; Martinez-Sanchez & Perez-Perez, 2008).

However, AMS adopted the OPO concept to improve employee interaction. Working from home has a negative impact on social interaction with co-workers (Cooper & kurland, 2002; Wilson & Greenhill, 2004).
Furthermore, suitability of home workplace rates as one of the most important factors for effectively working from home (De Croon, Sluiter, Kuijper & Frings-Dresen, 2005; Nakrošienė, Bučiūnienė & Goštautaitė, 2019). This means that when an employee does not have a suitable workspace at home, he/she won't be able to have the same benefits from working from home.

2.3 Applying physical barriers

By using physical barriers, an OPO occupants can exclude themselves from the disturbances present in the office. There are two approaches when it comes to applying physical barriers: fixed barriers and flexible barriers.

Fixed barriers; facilitated by the office

Flexible barriers; facilitated by the user

2.3.1 Fixed barriers

During the design of an office, the architect, office designer or office management can decide the implantation of fixed barriers. In ABW offices, fixed blocking is commonly a focus room. A focus room is a room with a single workplace, isolated from the rest of the office.

These focus rooms provide the occupant with more visual and auditory privacy compared to the rest of the office. Auditory and visual privacy are reported as problems within flexible offices (Kim & De Dear, 2013). Focus rooms therefore provide more benefits to its occupants compared to regular workplaces do. This makes focus rooms preferred over other workplaces.

The low employee-to-desk ratio (Danielsson & Bodin, 2008) causes a lower availability of these focus rooms. Office occupants realize that access to focus rooms is therefore valuable. If an office occupant has a choice between working in a focus room or at a regular workplace and isn't mainly at the office for social interaction, the focus room is almost always perceived as the better choice. If both focused work and social work must be performed, the occupant can always leave the focus room for social work, whilst the occupant cannot switch to a focus room if all focus rooms are occupied. This causes two problems.

The first problem is latecomer discrimination (Rolfö, Eklund & Jahncke, 2018). Flexible workstyles enable a higher degree of freedom for the employee to decide when to start working. This gives working parents the opportunity to drop their children of at school and arrive later at the office, whilst also enabling others to start earlier so they can avoid traffic. Since the focus workplaces are preferred over the other workplaces, focus rooms are occupied first. Employees who cannot arrive earlier therefore miss out on these workplaces.

As a result, some employees nest at these workplace (Rolfö et al., 2018). Nesting happens when an office occupant claims a workplace with work related items like post-its, timetables and chargers. This gives the appearance that the workplace is already taken. Clean desk policies should prevent these issues; however, these policies are barely enforced (Babapour Chafi & Rolfö, 2019).

Another issue with fixed barriers is the requirement of them being built into the office. In most ABW offices, these rooms are considered during construction. However, OPO often don't have these rooms. The AMS office is an example of an OPO without individual focus rooms. Occupants of the AMS office therefore sometimes work from meeting rooms to achieve focus.
Fixed barriers do provide the user with increased visual and auditory privacy (Haapakangas, et al., 2018). This increased privacy shows to have positive effects on environmental perceptions, perceived collaboration and and a decrease in employee stress.

2.3.2 Flexible blocking

Flexible barriers are tools that enables its user to achieve higher levels of either visual or auditory privacy. The most common flexible barrier in offices are headphones. By wearing headphones, an office occupant can block auditory disturbances. Since an increase in auditory and visual privacy has positive effect environmental perceptions, perceived collaboration and and a negative effect on experienced stress, providing a flexible visual barrier could possibly achieve similar results as a fixed focus room. If the flexible visual barrier can be applied to every workspace in the office, there will also be less workspace inequality than with fixed visual barriers. As a result, the availability of flexible barriers prevents nesting and late comer discrimination.

However, the challenge of visual flexible barriers lies in providing the office occupant with the right barrier. Most private information is displayed on the screen of an office occupant, which makes visual blocking from behind a requirement for a flexible visual barrier. Blocking from the front is experienced as less important, since office occupants don't feel the need to hide from their co-workers.

The AMS office has a low ambient sound level of 45 dB, which is comparable to a library.
Only when a conversation in proximity to the office occupant happens a higher noise level is experienced. Headphones are better at providing auditory blocking compared to sound absorbing material in a physical barrier when it comes to this type of noise in the office.

Another aspect that makes headphones better at achieving focus is that they communicate that you prefer not to be disturbed. The most frequently indicated cause of loosing focus at AMS are co-worker interruptions. Flexible visual barriers therefore don't enable the user to achieve higher levels of focus.

Design intervention: Portable barrier

Appendix III

The assumption that visual flexible barriers improve visual and auditory privacy is tested by the design intervention that introduces a flexible barrier in the AMS office. The prototype is a portable barrier that can be picked up and placed on any desk in the office. In the barrier is sound absorbing material, attempting to provide additional auditory privacy. The dimensions of the prototype allow the users to place their laptops in the barrier. It was introduced to the AMS office and left for 2 weeks.

During the time at the AMS office, no occupants are observed using the barrier. AMS office occupants confirm that in my absence, the prototype saw no use. When performing a more hands on user evaluation, active collaborators and participators indicated the following problems:

The physical barrier is too low to provide visual privacy from co-workers walking past the desk
Since co-workers were still able to look in the barrier when whilst passing, the user doesn't experience an increase in visual privacy.

The physical barrier does not improve visual privacy from behind
Since the barrier does not provide visual privacy from behind, the screen of the user is still visible, which is perceived as the most privacy sensitive object by the AMS office occupants.

The physical barrier doesn't improve auditory privacy
During the introduction of the prototype, the ambient noise level in the AMS office was 45 dB. This noise level is comparable to a library. Measuring the noise level in the barrier gave the same result.

The prototype is too large to be considered portable
The dimensions made the prototype too large for AMS occupants to comfortably carry around the office and place over their workplace.

The main expressed disturbance comes from co-worker interruptions
The AMS office occupants indicate that this barrier does not prevent other occupants form interrupting their workday, which they experience as the most important factor in focus loss.

Intervention conclusion
Creating a physical barrier that provides the user with increased visual and auditory privacy should have a fundamentally different design approach. This barrier is both too small to improve visual and auditory privacy, yet too large to be considered portable. Providing frontal visual privacy is also less important than providing visual privacy from behind.

However, the most important insight gained from this prototype is that ambient sound and co-worker activity are not the primary causes of focus loss. Co-worker interruptions are perceived to have a higher impact on focus level.

Reflecting on the other example of flexible barriers, the success of wearing headphones can't be fully attributed to improved auditory privacy. Auditory isolation is one aspect. Yet equally important, headphones are used as an indicator, indicating that the user is focusing on their work. Providing both auditory privacy and a focused worker indication makes it a successful tool for achieving focus.

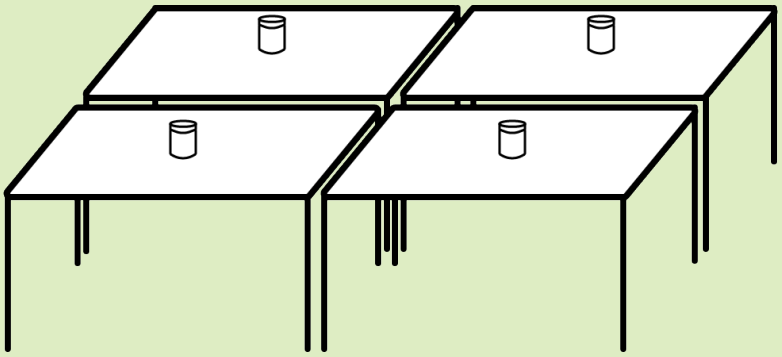
2.4 Workstyle indication

Workstyle indication happens when an occupant communicates his/her preferred workstyle initially or changes preference during the day. Headphones informally signal other office occupants a preference for not being disturbed. The headphones are in this case the indicators. Wanting to work in focus is the workstyle*. By signaling this preference, office occupants indicate a workstyle preference. Whilst wearing a headphone signals that you don't want to be disturbed, bringing a six-pack of beers to the office on a Friday afternoon, signals that you want social interaction. Workstyle indication is therefore not exclusive for increasing focus level but can also facilitate social interaction.

Workstyle indication happens on two different levels. The example of the headphones is individual workstyle indication, where the users' main goal is to avoid disturbance. Placing the six-pack of beer at the center of an available desk suggests that the specific desk will be used as a social zone, making it a zone indicator.

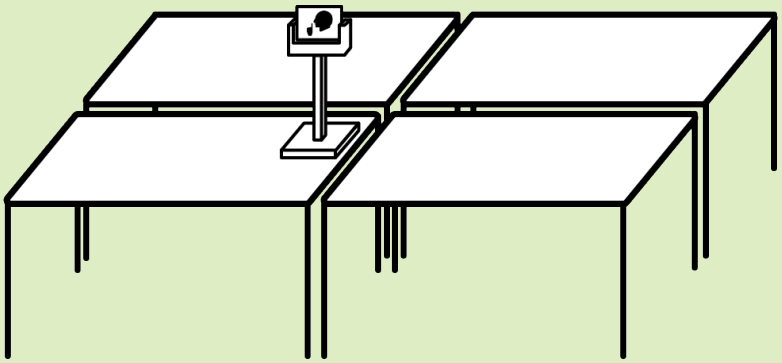
*Not wanting to be disturbed in the office doesn't always imply a desire to focus, but for the purpose of this example, I chose to simplify this.

Individual indication



Every office occupant indicates their own preference with the goal to communicate this preference to their co-workers

Zone indication



A specific zone is assigned to a workstyle, with the goal of finding co-workers who have similar preferences

2.4.1 Personal indication

The most commonly used tool for individual workstyle indication is a set of headphones. Whilst also providing auditory privacy, it requires the office occupants to bring their own headphones to communicate their preferred workstyle. Furthermore, headphones exclude yourself from the rest of the office. Office managers adapt an OPO concept primarily to improve co-worker communication.

Providing occupants with an individual workstyle indication tool which does not exclude the occupant from the rest of the office can therefore enable workstyle-based workplace selection.

Although the individual indicators reduce the amount of co-worker interruptions, they don't make a good workplace selection tool. When an individual changes workstyle preference, the adjacent co-workers no longer sit next to the workstyle preference they based their workplace selection on earlier that day. The individual indicators' main purpose is therefore a communication tool to share the user's workstyle preference, rather than enabling workstyle clustering

Figure 4.2.1.1; two low-fidelity GEMMA indicators at the AMS office

Design intervention: Low-fidelity GEMMA indicators.

Appendix III

The assumption that individual workstyle indicators improve focus in the AMS office through enabling workstyle-based workplace selection was tested by the low-fidelity GEMMA indicators.

The indicators from figure 2.4.1.1 are based on the GEMMA timers that initialized this project. The prototypes enables the user to indicate a workstyle preference. When the blue side is facing up, a “focus” workstyle is indicated. When the green side is facing up, a “social” workstyle is indicated.

Introducing the indicators to the AMS offices enables occupants to express their need to focus. Office occupants are not selecting their workplace based on workstyle preference. Office occupants use the indicators to prevent co-worker interruptions. Focus mode of the indicator is interpreted as a request for silence. However, it does not prevent interruptions from adjacent co-workers interacting with other co-workers. Individual indication allows adjacent co-workers to ech have a distinct workstyle preference.

Co-worker interruptions can be prevented by making a workplace selection based on workstyle preference. To support this workplace selection method, the floorplan of figure 2.4.1.2 supports the low-fidelity GEMMA indicator design intervention. The floorplan is placed near the entrance of the office. Markers are used to indicate which workstyle preference is indicated through the low-fidelity indicators per desk. However, since the workstyle preferences changes during the day, the information provided by the map is unusable for workplace selection.

This design intervention demonstrates that individual indicators can be used to prevent co-worker interruptions. However, they don't provide the office occupant with the right information to make a workstyle-based workplace selection.

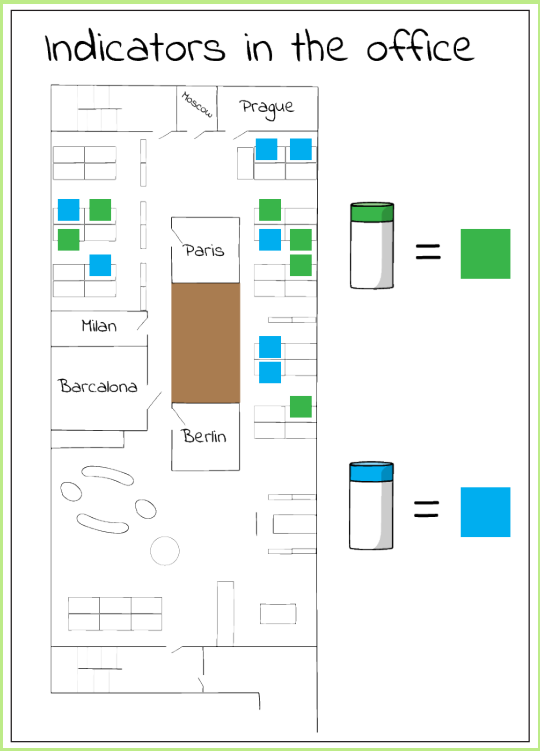


Figure 4.2.1.2; the floorplan with markers

2.4.2 Zone indication

With individual indication, the occupants indicating a focus preference can sit adjacent to co-workers which could have another workstyle preference. If the workstyle preference is assigned to a zone the size of all adjacent workplaces, each adjacent co-worker would have the same workstyle preference. If this is a preference for focus, interruptions from adjacent co-workers are prevented.

Zone indication is therefore a better approach to enable workstyle-based workplace selection. However, zone indicators give individual office occupants less control over their own workplace. Since activities of office workers change over the day, the situation that an office worker sits in a zone with a specific workstyle preference that no longer matches the preference of that worker can occur. The office worker can choose to ignore this difference in preference, yet the goal of this workplace selection method is to enable workers in a flexible office to find a workplace that matches their activities needs. Another option is to discuss changing the preference or relocating to another workplace in the office. Changing the preference of the zone should be done in accordance with the other occupants of the workstyle zone. This can in its place cause conflict between occupants who want to change to another workstyle preference and those who want to keep the original preference.

Figure 2.4.2.1; pre-desk zone indicator

Design intervention: Digital zone indicators

Appendix VI

This prototype explores the assumption that assigning a zone to a specific workstyle decreases co-worker interruptions form adjacent co-workers and enables office occupants to make a workstyle-based workplace selection.

To achieve zone clustering, a zone indicator with a floorplan near the entrance is introduced to the AMS office. Alongside an introduction of the goal of the prototype, office occupants are asked to use this prototype to make a workplace selection. They are sent a questionnaire, which allowed them to express their experience with the zone indicator, floor plan and co-worker interaction.

Participants can group at their preferred workstyle. However, there was a dedicated focus zone adjacent to two groups with other workstyle preferences (figure 2.4.2.1). The focus zone remained silent during the day, as did the adjacent groups. Although the office being above average occupied, the ambient noise level was observably low. This could be explained by the focus zone in between the two other zones, where the occupants of the other zones might have felt social pressure to preserve the silence. Participators experience the focus workstyle as intimidating when other desks use this workstyle. One participator told me that the red indicator with the red light was a harsh indication and felt like he shouldn't make noise around his workplace. Another participant who worked with a team work workstyle indicator wrote in the questionnaire:
"Was just looking at somewhere where people are not concentrated so that I could talk"

The average score on the question "through the availability of workstyle preference, I feel that I can better focus at the office" from the questionnaire is 6.5* on a 7-point Likert-scale (Kirakowski, 1994).

Experiencing lower noise level, users indicating that they don't want to talk near focus workstyle indicator and the score of the questionnaire indicate that participants were enabled to focus in the AMS office using zone indicators. Even though participants indicated that they experience pressure from the focus workstyle, participants were able to cluster at their preferred workstyle preference.

Figure 2.4.2.2; an in-use zone indicator

**Only 2/8 participants replied to the questionnaire, details in appendix VI*

2.5 Conclusion

Co-worker interruption is indicated the main source of disturbance in the AMS office. Individual workstyle indication, zone workstyle indication and avoiding disturbance prevent co-worker interruption. Avoiding disturbance achieves this by avoiding all face-to-face interaction with co-workers, whilst workstyle indication achieves this through workstyle preference indication. Either of the two remaining solutions provide interesting research topics. Since flexible work is so common, exploring how to improve social interaction with co-workers working from home could provide closer office ties with irregular visiting co-workers.

Exploring how workstyle indication enables occupants to achieve focus, puts more emphasis on interaction within the AMS office. It would fundamentally change how occupants make a workplace selection within an OPO.

In its current state, occupants who need social interaction profit more from the OPO concept than occupants who need to focus. If both occupants profit the same amount form OPO, where they choose to work isn't determined by their preferred workstyle, but by their own personal preference. Improving social interaction between co-workers working from home would also improve social interaction, whilst occupants could also visit the office for that purpose. Therefore, I think enabling a broader office usage takes priority over improving an element which is already the goal of the office. However, this is a personal preference in topic priority.

3

"Another day has almost passed, and you feel satisfied with the amount of work you were able to do today. Visiting the library was the right decision. It is nice and quiet here, allowing you to focus on your tasks. When it is almost time to go home, you still need to finish your last tasks. However, it takes 20 minutes by train to go home, so you think you will be able to finish your task in the silent area in the train. Once you've packed all your belongings, you take the bike to the railway station. Being barely in time, you jump on the train and look for a silent area. You put your bag in the seat next to you, unfold the table in front of you and as soon as you place your laptop on the table, you notice something. Two seats away, a girl is having a conversation through her phone. She is whispering, but you still can clearly hear her voice . Even though it is not loud, it keeps distracting you from your work. You try to keep working on your task when suddenly, the train stops. It is your stop, but you weren't able to finish your task...."

3. Defining focus

Whether workstyle indication enables activity-based working, depends on the boundaries set for the zones defined by the indicator. Using a binary focus indicators, office occupants can communicate either of two states. These two states are defined as focus and non-focus. The exact meaning of these states is left ambiguous. Ambiguity allows for both generalization and misinterpretation. Generalization in workplace indication allows different occupants to understand the general concept of a specific indication, whilst not having to agreeing on the details. The binary indicator is only able to communicate the norm and the other mode, which at AMS is focus (other mode) or everything else (the norm). Focus is perceived as absolute silence, whilst the norm is being open for all interruptions. In an OPO, occupants also need to perform teamwork. Preforming teamwork requires an occupant to talk to each other, whilst also not wanting to be interrupted for non-work-related interruptions. Introducing a teamwork mode in the individual indicator prototype, makes indication more specific. These more specified modes on the indicator enables user test participants to express their workstyle preference. Clearly defining each state of the indicator decreases the ambiguity and makes the modes more specific. However, this can also prevent occupants from expressing their preferences. Attempting to breake down the workstyles focus and non-focus into individual elements should enable office occupants to specify their exact workstyle preference. However, defining a workstyle zone by using individual elements of focus and non-focus causes confusion amongst occupants. Since occupants are aware that they are in an office, they can deduce what is expected from the three introduced workstyles.

3.1 indication

An icon of a head with a finger covering its mouth often indicates a request for silence. Figure 3.1.1 is the Dutch railways' (NS) variant, used for silent areas in a train. However, how to behave in that area is not entirely clear, causing different interpretations amongst passengers. What exactly is silent? Must you remain absolutely silent, or do you just need to be a little more quiet than usual?

To make areas clearer, NS introduced a new icon. Figure 3.1.2 is NS' new icon for working areas. The difference between NS' work area and silent area is that you can talk quietly in the work area, whilst you can't do that in the silent area. However, instead of making the purpose of each area clearer, train passengers couldn't understand either icon. Twitter flooded with comments from confused train passengers ('Verwarrende logo's in vernieuwde treinen zorgen voor ergernis', 2018). Some passengers thought it was a replacement of the silent area, whilst others thought it was an attempt at stimulating book reading.

The NS example illustrates the design challenge in creating dedicated areas. If the occupants of a dedicated area are not able to identify the meaning of that area, the area loses its meaning. This can happen by the area being either too specific or not being specific enough.

If the area is not specific enough, occupants with different interpretations occupy the same area. Since both behave differently, there is a possibility that both behaviors come in to conflict. Occupants may also just ignore the area all together, since all other occupants aren't behaving accordingly anyway.

If the area is too specific, occupants won't be able to interpret the expected behavior of the assigned area and will therefore not behave according to the set rules.

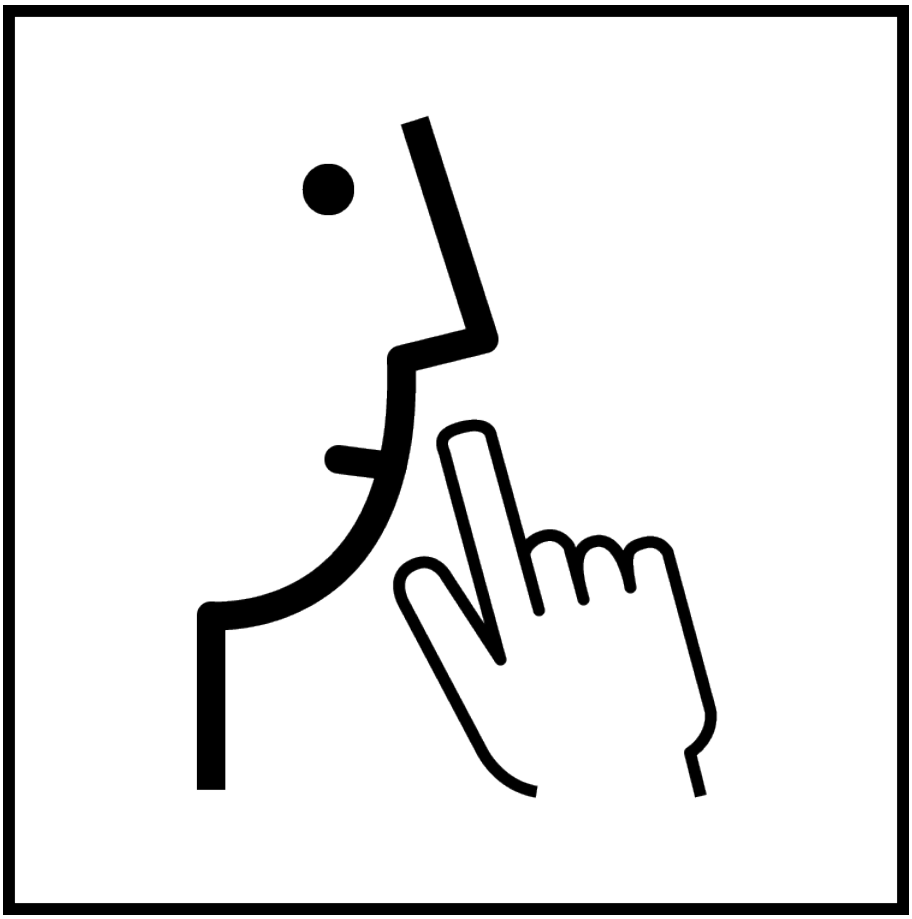


Figure 3.1.1; NS' silent area icon

Figure 3.1.1; NS' work area icon

Every indication comes at least in pairs. The dotted line near a train track marks the area you are not allowed to stand. However, this line implicitly indicates the other side to be the area where you are allowed to stand. Adding more indicators allows the indication to be more specific. For example, the prevdious example can be made more specific by adding another dotted line to indicate where you aren't allowed to stand when a sprinter passes the platform, whilst the other dotted line indicates the same for when an intercity train passes. With this addition, the indication is more specific. However, by being more specific, the indication has a higher chance to be interpreted incorrectly. A train passenger might confuse the two lines or think you have to stand between the two whilst waiting on the train.

Standing further from the track is always preferred over standing closer. Standing between the lines also doesn't give the passenger or the NS an advantage. Therefore, adding a second line would not add value to the indication. With workstyle indication, areas are also marked by indicators. However, adding additional indications could prove beneficial when 2 indications are not specific enough.

You can't stand here

You can stand here

You can't stand here

You can only stand here when a sprinter passes

You can stand here

3.2 Binary indicators

Binary indicators indicate either of two states. These indicators help to make a distinction between a new situation or the norm. In the train platform example, the norm is that you are allowed to stand everywhere you want. The dotted line indicates a change in this norm; you are no longer allowed to stand behind the dotted line. Focus indicators within an office work the same, where you can make a distinction between the norm and the new situation. At the AMS office, the office culture is centered around co-worker communication. Therefore, the norm at AMS is that office occupants are allowed to interrupt each other. Introducing focus indicators enables office occupants a change in this norm, where the other office occupants are no longer allowed to interrupt each other. With less co-worker interruptions, AMS office occupants are able to achieve higher levels of focus.

Problems occur when an office occupant can't identify with a workstyle preference provided by a binary indicator. OPOs are designed with collaboration in mind. During collaboration, co-workers talk to each other, whilst also being focused on their work. Since the binary indicator makes no distinction between work-related interruptions and non-work-related interruptions, collaborating isn't supported by binary indicators.

Figure 3.2.1; 2 low-fidelity GEMMA indicators

Design intervention: low-fidelity GEMMA indicator

Appendix III

In design intervention Low-fidelity GEMMA indicators (figure 3.2.1), I introduce a two-state indicator to the AMS office occupants. The occupants are able to indicate either one of two states. Since the exact rules aren't provided by the prototype, the users have to interpret the meaning of the two states (focus/social) themselves. Depending on the interpretation, one state will indicate a specific area requirement, whilst the other side indicates everything else.

Discussing the prototype with active collaborators, it becomes apparent that the blue side is the functional part of the indicator. Active collaborators and participators use the indicator to indicate if they need to focus or not, rather than indicating if they want to socialize or not. In the office culture at AMS, occupants are encouraged to approach each other for questions or conversations. Therefore, the primary use of the prototypes is to communicate that at that moment, they differ from the norm by not wanting to be interrupted. This makes the blue side a "don't interrupt me" signifier and the green side the "other mode". This gives the indicator the purpose of increasing focus level through decreasing co-worker interruptions. However, the green side indicates "the rest", making no difference between chatting about sports and discussing meetings; there is no distinction between work related interaction and non-work-related interaction. One of the main reasons to visit a flexible office is to have social interaction with your co-workers. Making no difference between work related interaction and non-work-related interaction creates situations where occupants are performing different activities with the same workstyle indication. This means that workstyle preference indication cannot be performed by a two-state indicator, since it doesn't enable occupants with distinct activities to cluster.

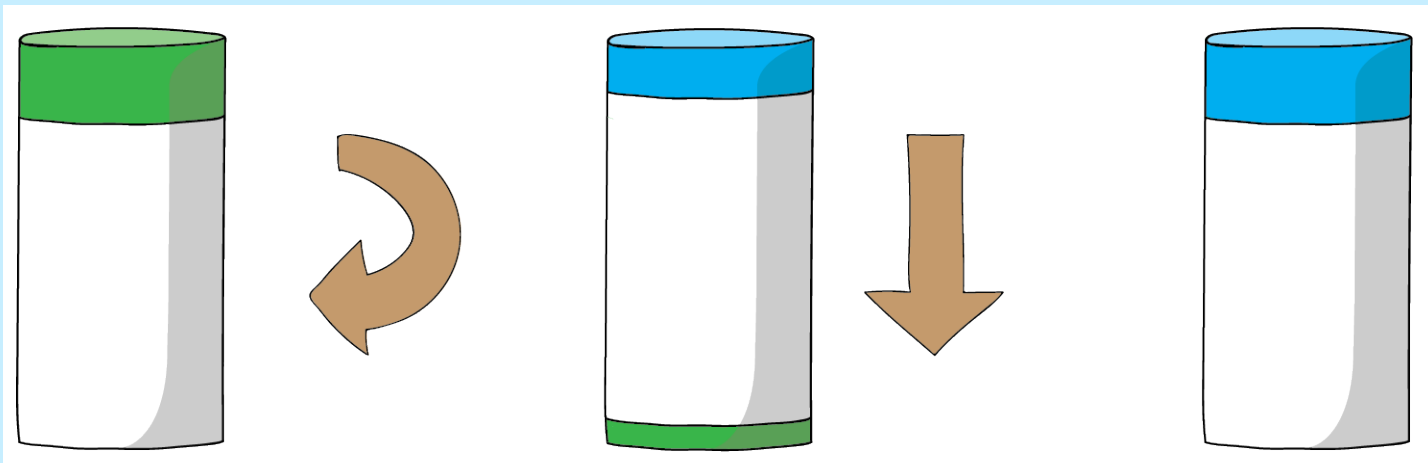


Figure 3.2.2; how to change modes

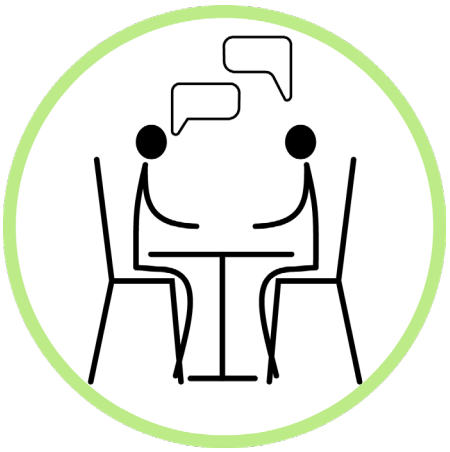
3.3 Three-mode indicators

Making a distinction between non-work-related interaction and work-related interaction requires an additional mode on the indicator. This new mode should enable more office occupants to cluster at a workstyle preference that matches their own. However, NS tried this approach with the new icon and instead of creating 3 clearly distinct areas, the work and silent areas in the train were too confusing for train passengers to understand what is expected from either area.

Collaborating however, is the work that is performed the most at the AMS office (appendix II). With the introduction of a mode that enables collaboration, the relation between each mode becomes more apparent. Like the binary indicators, the 3-mode indicators establish a relative workstyle indication. The intermediate mode represents the norm, with the other two modes representing meaningful deviation from the norm. Due to collaborating being the most performed work at the AMS office, the norm must allow for collaboration. This is enabled by introducing a “team work” workstyle mode, where the user indicates that they only allow work related interruptions. If an occupant doesn't want to be interrupted at all, “focus work” workstyle indicates that the office occupant prefers not to be interrupted. Social work is required, since not making a distinction between social work and team work would merge the two workstyles together. With a social work workstyle preference, the office occupant indicates to be open for all interruptions.

Focus work icon

Team work icon



Social work icon

Design intervention 5: interactive individual indicator

Appendix VII

Prototype 5 tests the assumption that enabling office occupants to make a selection between 3 workstyle preferences (focus work, team work, social work), office occupants can express their workstyle preference.

Prototype 5 is a fully functional medium fidelity prototype (Sauer, Seibel & Rüttinger, 2010). One of the goals of this prototype is to evaluate the three-workstyle indication; focused work, team work and social work. Each of these workstyles has an assigned color for communication. These colors are red for focused work, yellow for team work and green for social work. I selected these colors since they represent a traffic light. During discussions with active collaborators, the traffic light analogy was brought up several times. My chair's door analogy was also discussed a few times, which is also a three-state indicator. In this analogy, he uses his door as a workstyle indicator, where an open door communicates that interruptions are allowed, a closed door communicates that you can't interrupt and a half open door communicates that only urgent interruptions are allowed.

Participants of the user test indicate that they will most likely use the team work indication most frequently, adding that social work is too inviting, whilst the focus work is too strict when performing regular work. However, participants acknowledge there are situations in which either social work or focus work occur, only less frequently compared to team work. The necessity of both social work and focused work were discussed, with both discussions having the same conclusion, yet from the opposing perspectives. By removing one state, you merge the properties of the removed state into one of the original states. For example, if social working was removed and focus remains the same, the user is no longer able to communicate what kind of conversations the user is looking for (work related or not work-related), which creates a situation similar to the low-fidelity GEMMA indicators.

“the reds just go find a room… the interesting part of the prototype is the nuance between green and yellow” - a participant debating the need for a focus work indication

“if everybody has a green indicator, the office turns into a pub” - a participant debating the need for a social work indication

Focus work is preferred to be performed in a silent area, whilst both team work and social work allow for conversations. Conversations over non-work-related topics, are not louder than work-related conversations. This means for workplace selection, focus work and social work can sit in the same zone. However, whilst team work can be performed in a noisy area, the team work workstyle preference indicates that non-work-related co-worker interruptions are not allowed.

3.4 individual elements

The three proposed workstyles are open for interpretation. During the co-creation session, occupants disagreed on what is distracting when trying to achieve focus (appendix II). Whereas one participant would be interrupted by phone calls from adjacent co-workers, other participants only experienced disturbance when he was interrupted personally.

Similar to focus work workstyle, social work and team work workstyles are open for interpretation. AMS' decision for choosing an OPO, was based on the need for improved inter-team communication. By specifying personal interests and communicating these through the office, office occupants could engage in more specific social intera ction.

Design intervention 3: element indication, explores the opportunities of specific zone descriptions through focus elements and social elements.

Design intervention 3: element indication

Appendix V

Design intervention 3 tests the assumption that by enabling office occupants to specify their zone with specific elements, office occupants are able to create a workstyle zone that closely represents their preferences. Furthermore, it tests the assumption that by using zone indicators instead of individual indicators, workstyle preference clustering will improved. The first assumption is covered in this section, the second assumption tested by this prototype will be covered in chapter 4.2.2 (P.78).

This design intervention's goal is to explore what elements of focus are required to create a focus zone and what other indicators enable the AMS office occupants to cluster.
To do this, the focus and social workstyles are broken down in different icons. Office occupants can select an arrangement of tokens. These tokens can then be placed in a stand, which indicates custom zone (figure 3.4.1).

Office occupants find it hard to select an arrangement that sets their preferred workstyle, since they must individually address each element with an icon. It requires more indicators to achieve the desired area compared to the modes “focus work”," team work" and “social work”. Next to it being harder to express one's preference, it is also perceived harder to interpret what a combination of icons mean. This causes the element indicators to be ignored, since other office occupants are not able to identify what is asked by the elements. Even though the three workstyles are open for interpretation, office occupants are context aware and capable of knowing what to expect form those workstyle zones in an office setting. Making indication as explicit as individual elements don't improve workstyle-based workspace selection.

Figure 3.4.1; an element zone indicator

3.5 conclusion

Binary indicators do not allow for workstyle-based workplace-selection. Due to the office culture being open for co-worker interruptions, binary indicators serve the purpose of a “do not disturb" signifier. This is caused by the green side not making a distinction between work related interruption and non-work-related interruption. A more specific intermediate indication between “do not disturb" and “all interruptions allowed" becomes available when using a 3-mode indicator. In prototype 5, a newly introduced state indicates team work, where the occupant is open for interruptions, if they are work related. Participants of the prototype test predict to mainly use this intermediate modus, since they are in the office for collaboration. However, the teamwork state requires a state where no conversations are allowed (focused work) and a state where all conversations are allowed (Social work), to explicitly communicate what is expected from this intermediate state. Breaking down the states focus and non-focus in individual elements, makes the available information for workplace selection too specific. Prototype 3 enables the AMS occupants to create their own assigned zones through placing indication elements on a stand. Due to the high number of indication combination possibilities, the assigned zone becomes too specific. Every combination of icons is unique, which decreases the chance of finding a co-worker who has the same preferences. Furthermore, compared to the other prototypes, occupants don't experience the same level of workspace control as the individual indicators give them.

4

It is a new day, and you are walking somewhat sleepy to the office. It is still early, and you didn't sleep well last night. You enter the office and you decide to switch things up a little. Instead of your usual workplace, you decide to have a walk through the office. It is neither late nor early, giving you the opportunity to look for co-workers. But instead of sitting next to co-workers you know, you decide to sit next to people you don't recognize. Near the end of the hall, you spot a workplace with a man franticly typing away. When arriving at the desk next to him you ask if you can sit there. He briefly looks up, nods at you and continues working on probably something really urgent. This morning you made sure to bring your headphone, so you don't mind the arrhythmic symphony produced by the keystrokes of your neighbor. You set-up your laptop and start your day.

4. Finding focus

Information is often communicated through indicators. What these indicators communicate impacts how the receiver uses the information. When indicating information for workplace selection, where and when the indication happens provides opportunities for distinct indicators; on-desk indication and pre-desk indication. These indicators can be further categorized into individual indicators and zone indicators. By changing what these tools indicate, the moment when this information is relevant, and what the information is relevant for also changes. Individual on-desk indicators are most important when the workstyle preference switches, whilst zone indicators are more important when making a workplace selection. However, where the individual on-desk indicator provides important information when changing preference, individual pre-desk indicators don't improve workplace selection. Pre-desk zone indicators on the other hand, provide the users a suggestion where to go for a workplace with a specific workstyle. Combining the suggestion elements from the pre-desk indicator with the individual indicators, allow office occupants to make a workplace selection based on workstyle preference, whilst also being able to communicate their own workstyle preference.

4.1 Communication tools

Information is often communicated through indicators. They are tools that enable communication of specific information. Two indicators encountered in daily life are direction indicators and a traffic light.

The direction indicators on a car enables the driver to indicate when a car is going to change direction. Direction indicators are individually controlled indicators, which are only visible for other people who are in direct line of sight. This makes them specific for local use.

A traffic light, on the other hand, indicates when a specific group can cross a road. Which group is allowed to cross the road is indicated by the symbol in the light, a direction arrow, road markings, location of the traffic light or a combination of those elements. Unlike the direction indicators, these indicators are not individually controlled. They either follow a pre-programmed pattern or adapt to user input (pushing a button or measuring a car stopping in front of the traffic light). Since traffic lights communicates instructions to a larger group, traffic lights are often higher to improve visibility.

Both traffic lights and direction indictors are essential in traffic. Yet, the way they operate is fundamentally different. Direction indicators communicate an individual changing direction. The traffic light communicates to a group when they can cross the road.

Indicators enabling workstyle-based workplace selection need to facilitate two functions:

- Workplace selection
- Communicating preferred workstyle

Workstyle selection can be compared to the role of a traffic light. It indicates what is expected of the specific group. Whilst communicating office occupants' preferred workstyle to the office is similar to the direction indicator example, where the indicator gives information to the other occupants in line of sight. This means that a single indicator needs to fulfill both roles using two different methods or introducing two indicators to enable workplace selection.

There are many media that facilitate workstyle indication. Apps, displays, tokens and indicators to name a few. Furthermore, these media can also communicate the information differently, serving different purposes.

To enable all workstyle-based workplace selection, the tools used for communicating workstyle preference should be present at the office. If workstyle-based workplace selection requires occupants to bring their own tools, occupants can be excluded when they aren't able to access these tools. In the case of an app, OS exclusivity, empty batteries, forgetting your phone at home or having a phone that is too old for the required software can prevent a user from making a workplace selection based on workstyle preference.

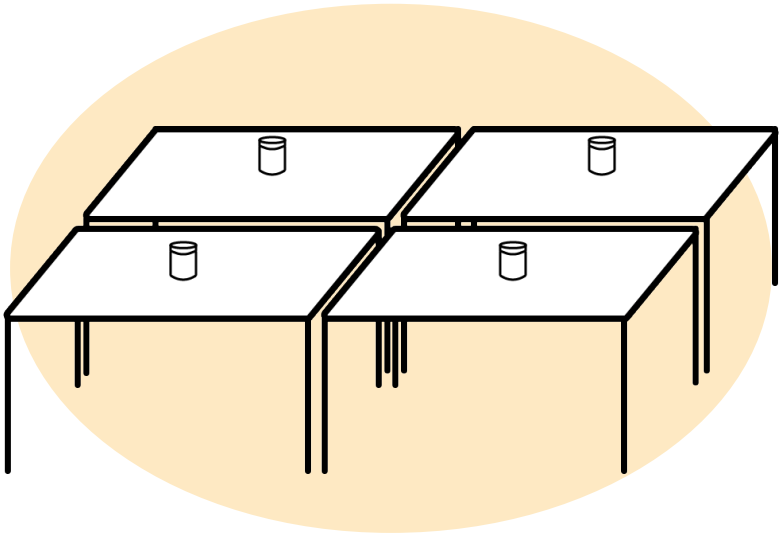
A variety of indicators can be used within the office. A distinction between indicators can be made based on when the indicator is used. The indicator can be used at the desk, or before making a workplace selection. Exploring the moments when indication happens, combined with what style of indicator (individual or zone) gives situation specific suggestions for when which indicator or combination of indicators should be used.

4.2 On-desk workstyle communication

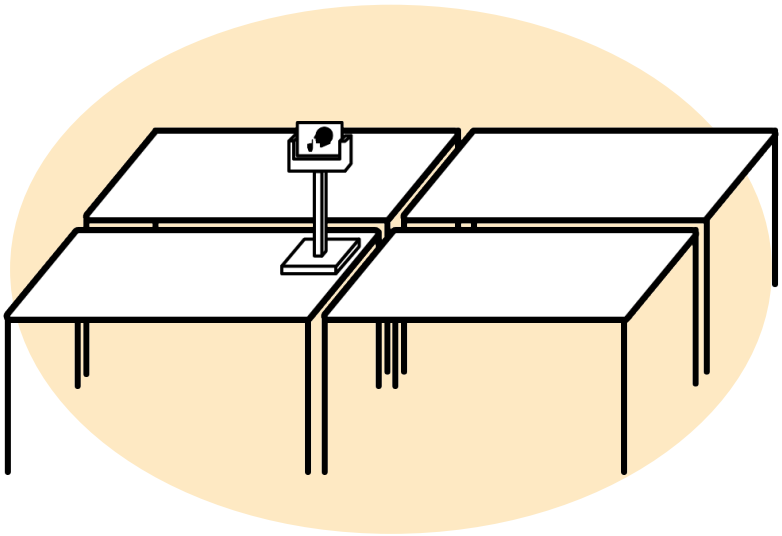
Desk-to-desk workstyle communication is enabled by on-desk indicators. These indicators are objects that can be found on office desks and allow office occupants to change their workstyle preference. In this section, the difference between individual and zone on-desk indicators is explored

Individual indicators are indicators controlled by the individual and indicate the specific preference of the individual. Zone indicators are controlled by a single indicator and indicate the preference of everybody in that specific zone.

Individual indication



Zone indication



4.2.1 On-desk individual indicators

The use of individual on-desk indicators enables office occupants to communicate their preferred workstyle to the rest of the office. Non-interactive indicators (like the low-fidelity GEMMA indicators) enable AMS office occupants to indicate their preferred workstyle temporarily after the indicators are introduced. Since there is no in-use indication with the non-interactive indicators, it can be hard to identify if an indicator is in-use, or if the indicator was left at the desk by the previous user.

Making use of interactive indicators, this problem can be solved by using the lighting on the indicator to show if an indicator is in-use. By solving that problem, the indicators can be used longer after introduction.

To enable workstyle-based workplace selection, the office occupant must be able to make a workplace selection that matters. This means that a single indicator changing in workstyle preference must not change the zone to such a degree that the selection made by the other office occupants becomes irrelevant. To achieve this, individual on-desk indicators must interact with each other when a relevant mismatch between workstyle preferences occurs. Since social work and team work workstyles both allow the office occupants to talk to each other, a mismatch between these workstyles doesn't influence workplace selection. However, the focus work workstyle doesn't allow the office occupants to talk in that zone, meaning that office occupants with a focus work workstyle preference can't sit adjacent to office occupants who have a social work or team work workstyle preference.

Achieving focus requires silence, which can't be achieved in a noisy hall. However, the other way around is no issue. In the current situation in ABW offices, occupants who want to work in silence are asked to move to a quiet area (E.g. focus room). However, since there are no such facilities in most OPOs, asking people to relocate to a silent area is not an option. Therefore, asking occupants who need or prefere to talk with each other should be asked to move to another area in this situation. Calling the social work and team work workstyle preferences to action can be achieved by giving a notification of a mismatch between workstyles through the indicators. Blinking light is a notification that enables office occupants to identify a mismatch between workstyle preferences. Since the mismatch is only relevant for adjacent indicators, there is no need to indicate the workstyle preferences of the adjacent indicators on each indicator. The mismatch can easily be identified by looking at the adjacent indicators instead. This call to action should trigger the office occupants who get this notification to either change their workstyle preference so there won't be a mismatch or relocate to a new workplace.

Design intervention: low-fidelity GEMMA indicators

Appendix III

Design intervention 1 main assumption is that by enabling enabling AMS' office occupants to indicate their workstyle preference, occupants can identify workstyle biases in specific areas, allowing workstyle clustering. The design intervention consists of a floorplan and on-desk indicators, this section focuses on the latter.

Low-fidelity GEMMA indicators are introduced to the office, to enable workstyle indication using a binary indicator. During the first week after introduction of the binary indicators, office occupants experienced an increased amount of workstyle awareness. When the prototypes are in use, the AMS office occupants reconsider their interruption priority. If a co-workers indicator is in focus mode and another occupant's question doesn't have a high priority, the occupant decides to wait with the question until the indicator is set to non-focus mode.

Occupants find it hard to determine when to switch the indicator, since they don't experience a clear switch moment between work statuses. Workstyle progressively flows from one style to the other. However, occupants identify a pattern; indicators switch to social working at the end of the day, allowing occupants to ask non-work-related questions they didn't ask during focus working.

Three weeks after the introduction and the indicators were no longer being used. The indicators were introduced to the office in a box near the entrance. During this time, occupants had to go to the box to pick up an indicator when they wanted to use one. An active collaborator suggested that the indicators would easier integrate in their daily set-up, if the indicators are placed on the workplaces. I agreed with his assumption and decided to place an indicator on each workplace. Non-participators caused prototypes to stand on occupied desks whilst not being used. This makes it unclear who is using the indicators, since there is no in-use indication. Without the knowledge who is actively using the prototype, the indicators lost their ability to prevent co-worker interruption.

Lastly, occupants are also not able to use the indicators for workplace selection due to the lack of in-use indication, lack of workstyle preference options (chapter 2.2) and the information changing too frequently. Since users can change their workstyle preference at any moment, using workstyle preference as workplace selection criteria only initially achieves its goal, as long as nobody changes workstyle preference.

Stand prototype

The stand prototype displays the user's workstyle preference with the light on top. The workstyle preference is selected by pressing one of the three buttons. It indicates the workstyle preference of adjacent workstyles through a display in front, enabling the user to identify what the workstyle preferences are of adjacent co-workers.

Figure 4.2.1.1

Cylinder prototype

The cylinder prototype displays the user's workstyle preference with the light on top. The workstyle preference is selected by sliding a ring over the one of the three colors corresponding with the preferred workstyle. It indicates the workstyle preference of adjacent workstyles through the rings below the user's ring

Figure 4.2.1.2

Design intervention: Interactive individual indicator

Appendix VII

Two assumptions prototype 5 tests are:

1) For workstyle-based workplace selection, adjacent workstyle preferences must be communicated through individual the individual indicators.

2) For workstyle-based workplace selection, an occupant must be notified if there is an adjacent workstyle preference which produces less noise.

Two prototypes were produced which both communicate the status of adjacent workplaces differently (figure 4.2.1.1 & 4.2.1.2). The cylinder prototype uses rings to indicate statuses of both the user and the adjacent co-workers. The upper ring always corresponds with the user's preference, whilst the rings below that are the workstyle preferences of adjacent co-workers.
The stand prototype's upper lamp is indicating the user's workstyle preference. The display in front shows all workstyle preferences of co-workers adjacent to the user. The workstyle lights on the display correspond with the relative position of the indicators.
When there are two different workstyles present, the upper light of the indicator with the "loudest" workstyle starts to blink. This blinking triggers the user to take action.

During the user research, participants were asked to interact with both indicator concepts and reflect on them using an AttrakDiff (Hassenzahl, Burmester & Koller, 2003) questionnaire. After which, the results are discussed in a semi-structured interview.

Discussing the clustering capabilities of the prototype with the participants shows that blinking provides the user with enough information to be called to action. The rings of the cylinder prototypes are hard to interpret, since there is no logical order to them. It is unclear to the participant which ring corresponds with which adjacent co-worker. The stand is easier to interpret, yet participants weren't convinced by the necessity of the indication on the prototypes themselves. If an indicator is blinking, it is easier to look up and see who has a different workstyle preference, rather than checking on your own indicator.

Having your own preferred workstyle on top enables other office occupants to quickly scan the office for similar preferred workstyles. This increases the clustering capabilities of this indicator compared to the indicator of design intervention 1. It also enables office occupants to identify which indicators are in-use.

The participants are split on the blinking LED on top. Call to action priority is perceived as fair and 4 participants would either change their workstyle to match that of the more quiet indicated workstyle or move to a new workplace. Participants share concerns when it comes the the rights given to the more quiet workstyle preferences. This prioritization provides a lot of rights to the occupant with the most quiet preferred workstyle, no matter what the previous preferred workstyles in the zone are. The concern is about the interaction between an arriving office occupant and an already existing workstyle group. With this prioritization, the newly arriving worker could set the new indicator to focus work, calling the rest of the occupants to action. If this situation occurs in a real use setting is debatable, since it seems unrealistic for an occupant to select a louder table when there is a focus preference.
Calling social workstyles to action, when a team work workstyle is indicated, seems not necessary by participants. Non-work-related conversations are assumed to be of the same noise level as work related conversations. Whilst those workstyle preferences co-exist at adjacent desks, the role of the indicator should not be to call the social workstyle to action, but it should signify the social workstyle preference that some co-workers don't want to have a non-work related conversation.

4.2.2 On-desk zone indicators

Zone indicators create an assigned area by using only 1 indicator. When a single office occupant indicates their workstyle preference with such an indicator, there are instantly 3 other workplaces that are assigned to that workstyle. This also means that only occupants with the same workstyle preference will sit at the same desks. However, the AMS' OPO is aimed at flexible workers, who perform distinct activities during the day. Since the activities of flexible workers don't happen at the same time, office occupants might work at a desk group with a workstyle indication that is not aligned with their current preference.

When information about the 3 workstyles is provided by a zone indicator, it enables AMS office occupants to make a workstyle-based workplace selection. However, when using information that doesn't allow for clustering (E.g. element indication), some issues with zone indicators become more apparent. Office occupants don't experience the zone indicators as inviting as individual indicators. Since they indicate the workstyle preference of the entire zone, changing individual elements should either be discussed or changed by an individual's preference. This can either lead to the indicators being ignored or the workstyle preference not being changed during the day.
Focus work workstyle zones enable office occupants to focus. The amount of office noise is reduced in and adjacent to that zone. Since the workstyle preference of that zone doesn't change frequently during the day, making a workstyle-based workplace selection is improved compared to on-desk individual indicators.

Design intervention: Element indication

Appendix V

Design intervention 3 tests the assumption that by enabling office occupants to specify their zone with specific elements, office occupants are able to create a workstyle zone that closely represents their preferences. Furthermore, it tests the assumption that by using zone indicators instead of individual indicators, workstyle preference clustering will improved. The first assumption is covered in chapter 3.4 (P.61), the second assumption tested by this design intervention is the focus of this section.

Design intervention 3 failing to be used by the AMS office has been discussed in chapter 3.4. However, it still provides interesting insights into what happens when a group indicator gives uninterpretable information and how it affects all interacting parties.

Due to people not understanding the indication, the entire area was ignored. This caused frustration with the participant who set up the area. The indicators were also perceived as group indicators, causing other office occupants to ignore the indicator when approaching an occupant in that zone. Having uninterpretable information negatively impacts cluster ability, even when used for group indicators. It is also a cautious note for further developments, if the area is not accepted, clustering can't happen.

Furthermore, changing the icons within the stand caused conflicts amongst co-workers, whereas one occupant assigned the area to be a conversation area, the other still needed to focus. To prevent conflict, the individual elements are changed less frequently than individual indicators. This makes zones more stable, yet can cause a mismatch between an occupants activity and the zone the occupant sits in.

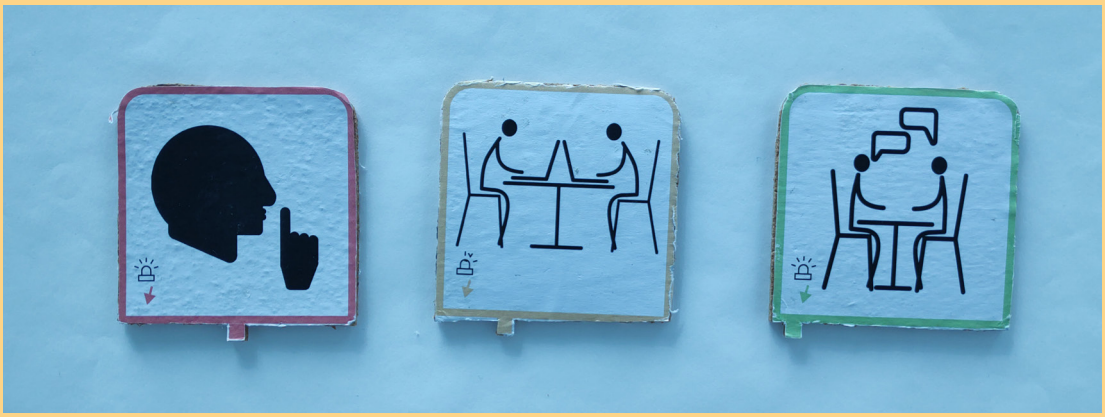


Figure 4.2.2.1; the three workstyle cards

Figure 4.2.2.2; in-use on-desk zone indicator

Design intervention 4; Digital zone indication

Appendix VI

One of the assumptions design intervention 4 tests, is that providing the office occupants with on-desk zone workstyle indicators (using the 3 workstyles), office occupants will be able to make a workstyle-based workplace selection.

For this purpose, the prototype used a stand, with a card holder. In the card holder, 3 workstyle cards could be slit in (figure 4.2.2.1). With the card in the holder, an RGB LED lights up in the color corresponding to the workstyle color, which is printed on the edge of the card.
Furthermore, a display near the entrance projected the workstyle preferences indicated by each zone. In chapter 4.3.2, more details about the display will be covered.

Office occupants are able to cluster through this design intervention. Answers on the questionnaire indicate that the icons on the indicators and the display near the entrance had the largest influence on occupants clustering. The lights in the indicators are used to a lesser degree for workplace selection, compared to the display at the entrance or the icons on the cards.

The workstyles in the indicators were also changed less frequently (3 times), compared to the individual indicators or design intervention 1 (9/7 times). The results from the questionnaire indicate that switching workstyle with a group indicator is easier when alone at the workstyle group compared to when other occupants are also part of the group. This could be an indication of feeling less in control over the group.

4.3 Pre-desk workstyle indication

Enabling office occupants to communicate their preferred workstyle enables workstyle-based workplace selection. However, if on-desk indicators are out of sight, locating a preferred workstyle either requires more effort or can't be achieved at all. For example, when looking for a focus work workstyle preference, an office occupant might need to walk through the entire office to find occupants with a similar preference. Due to the small size of the AMS office, this can still be considered as an option. However, doing the same in a multi-floor office with hundreds of occupants becomes less attractive.

Instead of on-desk indication, another moment when workstyle communication can take place, is before the occupant arrives at a workplace. At larger offices, this lowers the time that is currently being lost looking for a workplace. When it comes to communicating workstyle preference before desk arrival, there are many possibilities to do this. Lighting, sound and signs are just a few tools which can be used to achieve this goal. The main tool for pre-desk workstyle indication in this study are based on floorplans.

4.3.1 Pre-desk Individual indicators

Information provided by the on-desk workstyle indicators can also be provided by the pre-desk workstyle indicators. Changing from on-desk to pre-desk workstyle indication also changes how the provided information and indicators are used.

Individual on-desk indicators are better suited for communicating workstyle preference to adjacent co-workers than for enabling workstyle-based workplace selection. This information usages also directly indicates a problem with using individual pre-desk indicators. Since the pre-desk indicators only give information, the tools can't be used to communicate an individual's workstyle preference. When it comes to make a workstyle-based workplace selection, individual workstyle preferences remain too specific and can change too frequently to make a relevant workplace selection. Pre-desk individual indicators therefore don't enable AMS office occupants to make a workstyle-based workplace selection or communicate workstyle preference.

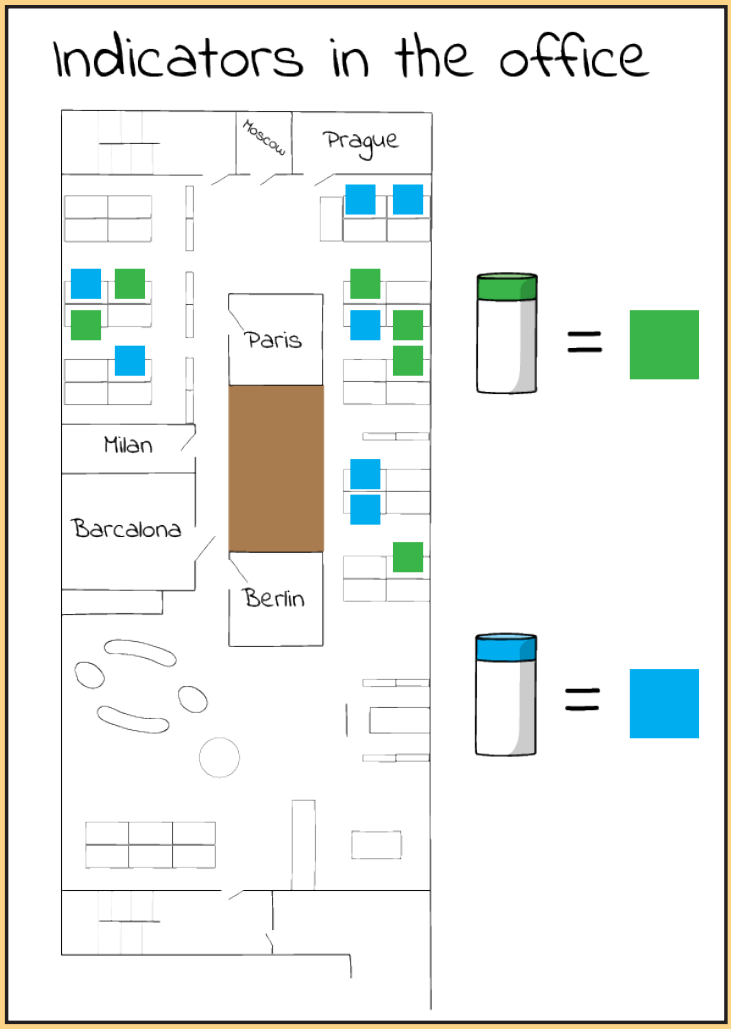


Figure 4.3.1.1

Design intervention: low-fidelity GEMMA indicators

Appendix III

Design intervention 1 tests the assumption that providing the AMS office with a floorplan which displays workstyle preference per desk enables AMS occupants to make a workstyle-based workplace selection.

To test this assumption, a floorplan is introduced to the AMS office (figure 4.3.1.1). Each indicator in the office is represented on the map with a marker. If the mode of the indicator switches, the marker also switches to the newly indicated workstyle preference.

Office occupants are confused about the implementation of the floorplan. The green and blue markers are interpreted as workplace suggestions for that workstyle, workstyle indicator pick up points and current workstyle status indicator. By not being able to identify what the floorplan tries to achieve, AMS office occupants are not able to make a workstyle-based workplace selection.

Furthermore, for the same reason as the individual indicator doesn't allow for clustering, so doesn't the map that shows the same information. The selection criteria “workstyle status" changes too frequently to make a meaningful workplace selection.

Another element that prevents workstyle-based workplace selection is that if the map is interpreted correctly and the criteria workstyle status is being seen as a valid workplace selection criterion, than it is still hard to understand what the map means. Occupants are not sure what to expect from an area with 2 green indicators and 1 blue indicator. Therefore, desk-specific information is not usable for workstyle-based workplace selection.

4.3.2 Pre-desk zone indicators

Pre-desk indicators don't allow office occupants to communicate their workstyle preference. With the premise that for workstyle-based workplace selection both communication of workstyle preference and indication of workstyle preferences within the AMS office are required, pre-desk indicators could be more beneficial for the latter. As discussed in chapter 4.2.2, on-desk zone indicators are better at enabling workstyle clustering compared to on-desk individual indicators.

Using pre-desk zone indication has the same influence on workstyle clustering within the AMS office compared to on-desk zone indicators. The difference between individual and zone indicators that allow for workstyle clustering is that zone indicators give the offices occupants a suggestion where to go for a specific workstyle preference. Since this information is provided before making a workplace selection, office occupants can locate their preferred workstyle preference and make a workplace selection based on that information.

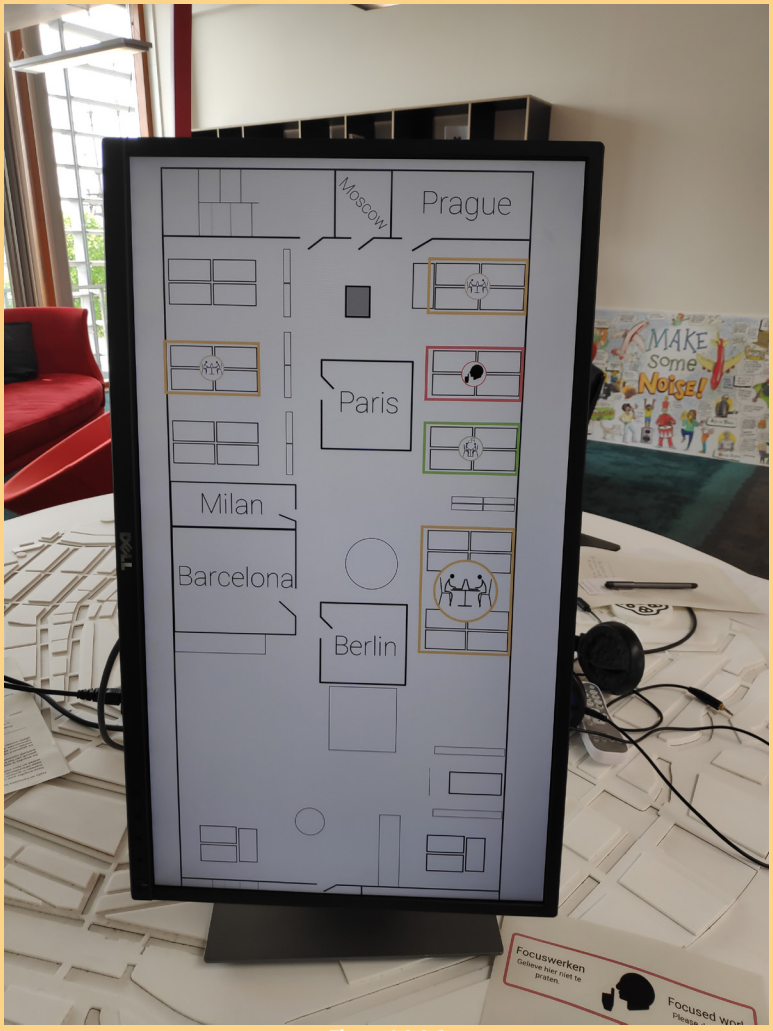


Figure 4.3.2.1

Design intervention 4; Digital zone indication

Appendix VI

One of the assumptions design intervention 4 tests is that providing the AMS office occupants with a pre-desk zone indicator, the AMS office occupants are enabled to make a workstyle-based workplace selection.

To test this assumption, a pre-desk zone indicator in the form of a display was introduced during the design intervention. This display (figure 4.3.2.1) is linked to the on-desk zone indicators. When a zone indicator indicates a specific workstyle preference, the entire group of desks is marked on the display as that specific workstyle zone. The display updates real-time data to represent the workstyle statuses in the office. If two adjacent groups have the same preference, the groups merge.

The information provided by the indicators is more useful for workstyle clustering compared to the pre-desk individual indicators. Since the pre-desk zone indicators indicates both where to go and where people are with similar workstyle preferences. However, this communication requires zone indicators or all individual indicators being in the same mode.

4.4 Combining indication tools

By combining pre-desk indicators with on-desk indicators, a selection can be made to achieve a specific goal. The table on the left shows how pre-desk and on-desk indicators can be combined when they provide individual or zone information.

Individual indicators are better at enabling office occupants to communicate their workstyle preference, whilst zone indicators are better at enabling workstyle clustering. The low-fidelity GEMMA indicators with the floorplan are an example of both on- and pre-desk individual indication, whilst the digital zone indicators are an example of both on- and pre-desk zone indication.

The low-fidelity GEMMA indicators don't allow for workstyle-based workplace selection and is therefore not a solution for conflicting activities in an OPO.

On the other hand, the digital zone indicators do allow for workstyle-based workplace selection. However, on-desk zone indicators also indicated to be more easily ignored when it comes to individual co-worker interruptions. This was observed through an earlier prototype, yet it raises the concern that over time, the same effect can happen with this solution as well. If the office is mainly looking for a solution that enables workstyle clustering, this design intervention can be a direction for further development.

Since office activities change during the day and office occupants change workstyles more frequently when provided with individual indicators, I think for supporting activity-based workstyles in an OPO, combining on-desk individual indicators with pre-desk zone indicators will give the best of both concepts.

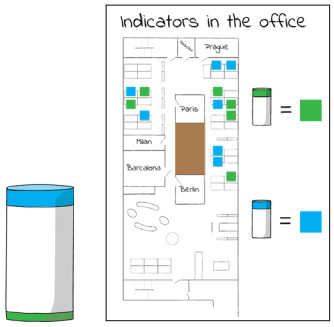
On-desk

Individual

Zone

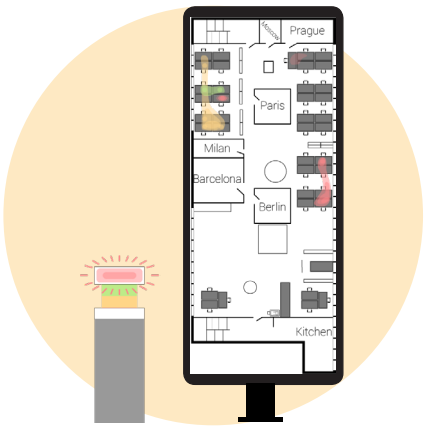
Pre-desk

Individual

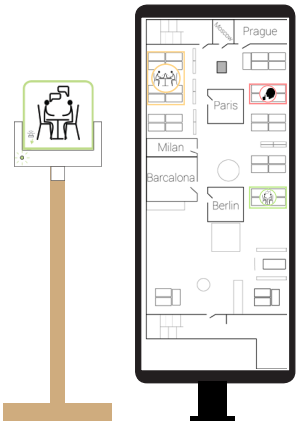


Design intervention 1

Zone



Recommendation



Design intervention 4

5

5. Conclusion

Concluding this design exploration into facilitating activity-based workstyles in OPO, a set of tools is suggested which enable AMS office occupants to make a workstyle-based workplace selection. Through this set of tools, AMS office occupants will be able to perform distinct activities within the AMS office with reduced co-worker interruptions.

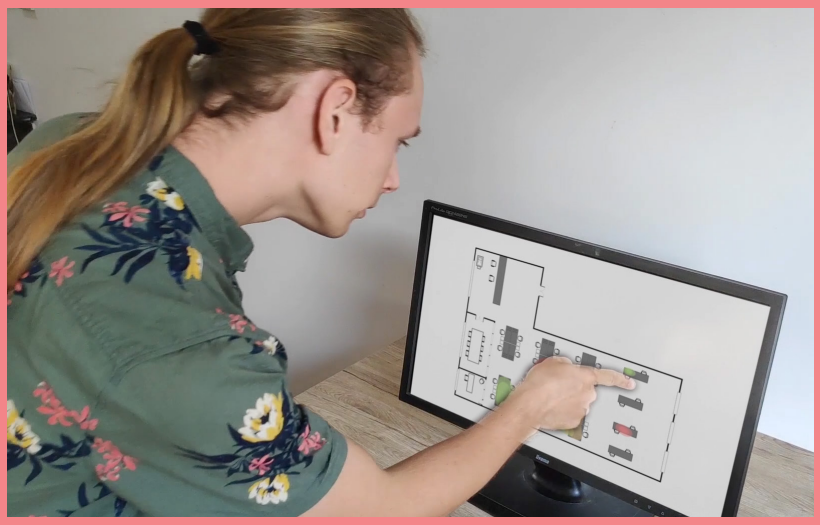
From the approaches used in to achieve focus within flexible offices, workstyle indication and avoidance are applicable to the AMS office. The physical set-up at AMS doesn't allow for applying fixed physical barriers. Using flexible barriers requires office occupants to bring their own barriers and only successful if the barriers are recognized as workstyle indicators (E.g. wearing a headphone being interpreted as wanting to focus). Avoiding the office requires another location where the office occupant can focus, which can't be guaranteed. Enabling workstyle indication allows office occupants to make a workplace selection based on workstyle preference. By clustering occupants with the same preference, social interaction, collaboration and focus are facilitated.

Using binary indicators, users can indicate the norm or a deviation from the norm. At the AMS office, being approachable is the norm, whilst wanting to focus is a deviation of the norm. Using binary indicators therefore only allow to communicate a focus workstyle or every other workstyle. Collaboration requires office occupants to either communicate with each other whilst also being focused at their work. Therefore, binary indicators don't allow office occupants to communicate their preferred workstyle. Using three modes, the office occupants can communicate three workstyle preferences. Focus work doesn't allow for co-worker interruptions, team work only allows work-related co-worker interruptions and social work allow all co-worker interruptions. Using these three workstyles, AMS office occupants can make a workstyle selection which enables them to perform their activities. Increasing the number of indications doesn't improve workstyle clustering.

Office occupants need to communicate this workstyle preference, whilst also being able to find co-workers with similar preferences. Communicating workstyle preference can be performed by on-desk indicators and pre-desk indicators, which both can be individual or zone indicators. Individual indicators give office occupants more control over their workplace, yet don't provide information which can be used for clustering. Zone indicators are do provide this information yet give an individual less control over their workplace. Pre-desk indicators primary role is to communicate where specific workstyles are and are therefore better at communicating workstyle preference than indicating workstyle preference. Combining individual on-desk indicators with zone pre-desk indicators could therefore provide the user with the benefits of both tools. This is recommended, yet not been tested during this study.

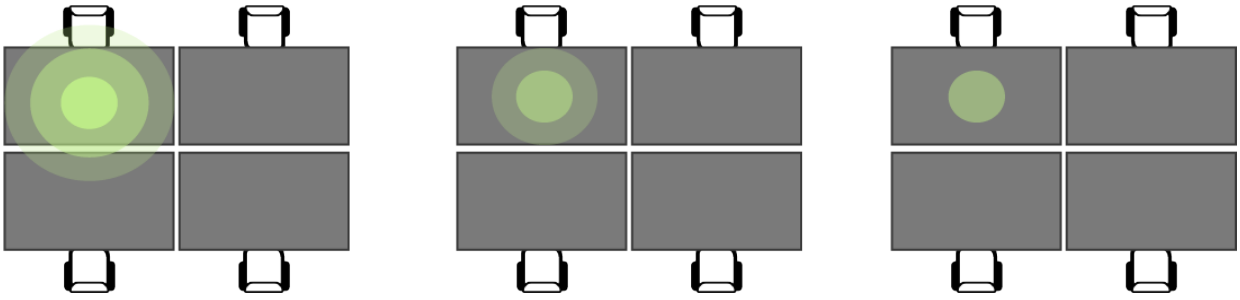
Workstyle indication reduces the number of co-worker interruptions, whilst also providing a tool that enables workstyle clustering. Using three workstyles enable office occupant to express their activities needs. Communicating these preferences through individual on-desk indicators and zone pre-desk indicators enables workstyle-based clustering. Workstyle based clustering enables offices occupants with distinct activities, to perform their work at the AMS office.

5.1 Final design: pre-desk indication



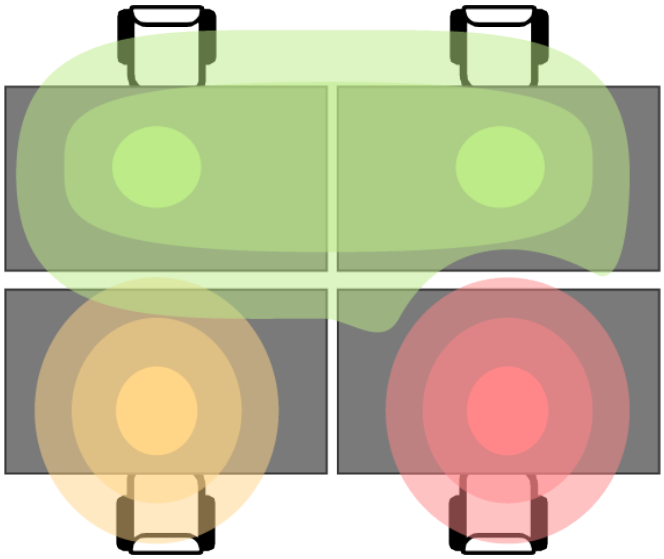
Near the entrance of the office is a digital floorplan. This floorplan indicates what workstyles are currently present at the office and suggests to the office occupant where to sit for a specific workstyle preference.

Each time an indicator switches to a new mode (including turning on), a dot is created on the location where the indicator is located within the office. The initial dot covers an area that is slightly larger than the individual desk. This is done to help office occupants to cluster at recently set-up workstyle zones. Over time, the size of the dot decreases, indicating that the indicator hasn't changed for a while and possibly no longer represents the preference of the office occupant.



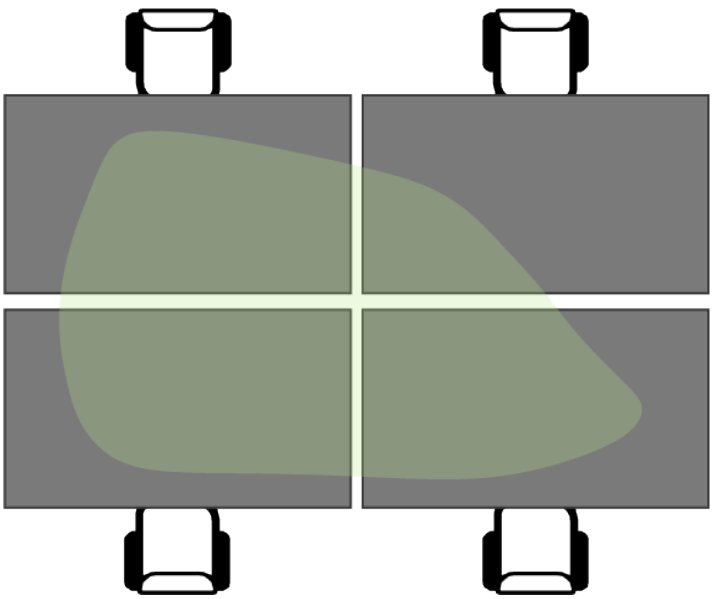
Initial dot *Inactive dot*

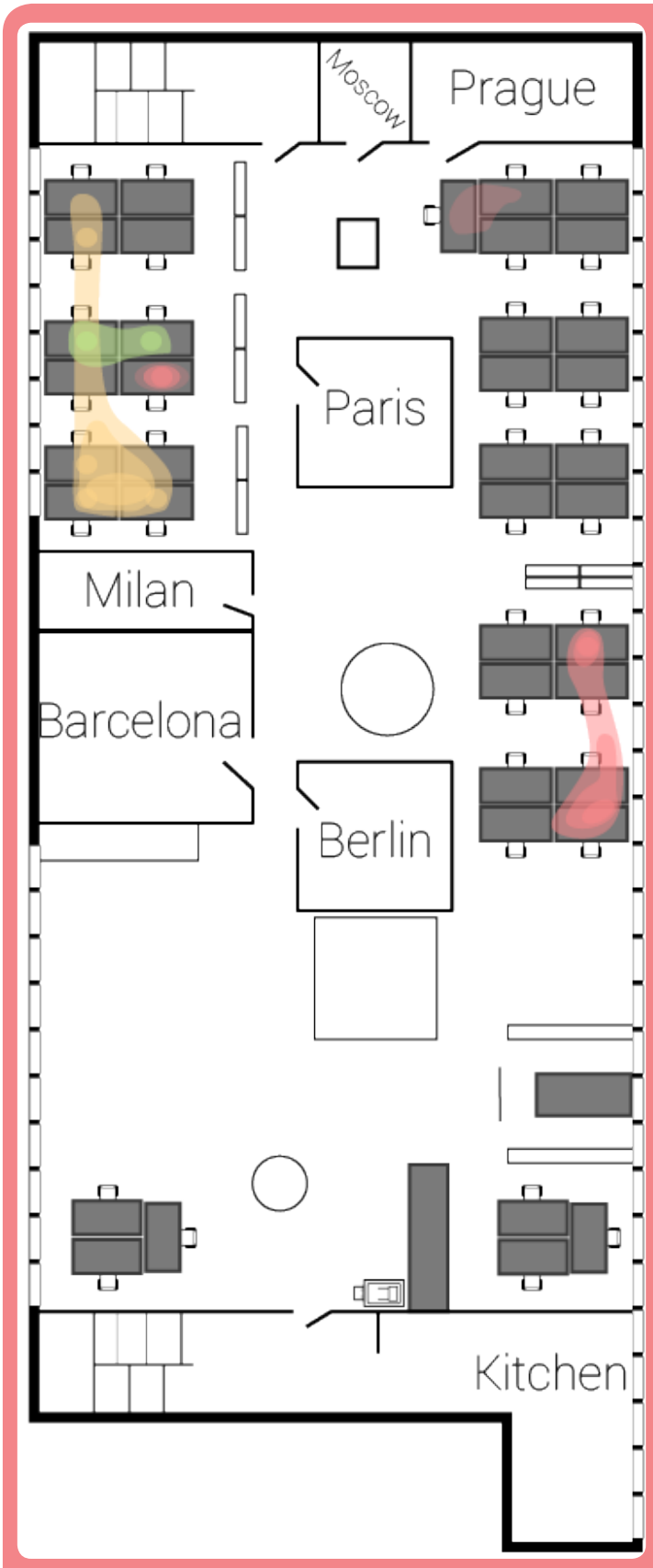
Two dots of the same color attract each other, merging into a zone. The closer the indicators are to each other, the stronger the attraction.



Social work and team work workstyle dots (yellow and green) overlap. They don't attract each other but they can be in proximity of each other. Focus work workstyle dots (red) on the other hand repel the other workstyle dots, since they prefer not to sit in the same zone.

Further development of the prototype would allow for data analysis. It can collect data from the office to identify trends in workstyle/ workplace relation. This enables further suggestions for areas based on previous indications. However, is suggestion is removed when another workstyle preference is indicated in that zone.

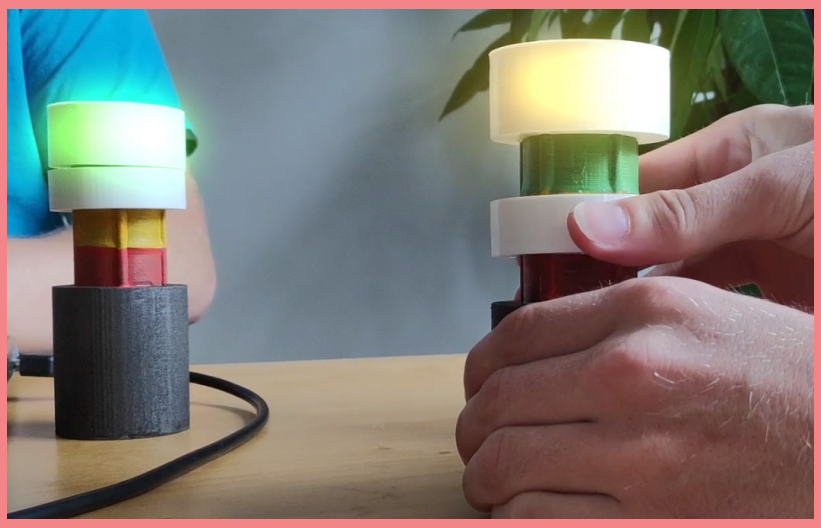




Example of the concept floorplan at AMS

This concept is based on zone pre-desk workstyle indicators and has not yet been evaluated.

5.2 Final design: on-desk indication



On each desk, a workstyle indicator is located. With this indicator, the office occupant can indicate a workstyle preference. By doing so, other office occupants are informed of the workstyle preference of the user, enabling a preferred level of co-worker interruption.

The indicators have three modes:

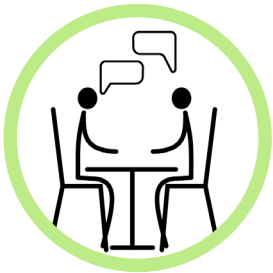
Focus work

The user of the indicator doesn't want to be interrupted

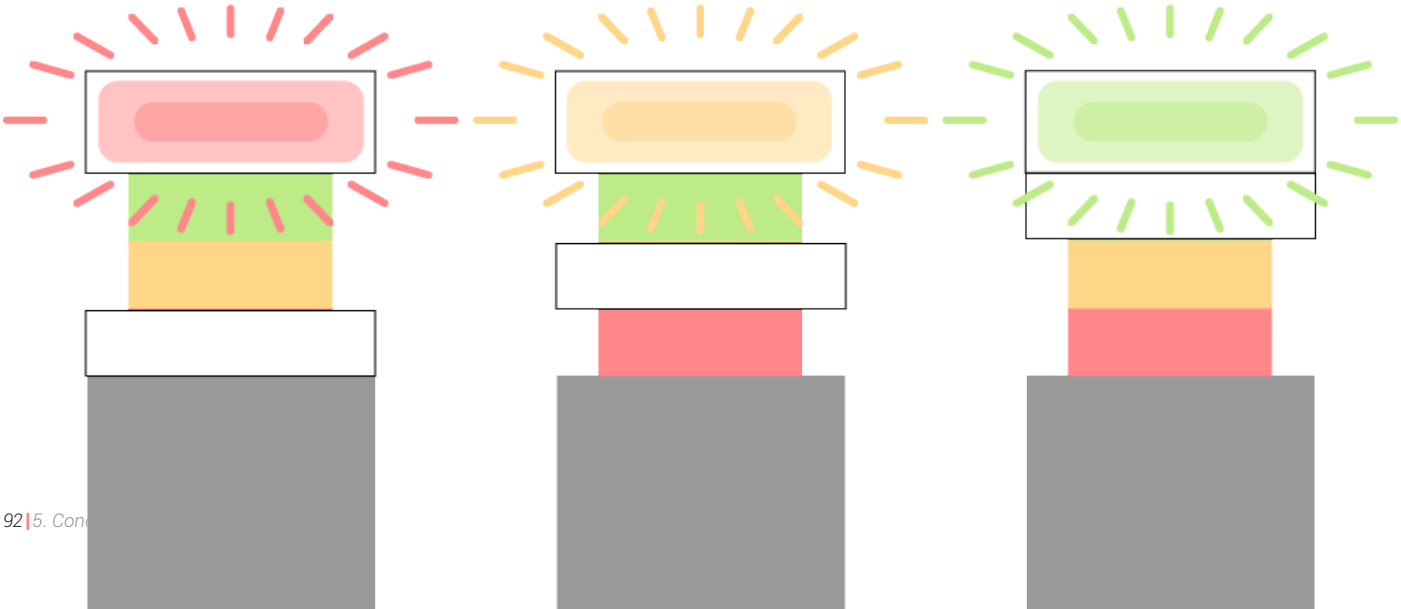
Team work

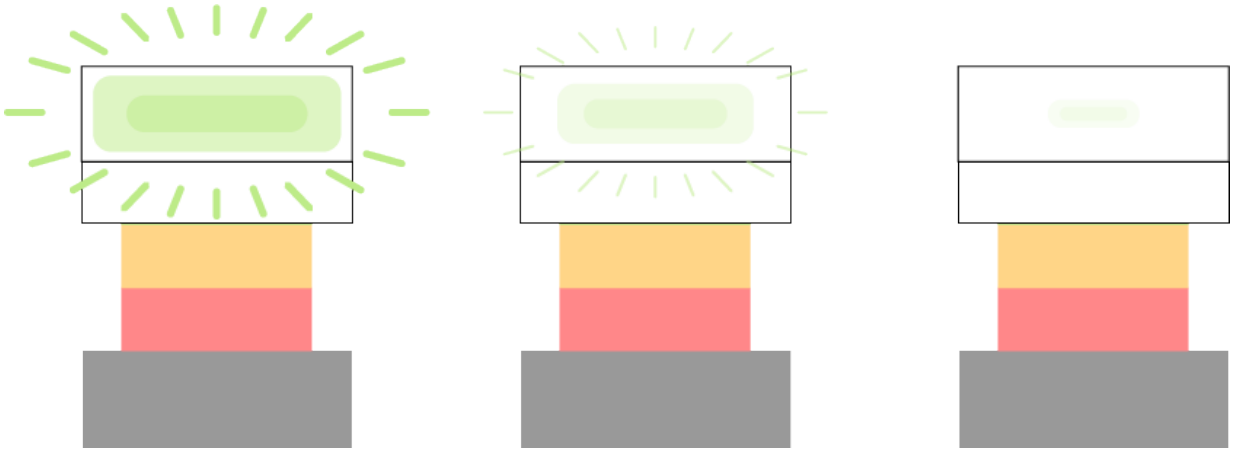
The user of the indicator only allows work-related interruptions

Social work



The user of the indicator is open for all interruptions

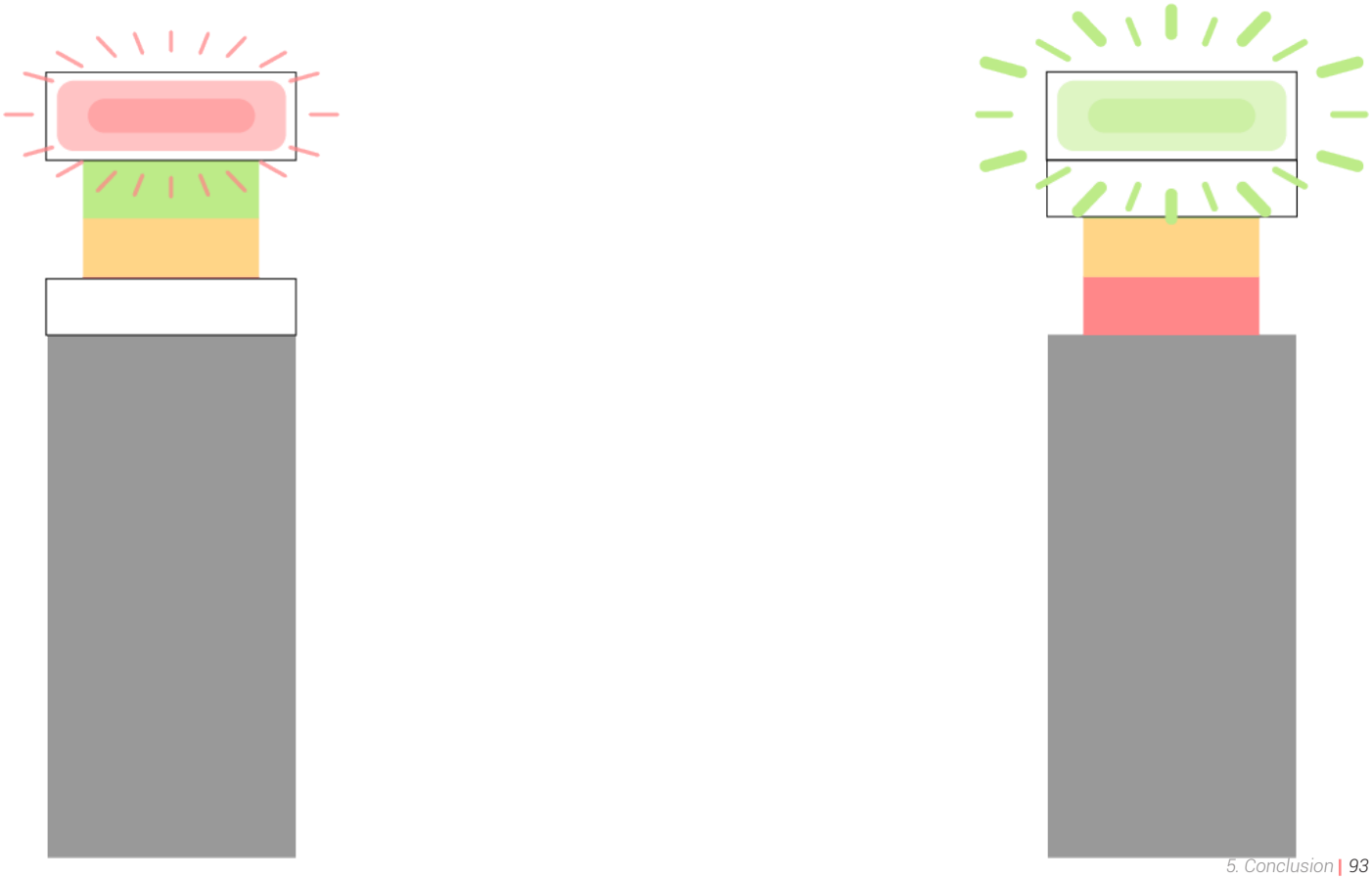




The workstyle preference is can be indicated by sliding a ring over the color corresponding to the workstyle preference color.

Over time, the light of the indicator dims, indicating that the workstyle preference hasn't been updated for a while. After 8 hours (or when the office closes), the indicator automatically turns off. This enables office occupants to identify which indicators are in use.

When a social or team work workstyle is indicated whilst siting next to a focus workstyle indication, the indicator of the social or team work workstyle will start to blink. This calls the user to action to change their workstyle preference accordingly or by looking for a new workplace within the office.



5.3 Limitations

The conclusion of this study is based on specific situations. Addressing important elements of this situation is required to identify possible limitations.

Starting with the case of AMS, all findings, except for the final prototype evaluation are performed at AMS. The opinions of the AMS office occupants have therefore majorly influenced the results of this design research. This could cause an overrepresentation of there preferences over more commonly shared problems within OPOs.

Another limitation related to AMS is the office size. AMS has a small office of 1 floor and 36 workplaces. Office navigation and workplace selection methods are affected by these physical attributes.

Due to the office being smaller, a limeted variety of participants were able to perform user tests. Participants who are categorized as active collaborators participated and communicated the most during these tests. This can place too much emphasis on their personal preferences. For most of the performed tests, there also was an emphasis on open responses to gain insights from the AMS occupants. This in its place caused a reduction in the recorded information gained from the office. This is represented by the low number of participants per design intervention, since only office occupants who partook in semi-structured interviews were considered when reporting participants.

The user tests were all performed qualitatively, highlighting once more that individuals' opinion played a large role when determining outcomes of tests.

The study was performed by the author only. The insights gained from exploring the context is interpreted by myself and then used to generate the provided solution. This could allow for overemphasizing the problem severity. It is recommended to perform larger scale user research, using high-fidelity prototypes to evaluate the findings from this report.

The final product from this study has not yet been tested and serves the purpose of a showcase. It gives a representation how a product for facilitating workstyle-based workplace selection could look like. However, production and development costs are unknown.

5.4 Recommendations

Like mentioned in the limitations, a research using higher-fidelity prototypes, with more participants and a different context should be performed before it can be determined how much of this study is applicable to other contexts.

The floorplan explained in 5.1 has not yet been tested, further studies into displaying workstyle preference can be conducted to identify if this approach is desired.

A fundamental other approach of achieving focus has also been discussed during the study and can also be considered for follow up-studies. I made the decision to focus on making workstyle-based workplace selection. However, avoiding the office is the current standard for achieving focus. Facilitating this method to limit its negative implications (reduced social interaction with co-workers), could create a solution which would use the currently applied method, making it easier to adapt in daily work routines.

This study also emphasized the use of indicators. However, objects that serve other purposes can be used as visual cues to indicate a workstyle preference, rather than having a separate indicator. Flexible barriers were proposed during this study. Headphones were identified to serve a signaling function to other office occupants. Flexible physical barriers could serve the same purpose when designed more subtly.

Another often mentioned functionality of the indicators was that it could display co-worker location in the office. Exploring this functionality could be a starting point for a follow-up study.

Another aspect worth considering is how to address perpetrators. Right now, all the project is based on a perfect world situation where everybody is following the rules as intended. However, the often-given example of the silent area in the train is also a great example of what happens when people don't follow the rules.

Introducing anti-perpetrator and personal finding features could be explored in further research. However, both a participant of the first and the last design intervention indicated that they wouldn't prefer more information from the indicators. In its current form, it only concerns workstyle preference. Sometimes, tools are better if they don't try to solve everything. So further investigation into workstyle-based workplace selection should always consider when the tools are doing more than is useful.

5.5 Reflection

This project has been an incredible journey for me, with some high highs and some low lows. Starting with some highs, I enjoyed “doing” a lot. This project was set-up as an explorative design research, which caused the emphasis to be more on designing rather than on researching. Thanks to the access to the AMS office, I was able to perform several design interventions in this project which had wildly different goals.
The performed design interventions were a lot of fun and very enlightening. During the bachelors and the masters at TU Delft, you perform most projects in teams and very structured. The classical design research approach of researching first, ideate 200 ideas, conceptualize your preferred ideas, perform a user test and evaluate to propose a recommendation is almost a given for every course. During this project, a completely different approach was set-up, which focused more on designing and doing, before delving too much into research papers. Looking at my list of references, I might have performed too little research in the end, and that is something I should improve upon if I continue with design research in the future. A lot of research has already been performed, so instead of doing everything myself, I might need to spend a few more weeks looking things up. When looking at my learning objectives, I mentioned at the start of the project that I wanted to develop myself as an independent designer with a more hands on design approach. This is certainly something I improved upon during my graduation, yet there is still much to learn.
Another aspect I thoroughly enjoyed of performing my graduation on my own, is that I also had to do everything myself. Normally you can discuss things or create things with other students. However, this time I was doing everything on my own. This caused me to learn a lot; from programming, to woodworking and working with textiles to name just a few. In my learning objectives I ramble something about traditional and advanced tool usage, which both played a role in this project. However, I learned that it is more important to learn a specific tool for a specific task, rather than having a general understanding of how a lot of tools work. For example, I knew a thing or two about Arduino when starting this project. However, by now I would consider myself capable of creating simple IOT projects. My basic knowledge of Arduino might have helped me getting started, yet I needed to learn a lot before I could get everything going the way I wanted to. Being more aware of my strengths, weaknesses and interests should help me determining what I want to spent time on and on what I don't want to spend my time on.

However, there is a metaphorical sizable mammal in the room that needs addressing.
The project went several times over its deadline. This has several causes. The first of which I will address are my own planning skills. During the project, I found that everything takes longer than expected. The only thing worse than a bad planning, is a too optimistic planning. Over the summer, I expected to do more than was realistically possible, without me realizing that I was setting myself up to fail. Add on a week or two of summer heat and I'm even further behind than I expected. Even though the problem initiated itself before summer, it really came to fruition during summer.
However, too optimistic planning isn't the only factor in this problem. Another aspect is my “designer insecurity”. When talking to others about graduating, I always see the things they do, which I don't. Instead of being able to think “well, that is not my project” I really try to fit

whatever others do into my project to a certain degree. This caused me to want too much from my graduation project. Furthermore, during the greenlight meeting, I discussed several design interventions I planned to do after the meeting. However, the only thing you should do after the greenlight meeting, is maybe testing the prototype you currently have, but then proceed to finish your thesis. Since I got limited results from my second to last design intervention (appendix VI), I felt that my project needed a more substantial research to be considered of “Master of Science” level. So, with 3 weeks left, I decided to make a new prototype, program it, 3D print it, set-up a SUS/AttrakDiff user research and evaluate the results, before starting to work on my thesis. Looking back at it, I realize I had a bit of an optimistic planning. Yet, back during summer, I really thought that if I didn't do that, I wouldn't be able to graduate (and yes, this all happened after getting a greenlight for graduating). Only after failing to meet the deadline, I realized that I pushed myself too far. Skipping nights on sugar-free energy drinks and overdosing on ADD medicine should have been a red flag for me to inform my supervisory team that I wasn't going to make it. What I learned from this? Try to be more confident about the work I have done. After failing the deadline, I went to see some other graduation projects, and only then was I able to identify what they did thoroughly, but also what they didn't do. I was able to place my work into context, and now I believe this thesis is definitely of “Master of Science” level, only not in time.

So, expect that everything takes longer than expected and be confident about the work you do.

Kind regards,
Rik

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Images

P.11 Photo by Cadeau Maestro from Pexels, retrieved 16-August-19, https://www.pexels.com/photo/people-sitting-on-chairs-beside-their-desks-in-an-office-1170412/

P.13 Photo by Product School from Pexels, retrieved 31-August-19, https://www.pexels.com/photo/people-gathered-inside-one-room-2678468/

P.13 Office_in_with_Montana__Union_Pacific_Overland_Route_maps, retrieved 21-August-19, https://www.officemuseum.com/Office_in_with_Montana__Union_Pacific_Overland_Route_maps.jpg

P.14 Scene office space, retrieved 29-June-19, http://bartleby2009.blogspot.com/2010/01/bartleby-first-american-office-space.html

P.51 NS silence icon, retrieved 29-June-19, edited for resolution, https://nos.nl/artikel/2223973-verwarrende-logo-s-in-vernieuwde-treinen-zorgen-voor-ergernis.html

P.51 NS work icon, retrieved 29-June-19, https://www.businessinsider.nl/snap-jij-m-wel-twitteraars-klagen-over-wat-deze-logos-in-de-nieuwe-ns-treinen-betekenen/

Appendix I: Testing at AMS

Early 2019, the Advanced Metropolitan Solutions institute (AMS) moved to a new office. The goal of the new office is to create a higher level of inter-team communication. The minor Interactive Environments minor from 2018-2019, focused on creating interactive environments to stimulate knowledge sharing and collaboration. AMS' move to the new office and the minor were therefore matched together. To further develop the prototypes created in the minor, the living office design lab (LODL) acquired 3 master students. The projects of these students focus on solving specific issues highlighted by the prototypes from the interactive environments minor more in depth. A collaboration between AMS and the 3 master students was therefore set up. One of the three projects is this project. In this appendix, I discuss how interaction between me and the office takes place in relation to design interventions.

Situation

The availability of the AMS office provides different approaches for performing user research. Three approaches for performing user research are; in situ, in vitro and in sitro (Kjeldskov & Skov, 2007). In an in situ user research, prototypes are introduced in the "natural" situation. In vitro approach is the opposite, performing the user research in a fully controlled environment. In sitro approach sits in the middle of the two, where a real-world situation is simulated in a lab environment.

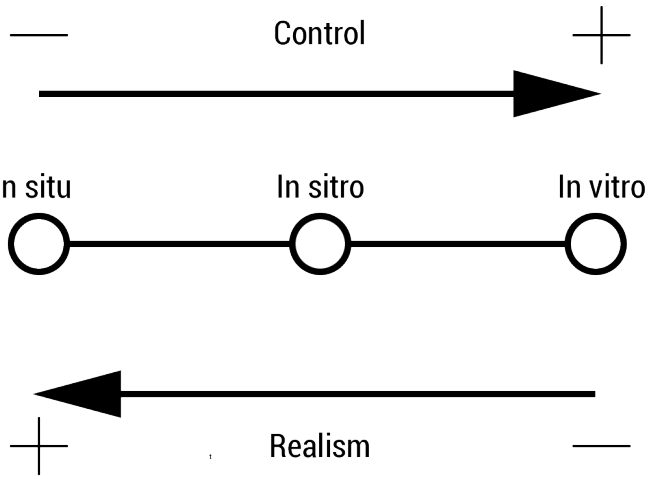


Figure I.1

Throughout the design research of this graduation project, the main goal of user research is to unveil interaction insights. Workplace selection is an action, which complexities mainly manifests themselves in the natural context. Solutions that are presented in isolation might be perceived as useful, yet their real-world implication might differ. It is therefore more beneficial to perform user research in the context, rather than performing user tests in a laboratory setting, excluding in vitro as research approach. The difference between in situ and in sitro is that sitro provides the researcher with tools to test specific elements of a prototype, whilst in situ allows the researcher to observe the "natural" interaction. Performing in use, in situ user research allows behavior to occur which would not happen in conventional pre-defined task user research (Fields, Almaldi, Wong & Gill, 2007). Unexpected behavior provides the researcher with new information about the influence of the context on user interaction with the prototype. This

creates a deeper understanding of the context and which problems need to be addressed when designing interventions. Once a general understanding is established, research can be performed in more controlled situations, which focuses more on the functionality of the prototype rather than exploring the context. Therefore, over the course of this project, most interventions will be performed in situ, with the last user test being performed in sitro.

One of the benefits of in situ research is that it reports “natural” user experiences. Asking user test participants what they think of a prototype when it is isolated from its context, participants might not be able to identify specific usage issues which would prevent daily use. In situ testing also reduces the amount of time spent by the participant on design activities. If the user is using the prototype in their regular activities, performing a design activity mostly involves a short interview, rather than active prototype interaction for user research.

However, in situ user research also comes with challenges. The number of participants joining a design activity isn't fully in the researchers control. I should actively introduce the prototype and ask for user participation, yet this does not guarantee a set number of participants. However, prototypes that are fully ignored by the office also provide a unique opportunity. When I introduce a prototype to the office, I always expect occupants to use it to some degree. If this does not happen, I have made an assumption that is not true. Asking active collaborators (figure I.2) why the prototype isn't being used should therefore give more interesting insights.

Another consideration is the “naturalness” of design activities. Whilst the goal of the test is for the user to use the prototype in regular activities, introducing a prototype in the “normal” environment always changes the environment. Users might be triggered by the prototype's novelty or announcement in the slack channel. The influence of the introduction will decrease over time, yet this is something that needs to be considered when interpreting data gained through this research approach.

Participants

Whilst performing user tests at AMS, the recruitable participant pool is limited. This is an element that needs to be considered when user tests are performed. Over the course of the design interventions, AMS office occupants adapted one of three roles, depicted in figure I.2.

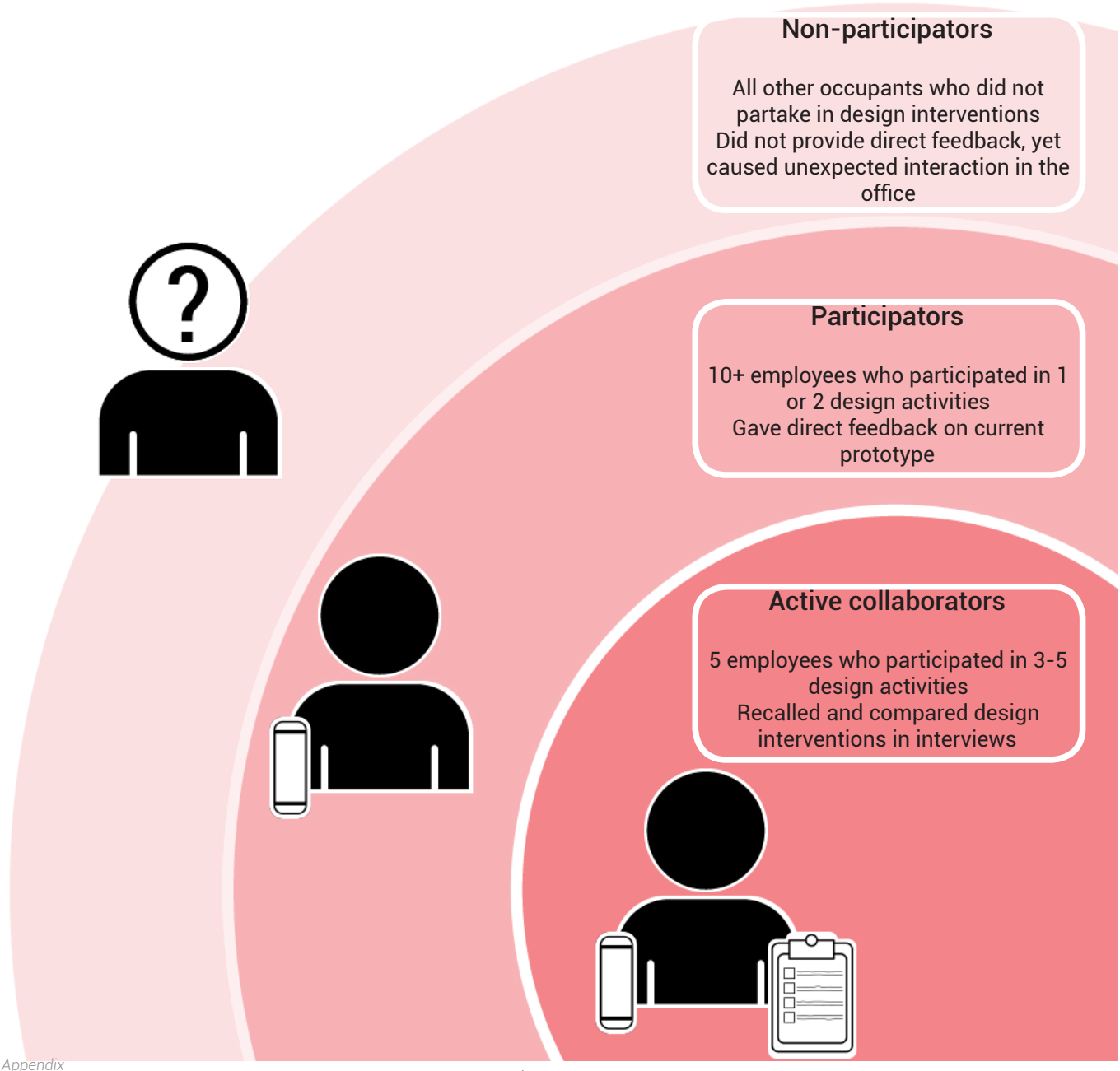


Figure I.2

Active collaborators: occupants who are closely related to the project. This is a group of 5 people who are frequently present at the AMS office and willing to join several prototyping activities. They have participated in at least 3 of the 5 design activities performed at the AMS office. This level of involvement allows them to reflect on previous design activities during interviews. Comparing, reflecting and evaluating distinct design activities makes them co-creators during the project. Whilst providing valuable insights during the project, this group can be biased towards certain elements they proposed in design interventions. Since they are frequently present at the office, casual conversations about design interventions happen spontaneously.

Participators: occupants who used the prototypes, but don't report on more than 2 design activities. Even though they provide less information, their role is critical in passive prototype testing. Three of the four design interventions test inter-occupant interaction. With participators using the prototypes, active collaborators are able to experience the intended design intervention interaction. If only active collaborators use the prototype, they won't fully experience what the prototype tries to achieve, forcing them to report their predicted user experience, rather than their actual experience.

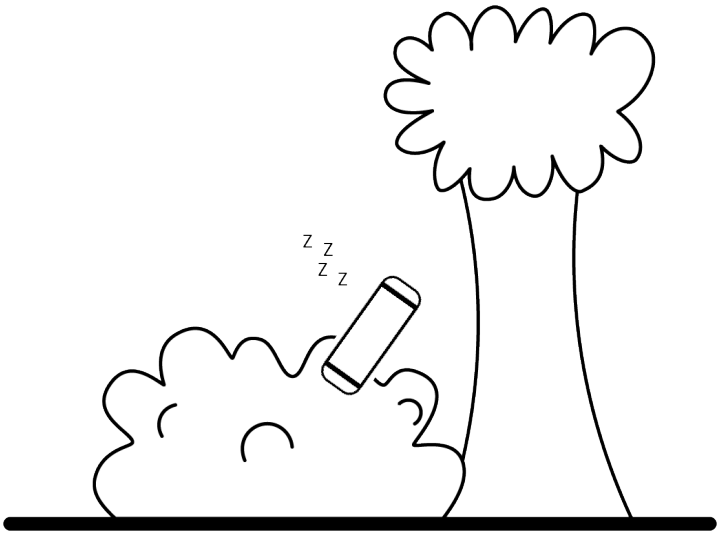
Non-participants: occupants who don't use the prototypes. These occupants either visit the office not frequently or have no interest in participating in user research. Whilst they do not directly provide insights to the user research, they fulfil an important role in the context. There will always be occupants who won't use the tools provided by the office, whether they are prototypes or not. The interaction between users and non-users influence the design interventions.

Data Control

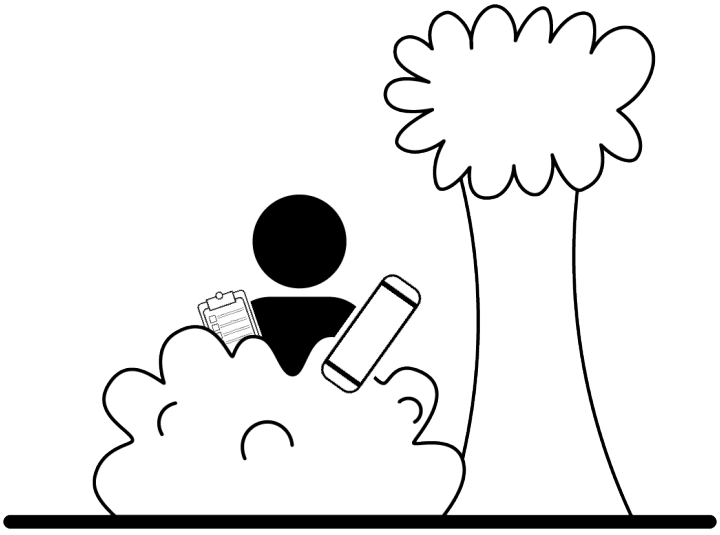
With most of the exploration being performed in situ and a participant group that is co-creating design interventions, the control of the user research is less organized compared in vitro user research. Conversations about the design start spontaneously and are therefore documented less structured compared to performing individual, prepared interviews. The participants are also allowed to express concerns with prototypes that were not anticipated during interviews. The number of respondents is also variable, depending on the acceptance of the prototype. For example, the second prototype was not used by the office at all. This leads to an evaluation of the prototype with active collaborators, which were more spontaneous conversations and only notes were written down. To make data control more consistent, evaluation dates with semi-structured interviews were planned in advance of the prototype introduction. However, the interviews are set-up to support the findings gained from spontaneous conversations, rather than the other way around.

Different approaches for prototypes
During this project, I performed user tests in three different ways:

Passive prototype testing; with passive prototype testing, I introduce the prototype to the office, giving instructions of its goals and how it can be used. After which I leave the prototype for a prolonged amount of time at the office. When returning to the office, I'll ask occupants to whom I introduced the prototype if they are willing to evaluate their experience with me.



Active prototype testing; with active prototype testing, I introduce the prototype to the office, giving instructions of its goals and how it can be used. After which I stay at the office to ensure the functionality of the prototype. This approach is used for design interventions with prototypes that required active maintenance.



Lab prototype testing; with lab prototype testing, I recruit participants and introduce the prototype in an isolated setting. The research is performed in a controlled environment with pre-defined activities. This approach is used for in-depth prototype evaluation.

Insights gained from the AMS office

AMS institute is a small office. When reflecting on the design interventions, the scale of AMS should be considered when applying insights from AMS to other offices.

Appendix II: Co-creation session

For testing our initial assumptions, a co-creation session was set up by the LODL members. The main goal of the co-creation session was gaining insights from users of the AMS OPO. We wanted to know what they experienced as benefits and problems of their office concept, whilst also being able to test if our assumed problems with an OPO occur.

Method:
The co-creation session is performed by asking participants to perform 3 tasks. Qualitative data will be gathered by discussing the results of the activities at the end for the session.
The session will be conducted at the AMS office, for it allows participants to join spontaneously. The session is also performed in the setting which is the topic of the study.
By providing the participants with expressive tools, the participants will be able to express their daily live at the office and create solutions to the identified problems or find opportunities to improve daily work live.

Setting:
Figure A2.1 is a visual representation of the setting in which the test was performed

Participants:
Participants were recruited from the AMS office. Recruiting was performed by sending an e-mail to AMS office occupants. 7 participants joined the session.

Approach:
The facilitator asked the participants to create a visual representation of a regular office day. The users were provided with an empty timeline (appendix II - A), icons (appendix II - B), pens, post-its and glue sticks to help them visualize their workday at the office. After roughly 5 minutes, the timelines were exchanged between participants. They were asked to create ideas for tools which could improve the workday of the received timeline. To test our assumed problems with an OPO, the participants were provided 2 decks of cards. In the first deck there were questions for specific situations which were linked to our assumptions (appendix II - C). The second deck consisted of images of the prototypes within the office introduced during the Interactive environments minor (appendix II - D). These cards were provided for inspirational use. Participants could discuss the visual representations with the group. After roughly 20 minutes, participants were asked to vote on 2 ideas; the idea that solved the most urgent problem in the office and the idea they liked the most. After voting was completed, a final discussion discussing the most voted on ideas was held.

Observations
The session was both recorded and notes were made by the notetaker. After the session was completed, we collected the created timelines.

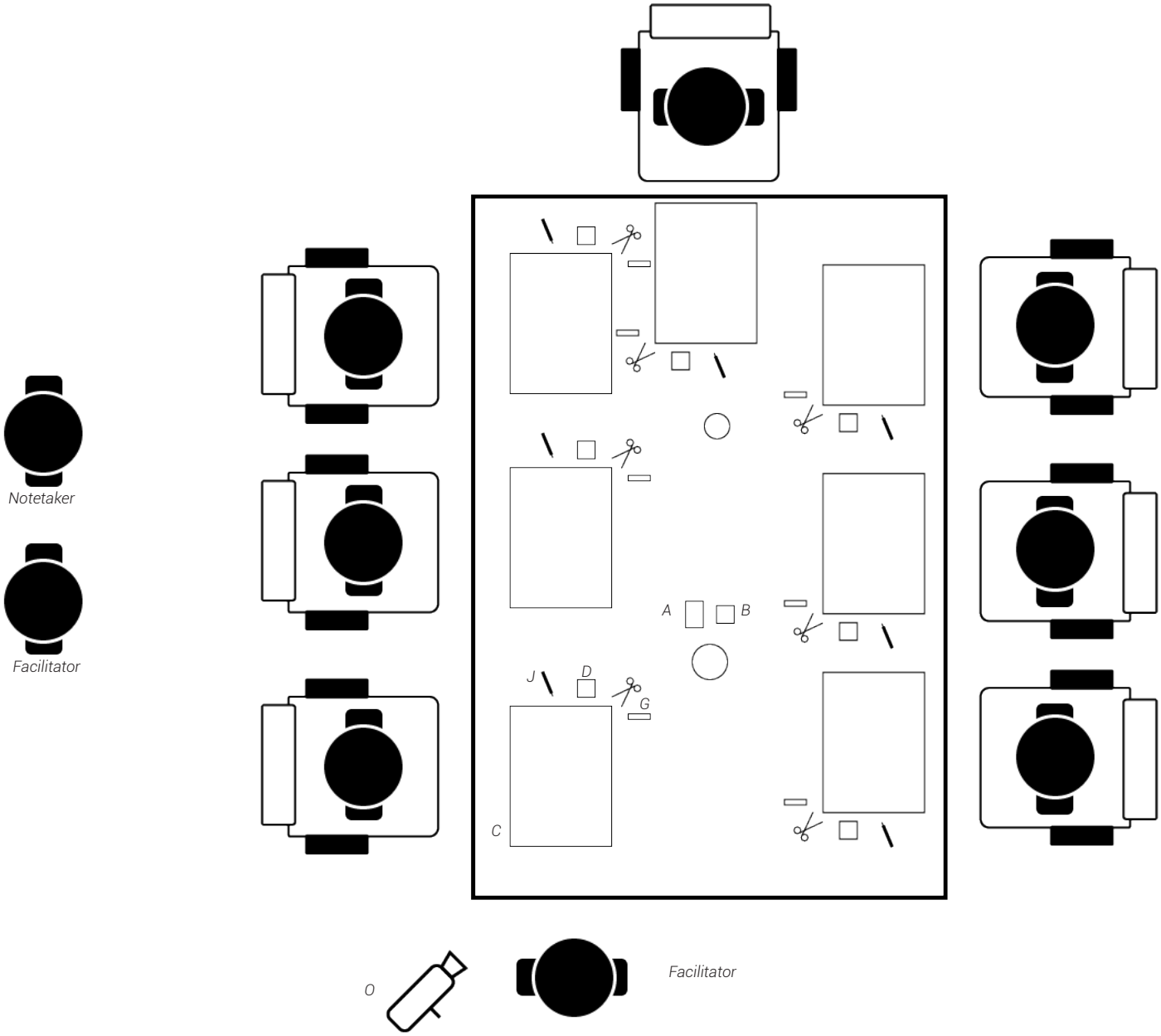


Figure A2.1; co-creation session setting

Materials:

A) Opportunity cards
B) Prototype cards
C) Time-line sheets
D) Time-line creation icons
E) Pink post-its
F) Green post-its
G) Glue sticks
H) Paper
I) Color pens
J) Pens
K) Pencils
L) Tape
M) Scissors
N) Snacks
O) Camera

Results
Each individual timeline can be found in appendix 2.5.
The created timelines had similar patterns. Most of the time spent at the office is spent in meetings, collaboration or conversations. A central moment of the day is the lunch with colleagues, in which formal and informal discussions take place.
When looking at the ideas on which were voted on the most, you could see clear themes in what they try to achieve. These opportunities are:

Better office furniture and customization; the current furniture is hard to adjust to your preferred settings. Furthermore, rooms are hard to adjust to the specific requirements for a meeting.

Office etiquette/rules; there are currently no rules about how the office is supposed to be used. This appeared to be a pressing issue since it was the idea that received the most "best" votes. What these rules should imply differed between participants.

Lunch walks; this idea covered multiple problems within the office. Leaving the office for a walk changes the setting and the content of interaction. Outside the office, people feel free to have non-work-related conversations. It also provides some fresh air and some time in another environment. It was also perceived as an activity, enabling people to move around rather than sitting behind their desk. The final issue it tackles is privacy.

Whilst these were the ideas which were voted for being the best or most liked, two themes were suggested more frequently. Ideas concerning privacy and focus were suggested 15 times in total.

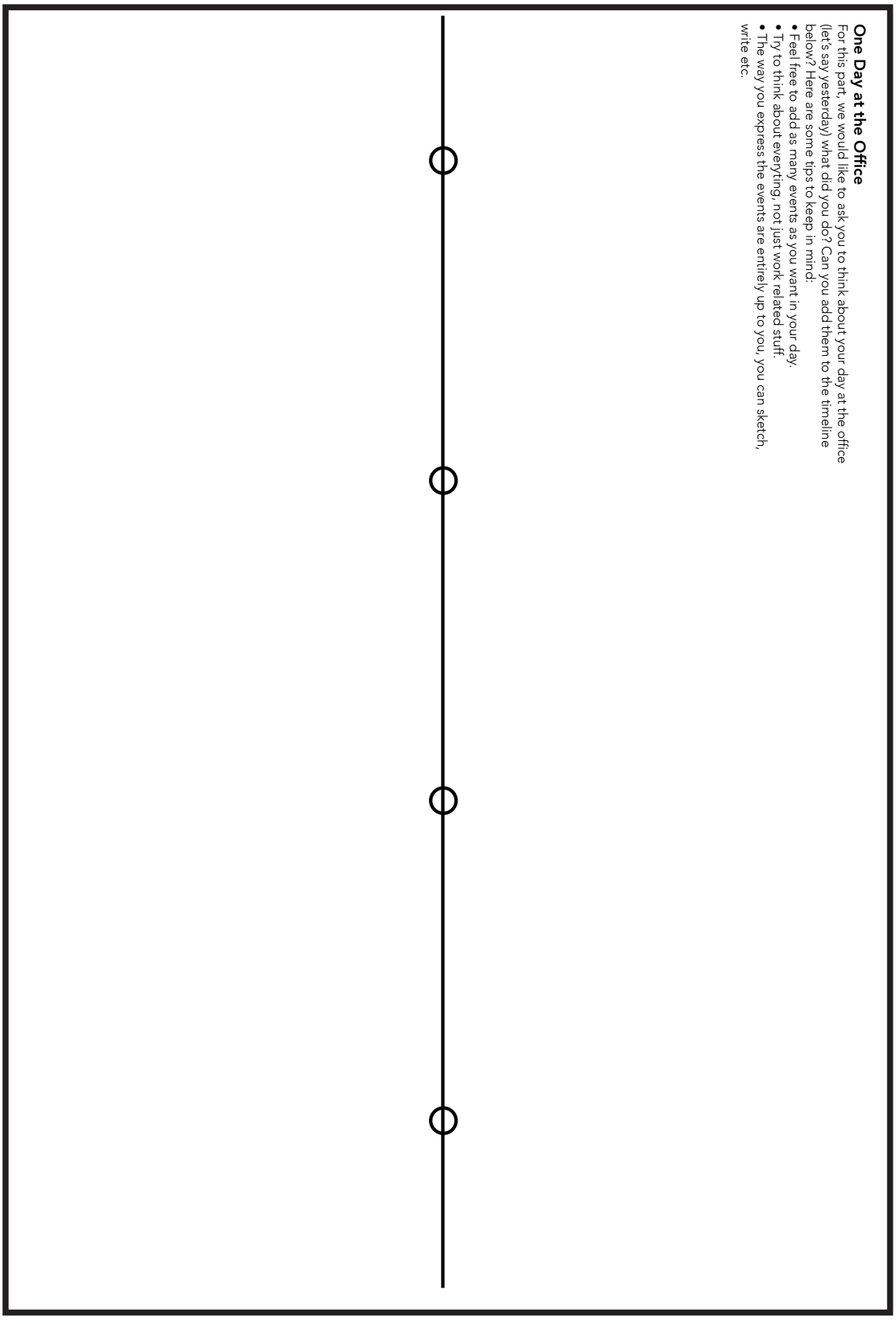
Privacy focused on both visual and auditory privacy. People felt there was a lack of spaces for private conversations. This causes uncomfortable interactions for everyone involved. In the current situation, when a conversation takes place, the other employees near the conversation can overhear what is being talked about. This causes unwanted disturbance for the people around the conversation. At the same time, people don't want their conversations to be overheard.

Focus, although closely connected to privacy, was concerning the sound level at the office. There was a perceived issue with noise within the office, causing people to lose their focus. As a possible solution, different variants of focus spaces were suggested.

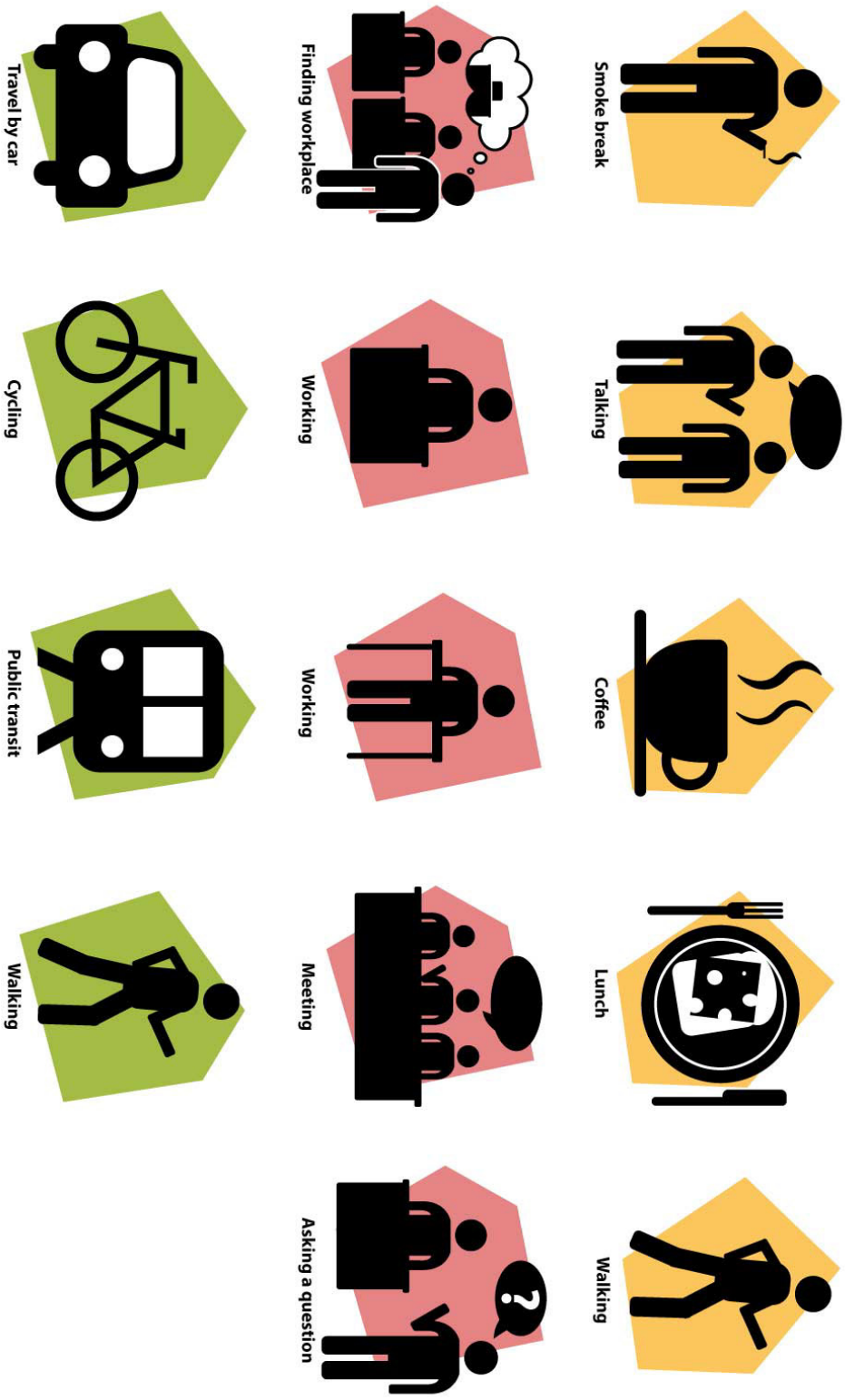
Discussion

Our findings are in line with other studies into flexible offices. Studies have indicated that auditory and visual privacy are amongst the elements that cause the greatest workspace dissatisfaction (Kim & De Dear, 2013). Haapakangas and colleagues (2018) showed that if people perceive that there are enough workplaces where people can focus, the need for these places also decreases. Since there are no focus places at the AMS office, the perceived need for them is high. Rules have been identified to fulfill a crucial role within offices that facilitate activity-based workstyles (Rolfö & Babapour Chafi, 2017). More recent studies show that working at an OPO offices reduces face-to-face social interaction by 70% (Bernstein & Turban, 2018). Although the ideas on which were voted on the most don't primarily concern privacy and focus issues, resolving these problems makes the AMS more attractive when focus work needs to be performed. Achieving focus at the AMS office will therefore play a guiding goal in this project.

Appendix II - A; timeline template



Appenix II - B; icons



Appendix II - C; opportunity cards

Appendix II - D; prototype cards

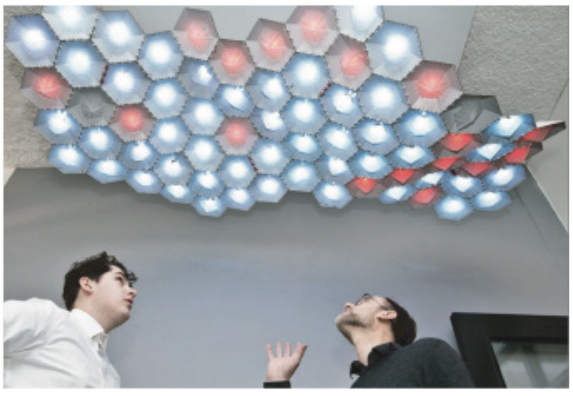
"TOPO"

"COMMUNITY FOREST"

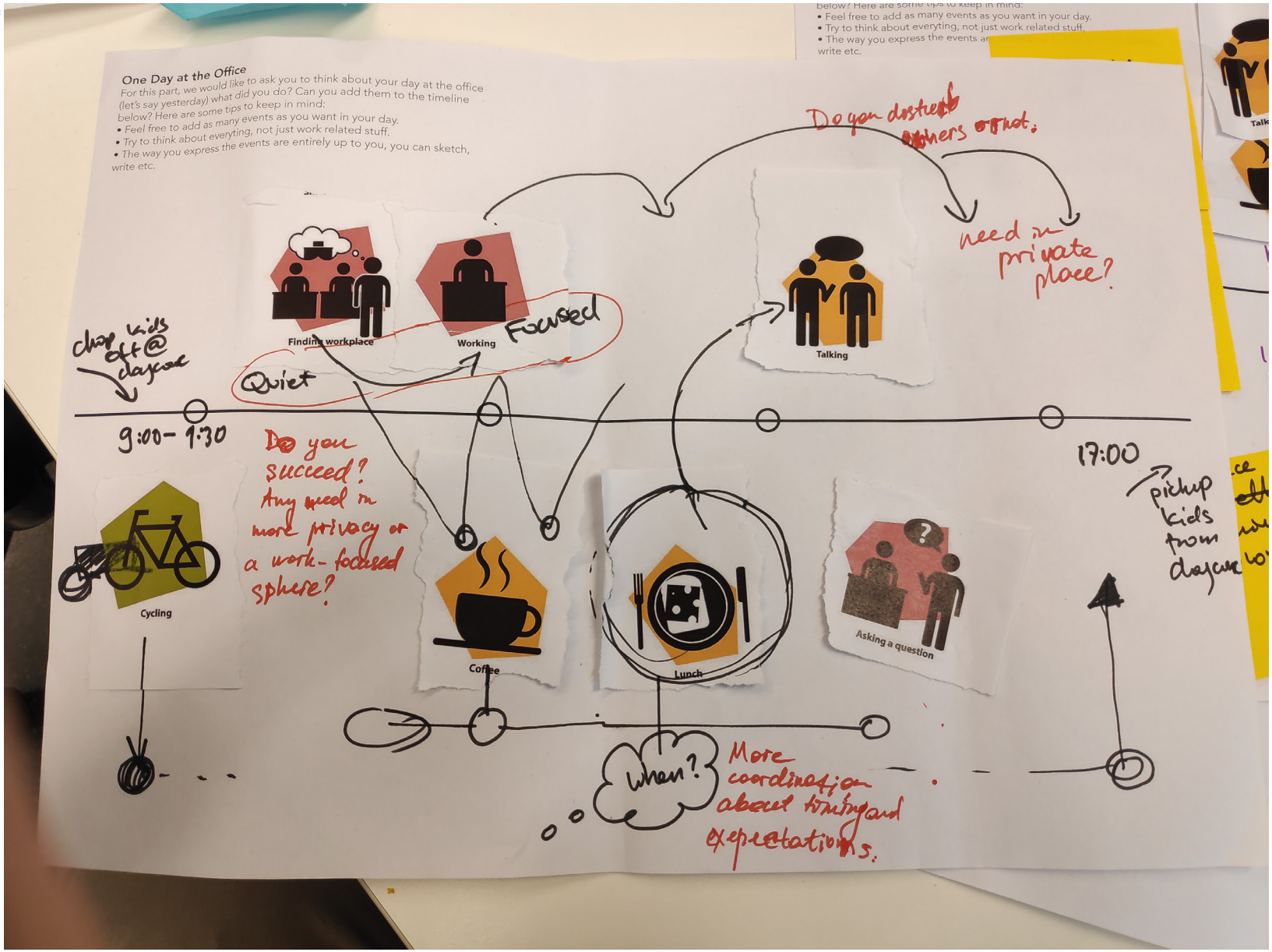
"MEET"

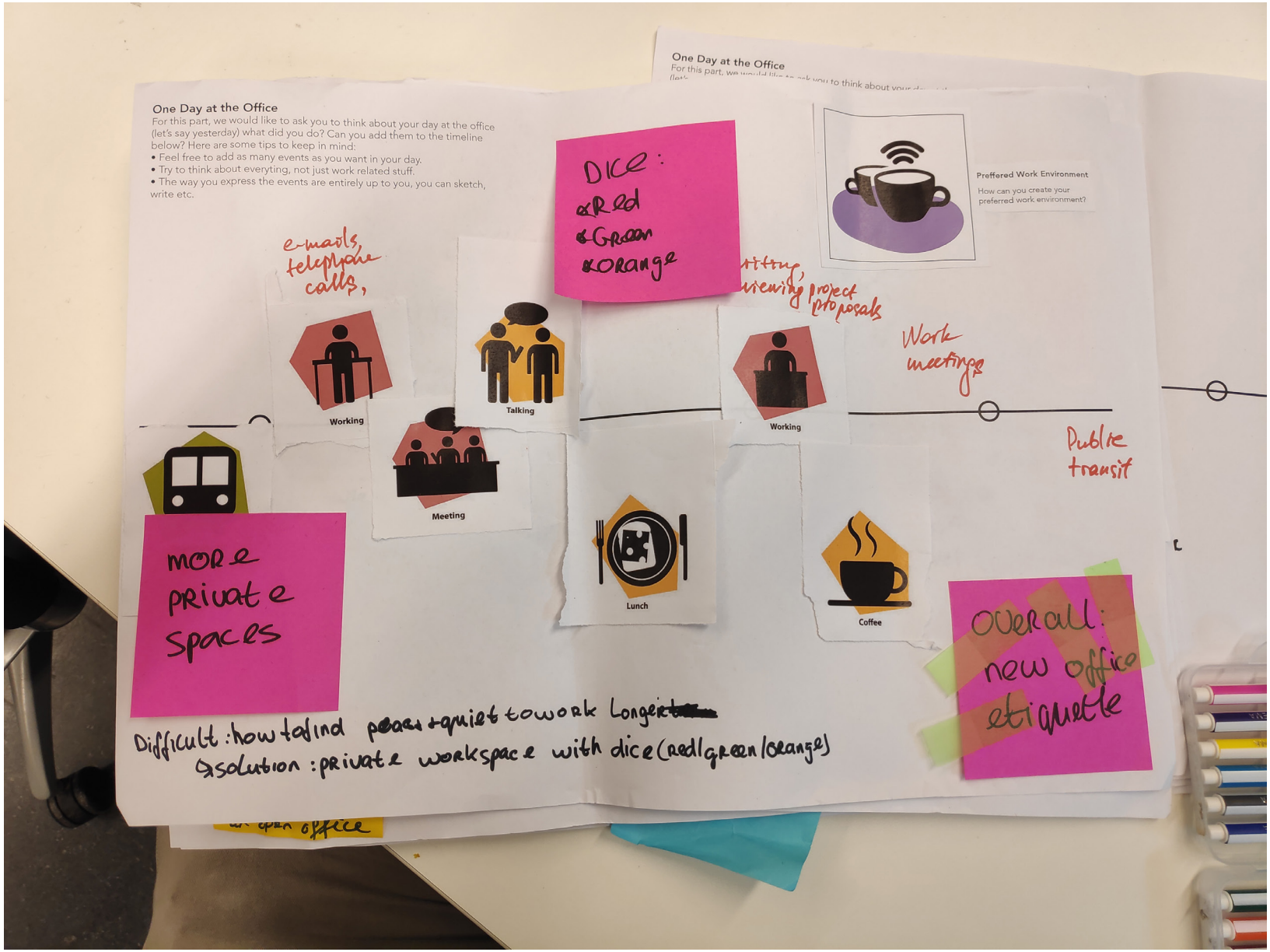
"COZONE"

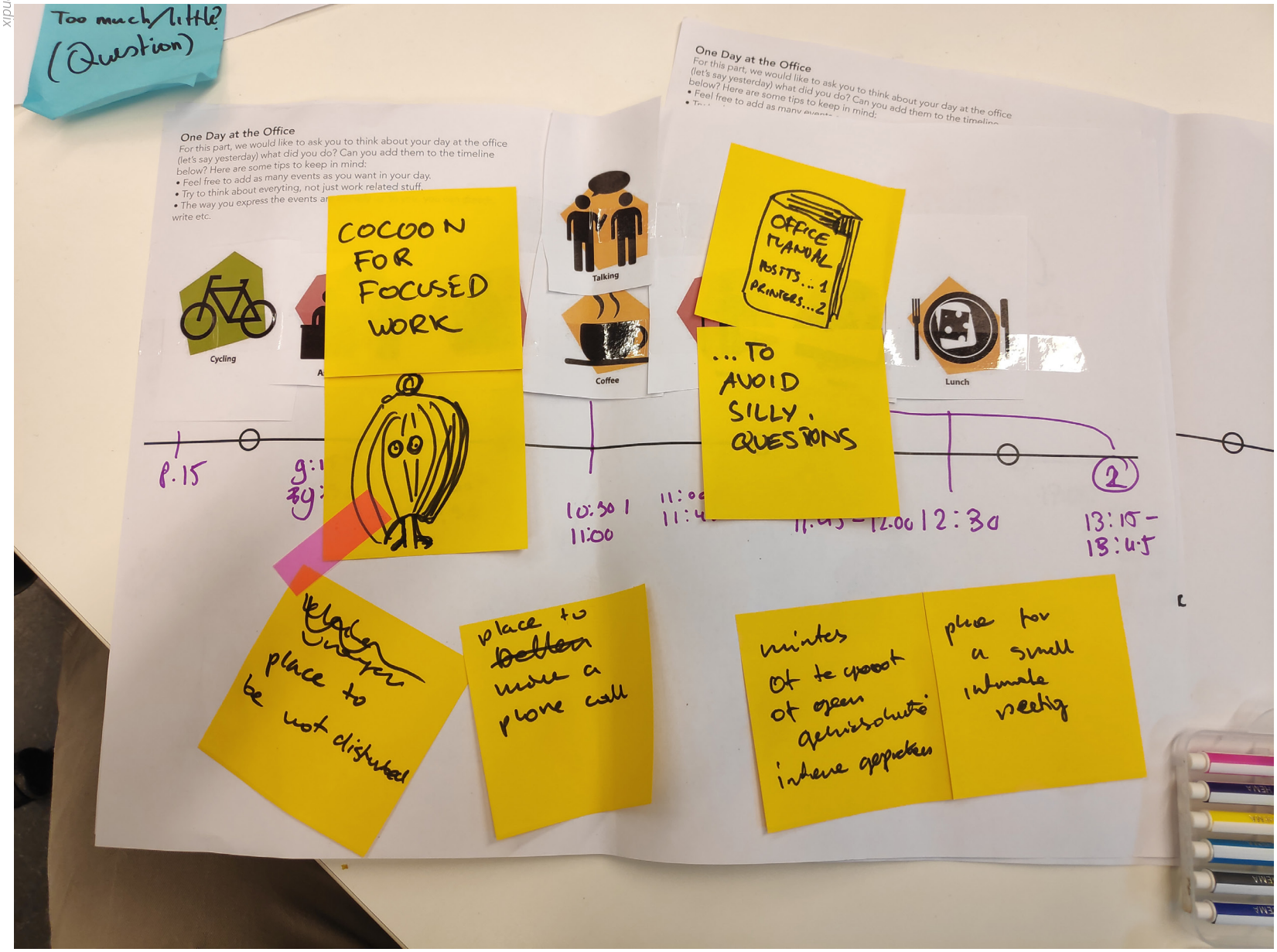
"GEMMA"

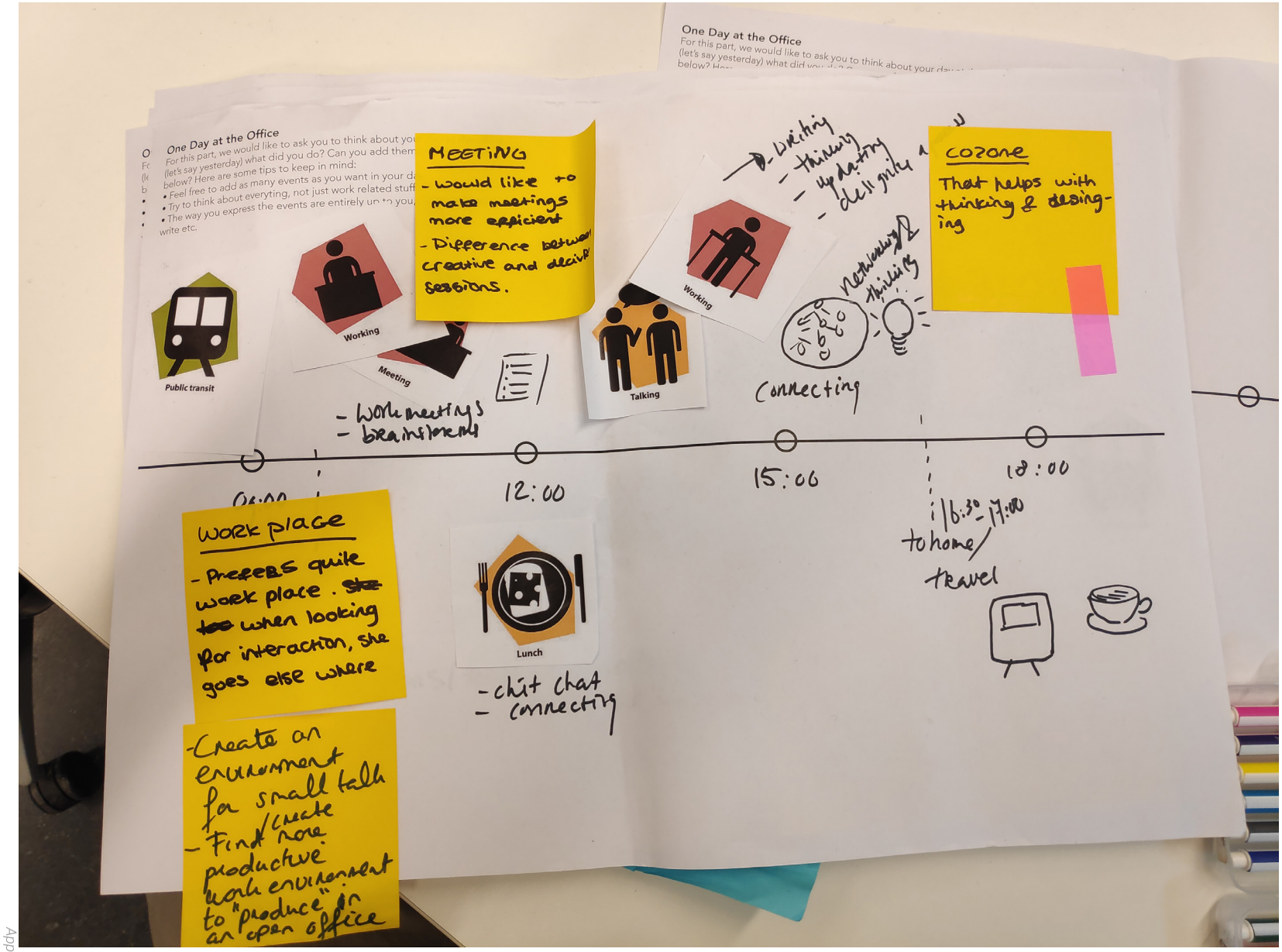


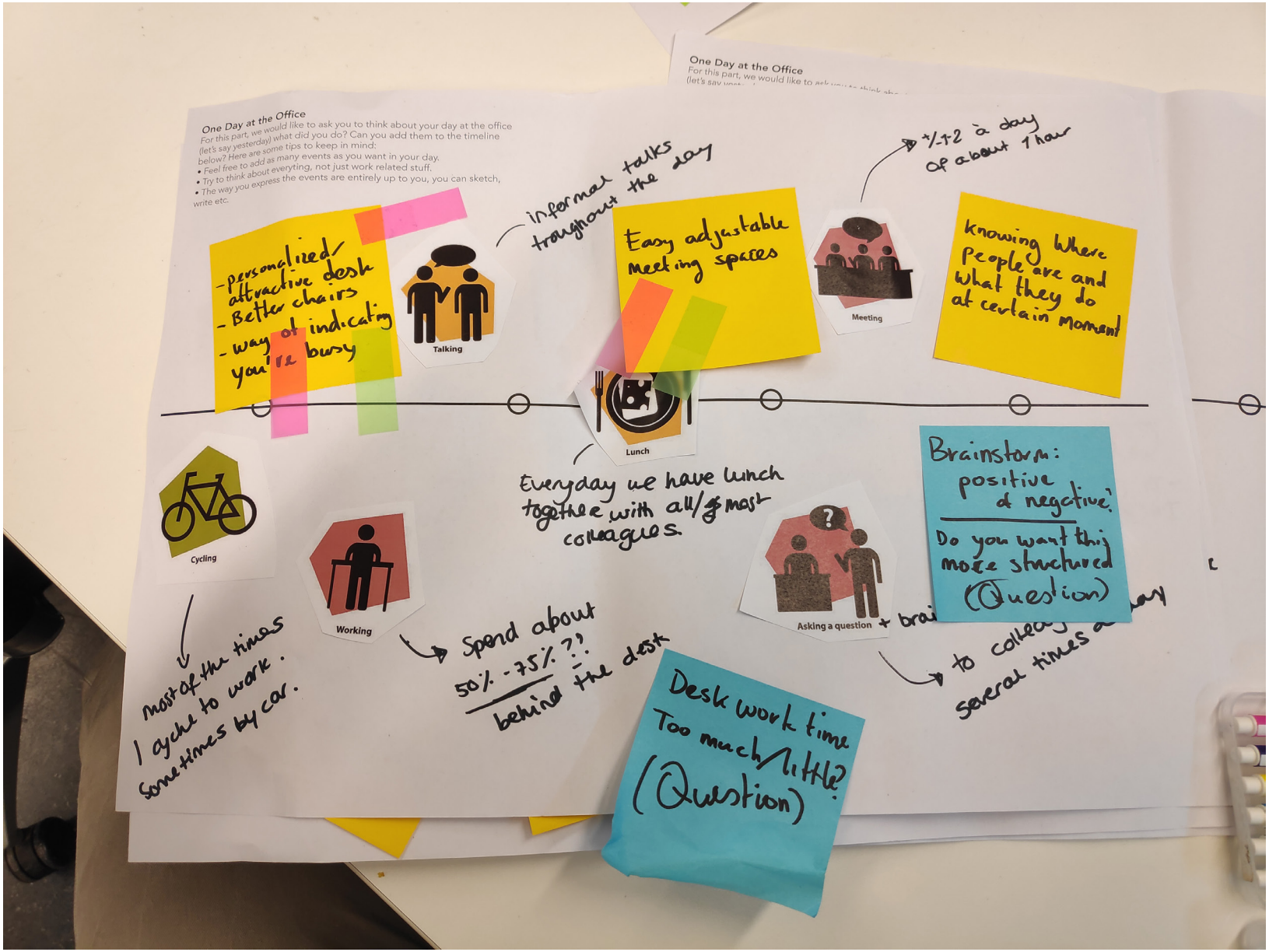
"MEMBRAIN"

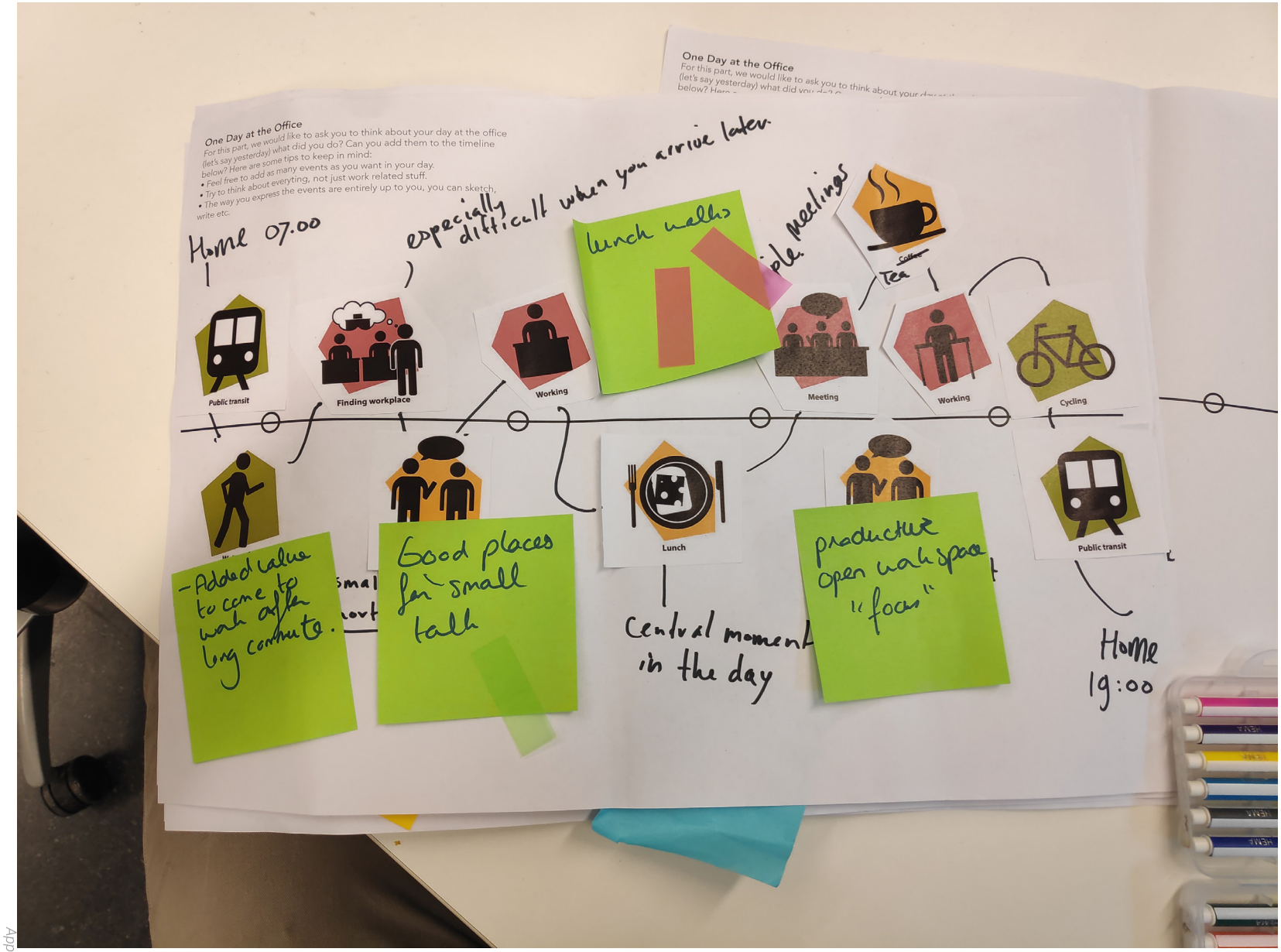

One Day at the Office
For this part, we would like to ask you to think about your day at the office (let's say yesterday) what did you do? Can you add them to the timeline below? Here are some tips to keep in mind:
• Feel free to add as many events as you want in your day.
• Try to think about everyting, not just work related stuff.
• The way you express the events are entirely up to you, you can sketch, write etc.
Finding workplace
Working
Talking
Cycling
Coffee
Lunch
Asking a question
drop kids off @ daycare
9:00 - 1:30
Quiet
Focused
Do you succeed? Any need in more privacy or a work-focused sphere?
Do you desire others or not:
need in private place?
17:00
pickup kids from daycare
When?
More coordination about timing and expectations.

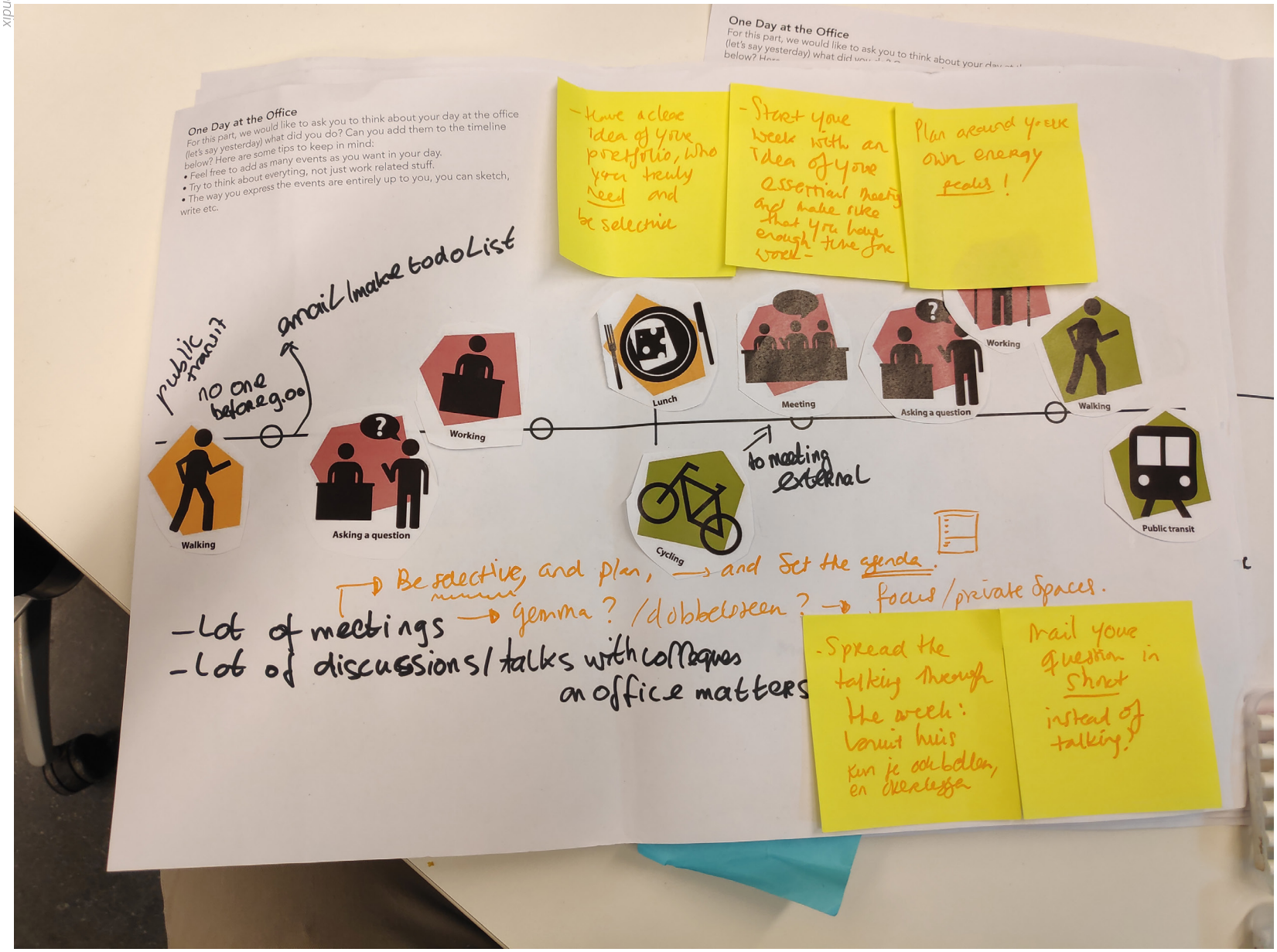

One Day at the Office
For this part, we would like to ask you to think about your day at the office (let's say yesterday) what did you do? Can you add them to the timeline below? Here are some tips to keep in mind:
• Feel free to add as many events as you want in your day.
• Try to think about everyting, not just work related stuff.
• The way you express the events are entirely up to you, you can sketch, write etc.
DICE:
xRed
xGreen
xOrange
Preffered Work Environment
How can you create your preferred work environment?
e-mails, telephone calls,
Working
Talking
Meeting
Lunch
Working
Coffee
Work meetings
Public transit
more private spaces
Overall: new office etiquette
Difficult: how to find peace + quiet to work Longer
solution: private workspace with dice (red/green/orange)


Too much/little?
(Question)
One Day at the Office
For this part, we would like to ask you to think about your day at the office (let's say yesterday) what did you do? Can you add them to the timeline below? Here are some tips to keep in mind:
• Feel free to add as many events as you want in your day.
• Try to think about everyting, not just work related stuff.
• The way you express the events ar
write etc.
Cycling
Talking
Coffee
Lunch
COCOON FOR FOCUSED WORK
OFFICE MANUAL
POSTTS... 1
PRINTERS...2
... TO AVOID SILLY QUESTIONS
P.15
10:30 / 11:00
12:30
13:15 - 13:45
place to be not disturbed
place to make a phone call
meeting room for a small intimate meeting


One Day at the Office
For this part, we would like to ask you to think about your day
(let's say yesterday) what did you do? Can you add them
below? Here are some tips to keep in mind:
• Feel free to add as many events as you want in your da
• Try to think about everyting, not just work related stuff
• The way you express the events are entirely up to you,
write etc.
MEETING
- would like to make meetings more efficient
- Difference between creative and decisive sessions.
COZONE
That helps with thinking & design-ing
Working
Meeting
Talking
Working
Public transit
Lunch
- Work meetings
- brainstorming
- chit chat
- connecting
Connecting
12:00
15:00
18:00
16:30-17:00
to home/
travel
work place
- Prefers quite work place . She too when looking for interaction, she goes else where
-Create an environment for small talk
- Find/create more productive work environment to "produce" in an open office


One Day at the Office
For this part, we would like to ask you to think about your day at the office (let's say yesterday) what did you do? Can you add them to the timeline below? Here are some tips to keep in mind:
• Feel free to add as many events as you want in your day.
• Try to think about everyting, not just work related stuff.
• Try to think about how the events are entirely up to you, you can sketch, write etc.
- personalized/ attractive desk
- Better chairs
- way of indicating you're busy
Talking
informal talks throughout the day
Easy adjustable Meeting spaces
Meeting
+/- 2 a day of about 1 hour
knowing where People are and what they do at certain moment
Lunch
Everyday we have lunch together with all/most colleagues.
Cycling
most of the times I cycle to work. sometimes by car.
Working
Spend about 50% - 75% ?! behind the desk
Asking a question
Brainstorm: positive & negative?
Do you want this more structured (Question)
Desk work time Too much/little? (Question)


One Day at the Office
For this part, we would like to ask you to think about your day at the office (let's say yesterday) what did you do? Can you add them to the timeline below? Here are some tips to keep in mind:
• Feel free to add as many events as you want in your day.
• Try to think about everyting, not just work related stuff.
• The way you express the events are entirely up to you, you can sketch, write etc.
Home 07.00
especially difficult when you arrive later.
lunch walks
Coffee
Tea
Public transit
Finding workplace
Working
Meeting
Working
Cycling
Lunch
Public transit
-Added value to come to work after long commute.
Good places for small talk
Central moment in the day
productive open workspace "focus"
Home 19:00


One Day at the Office
For this part, we would like to ask you to think about your day at the office (let's say yesterday) what did you do? Can you add them to the timeline below? Here are some tips to keep in mind:
• Feel free to add as many events as you want in your day.
• Try to think about everyting, not just work related stuff.
• The way you express the events are entirely up to you, you can sketch, write etc.
- Have a clear idea of your portfolio, who you truly need and be selective
- Start your week with an idea of your essential meetings and make sure that you have enough time for work -
Plan around your own energy peaks !
email / make todoList
public transit?
no one belongs
Walking
Asking a question
Working
Lunch
Cycling
to meeting external
Meeting
Asking a question
Working
Walking
Public transit
Be selective, and plan, → and Set the agenda.
- Lot of meetings → gemma ? / dobbelzeen ? → focus / private spaces.
- Lot of discussions / talks with colleagues on office matters
- Spread the talking through the week: Leuit huis kun je ook bellen, en overleggen
mail your question in short instead of talking?

Appendix III: Low-fidelity GEMMA indicators

Design
The goal of this prototype is to explore how a workstyle indicator, together with a floorplan, influence workplace selection.

During the minor Interactive Environments, the GEMMA timer (figure III.1) prototype was introduced to the AMS office. The goal of this timer is to enable the user to communicate if they need to focus or not. It is a timer that can be flipped, with either side communicating a different mode. On one side, the timer emits a green light, on the other a blue light. The green light indicates a social working mode, whilst the blue side shows a focused working mode. In the middle of the timer is the time indicator. This time indicator enables the user to have a pomodoro-like workstyle (Cirillo, 2016), whilst also communicating to the rest of the office how long the user predicts to be on that specific modus. When the timer runs out of time and the user was on focus mode, the prototype enables a moment where the user can decide if they want to focus longer or switch back to the social working mode.

In the co-creation session with the AMS office occupants (appendix II), focus is indicated as an issue in the OPO. Noise is attributed as one of the main causes for this lack of focus. The participants experience noise due to the combination of the office being an open hall and the office culture. At the AMS office, the office culture is centered on approachability. However, this culture comes into conflict with occupants when they need to focus. The GEMMA timers try to solve this issue by providing the user with a tool that communicates if the user wants to be disturbed or not. This tackles the social problem of always being approachable at the AMS office. However, the physical problem of all office occupants being in the same room is not covered by the GEMMA timers.

This design intervention tries to extend the GEMMA timers to tackle the physical problem. The main assumption made with this prototype is; if people who need to focus cluster, and people who do not need to focus cluster, occupants can create focus/non-focus clusters within the office. In the focus cluster, a quiet area will form, whilst in the non-focus cluster, a social environment will form.

To test this assumption, the GEMMA timers must be expended with additional tools that enable clustering. This additional tool is the floorplan of figure III.2 . The floorplan will be printed and placed in the office during this design intervention. For each desk with an

Figure III.1; a GEMMA timer

indicator (figure III.3), a marker (post-it) will be placed on the floorplan. These markers are green or blue, corresponding to the status of the indicator. This floorplan will therefore give an overview of what workstyle (focus/social) is preferred per desk. This floorplan will be placed near the entrance of the floor, allowing occupants to make a workplace selection based on workstyle preference.
I chose a floorplan over other options, since it includes an element into the prototype that the office occupants are familiar with. Since it is the initial design intervention, simplicity of prototype was preferred over advanced prototypes, since they allowed for rapid introduction. Furthermore, if the floorplan doesn't enable clustering, insights why this is the case are quickly gathered, enabling a rapid iteration. Introducing a complex prototype first and finding the assumption "clustering on focus preference solves AMS' social and physical problem" to be false, causes more resources to be lost (time in particular) than doing it the other way around.

Another important difference between the GEMMA timers and this prototype are the functionalities. This prototypes purpose is to quickly explore the earlier mentioned social and physical problem. Fast implementation is therefore more important than fully developing prototypes. This means that I chose low-fidelity prototypes over high-fidelity porotypes (Sauer, J, et al., 2010). I deemed the timers, lighting and embodiment of lesser importance for the purpose of this design intervention. Instead I chose to create a higher number of prototypes, allowing more people at the AMS office to use the prototype.

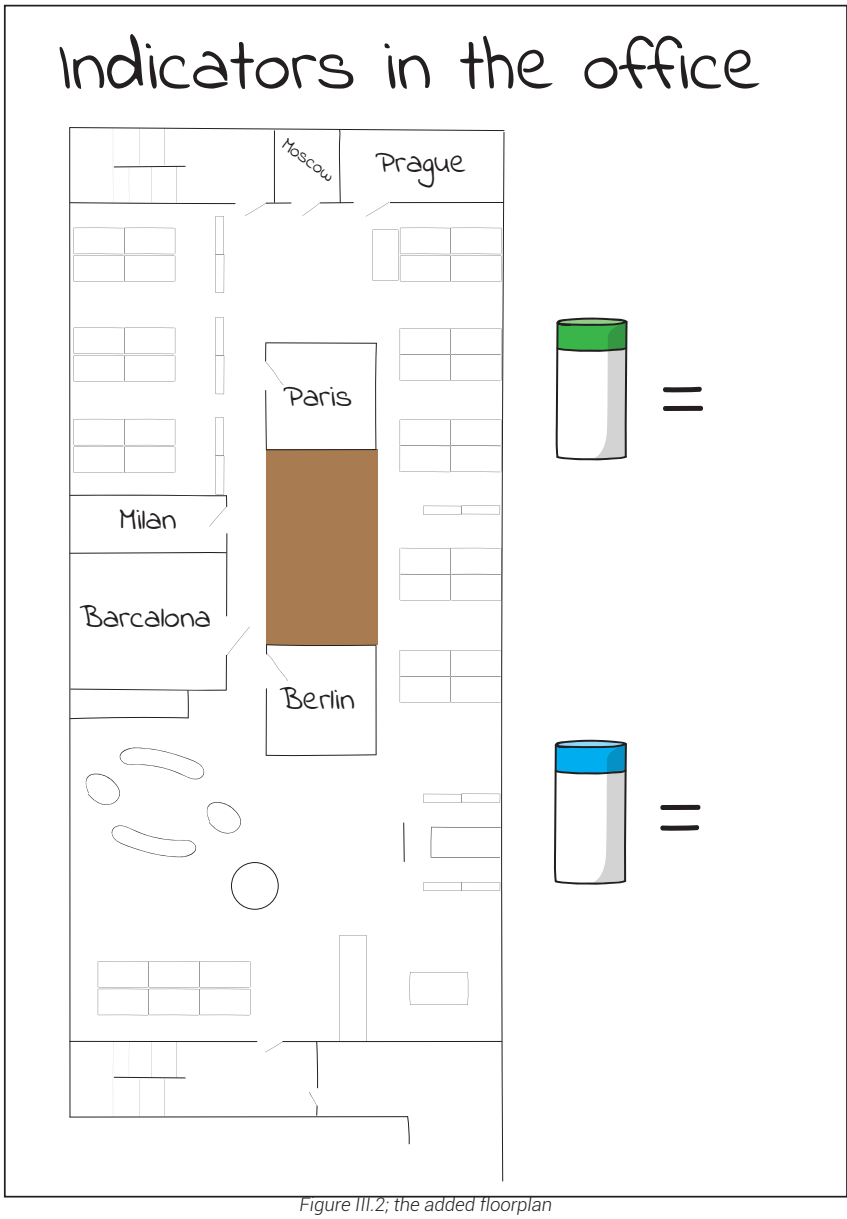


Figure III.2; the added floorplan

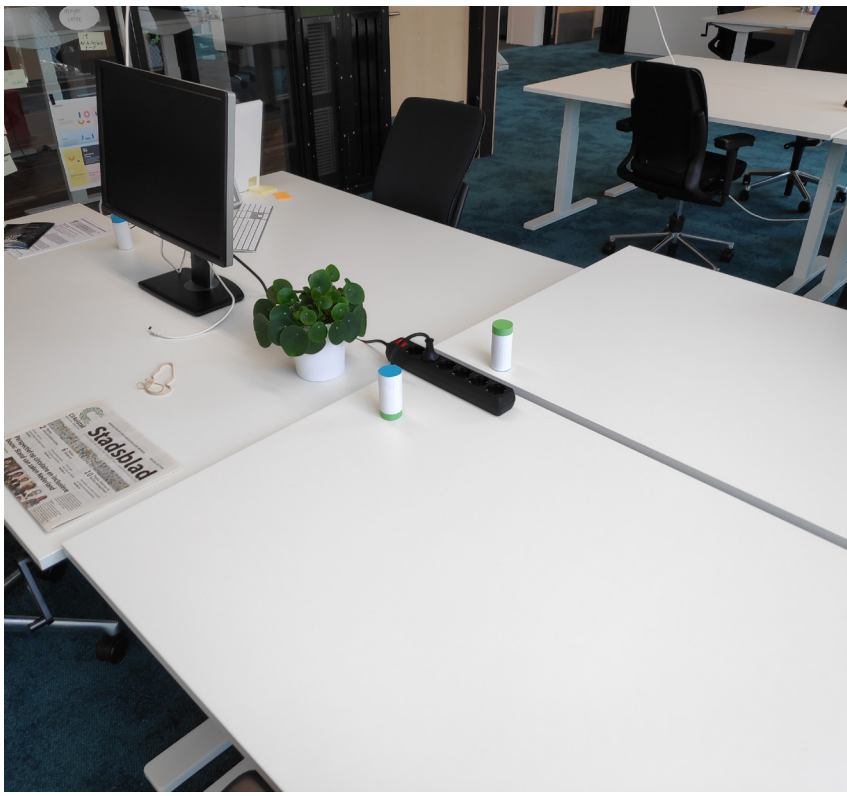


Figure III.3; two desks with indicators on them

The colors blue and green for focus/non-focus are also used in the new prototype. Green and red can also be considered, yet red can be interpreted as a more aggressive color, whilst blue is more neutral.

Test

The goal of the introduction of the low-fidelity GEMMA indicators is to explore workstyle clustering. The main assumption for this test is:

By enabling AMS' office occupants to indicate their workstyle preference, occupants can identify workstyle biases in specific areas, allowing workstyle clustering.

The need for workstyle clustering is derived from the following problems:

- Social problem: there is a low interruption threshold
- Physical problem: all activities are performed in the same hall

Prototype

The first part of the prototype is a tube with a green end, a blue end and a white slider that can hide either of two ends (figure III.4). The blue side up indicates a focus workstyle, in which the user tries to focus. The green side up indicates a social workstyle, in which the user is open for interaction with co-workers.
The second part is a printed floorplan and small blue and green post-its. The post-its are used as markers for individual desks, indicating which side of the GEMMA indicator is facing up at which desk (figure III.5). The floorplan stands near the entrance of the AMS office, allowing occupants

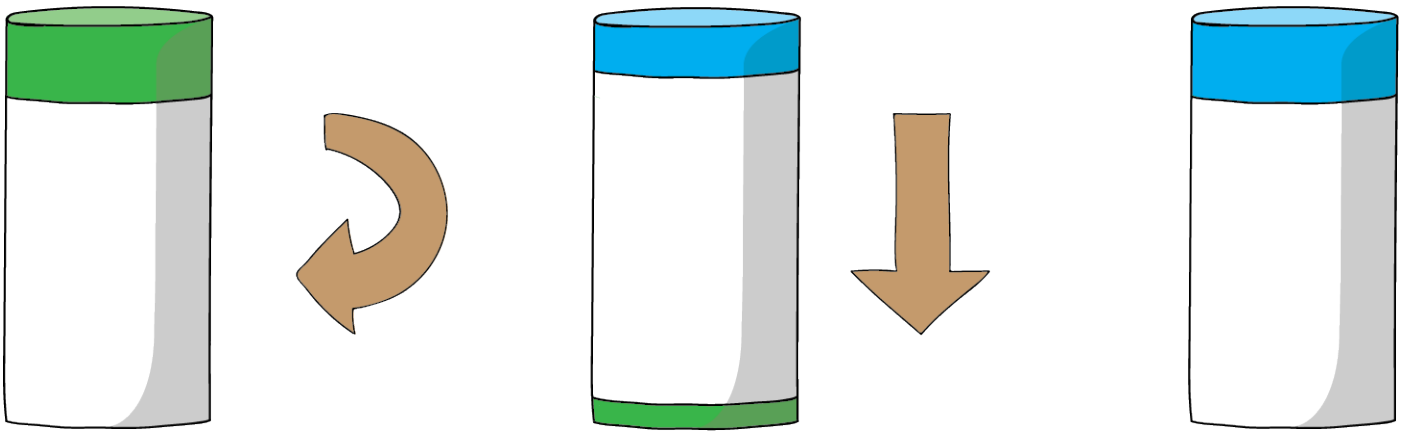


Figure III.4; two desks with indicators on them

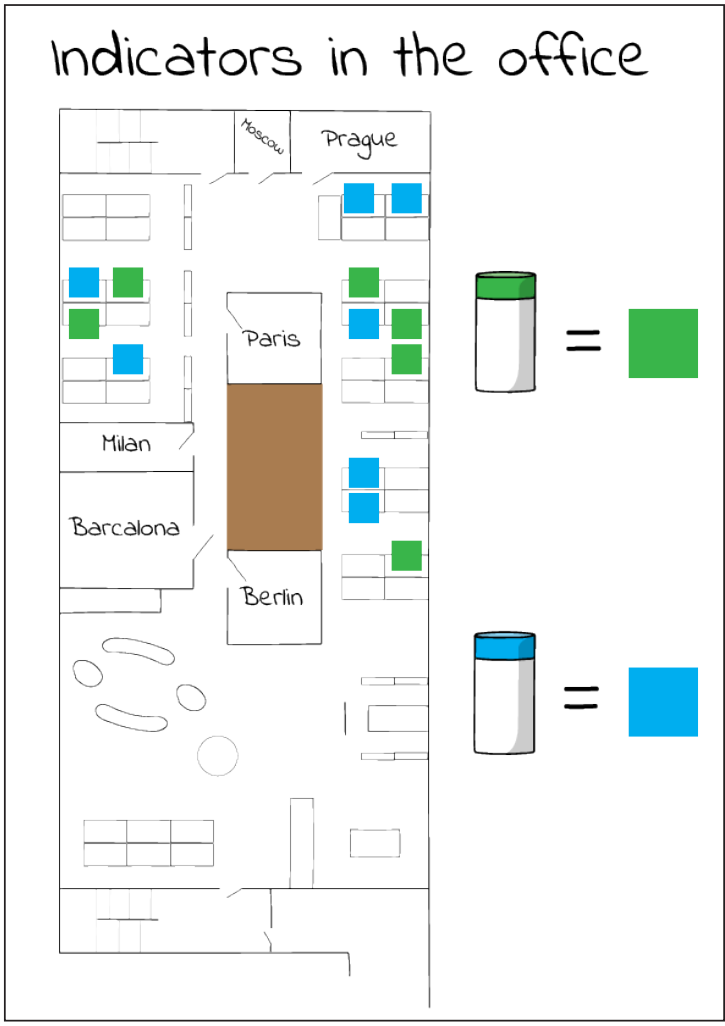


Figure A3.5; the floorplan with post its stuck on it

to see workstyle preference per workplace before making a workplace selection.

Approach

Setting

This explorative user research's goal is to get a deeper understanding of the context and the focus problem at the AMS OPO. To achieve this goal, the prototype is introduced in an, as close as possible, "real use" situation. This implies an in use in situ setting (Fields, B., et al., 2007).

The prototype was introduced in the office in a box near the entrance of the office, alongside an instruction poster. To inform the occupants of the prototype test, a message was sent on the AMS staff slack channel (appendix III - A). This message informed the office members that there is a prototype in the office, how this prototype works, where to find the prototype and that they can use the prototype. The prototype was left at the office for 3 weeks.

Participants:

Participants are recruited voluntarily. Every occupant who uses an indicator is a participant for observations. Participants who have the green side up are selected randomly for interviews. During the first observation day, 10 occupants used the indicators, during the second day 7 occupants.

Observations:

Observations are made at the day 1 and day 7 of the introduction. These observations are documented by graph, illustrating which side of the indicator was facing up at 20 min / 30 min time intervals for each individual desk (appendix III - B). The observations include only occupied tables with indicators, excluding non-occupied tables with indicators. An occupied table is a table at which an occupant places their work equipment.

Interviews:

Three interviews are performed. Two interviews are held one week after introduction, one 3 weeks after introduction. The first 2 interviews are individual interviews, the third a duo. These interviews are open interviews which are guided by 10 questions (appendix III - C). The answers are written down as notes. The interviews are held during working hours of the participant.
To limit the amount of disturbance, questions were skipped if the content of the question was covered in a previous response.

Materials:
- 30 tube prototypes
- 1 floor plan prototype
- Green and blue post-its
- Instruction poster
- Box for prototypes.

Results
The first day, the indicators were switched 9 times by 10 users, whilst the second observation day the indicators were switched 5 times by 7 users. The indicators were left at the table at the workplace when a person left.
Notes from the interviews can be found in appendix III - D.

Discussion
During the interviews about both parts of the prototype after a week of use, there was a clear split between acceptance of both parts. Participants indicate that there was an establish period needed to get used to using the indicators. The first day it was received as an accessible novelty, which became a vocal point during the day. Participants of the co-creation session recognized the indicators as one of their proposed ideas. This kickstarted the use of the prototype. The co-creation participants also introduced the indicators to other office occupants, making the use of the prototype spread wider than only the co-creation participants. However, only a minority of people made active use of the prototypes by switching between focus and social-working mode. The following week, there were less people at the office, yet the percentage of participants was higher. There also was an increased usage of the prototype; more participants switched the prototype during the day compared to the first day.

There was a general experience that people became more aware of the urgency of their co-worker interruptions. Before the introduction of the prototype, people tended to ask questions whenever they seemed fit. This changed when the indicators were introduced. People tended to consider the urgency of their question when the indicator was in focus mode. If their question was perceived as not urgent enough, they decided to wait with asking their questions. People also felt like that they were asked less questions when they indicated that they needed to focus. A pattern participants notice is, at the end of the day, people tend to flip their indicators to social-working mode. This gives the occupants a feeling of completion at the end of the day, whilst at the same time giving them the opportunity to ask the non-urgent questions they did not ask earlier that day. If this pattern was not found, waiting to ask a question might be a less viable option since there would not be a better time to ask the question.

Some users indicate that there rarely is a single moment in which they decide “now I need to focus” or “now I’m finished with focusing”. This caused the indicator to be on the wrong mode. In the original Gemma timers, this problem was solved by the timer, making users more aware of what activity they are doing when the time ran out.

The floorplan part of the prototype is not used. One of the reasons why it isn't being used, is that participants don't know how to interpret the floorplan. Office occupants are unsure what the post-its meant. It could either indicate where the prototypes are or a suggestion where the office occupants should sit if they pick up a certain color. Some office occupants think that they themselves should stick post-its on the floorplan.

Another reason for the map not being used is that the information is too specific. Indicating which desk has an indicator on it and which mode of the indicator is facing up only indicates what a specific occupant is currently doing. Since the mode of the indicator changes over the course of the day, the information provided by the map was not useful when making a workplace selection. One participant suggested that some sort of general indication would be more useful, since it would create areas instead of specific desks.

The final given reason for not using the floorplan is that the participants are not used to selecting their workplace based on the provided information. The given information is new, whilst people still use either their preference or their co-workers to choose their workspace.

When asking if the prototype should give more information, participants had different opinions. One participant said that the current information is fine, yet the display method and accessibility should be changed. He said that the information it currently gives is relevant and useful, creating a smarter interaction between co-workers. The indicator gives a clear message of not wanting conversations without it being hostile. This participant is a regular visitor who knows most of the other people in the office.

Another participant viewed the opportunities of this prototype differently. She also saw the indicators as a useful tool when it comes to deciding whether to ask a question to a co-worker. However, she believed that more information provided through the display at the entrance would help her when choosing a place at the office. Knowing what theme each person is working on would help her making a workplace selection. She indicated that it was one of her first times visiting the office.

After two more weeks at the office, the indicators were no longer being used. This was not caused by a decrease in necessity, but rather by how the prototypes were being used.
The first issue was the prototype durability. Since the prototypes were intended to be used for a shorter amount of time, little consideration went into the assembly of the indicators. The main goal was to quickly create enough indicators for the entire office. This decision caused the indicators to be made with a less durable method. After the three weeks of use, several of the indicators started to fall apart, discouraging the use.

Another issue is that there is no in-use indication on the prototypes. Like mentioned before, the original Gemma timers were supposed to be picked up and placed back at their charging stations. This meant that if they were on a desk, the employee brought it with them to the desk, indicating that it is in use. However, with these indicators always being on a desk, it quickly became unclear if people were using it or not. This was also caused by people not using the indicators whilst sitting at desks that had indicators on them.

Reflection
This initial exploration of the problem provided me with valuable information. Thanks to the rapid introduction, I could quickly access what the qualities of the GEMMA indicators are. Since the indicators were based on an idea that was founded by active collaborators, it was easily adapted in the office. This makes me realize that close collaboration helps by the acceptance of a prototype.

Appendix III - A; slack invitation

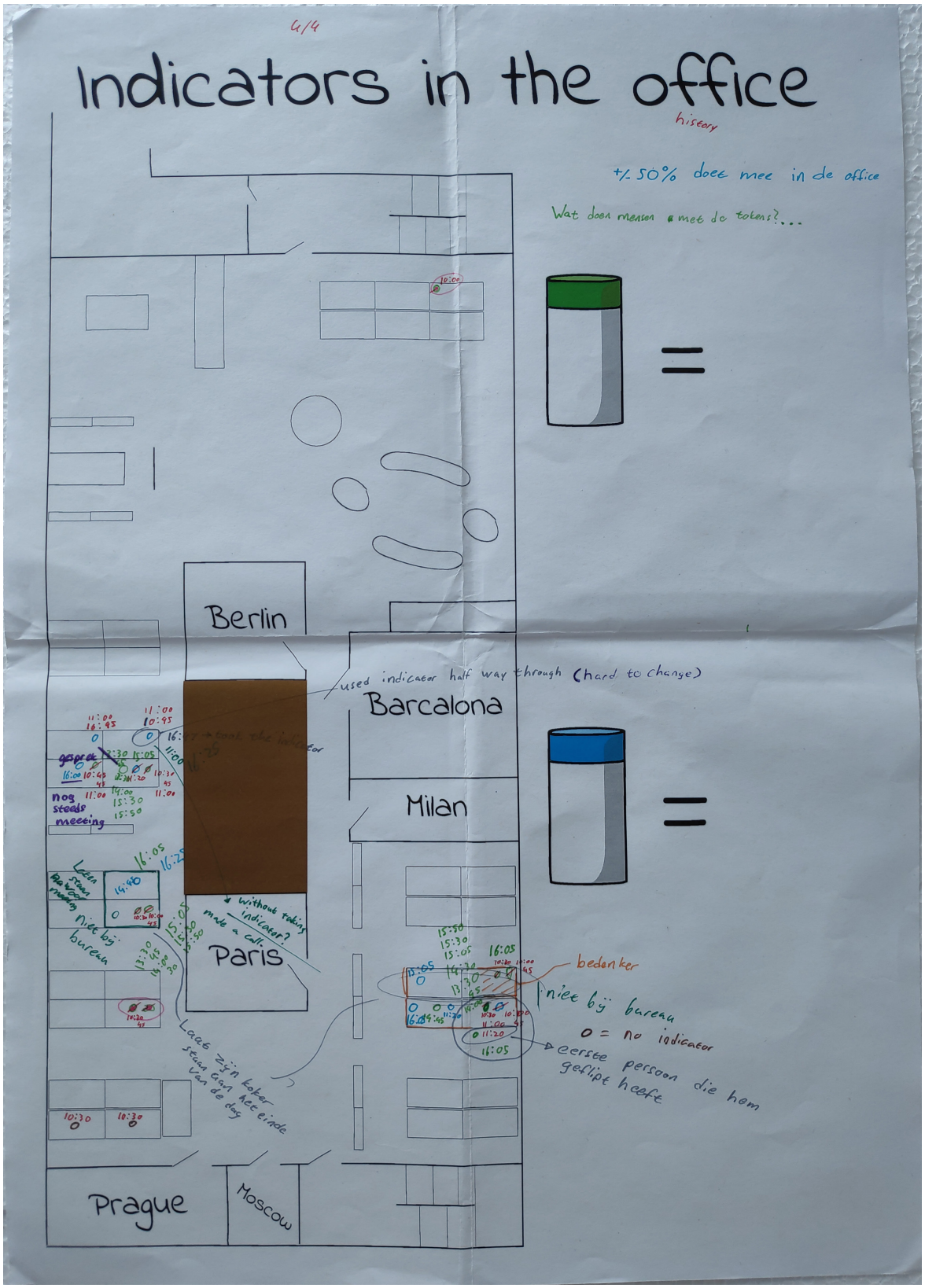
As part of my project to improve the working experience within a flexible office, I would like to perform a prototype test. The prototype will help you indicate what your preferred work style is and find people with a similar preference. Near the entrance of the office, there is a box with indicators. These indicators have two sides, a side that indicates that you need to focus and prefer not to be disturbed (blue) and a side that indicates that you can be approached (green). You can take one of these indicators and place it with the preferred side up on your desk.

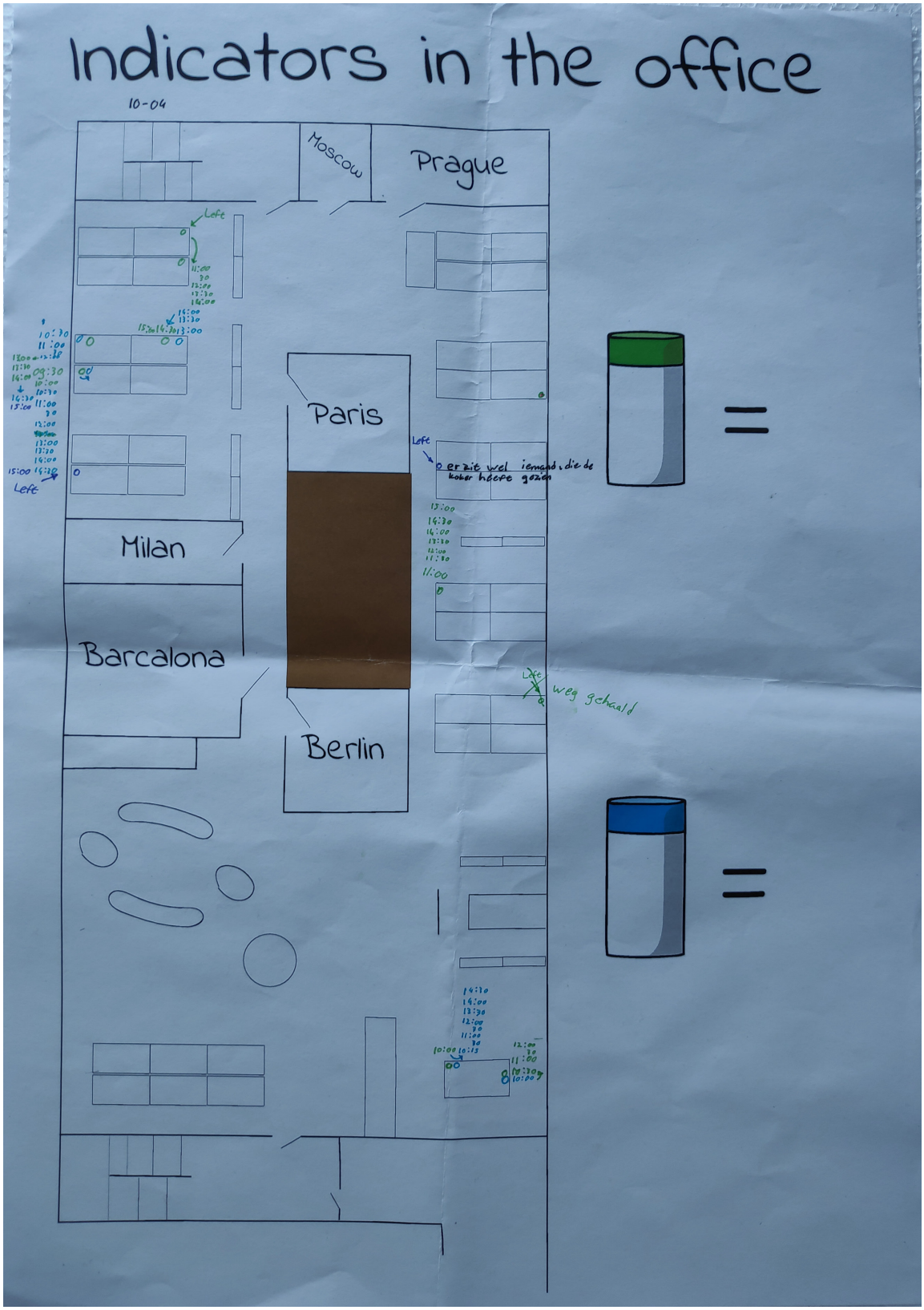
The other part of the prototype consists of a floor plan next to the box. Once you place your indicator on your desk, I will mark which side is up on the floor plan. This gives an indication what work style is preferred on each desk. Your co-workers who enter the office after you will then be able to see where in the office people are with similar work preference at that time.

The floor plan needs to be updated manually and will therefore only be active when I am at the office. However, the indicators are already present and can be used right now. Next Wednesday (10-4) I will be present to update the floor plan. If you would like to participate in this prototype test, please take one indicator from the box and place it on your table next Wednesday. In the later half of the day I will ask a few of you about your experience with the prototype (but only if you have the green side up).

Kind regards,
Rik

Appendix III - B; observed switches




Indicators in the office
10-04
Moscow
Prague
Paris
Milan
Barcalona
Berlin
Left
Left
Left
er zit wel iemand die de koker heeft gezien
weg gehaald
=
=

Appendix III - C: Interview questions

Hoe vond je het gaan?

Waarom ben je het prototype gaan gebruiken?

Een van de doelen van het prototype is om te kunnen communiceren dat je gefocust wilt werken. Hoe ervaar jij focussen tijdens een normale werkdag?

Wat zijn de grootste factoren die op het vermogen om te focussen invloed hebben?

Hoe heeft het prototype daar vandaag invloed op gehad?

Heb je gebruik gemaakt van de verschillende modi van het prototype?

Het prototype bestaat uit twee gedeeltes, het tweede gedeelte is de plattegrond van het kantoor. Wat voor rol heeft deze plattegrond gespeeld bij jouw keuze van werkplaats in het kantoor?

Wat zijn factoren die een rol spelen bij het kiezen van een plek?

Op dit moment zijn gegevens anoniem, je kan alleen zien wat voor voorkeur mensen hebben aan welk bureau. Wat voor invloed zou het personaliseren van deze informatie hebben? (In plaats van kleuren komen er bijvoorbeeld namen te staan).

Als het product uiteindelijk gedigitaliseerd wordt zijn er natuurlijk veel meer mogelijkheden. Wat zou voor jou relevante informatie zijn die zou kunnen worden weergegeven?

Wat voor invloed heeft dit prototype gehad op jouw productiviteit vandaag?

Dit waren mijn vragen, hartelijk bedankt voor het mee doen, heb jij nog vragen of suggesties?

Appendix III - D: Interviews

Interview 1

1) Hoe vond je het gaan?
Makkelijk, maar het is nog geen gewoonte
2) Waarom ben je het prototype gaan gebruiken?
Nieuw, houd er van nieuwe gadgets te testen
Gemakkelijk mee doen, toegankelijk model
Goed relevant, het is een probleem dat speelt
3) Een van de doelen van het prototype is om te kunnen communiceren dat je gefocust wilt werken. Hoe ervaar jij focussen tijdens een normale werkdag?
Verschilt maar meestal geen probleem, andere dynamiek (als je wilt focussen blijf je thuis)
4) Wat zijn de grootste factoren die op het vermogen om te focussen invloed hebben?
Open ruimte, gebeurt veel om je heen
5) Hoe heeft het prototype daar vandaag invloed op gehad?
Je ziet bepaalde teams in bepaalde richtingen kruipen
6) Heb je gebruik gemaakt van de verschillende modi van het prototype?
-
7A) Het prototype bestaat uit twee gedeeltes, het tweede gedeelte is de plattegrond van het kantoor. Wat voor rol heeft deze plattegrond gespeeld bij jouw keuze van werkplaats in het kantoor?
Was niet duidelijke informatie, helpt meer als richting geeft
7B) Wat zijn factoren die een rol spelen bij het kiezen van een plek?
Niet bezet, open, niet alleen, niet druk, balans, niet op scherm kijken, afscherming, uitzicht. Kiest veel nieuwe plekken, sommige mensen willen niet gestoord worden dus ga je er niet bij zitten
8) Op dit moment zijn gegevens anoniem, je kan alleen zien wat voor voorkeur mensen hebben aan welk bureau. Wat voor invloed zou het personaliseren van deze informatie hebben? (In plaats van kleuren komen er bijvoorbeeld namen te staan).

9) Als het product uiteindelijk gedigitaliseerd wordt zijn er natuurlijk veel meer mogelijkheden. Wat zou voor jou relevante informatie zijn die zou kunnen worden weergegeven?
Niet gebruiken om iemand te zoeken, is AMS te klein voor
10) Wat voor invloed heeft dit prototype gehad op jouw productiviteit vandaag?
Hield zich wel aan de regels, het is niet kwetsend, interactie slimmer, object interactie subtiel
11) Dit waren mijn vragen, hartelijk bedankt voor het mee doen, heb jij nog vragen of suggesties?
Zet op ieder bureau zo'n indicator neer, dan gaan meer mensen er gebruik van maken

1) Hoe vond je het gaan?
-
2) Waarom ben je het prototype gaan gebruiken?
-
3) Een van de doelen van het prototype is om te kunnen communiceren dat je gefocust wilt werken. Hoe ervaar jij focussen tijdens een normale werkdag?
Focussen is moeilijk
4) Wat zijn de grootste factoren die op het vermogen om te focussen invloed hebben?
-
5) Hoe heeft het prototype daar vandaag invloed op gehad?
Prettig -> bewust, tijd element maakt je bewust, helpt je bij kiezen
6) Heb je gebruik gemaakt van de verschillende modi van het prototype?
-
7A) Het prototype bestaat uit twee gedeeltes, het tweede gedeelte is de plattegrond van het kantoor. Wat voor rol heeft deze plattegrond gespeeld bij jouw keuze van werkplaats in het kantoor?
Nee
7B) Wat zijn factoren die een rol spelen bij het kiezen van een plek?
Collega's, enclosure, uitzicht, zelfde omgeving
8) Op dit moment zijn gegevens anoniem, je kan alleen zien wat voor voorkeur mensen hebben aan welk bureau. Wat voor invloed zou het personaliseren van deze informatie hebben? (In plaats van kleuren komen er bijvoorbeeld namen te staan).
-
9) Als het product uiteindelijk gedigitaliseerd wordt zijn er natuurlijk veel meer mogelijkheden. Wat zou voor jou relevante informatie zijn die zou kunnen worden weergegeven?
Wel waar je zou zitten, thema's onderzoeks thema's (6)
10) Wat voor invloed heeft dit prototype gehad op jouw productiviteit vandaag?
-
11) Dit waren mijn vragen, hartelijk bedankt voor het mee doen, heb jij nog vragen of suggesties?
Maak het professioneler, maak het een plant, gebruik paar

Interview 2

1) Hoe vond je het gaan?
Je spreekt niet iemand aan
2) Waarom ben je het prototype gaan gebruiken?
Niet, ze worden niet meer gebruikt, lagen ze er al of heeft iemand hem neergezet?
3) Een van de doelen van het prototype is om te kunnen communiceren dat je gefocust wilt werken. Hoe ervaar jij focussen tijdens een normale werkdag?
Zitten normaal gesproken in een hoekje, afgeslote ruimte
4) Wat zijn de grootste factoren die op het vermogen om te focussen invloed hebben?
-
5) Hoe heeft het prototype daar vandaag invloed op gehad?
-
6) Heb je gebruik gemaakt van de verschillende modi van het prototype?
-
7A) Het prototype bestaat uit twee gedeeltes, het tweede gedeelte is de plattegrond van het kantoor. Wat voor rol heeft deze plattegrond gespeeld bij jouw keuze van werkplaats in het kantoor?
Geen, veranderen van focus naar niet focus "je gaat niet wandelen"
7B) Wat zijn factoren die een rol spelen bij het kiezen van een plek?
Zelfde plaats elke keer
8) Op dit moment zijn gegevens anoniem, je kan alleen zien wat voor voorkeur mensen hebben aan welk bureau. Wat voor invloed zou het personaliseren van deze informatie hebben? (In plaats van kleuren komen er bijvoorbeeld namen te staan).
-
7) Als het product uiteindelijk gedigitaliseerd wordt zijn er natuurlijk veel meer mogelijkheden. Wat zou voor jou relevante informatie zijn die zou kunnen worden weergegeven?
-
8) Wat voor invloed heeft dit prototype gehad op jouw productiviteit vandaag?
Geen, gebruikt om te connecten, dat spoorde niet aan
9) Dit waren mijn vragen, hartelijk bedankt voor het mee doen, heb jij nog vragen of suggesties?

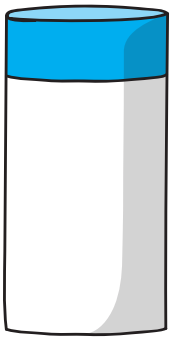
Appendix III - E; instruction poster

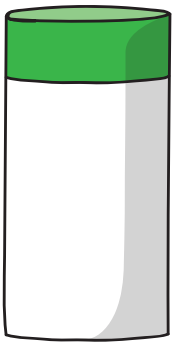
(prototype test)

workstyle indicator

Please take one of these tokens to indicate your preferred workstyle

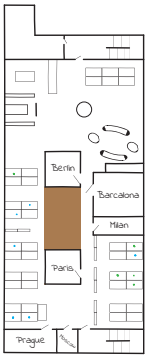
Focused
Please don't disturb



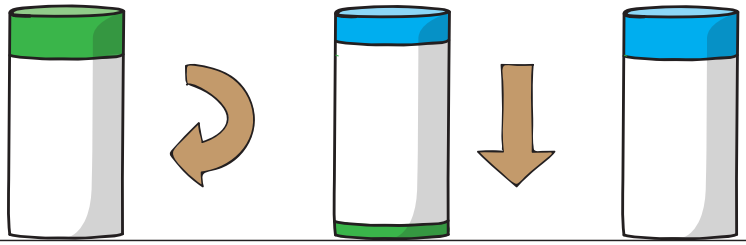


Not focused
You can approach me

The map indicates where other indicators are in the office and which side is up



How to swap preferred workstyle
Flip the indicator and slide the middle part down



Appendix IV: Portable focus room

design
This second prototype's goal is to increase the auditory and visual privacy at any workplace using a physical barrier. The main assumption of this prototype is that by providing the user with a tool that enables occupants to create a focus room from every workplace, nesting can be prevented. It also prevents latecomer discrimination, since every desk can be made into a focus place.

Design
I performed ideation to create several versions of this physical barrier (appendix IV - A). The two variants being: a foldable/expendable barrier and a portable barrier.
The foldable/expendable barrier is fixed to the desk and can be opened or closed at any given moment. The portable barrier is a barrier that can be carried around the office and placed on each desk.
Since the foldable/expendable barriers are located on each desk, the users only needs to interact with this barrier if they want to increase their auditory and visual privacy. The portable barrier needs to be carried to the desk of the user who wants to use the barrier. However, to enable each desk to become a focus space, each desk must be equipped with a foldable/expendable barrier, whilst fewer portable focus rooms achieve the same goal. For example, if three occupants want flexible focus in the office, three focus rooms are required. With the portable focus rooms, only three prototypes are required since each can be carried to the occupants desk. However, since the prototype's goal is to enable flexible blocking, meaning non-workplace depended blocking, each desk must be equipped with foldable/expendable barrier.
Since this is an explorative prototype, I preferred the portable barrier. With only a single barrier required to perform the user research.
Since the prototype aims to improve visual and auditory privacy whilst still being portable, the prototype was build using a wood frame, plumbing pipes and sound absorbing material (figure IV.1).

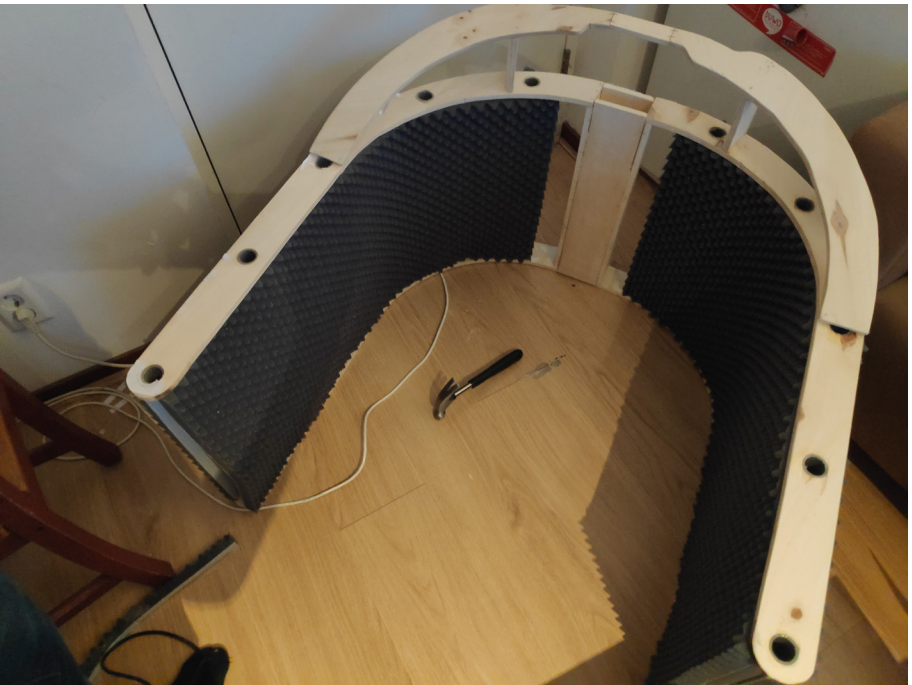


Figure IV.1 ; build in progress portable focus room

Test
The goal of the introduction of the portable focus room is to explore flexible blocking.
The main assumption for this test is:

By enabling AMS' office occupants to place a physical barrier on a desk, visual and auditory privacy will be improved, allowing office occupants to achieve focus. The portability of the prototype prevents nesting and latecomer discrimination.

Prototype
The prototype is a portable wall that can be placed on a desk to create a focus area. In total is the tool 700 x 1000 x 1000 mm and weighs around 5 kg. Inside the frame is sound absorbing foam. On the top is a handle for carrying.

Approach
Setting
The user research will be performed in an in situ setting (Fields, B., et al., 2007). The research will performed following the passive prototyping approach (appendix 1), meaning that after the introduction, it will be left in the office for occupants to be used. After a week, I return to ask questions to occupants who use the prototype.
Prototype introduction:
The prototype will be announced at the AMS office staff slack (appendix IV - B). An information poster will also be provided at the back of the prototype (appendix IV - C).
Participants:
Participants are recruited voluntarily. Every occupant making use of the barrier is considered a participant.
Interviews:
Interviews are prepared with questions which can be found in appendix IV - D.
Materials:
- Barrier prototype
- Instruction poster

Results

The prototype did not see spontaneous use. At the introduction, I asked an occupant to evaluate my prototype. He informed me that for visual and auditory privacy, the prototype was too low. This was improved by adding stands to either side of the prototype for the next day (figure IV.2). However, even with this addition the prototype did still not see any use. To identify the issue with the prototype, I performed 3 interviews (1 active collaborator, 2 participators). The main goal of these interviews was to identify what caused this prototype to be left unused. The given reasons are:

- Too novel; compared to working standing, it requires time to get acquainted with working within this physical barrier.
- The portable focus room does not improve visual privacy
- The portable focus room does not improve auditory privacy
- The portable focus room does not provide visual privacy from behind, allowing other occupants to see the screen of the user
- The portable focus room does not prevent co-worker interruption.

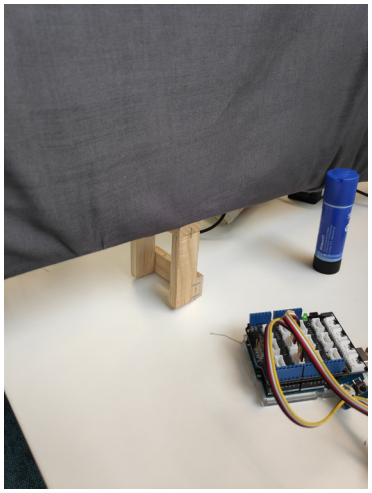
Discussion

Although there is only limited response to the portable focus room, the fact that it is unused for two weeks indicates that the AMS office occupants don't experience the need for this prototype. The given reasons give insight into the cause of auditory distraction. Rather than ambient sound, the main auditory distraction is office occupants disturbing each other directly.

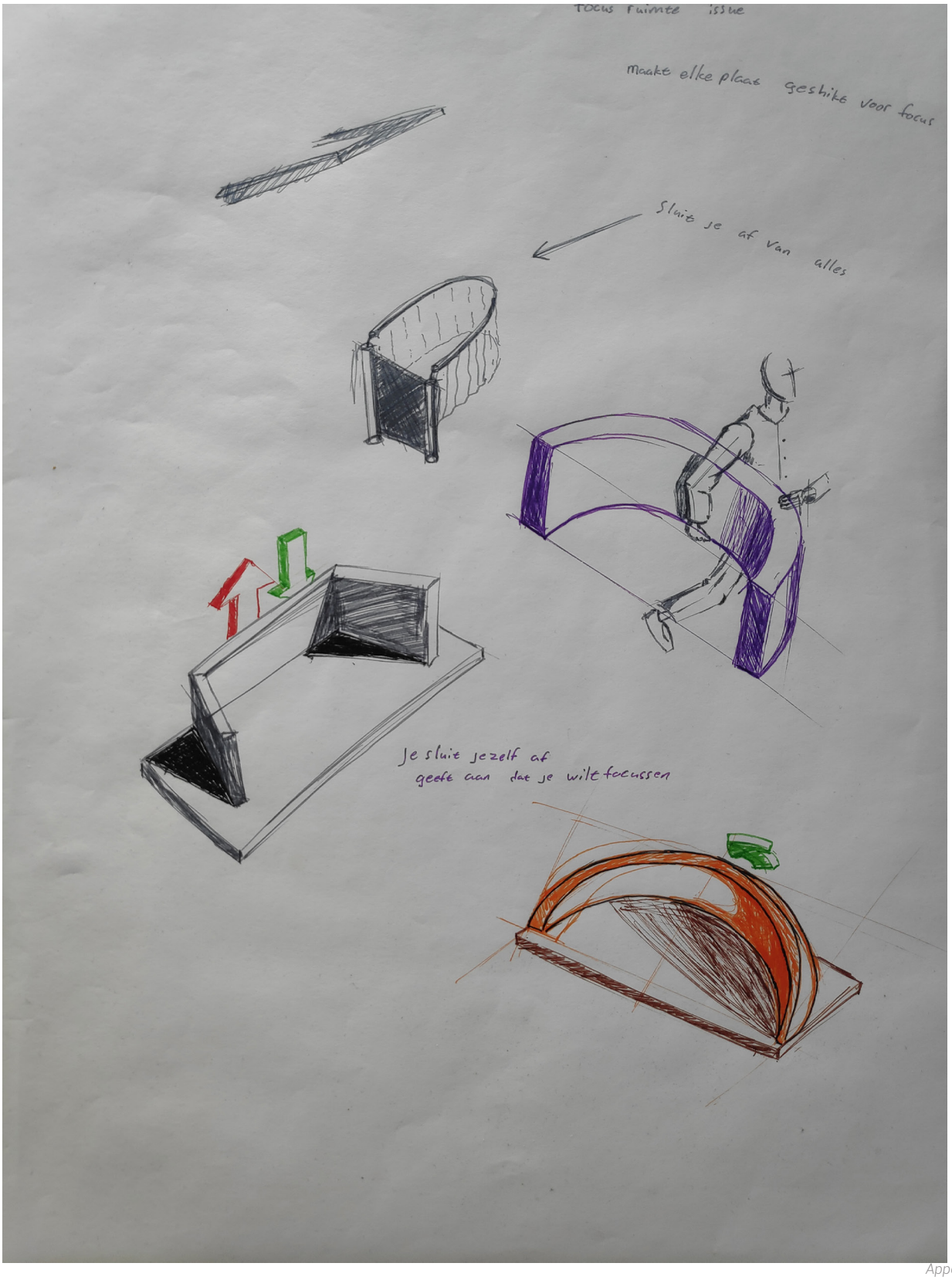
Reflection

The lack of visual privacy can be solved by using a barrier that comes from behind. This should either be integrated into the chair or a drop-down barrier. The auditory privacy is of less importance, since this can also be achieved by using headphones. Auditory disturbance from ambient sound also did not seem an issue concerning focus. The barriers from behind also serve a second purpose as an indicator that someone wants/needs to focus. Using a drop down barrier could be cumbersome, from the chair would be better yet it requires enough room for different people to fit in, yet be enclosed enough to give visual privacy.

Figure IV.2: Wooden stand



Appendix IV - A: Ideation



Appendix IV - B; invitation

Hello everyone,

Today I will be introducing a new prototype to the office; a portable focus room. This prototype should help you to focus on your work by reducing the amount of noise and visible movement from the office. If you feel the need to focus today, please take the prototype with you and place it on your desk. It can be found near the entrance of the office.

Kind regards, Rik

Appendix IV - C; instruction

Appendix IV - D; semi-structured interview questions

1) Wat vind jij van dit prototype?

2) Waarom gebruik jij hem niet?

3) Denk jij dat geluid een probleem is in dit kantoor?

4) Wat voor geluid stoor jij je het meeste aan?

Appendix IV - D; semi-structured interview notes

Interview 1
1) Wat vind jij van dit prototype?
Niet voor haar, koptelefoon voor focus
2) Waarom gebruik jij hem niet?
Voegt niks toe
3) Denk jij dat geluid een probleem is in dit kantoor?
-
4) Wat voor geluid stoor jij je het meeste aan?
Vragen van collega's, van alles, "waar is een paraplu?" daarom kokers, voorgesteld werkstijl dobbelstenen aan te schaffen.

Interview 2
1) Wat vind jij van dit prototype?
Te laag, niet blokkerend genoeg
2) Waarom gebruik jij hem niet?
Zicht is geen issue, normaal zitten ze in een hoekje
Wel geïnteresseerd, maar te "novel"
3) Denk jij dat geluid een probleem is in dit kantoor?
Niet per se
4) Wat voor geluid stoor jij je het meeste aan?

Interview 3
1) Wat vind jij van dit prototype?
Dekt niet genoeg, te laag
2) Waarom gebruik jij hem niet?
-
3) Denk jij dat geluid een probleem is in dit kantoor?
Ja, bellen wil ik niet en public
4) Wat voor geluid stoor jij je het meeste aan?
-

Appendix V: Workstyle elements

Design
Low-fidelity GEMMA indicators fail to enable office occupants to cluster based on their workstyle preference. The AMS office occupants explained it is mainly due to focus not being their primary workplace selection criteria. In their current situation, they mainly select their workplace based on where their co-workers are. Whilst this is an appropriate workplace selection criterion for collaborating, it can prove to be less useful when someone needs to perform individual focus work.
One of the reasons the low-fidelity GEMMA indicators fail at clustering on workstyle preference, could be attributed to the fact of the prototype not addressing the right workplace selection criteria. It addresses either of two options: focus or non-focus. This binary selection criteria could possibly be expended upon, to make it a more valuable workplace selection criterion. To explore how to expend this criterion, I must investigate what the implications of both sides of the indicators are.

Focus
The blue side of the indicator indicates the user's need to focus. Yet, even during the co-creation session (appendix 2), there is disagreement what a focus workstyle implies. Think of it like the silent department in a train. Where one person expects absolute quietness, the other can interpret it as an area where you can still talk but you need to whisper. The difference in this interpretation can cause conflict, since the rules are not clearly communicated to the users. During a discussion concerning focus at the AMS office in the co-creation session, one participant explains that the sound other occupants make is distracting. Another participant reacted by saying that the noise was not a problem since he could wear headphones to block the noise made by other occupants. Creating a focus area will therefore be different for both of these office occupants. This prototype explores if the focus criteria can be broken down into different elements, to provide enough types of areas for all occupants to achieve focus.

Non-focus
The green side of the indicator indicates a non-focus workstyle preference. Indicating that an office occupant does not need to focus, makes them more approachable by others. The role of non-focus in the low-fidelity GEMMA indicators was to counteract the focus side of the prototype. However, since the AMS office staff want to improve inter-team communication, the non-focus side can also be expended into an interaction opportunity. By facilitating the communication of other messages on the non-focused side, office occupants can communicate what kind of conversation is preferred. This prototype explores if there are other qualifiers for workplace selection that improve inter-team communication.

Feedback from the AMS office occupants shows that the low-fidelity GEMMA indicator status per desk was too specific for workplace selection and could easily change over the course of the day. This makes the information provided by the prototype too specific for workplace selection. This prototype iterates on this problem by using zone indicators. At the AMS office, desks are grouped in four adjacent desks (except for 2 desk groups). By making the indicators indicate a zone, the

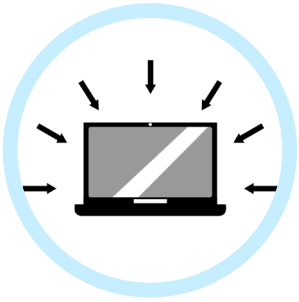
communicated information becomes less specific. Zone indicators use a single indicator for the entire zone, which consists of 4 desks. By using zone indicators, clustering should be improved. When an occupant indicates what his/her preferences are for their zone, other occupants with similar preferences can decide to join that zone. If others have another preference, they can sit at another workplace, creating a zone that fits their preference.

The second design decision concerns how these preferences are communicated. The low-fidelity GEMMA indicators make use of colors. This is possible since the prototype only has 2 modes. If you increase the number of potential options, using exclusively color becomes more complex. If, for example, a prototype contains 12 modes, you need 12 colors to communicate each mode. For the prototype to be used in the flexible office, users must remember what each of these colors means. Since elements in which focus splits are closely related (e.g. whispering or (no) sound allowed), using exclusively colors can lead to confusion. Therefore, I decide this prototype needs to provide more information than just a color code.

Text or icons are two other methods of communicating information more specifically than color codes. The goal of this prototype is to enable office occupants to cluster at specific workstyle preferences. The low-fidelity GEMMA indicator established that this should take as limited effort as possible. Current workplace selection is being performed by looking through the office and looking for the right workplace qualifiers (co-workers). Once a user is familiar with the icons, or the icons are clear enough to be interpreted correctly straight away, a user can scan the office to see if there are icons which match his/her personal preferences. Text on the other hand needs to be read, instead of being glossed over. Text is therefore less suited for quickly scanning the office for workstyles. Therefore, this prototype uses icons.

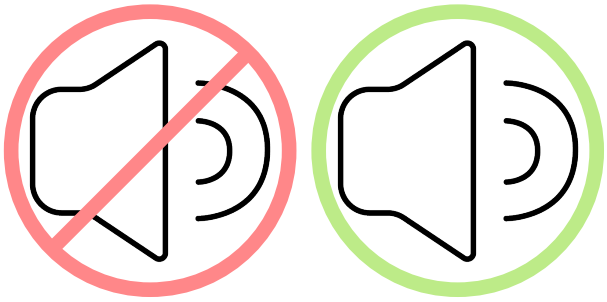
This prototype's goal is to enable AMS office occupants to communicate their specific preferences for a workplace and allow occupants to cluster with other occupants that share these same preferences. This prototype tries to specifically identify elements which are important for office occupants to make a workplace selection. Allowing for an indication that uses multiple elements, a user can create a specific preference. If this happens, an opportunity arises to discuss why this combination of elements make up a specific preference. It also provides the possibility to explore how these preferences are shared amongst other office users. Therefore, this prototype will enable the use of up to 4 elements.

In earlier discussions with AMS office occupants, several factors are discussed which are required to achieve focus or which disturb achieving focus. This prototype wants to explore how important each of these individual factors are. Therefore, each of these factors are made into their own elements.

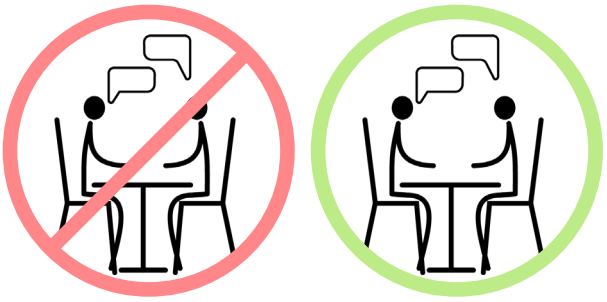


Focus

Whisper

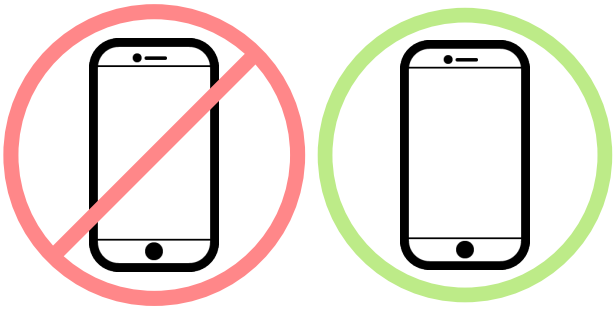


No sound / sound allowed



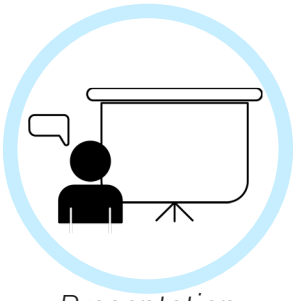
No conversation / conversations allowed

No excluding / excluding allowed



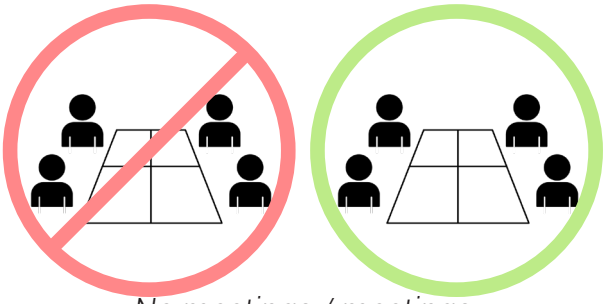
No phones / phones allowed

One of the main principals of this project is that by enabling workstyle-based clustering, activity-based workplace selection can be achieved in an open office. Enabling the user to indicate what activity they are planning to do in a zone, enables other occupants with the same activity to cluster at that desk. Therefore, icons that communicate specific working activities need to be tested.



Presentation

Individual work / collaborating

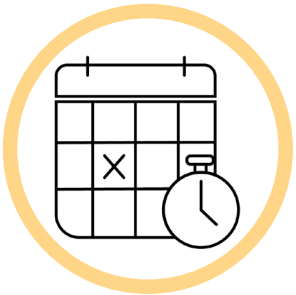


No meetings / meetings

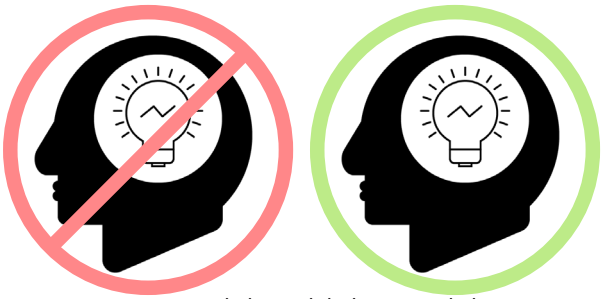
However, it also grants the opportunity to communicate specific needs or moods. By communicating these needs, communication can be improved, which was a goal of moving to this new office.

Challenge

Information

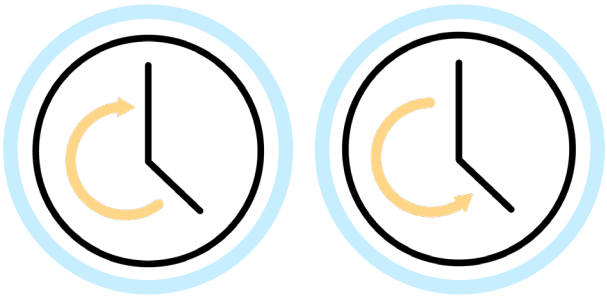


Deadline



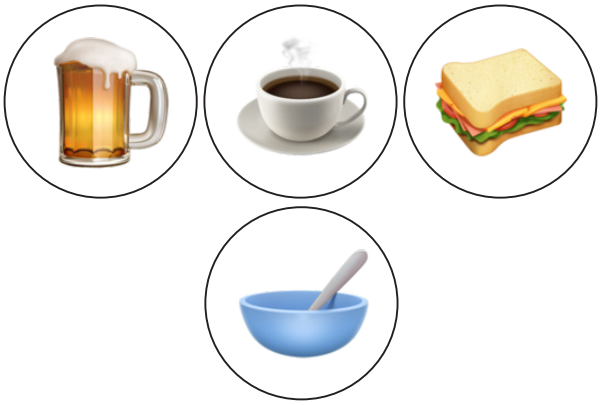
No creativity / high creativity

High / low productivity



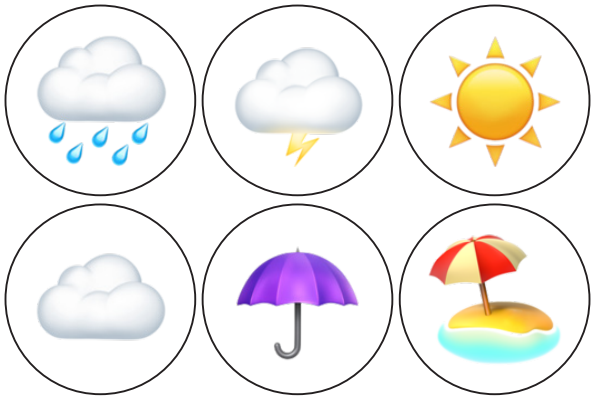
Later / earlier

All the previously mentioned icons are based on working activities. However, working is also a social activity. It enables people to connect on other non-work-related issues. Not every hour of a work day needs to be spent on work. Enabling office conversations is another aspect explored by this prototype. However, making a clear distinction between icon language allows for a clearer interpretation which icons are aimed towards work and which icons are aimed towards social activities. Emoticons or emojis have become part of everyday communication. However, they are more commonly used in a more casual setting or a setting that tries to appear casual. Using emojis for non-work-related topics is therefore something that is explored by this prototype. A selection of emojis is made which is not too broad for usage, yet broad enough to communicate a wide range of topics. The emojis are split into 6 categories. These 6 categories are chosen due to the commonality of the conversations they provide.

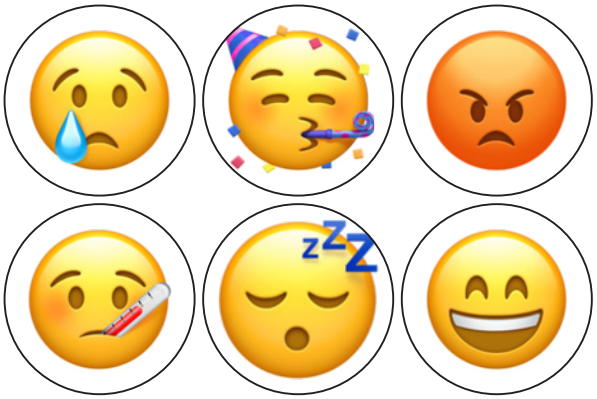


Food

Transportation

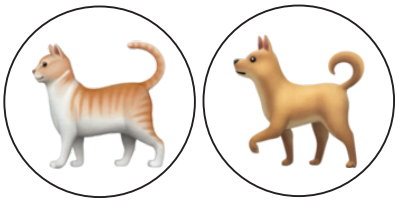


Weather



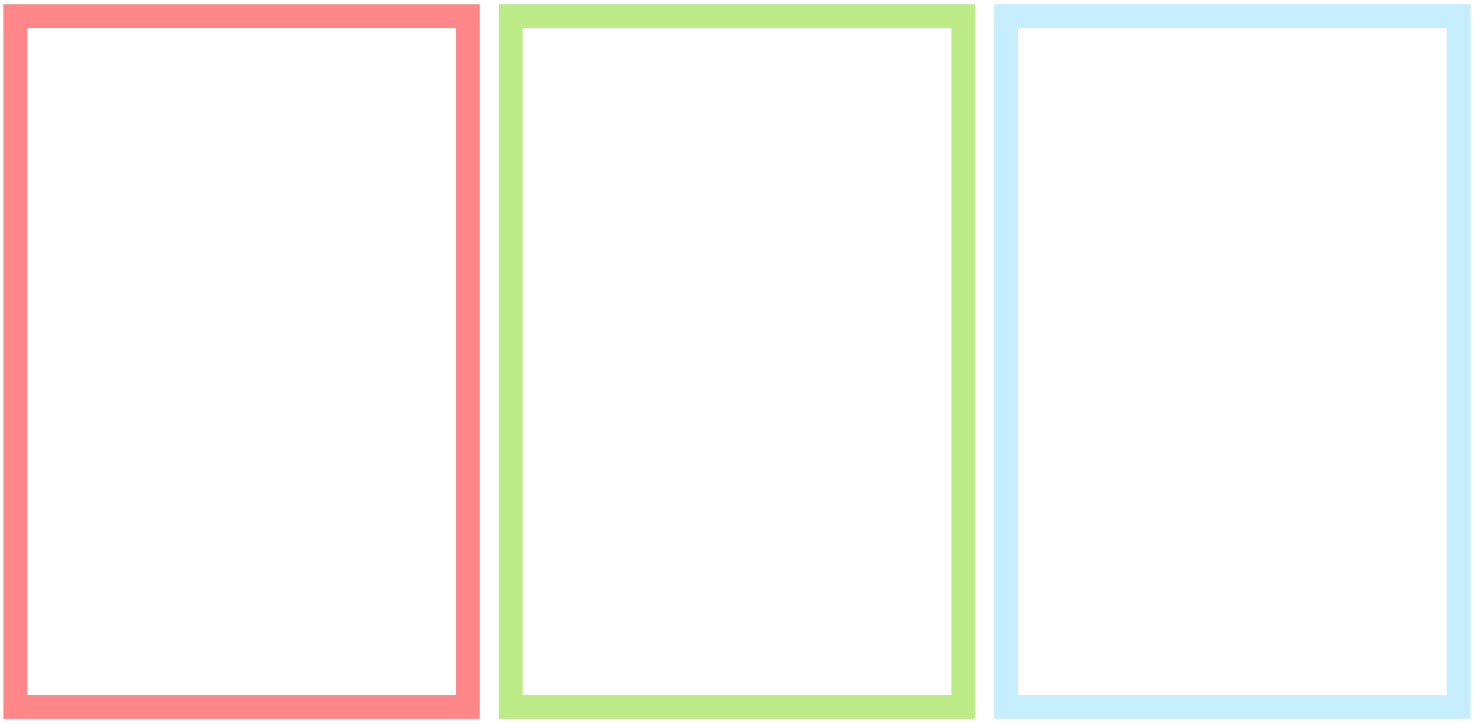
Mood

Activity/sport



Pets

If there are other criteria which are not covered by these icons, the user can create a custom icon. There are blanc icons with a pen. Each of these blanc icons also has a colored border, allowing the user to pick a border color which they deem appropriate for the custom icon.
Discussing the findings of the low-fidelity GEMMA timers, it was discussed that relying



exclusively on color could make the prototype too complex to be used. However, when using complementary colors can improve the clarity of the icons. Therefore, the tokens are given a colored border.

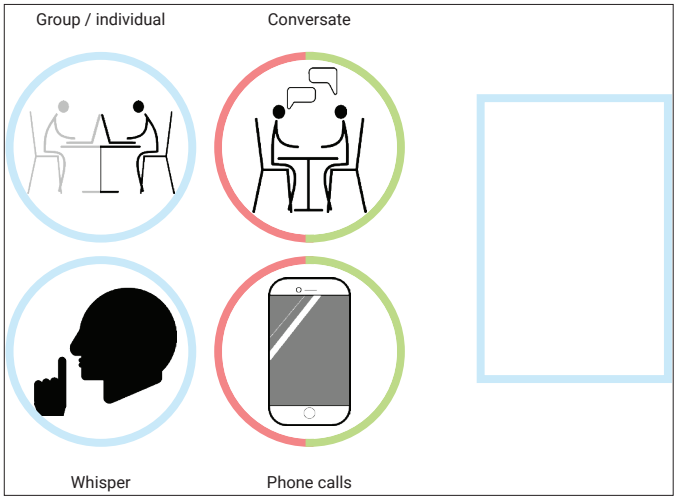


Figure V.1: Introduction selection

Test

The goal of the workstyle element indicators is to explore workstyle element indication with zone indicators. The main assumption for this test is:

By enabling office occupants to specify their zone with specific elements, office occupants are able to create a workstyle zone that closely represents their preferences. By using zone indicators over individual indicators, workstyle preference clustering will be improved.

Approach

Setting

Since this prototype is more complex than the previously introduced prototypes, a hands-on explanation was given to office occupants who wanted to use the prototype. This explanation was given near the office entrance. The participants are introduced to a selection of icons that cover focus elements and collaboration elements (figure V.1). Introducing a selection rather than the whole collection is to prevent an overwhelming introduction with too many icons, before the participant understands what the goal of these icons are. This specific selection is made since these elements cover the same topics which the low-fidelity GEMMA indicators cover with the focus/non-focus modes. Furthermore, the participants are allowed to create their own icons if they experience a lack of a specific criterion. After the introduction and icon selection, the participant is asked to place the icons in a stand or find a stand with similar preferences. Another box with icons is also left at the office. In this box, the remaining icons can be found. Icons made by myself are explained through a poster standing next to the box (appendix V - A). After the first day the prototype was introduced, office occupants were curious about the prototypes, but didn't know how to use them. Therefore, a smaller version of the explanation poster was printed and stuck to every stand (appendix V - B).

Introduction

The users are provided with a set of indicators, with which they could indicate what qualifiers they want their desk area to be. These indicators, and why they were selected, are:

- Calling/no calling; phone calls within the flexible office are indicated to be one of the main causes of distraction during the workday. Giving the occupants control whether or not phone calls are allowed in their zone should decrease the influence of this factor on occupant focus.
- Talking/no talking; The previous prototype showed that having a focus/non-focus indicator mainly influenced the amount of conversations someone had at their desk. Including this as an option to indicate focus or non-focus should allow for other elements to be discovered as important. Conversations can also indicate that people would like to sit with specific co-workers, which could also help other office occupants to select their workspace.
- Whispering; libraries are often used as examples of areas where people are going when they need to focus. One of the core rules within a library is that when you want to speak, you need to whisper. By providing the whisper element for zone indication, office occupants are enabled to identify zones where only whispering is preferred.
- Working individually/working in a group; this indication allows the occupant to

communicate a preference for individual or group work. By indicating that a zone will be used for group work, other office occupants who are part of that group can easily identify where they can meet their co-workers. Other office occupants are enabled to identify zones where other occupants are expected to join later that day.

This first introduction into workspace qualifiers can make people more aware of their workplace selection. Further awareness of workplace selection can lead to more meaningful insights.
To test if this increased awareness leads to more critical workplace selection, more workstyle indication elements are introduced to the office at a later date. The participants are able to find these indicators in a box near the entrance of the office. Furthermore, participants are able to create their own icons if there is a specific element missing that is most important for their workplace selection.

Result

After a week at the office, the elements used in the stands have not changed since the first day of the introduction. Since it appeared that nobody was using them, I approached a group in the office consisting of 3 active collaborators and 1 participator. They informed me that the prototype didn't allow them to make a workstyle zone. Giving the following reasons:

- The adaptation of the prototype was low. Since the introduction was limited, people did not comply to the rules. The office culture allows for co-worker interruption, the whisper elements were not enough to discourage office occupants from interrupting each other.
- The office occupants work with the co-workers they need and base their workplace selection on that qualifier alone.
- The low-fidelity GEMMA indicators drew more attention compared to the zone indicators. Office occupants noticed the individual indicators and acted accordingly, whilst the zone indicators were overlooked or ignored.
- The individual indicators were easier to understand by using only 2 modes.
- The individual indicators are more flexible, since the user can change their preference at any given time.
- The individual indicators gave more personal control, being able to switch more frequently.
- Since the prototype determined the workstyle preference of the entire zone, users were not confident changing the elements by themselves.

Discussion

This prototype failing in creating workstyle zones gives a clear indication that there is no need for the individual elements. Since they are too specific, it makes it harder to cluster in zones which co-workers comply to the indicated preferences. Even after placing the instructions on each stand and giving personal instructions to a part of the office occupants, the interviewed group still expressed that the rest of the office would like a more in-depth introduction to make the prototype work. However, since the office is a real-world situation, the indicators would have a similar effect on zone creation. Since the occupants of a flexible office change rapidly, thorough explanation of specific elements is harder to communicate to all office visitors. This realization

provides the insight that the tools used for clustering within the office should be intuitive, since ignored indicators cause a reduced effect of the tools.

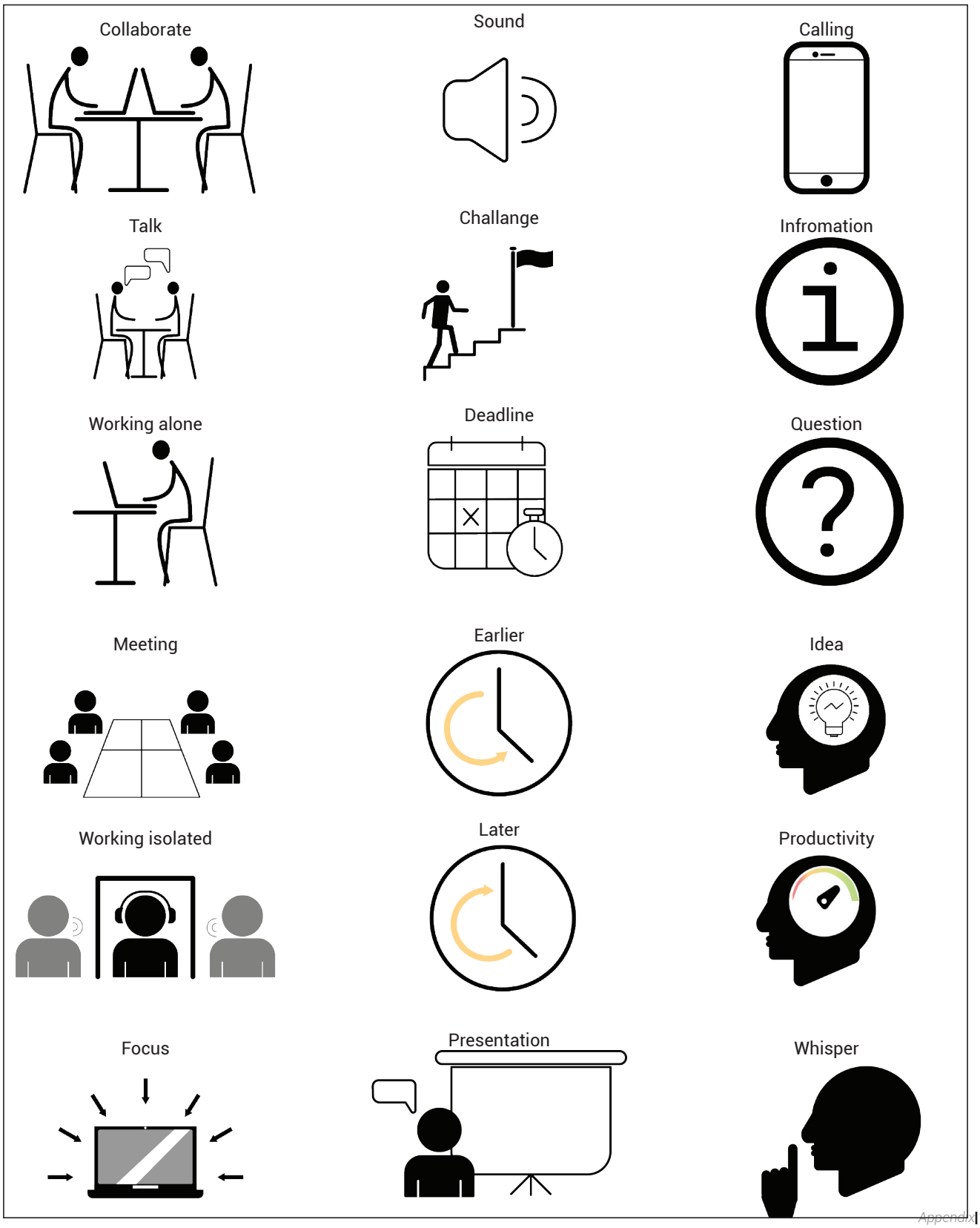
Furthermore, the use of zone indicators over individual indicators has also been debated. Individual indicators give the users of those indicators more control over their own workplace preference. Due to the zone indicators being ignored, the effectiveness of the individual indicator was preferred over the zone indicators. Since this prototype didn't improve workstyle clustering, the assumed benefit of zone indicators also did not come true. However, if this can be attributed to the indicators or what the indicators indicated should be explored further.

Reflection

The amount of time spent on this prototype has been disproportioned compared to the gained results. Since the previous prototype wasn't used, I decided to do a combination of overthinking and not thinking thorough enough with this prototype. The preparations were thorough, with instruction posters, instruction plan, instruction platter to name a few things. However, I mainly focused on how to introduce the prototype and less on the prototype itself.

Although the results give a negative impression of zone indicators, the lack of clustering capabilities could also be fully attributed to the use of elements. Further exploration must be performed to identify which of two (zone indicators or individual elements) had a greater impact on clustering capabilities.

Appendix V - A; custom icons poster

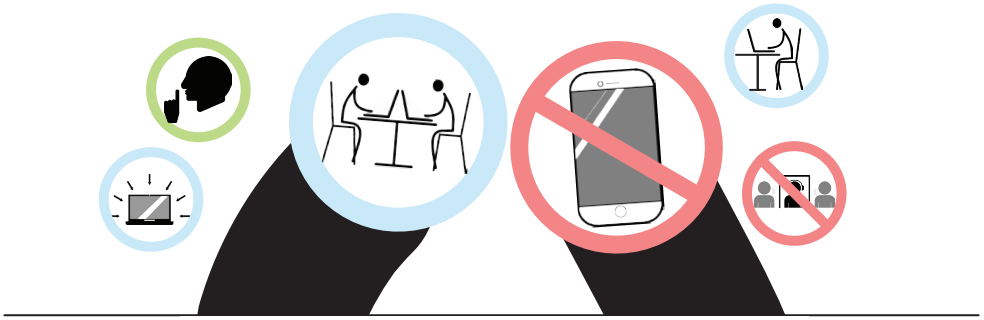


Appendix V - B: Instruction poster

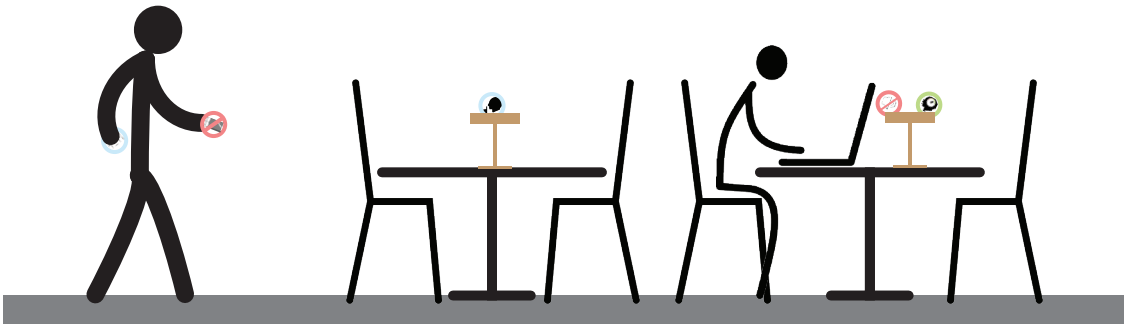
Workplace selection tool

Select a workplace based workarea elements

Step 1: Pick elements you find important for your workspace
(you can find most elements in the cardboard box at the first desks)

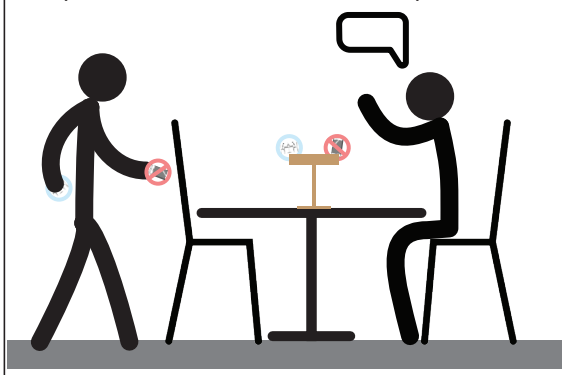


Step 2: Look for workspaces with similar elements

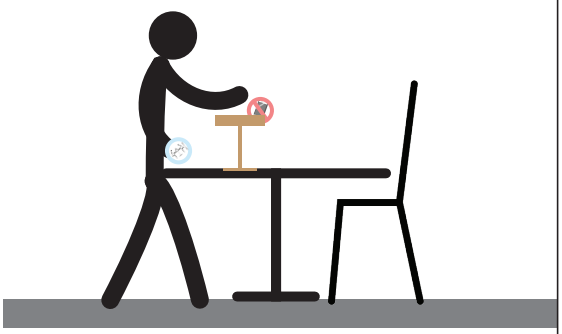


OR

Step 3 A: Join someone with similar preferences



Step 3 B: Make your own prefered work area



If you have any questions or suggestions,
please tell me or send me an e-mail at
rikderijcke@gmail.com

Me, Rik

Appendix VI: Digital zone indicator

Design
The most important insights gained from the workstyle elements design intervention were the following:

- Zone indicators didn't prevent co-worker interruption
- Having individual elements to create a custom zones makes the zones too specific and too complex to be clustered at

I expect the first insight being the result of the second. Since office occupants aren't able to identify the indicated preference by using individual elements, office occupants also don't know that the indicator user doesn't want to be interrupted. Not being able to cluster is in this case can be more attributed to the combination of elements being too complex and too specific to interpret by other office occupants. Therefore, further exploration into the zone indication is performed.

My project chair's door can be compared to a workstyle preference indicator. When his door is open, you can enter, when its closed, you cannot. However, when the door is half open, it means that you can interrupt when its urgent or important. Comparing this to the low-fidelity GEMMA indicators, they only have an open and a closed-door setting. The door being half open, is not an option. The low-fidelity GEMMA indicators allow for workstyle indication but fail at clustering office occupants. Exploring this in between option, in combination with the zone indicators, could allow for better workstyle clustering. This exploration will therefore test the earlier made assumption that a floorplan indication enables workstyle clustering in combination with on-desk zone indicators.

To perform this test, a prototype consisting of 2 elements was made. The stand is an on-desk zone indicator, whilst the floorplan is a pre-desk zone indicator.

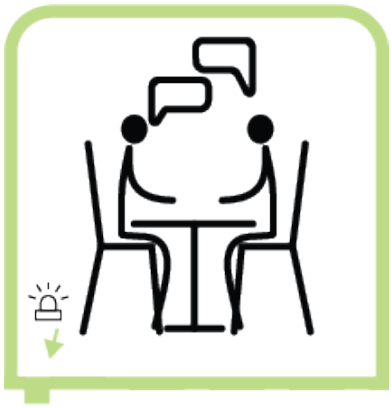
Choosing a workstyle preference happens at the desk. At the desk, the user can put either of three cards in the indicator. These cards have an icon on them and a small hump at the bottom. The edge of the icons are based on a traffic light analogy. Each card has a different meaning:

- Red: focus work, no interruptions allowed
- Yellow: team work, only work related interruptions allowed
- Green: social work, all interruptions allowed

When a card is slotted in the indicator, a light in the indicator lights up with the corresponding color. This should enable users to make a workplace selection based on scanning the office. Furthermore, what mode is activated at which desk is also send to the pre-desk indicator near the entrance of the office floor. When the card is slot into the indicator, a box will be drawn over the 4 desks this indicator stands on. When 2 adjacent indicators have the same preference, the box will be drawn over all desks within that zone, creating one larger zone.

Focus work

Team work



Social work

The indicators are built with 5 built-in buttons, allowing for 119 possible indications (no-buttons pressed is always off). This was done to ensure that if users were able to identify a missing qualifier, this could be printed and worked into the prototype. When a card is slotted into an on-desk indicator, the little bump at the bottom presses at least one of the buttons, which enables it to detect what card is slotted into the indicator.

Test

The goal of the digital indicators is to explore workstyle-based workplace selection using on-desk and pre-desk zone indicators. The main assumption for this test is:

By enabling office occupants to create a dedicated workstyle zone in the office, office occupants will be able to cluster at their preferred workstyle preference. The three workstyles (focus work, team work and social work) enable the office occupants to make a workstyle preference selection that enables them to perform their activity at the office.

Setting

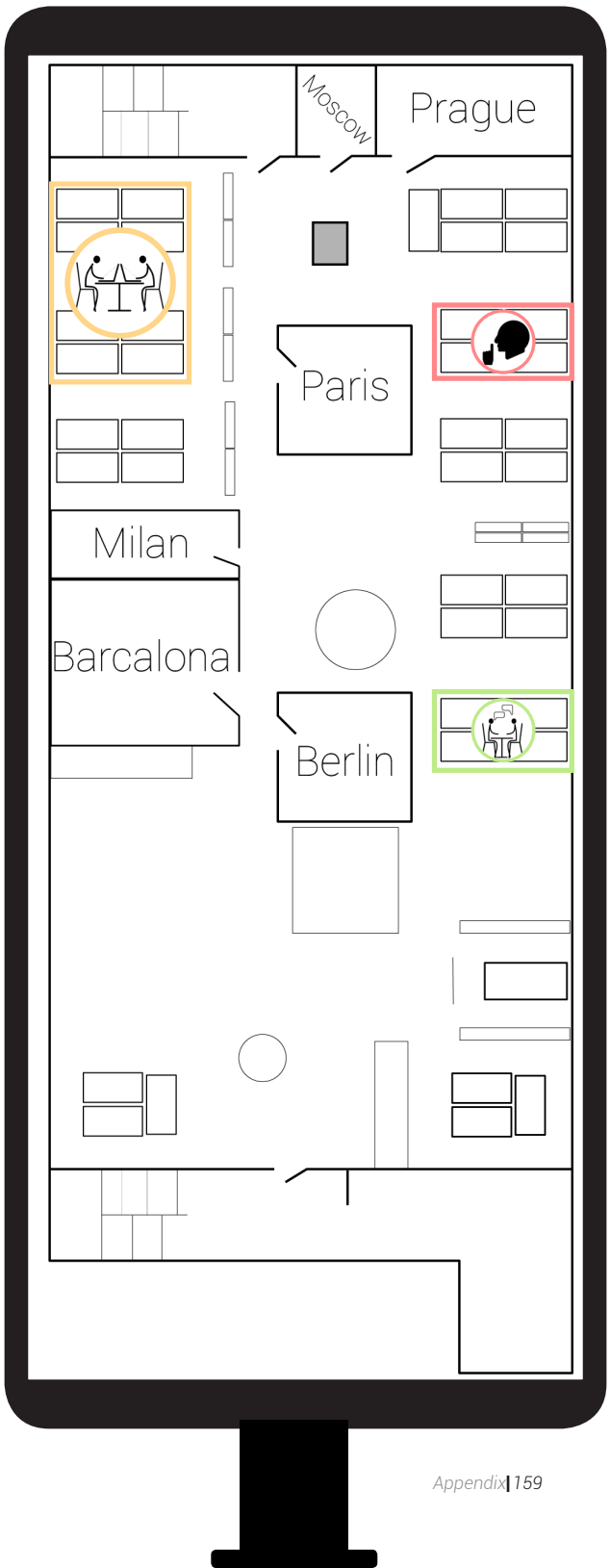
Like the other tests at the office, a natural setting is preferred for this design intervention. Therefore, the prototype was introduced in situ (Fields et al., 2007) in the office.
Since the floorplan required active maintenance to keep it running, this prototype is performed in an active user research setting (appendix 1).

Iterating on the previous prototype test, the introduction was expanded with an introduction near the entrance and an instruction hand-out (appendix VI - A) at every on-desk indicator. The prototype was tested one and a half day, of which the second day participants were recruited for answering a questionnaire (appendix VI - B).

Participants

Occupants entering the office floor were asked if they

Display near the entrance



wanted to use a prototype for workplace selection and reflect on their experience through a questionnaire, of which 8 occupants agreed to do so. These were introduced to the prototype and their e-mails collected. In the afternoon, a mail was sent with the questionnaire to these e-mail addresses. 2/8 of the participants respondent.

Data

Data was gathered through discussing the prototype with active collaborators and participators, performing observations and from the questionnaire. This questionnaire consisted of 23 questions, of which 20 were 7 point Likert scale questions, 1 was a two-dimensional scale question (Kirakowski, 1994) and 2 open questions. After each question the participant had the opportunity to elaborate on their answer through a text box. The questionnaire was split into 3 parts;

- Current office experience (4 questions)
- Workplace selection (13)
- Workstyle communication (5 questions)

At the end the participant was asked for general feedback.

Results

The results of the questionnaire can be found in appendix VI - C.
Questions with an average score higher than 6 are:
1) I can easily find a suitable workplace
2) I can focus on my work
4) I spent my time at the office effectively
6) I choose a workplace for the team work workstyle at that desk (yellow workstyle card)
9) Workstyle indication positively influences my workplace selection
13) The display near the entrance of the office gives me enough information to make a workplace selection
16) I found it easy to change the workstyle card whilst I was sitting alone at the desk group
21) Through the availability of workstyle preference, I feel that I can better focus at the office

Questions with an average score lower than 3:
7) I choose a workplace for the focus workstyle at that desk (red workstyle card)
8) I choose a workplace for the lack of workstyle indication at that desk (no workstyle card)
11) I will move to another workplace since the workstyle preference of the desk group changed to another workstyle (E.g. a co-worker puts another card in the indicator)

Questions where participants differed more than 4 points:
5) I choose a workplace for the social workstyle at that desk (green workstyle card)
10) I will move to another workplace when my workstyle preference has changed (E.g. from focus work to social work)

Discussion
These results indicate that clustering on workstyle preference can be achieved by using group indicators. The pre-desk indicators give the users enough information where to look for a specific workstyle. One of the participants indicated that communication was required that day, whilst the other needed to work. Both therefore chose the team work workstyle. The participant who wanted to have social interaction also says that a social workstyle could be considered, whilst the other doesn't want to sit in a social workstyle zone. This indicates that social work and team work can be performed next to each other. Focus workstyle wasn't preferred by both participants. However, during the testing day, the zone that remained the longest with the same preference was the focus work zone. This zone was noticeably more silent compared other office days. However, it had the consequence that adjacent zones also don't produce a lot of noise. This can simply be because no social interaction was required. However, participators discussed that the red light worked intimidating on them. This could indicate that focus work workstyle zones influence adjacent zones.
Drawing definitive conclusions from this research is unjustified, since only 2 participants filled in the questionnaire. However, the findings of this research can be used in the following protype. More insights were gathered from this prototype by having conversations with participators and active collaborators, yet these were spontaneous conversations and therefore less well documented.

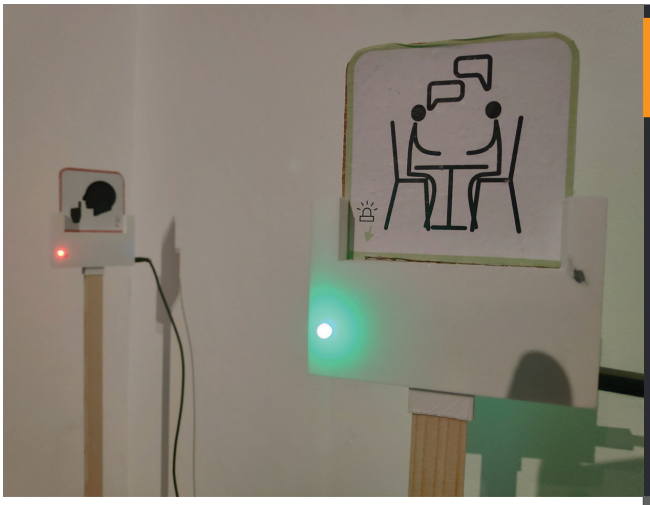
Reflection
The design of the prototype showed to be effective at clustering occupants. However, I noticed a lot less workstyle preference switches during the day compared to the low-fidelity GEMMA indicators. During the workstyle elements design intervention, it was indicated that switching group indicators was perceived as less flexible. There was the feeling that if you change the group indicator, you are switching for the entire group, which in its place caused either reluctancy or social pressure. The floorplan on the other hand, doesn't have this effect. This is caused by the floorplan not being next to the desk and also having no direct impact on the on-desk indication. It is only used to find a workstyle, rather than assigning one.

Using three workstyles (focus work, team work and social work) instead of two (focus/non-focus), enables the office occupants to select a workstyle preference in which they are allowed to talk, but are only addressing work related issues (team work workstyle). This workstyle feels like a comfortable workstyle, since it indicates how the majority of work is performed within the flexible office. Office occupants are at the office to perform work, which involves communicating with co-workers. In the low-fidelity GEMMA indicators, since you need to communicate with co-workers, the office occupants are supposed to set the indicator in non-focus. However, with the new workstyle, office occupants are able to indicate that they are working with co-workers and therefore prefer not to be interrupted by not-work-related interruptions.

When reflecting on the process, the timing of this design intervention was unfortunate. It was planned around the start of July, but due to a miscommunication, I was only able to start testing

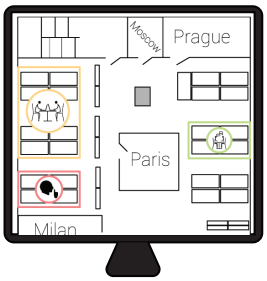
the second week of July. As a result, I tested on a day which was concluded with a farewell drink of one of the co-workers. After which, most of the office occupants went on vacation. Although the questionnaires were sent on request of the office occupants (rather than physical forms), they were caught off guard with the drinks at the end of the day, causing most of them to forget the questionnaire. A few days later I send out a reminder, with unfortunately no results. To confirm these explorative findings, a larger scale research should be performed.

Appendix VI - A: Instruction hand-out



De werkstijl indicator

Het werk in een flexibel kantoor is even gevarieerd als zijn gebruikers. Waar de ene een belangrijke e-mail opstelt, is er een andere groep de belangrijke punten van de afgelopen meeting aan het doornemen. Een flexibel kantoor kan ieder zijn behoefte faciliteren. De werkstijl indicator helpt bij het faciliteren van deze ruimte, door de voorkeur voor een werkomgeving te communiceren. Hierdoor is het mogelijk het kantoor aan te passen aan de hand van de vraag die er op dat moment is.



Dit is hoe het werkt

Bij de entree staat een display met daarop een plattegrond van de tweede verdieping van AMS. Deze plattegrond geeft per bureaugroep aan wat de voorkeur werkstijl is. Deze werkstijl kan jij zelf aanpassen om deze geschikt te maken voor jezelf en jouw collega's.

Nee

Zie je op de plattegrond een werkstijl die bij je past?

Ja

1 Ga dan naar een vrije plaats in het kantoor naar keuze. Plaats een geschikte werkstijl indicator in de standaard.

Let op: zorg ervoor dat de pijl met het lamp symbooltje naar de kant wijst waar de lamp zich bevindt.

Dan kan jij er voor kiezen om aan deze bureaugroep te gaan werken. Kijk op de plattegrond waar deze bureaugroep zich bevindt of kijk voor de indicator met de corresponderende kleur verlichting.

2 Als de lamp dezelfde kleur heeft als de rand van de indicator, dan zit deze goed in de standaard. Het kan enkele seconden duren voordat de lamp aan gaat. Als dit na een halve minuut nog niet is gebeurd, kan je de indicator harder aanduwen of om hulp vragen.

3 Jouw voorkeur wordt weergegeven op de kaart, waardoor jouw collega's de mogelijkheid krijgen om bij je aan te sluiten.

Werkstijlen

Focuswerken

Gelieve hier niet te praten.

Samenwerken

Alleen werk gerelateerde vragen of gesprekken

Sociaalwerken

Open voor conversaties

Appendix VI - B: Questionnaire

Question

1) I can easily find a suitable workplace
2) I can focus on my work
3) I can easily connect at the office
4) I spent my time at the office effectively
5) I choose a workplace for the social workstyle at that desk (green workstyle card)
6) I choose a workplace for the team work workstyle at that desk (yellow workstyle card)
7) I choose a workplace for the focus workstyle at that desk (red workstyle card)
8) I choose a workplace for the lack of workstyle indication at that desk (no workstyle card)
9) Workstyle indication positively influences my workplace selection
10) I will move to another workplace when my workstyle preference has changed (E.g. from focus work to social work)
11) I will move to another workplace since the workstyle preference of the desk group changed to another workstyle (E.g. a co-worker puts another card in the indicator)
12) The lights on the indicators give me enough information to make a workplace selection
13) The display near the entrance of the office give me enough information to make a workplace selection
14) I fully comply to the rules of the workstyle indicated at my desk
15) Co-workers at my desk group fully comply to the rules of the workstyle indicated at my desk
16) I found it easy to change the workstyle card whilst I was sitting alone at the desk group
17) I found it easy to change the workstyle card whilst there were co-workers at the desk group
18) The three workstyle options allow me to clearly communicate my workstyle preference
19) To communicate my workstyle, the number of workstyle options are… (4 is exactly enough)
20) Through the availability of workstyle preference, I feel that I can better connect to other people at the office
21) Through the availability of workstyle preference, I feel that I can better focus at the office
22) What other information would allow you to make a better workplace selection (for example: location of specific people, sound level, temperature, etc.)
23) Do you have any suggestions or questions that have not yet been covered?

Appendix VI - C: Questionnaire results

Question	P1	note	p2	note	Average
1) I can easily find a suitable workplace	7		5		6
2) I can focus on my work	6	Only the noise of the ventilation makes me disturbed.	6		6
3) I can easily connect at the office	5	I didn't particularly experience that	4		4.5
4) I spent my time at the office effectively	7		5		6
5) I choose a workplace for the social workstyle at that desk (green workstyle card)	1		7	Was just looking at somewhere where people are not concentrated so that I could talk	4
6) I choose a workplace for the team work workstyle at that desk (yellow workstyle card)	7		7	Was just looking at somewhere where people are not concentrated so that I could talk	7
7) I choose a workplace for the focus workstyle at that desk (red workstyle card)	1		1		1
8) I choose a workplace for the lack of workstyle indication at that desk (no workstyle card)	1		1		1

9) Workstyle indication positively influences my workplace selection	7	by looking at the illustrations i understood what kind of workstyle i wanted	5		6
10) I will move to another workplace when my workstyle preference has changed (E.g. from focus work to social work)	6	if i am alone or only with one person i would change the workstyle card -i would also ask the person that sits next to me	1		3.5
11) I will move to another workplace since the workstyle preference of the desk group changed to another workstyle (E.g. a co-worker puts another card in the indicator)	4	depends whether she communicates this to me and we agree on doing something together etc	1		2.5
12) The lights on the indicators give me enough information to make a workplace selection	7		2	I look at the cards, the colour difference of the light just occurred to me	4.5
13) The display near the entrance of the office give me enough information to make a workplace selection	7	i love it	6		6.5
14) I fully comply to the rules of the workstyle indicated at my desk	6		3	who makes the rules?	4.5

15) Co-workers at my desk group fully comply to the rules of the workstyle indicated at my desk	6		5		5.5
16) I found it easy to change the workstyle card whilst I was sitting alone at the desk group	7		7		7
17) I found it easy to change the workstyle card whilst there were co-workers at the desk group	4		4	I didn't try	4
18) The three workstyle options allow me to clearly communicate my workstyle preference	7		6		6.5
19) To communicate my workstyle, the number of workstyle options are… (4 is exactly enough)	4		4		4
20) Through the availability of workstyle preference, I feel that I can better connect to other people at the office	6		4	I didn't feel the need to connect today	5
21) Through the availability of workstyle preference, I feel that I can better focus at the office	7		6		6.5

22) What other information would allow you to make a better workplace selection (for example: location of specific people, sound level, temperature, etc.)		my teammates, where are they?		A heatmap style plan would be nicer to read since the table clusters are too close together	
23) Do you have any suggestions or questions that have not yet been covered?				nee	

Appendix VII: Individual workstyle indicators

Design
Having access to workstyle indicators does not prevent adjacent co-workers to have another workstyle preference. The users of the low-fidelity GEMMA indicators said the prototype was mainly used to show other office occupants that they preferred to not be interrupted. The observations of the prototype show that occupants with distinct workstyle preferences worked adjacent to each another. The information this floorplan communicates is too specific to cluster based on workstyle preference.

The digital zone indicators from design intervention 4, on the other hand, did allow its users to cluster based on workstyle preference. However, due to the indicators used being zone indicators, users perceive less control over their own workplace. If this issue continues to exist, a situation can occur that is similar to element indicators, where other office occupants ignore the zone indicators since they reflect the zone's workstyle rather than the individual's.
A combination of the clustering capabilities of zone indicators and the workplace control of low-fidelity GEMMA indicators could enable workstyle clustering whilst retaining an individual's control over their workspace. How to combine these two prototypes is the design challenge prototype 5 faces.

The zone indicators mark an area of 4 desks per indicator. Therefore, 4 office occupants are able to cluster at a single indicator. The low-fidelity GEMMA indicators only communicated the workstyle preference of its user. Having individual indicators interact with indicators of adjacent desks, allows the indicators to respond to changes in workstyle preferences in a zone. By doing this, miss matches in workstyle preferences can be identified and used to call the indicator users to action. This action can either be adjusting the workstyle preference, so no miss matches exist or moving to a new workplace that corresponds with the same workstyle preference.
There are several variants of deciding who needs to be called to action. However, it is important that office occupants agree on this decision. If there is no agreement on this, there is a higher change for this call to action to be ignored.

Call to action based on workstyle popularity
There are two variants of calling to action based on popularity: the minority is called to action or the majority is called to action.

By calling the majority to move to a new workplace, the office occupants create a new zone that conforms their preferred workstyle. By doing this, office occupants create new workstyle zones to support the distinct workstyle preferences within the office. This enables for a wider variety of workstyle preferences present within the office.

Calling the minority to move to a new workplace has a similar effect. However, it has been indicated that the AMS office occupants prefer to sit at the same workplace for the entire day. Therefore, I expect the minority will be more likely to adapt their preference to the preference of the majority. This will lead to a more efficient space usage, since there are no workstyle zones

with only a single member.

Call to action based on workstyle indication order
Flexible offices provide workplaces for occupants with a flexible agenda. Therefore, it is not uncommon for office occupants to arrive later during the day or change their workstyle preference during the day. Changing the preferred workstyle over the day causes the new workstyle preference to be different from the workstyle preference the occupant used for workplace selection. When calling office occupants to action, a decision could be made regarding if the occupants with a new preference should be called to action, or the office occupants with the older preference?

By calling office occupants with the older workstyle preference to action, you ensure that the most recent workstyle preferences are present at the office. This creates a cycle, where the workstyle preferences which are more relevant earlier in the day will be replaced by workstyles that become more relevant later during the day.
On the other hand, calling office occupants with a new workstyle preference to action ensures that the workstyle preferences which were used for workplace selection are maintained in the office.

Call to action based on workstyle noise level
Currently, office occupants (re)locate their workplaces based on the noise level, with the burden of relocation being for the lowest sound level workstyle preference. If an office occupant has a more quiet workstyle preference (e.g. needs to focus), they are expected to find a quiet area in which they can perform their activity. If an office facilitates enough focus rooms/areas, this solution improves perceived performance and productivity (Haapakangas, et al., 2018).
To achieve focus, the rooms/areas should be quiet. This is either achieved by everybody in the room being quiet or the room being isolated from noise.
Calling the occupants with the loudest workstyle preference to action changes the purpose of the main working area to be a focus room. If a worker wants to have a conversation or meeting, they are requested to move to a “non-focus” work area. Furthermore, by calling the occupants with the loudest workstyle preference to action requires less dedicated workplaces. Occupants with louder workstyle preferences can be clustered in the same area since there is less need for auditory privacy.

Call to action priority selection.
Using workstyle indication order for calling to action priority, relies on the most assumptions. Calling the occupants with the oldest workstyle preference to action assumes that there is a daily cycle with distinct activities being more present at specific times of the day. If this assumption is true, there would be no need for indicators, since the workstyle preference of all occupants would be in sync with the time of day.

Calling the occupants with the newest workstyle preference to action renders the indicator useless. With this prioritization, as soon as an office occupant changes preference with adjacent co-workers, they are called to either change their preference back or move to a new workplace. Since changes can happen multiple times a day, the office occupant would need to move every time the preferred workstyle changes.

Calling the occupants with the minority workstyle preference to action feels like the most straight forward solution. In this example, there is a group of office occupants who have workstyle preference A, whilst one occupant has a workstyle preference for B. Using this prioritization, the single office occupant needs to adjust his/her preference or select a new workplace. This requires a facility that enables office occupants to move to an aree/room where that workstyle preference is possible. As discussed before, this can be the case in an ABW office, yet is more uncommon in OPO. Furhtermore, AMS office occupants tell that they are reluctant to change workplace during the day. This is an overarching problem applicable to all solutions. This problem does suggest that calling the occupants with the majority preferred workstyle to action would cause a more reluctant reaction since more office occupants are called to action.

One of my assumptions is that the more reasonable the justification is for who needs to be called to action, the more likely office occupants are to take action when mismatches in workstyle preferences occur. Calling louder workstyle preferences to action provides a reasonable justification. Whilst you can create noise in a silent environment, you can't create silence in a noisy environment. Therefore, calling the occupants with the loudest workstyle preference to action facilitates two goals; focused work and social interactions. Office occupants who want to have social interaction can be called to move and look for another workplace amongst co-workers who also prefer a social workstyle. For AMS, this can also improve inter team interaction, since office occupants are able to identify which co-workers want social interaction.

This approach of calling to action assumes that office occupants find calling occupants with louder workstyles preference to action more reasonable than a minority-based system. Prototype 5 will explore this assumption.

How to call to action

A call to action from an indicator must be clear enough for the user to understand that an action needs to be performed. In the case of workstyle indicators, it must be clear enough for the user to identify that their workstyle preference is a mismatch with the workstyle preference of adjacent co-workers. Therefore, the indicator must show what the workstyle preferences of adjacent co-workers are.

Furthermore, only displaying this information might not draw the attention of the indicator user who needs to perform a certain action. To ensure that the user notices the mismatch between workstyle preferences, a notification must be presented by the indicator.

Communicating this information and notification can be done in several different ways. Two prototypes are tested in prototype test 5;

Figure VII.1

Stand

This prototype displays the workstyle preference of adjacent indicators through a display. The display lights up partially, corresponding to the location the other indicator. The own preferred workstyle is communicated through a light on top. When there is a mismatch between workstyle preferences, the light on top starts blinking. This prototype is designed to be as simple and intuitive as possible.

Cylinder

This prototype displays the workstyle preference of adjacent workstyle preferences through rings of light. The upper light is the user's preference, the rings below display the preference of the adjacent users. The rings are built up from the top. If there is a mismatch between workstyle preferences, the top light starts blinking. This design is based on an iteration of the low-fidelity GEMMA indicators, where the user slides the indicator in a similar fashion to decide which mode is preferred.

Figure VII.2

Test

Goal
This user test covers interaction on a desk-to-desk level with the prototype. The main goal of this user test is:

Evaluating interaction between users and on-desk individual workstyle indicators whilst performing work tasks.

Sub goals are:

- *Analyze the usability and user experience of the cylinder prototype*
- *Analyze the user experience of the stand prototype*
- *Test the assumption that calling the user with the loudest workstyle preference to action is perceived as reasonable*
- *Test the assumption that information about adjacent indicators on the user's own indicator is required by the user to identify a call to action*
- *Test the assumption that a notification about a mismatch between adjacent workstyle preferences is required by the user to identify a call to action*

Method
The user research is conducted by asking participants to perform a task. After the task is performed, the participants are asked to fill in three questionnaires. 2 questionnaires for the cylinder prototype (AttrakDiff and SUS) and 1 for the stand prototype (AttrakDiff). After these questionnaires, an interview will be conducted, gathering qualitative data. The entire user test is filmed for analysis.

Data covering the usability and user experience will be acquired by asking the participants to fill in three questionnaires after performing the task. Data covering on-desk interaction, prototype clarity and enabling workstyle communication is acquired with an interview after filling in the questionnaires.

The user test will be conducted in an in sitro setting (Fields et al., 2007), meaning that the test will be performed in a controlled environment that simulates the real-world situation. The participants are asked to perform a task that simulates work, in this case a sudoku (appendix VII - A).

Setup

Figure VII.3 shows a top down impression of the user test setup. The materials in this user test are:

A) 2 cylinder prototypes
B) 1 stand prototype
C) 2 sudoku's with pens
D) 4 AttrakDiff questionnaires (appendix VII -B)
E) 2 SUS questionnaires (appendix VII - C)
F) 2 consent forms (appendix VII - D)
G) Camera

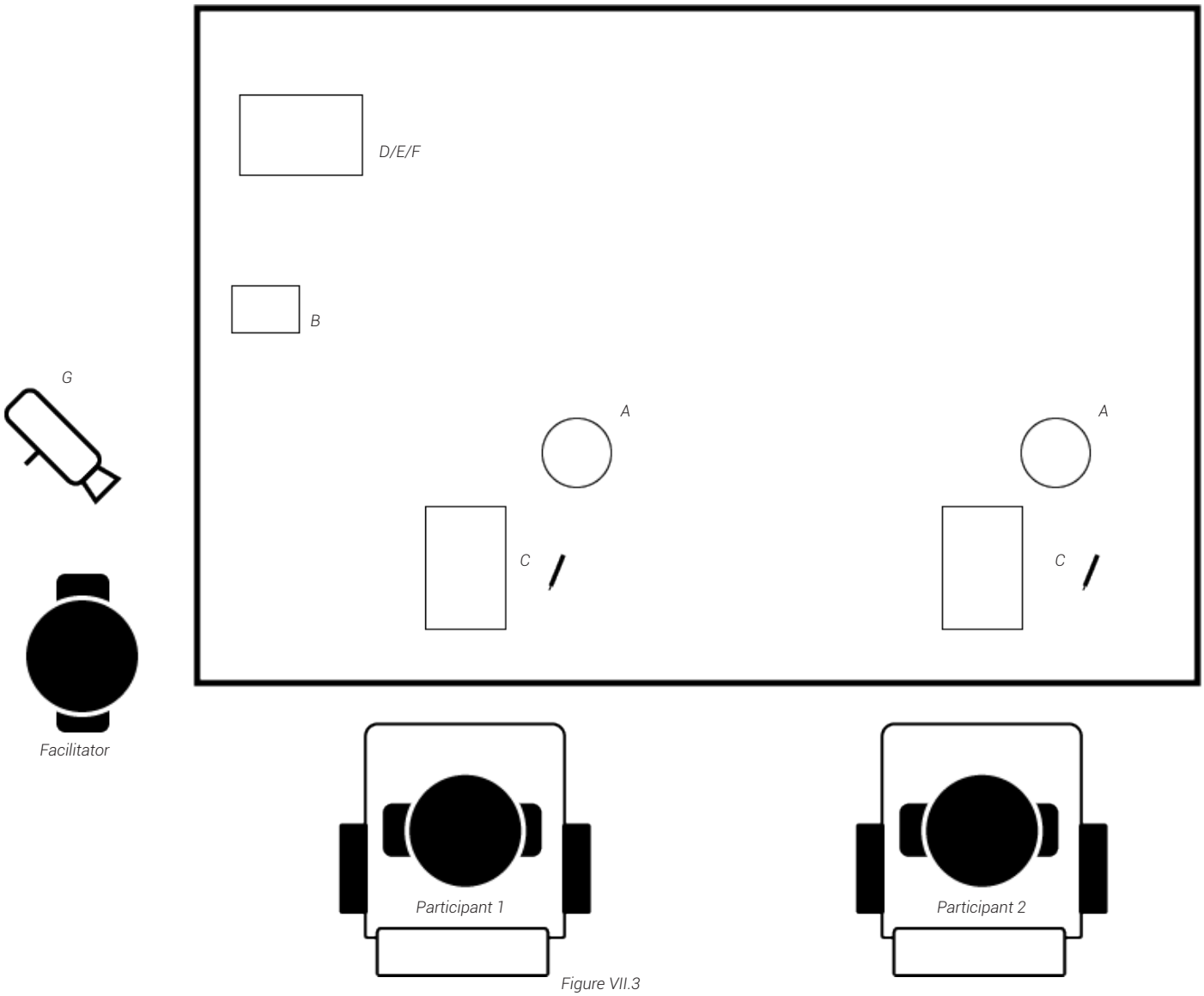


Figure VII.3

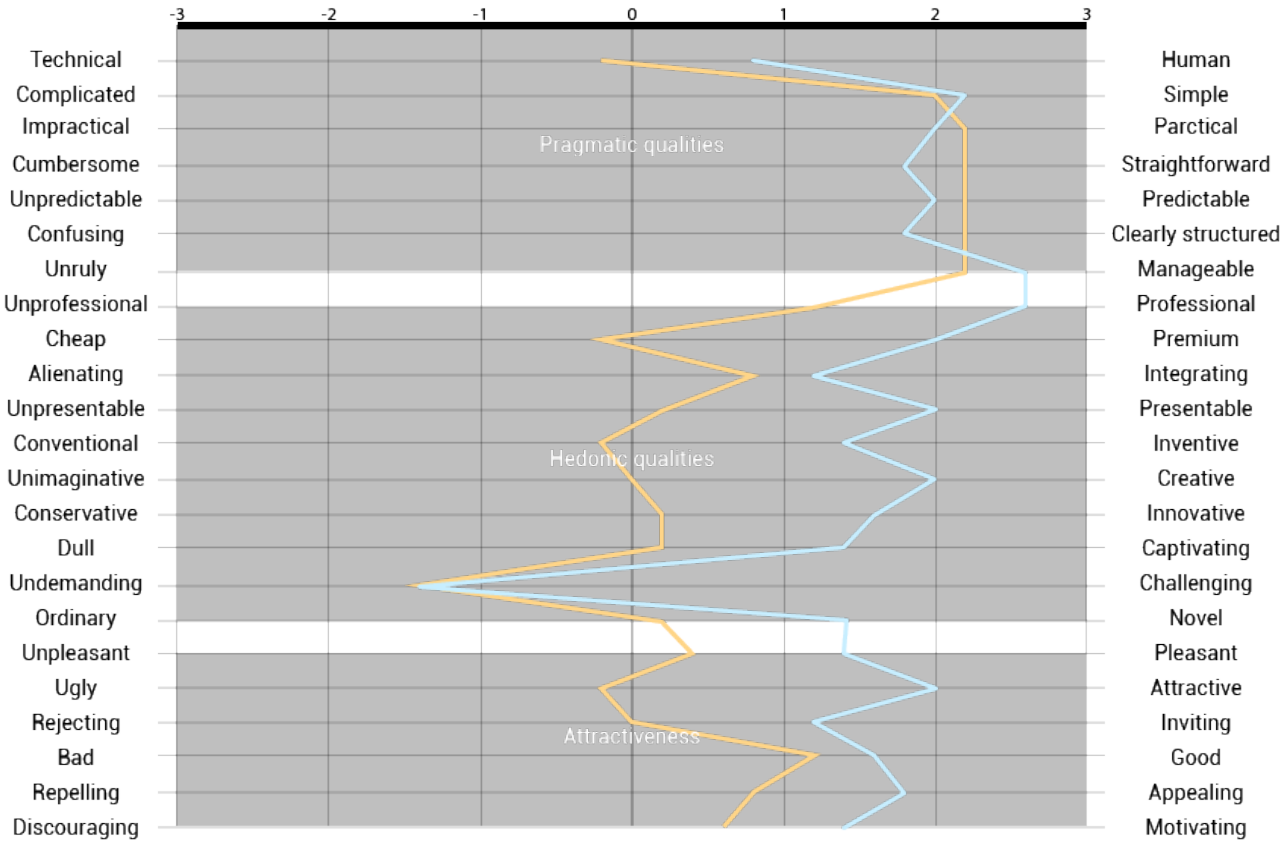
Participants
The participants are recruited from students with a (industrial) design background. The goal of the user research is to evaluate on-desk interaction between users and on-desk individual workstyle indicators whilst performing work tasks. For this final design intervention, I preferred a more controlled research than the previous more explorative interventions. Combining those two factors, the need for easily recruited participants outweighed the need for participants from the target group. Novice participants are likely to identify less usability issues, but are still able to identify severe usability problems (Sauer, Seiber, Rüttinger, 2010).

Procedure
After the participants signing a participant consent form, the recording of the session starts. The session begins with an introduction of the setting and the cylinder prototype. After the introduction, the participants are asked if they understand the setting and how to use the prototype. Once the participants confirm that they understand the setting and how the prototype works, they are asked to fill in a sudoku. This sudoku simulates a work task. The participants are asked to use the cylinder prototype whilst performing their task. Whilst the participants perform the task, I will use the stand prototype to simulate another co-worker. After 5 minutes have passed, the participants are asked to fill two questionnaires concerning the cylinder prototype. As soon as the participants are finished filling in the questionnaires, they get an explanation about the stand prototype. Afterwards, they are asked to fill the third questionnaire, covering the stand prototype. When the final questionnaire is filled in, a semi-structured interview will take place (appendix VII - E).

Results
SUS
Results from the SUS questionnaire can be found in appendix VII - F. This gives the prototype a sus score of 84,5, scoring it between great (SUS score of 71.4) and excellent (SUS score of 85.5) (Bangor, Kortum, Miller, 2009; Brooke, 1996).

AttrakDiff

The results of the AttrakDiff questionnaire are shown in figure VII.4. The exact results can be found in appendix VII - G.



Interviews
The notes from the interviews can be found in appendix VII - H

Discussion
The results from the AttrakDiff show that pragmatic qualities of both prototypes are very similar rated with a slight advantage to the stand prototype. However, the cylinder scores higher in both hedonic qualities and attractiveness. All participants also tell during the interviews that they prefer the cylinder over the stand. They find it more attractive, more inviting and mechanically more enjoyable to interact with.

The stand scoring slightly higher on pragmatic qualities is mostly attributed to the controls and the added feature of the display. However, over the course of the interviews, all participants find that both the display and the rings are not necessary to determine if there is a mismatch in workstyle preference. Especially for the cylinder, participants find it easier to look up at the other indicator than to identify which ring corresponds with which indicator. However, being notified that there is a mismatch was perceived as a useful call to action.

A concern shared by 4 of the 5 participants was that people who have a more quiet workstyle preference can force people away from their workplace. This would feel unfair since they were sitting there first. However, considering that office occupants who have that work preference need to focus, it seems counter intuitive for them to go to a workplace with talking co-workers. However, this assumption can be considered in further development.

Even with the raised concern of workplace dictation by others, all participants agreed on calling non-focus workstyles to action. However, the participants of the first session came with the notion that green and yellow can sit next to each other, since there is no difference between the noise level those workstyles produce. Having a non-work-related conversation should produce the same noise level as a work-related conversation. The difference being that the team work workstyle indicates that the user prefers not to be interrupted for non-work-related conversations.

Reflection
Reflecting on the design, there is no need to indicate the workstyle preferences of adjacent co-workers on each indicator. Since their indicators are visible to the user, it is easier to look up and see what their status is, rather than looking at your own indicator. Removing the status of other indicators, the indication ring will sit next to the light, making that easier to understand.
Using only (industrial) design students could have impacted the results compared to the AMS office occupants. On the one hand, they are more accustom to user tests, which influences how they proceed to give feedback to the designer. They have a different look towards products than most non-designers have. However, they are also more aware of possible usability issues, compared to non-designers who can be impressed by using prototypes. Therefore, in future studies, it is recommended to verify the findings with the actual target group.

Appendix VII - A: Sudokus

Each participant was given sudoku randomly

3			6	2			9	
			5					
					4			
7					2			6
2		3	8				4	9
	9			6		7	8	2
	3	2	1	4	6	9	7	
4				5	3	6	2	
5	7	6	2			4		

5	2			1	3		4	7
4		9		2		6	3	
3					4	1		
	8	1				2		
2	5	4	9	7	1	3	6	
6	7			4	8			9
8		6					5	1
7		2	1			8		
	3		7	8	9	4		6

8	3	7	2	5	9	1	6	4
4	6	9	7	1	3	5	2	8
5	1	2	4	6	8	9	7	3
7	4	6	8	2	1	3	5	9
9	5	3	6		7	8	1	2
1	2	8	3	9	5	6	4	7
6	7	5	9	8	4	2	3	1
3	9	1	5	7	2	4	8	6
2	8	4	1	3	6	7	9	5

Appendix VII - B: AttrakDiff questionnaire

Name : _____

Please rate the experience of operating The concept with followings qualities:

	-3	-2	-1	0	1	2	3	
technical								human
complicated								simple
impractical								practical
cumbersome								straigntforward
unpredictable								predictable
confusing								clearly structured
unruly								manageable
unprofessional								professional
cheap								premium
alienating								integrating
unpresentable								presentable
conventional								inventive
unimaginative								creative
conservative								innovative
dull								captivating
undemanding								challenging
ordinary								novel
unpleasant								pleasant
ugly								attractive
rejecting								inviting
bad								good
repelling								appealing
discouraging								motivating

Appendix VII - C: SUS questionnaire

Name : _____

Please rate the concept with following:

I think that I would like to use this product frequently.

strongly disagree	1	2	3	4	5	strongly agree

I found the product unnecessarily complex.

strongly disagree	1	2	3	4	5	strongly agree

I thought the product was easy to use.

strongly disagree	1	2	3	4	5	strongly agree

I think that I would need the support of a technical person to be able to use this product.

strongly disagree	1	2	3	4	5	strongly agree

I found the various functions in this product were well integrated.

strongly disagree	1	2	3	4	5	strongly agree

I thought there was too much inconsistency in this product.

strongly disagree	1	2	3	4	5	strongly agree

I would imagine that most people would learn to use this product very quickly.

strongly disagree	1	2	3	4	5	strongly agree

I found the product very cumbersome to use.

strongly disagree	1	2	3	4	5	strongly agree

I felt very confident using the product.

strongly disagree	1	2	3	4	5	strongly agree

I needed to learn a lot of things before I could get going with this product.

strongly disagree	1	2	3	4	5	strongly agree

Appendix VII - D: Consent form

Participant consent
I am voluntarily taking part in a research study conducted by Rik de Rijcke for the purposes of analyzing the usability of the concept. I understand that my participation will be recorded on digital audio and that I will be photographed.
I understand that data and information I share today will be handled confidentially and anonymously.
I understand that the audio recordings and photographs will not be used for any commercial purposes whatsoever. The audio recordings and photographs may be part of information presented at professional conferences.
I will not be identified by name or by showing my face. My personal information will be protected; taking part in this study and the results from the study are not part of my performance review; my manager won't have access to the notes or data you help us gather. My information will be rolled up with the rest of the data from the other study participants.
I waive any right that I may have to inspect or approve the final recordings, photos and report. I discharge Rik de Rijcke from any liability for making, editing or using the recordings and photographs from this study according to the uses outlined above.

Signature: _____

Name: _____

Date: _____

Appendix VII - F: SUS results

	Participant 1	*Participant 2*	*Participant 3*	*Participant 4*	*Participant 5*	*Average*
Question 1	*5*	*4*	*4*	*3*	*4*	**4**
Question 2	*2*	*2*	*2*	*2*	*3*	**2.2**
Question 3	*5*	*4*	*5*	*4*	*4*	**4.4**
Question 4	*1*	*1*	*1*	*1*	*1*	**1**
Question 5	*4*	*4*	*4*	*4*	*4*	**4**
Question 6	*1*	*1*	*1*	*2*	*2*	**1.4**
Question 7	*4*	*5*	*4*	*5*	*5*	**4.6**
Question 8	*1*	*1*	*1*	*2*	*2*	**1.4**
Question 9	*5*	*5*	*3*	*3*	*5*	**4.2**
Question 10	*2*	*1*	*3*	*1*	*1*	**1.6**

After conversion

	Participant 1	*Participant 2*	*Participant 3*	*Participant 4*	*Participant 5*	*Average*
Question 1	*4*	*3*	*3*	*2*	*3*	**3**
Question 2	*3*	*3*	*3*	*3*	*2*	**2.8**
Question 3	*4*	*3*	*4*	*3*	*3*	**3.4**
Question 4	*4*	*4*	*4*	*4*	*4*	**4**
Question 5	*3*	*3*	*3*	*3*	*3*	**3**
Question 6	*4*	*4*	*4*	*3*	*3*	**3.6**
Question 7	*3*	*4*	*3*	*4*	*4*	**3.6**
Question 8	*4*	*4*	*4*	*3*	*3*	**3.6**
Question 9	*4*	*4*	*2*	*2*	*4*	**3.2**
Question 10	*3*	*4*	*2*	*4*	*4*	**3.4**
Total score after conversion	*90*	*90*	*80*	*77.5*	*82.5*	**84**

Appendix VII - G: AttrakDiff results

Cylinder prototype results

	Participant 1	*Participant 2*	*Participant 3*	*Participant 4*	*Participant5*	**Average**
Technical/human	*2*	*1*	*0*	*0*	*1*	**0.8**
Complicated/simple	*2*	*2*	*3*	*2*	*2*	**2.2**
Impractical/practical	*3*	*2*	*3*	*1*	*1*	**2**
cumbersome/ straightforward	*2*	*1*	*3*	*2*	*1*	**1.8**
unpredictable/predictable	*3*	*1*	*2*	*2*	*2*	**2**
confusing/clearly structured	*2*	*1*	*2*	*2*	*2*	**1.8**
unruly/managable	*3*	*2*	*3*	*3*	*2*	**2.6**
unprofessional/professional	*3*	*3*	*3*	*2*	*2*	**2.6**
cheap/premium	*3*	*3*	*2*	*1*	*1*	**2**
alienating/integrating	*2*	*2*	*1*	*-1*	*2*	**1.2**
unpresentable/presentable	*3*	*3*	*2*	*0*	*2*	**2**
conventional/inventive	*1*	*3*	*2*	*-1*	*2*	**1.4**
unimaginative/ creative	*1*	*3*	*3*	*1*	*2*	**2**
conservative/innovative	*1*	*3*	*1*	*1*	*2*	**1.6**
dull/captivating	*2*	*2*	*-1*	*2*	*2*	**1.4**
undemanding/chellenging	*-1*	*-2*	*-2*	*-2*	*0*	**-1.4**
ordinary/novel	*0*	*3*	*2*	*0*	*2*	**1.4**
unpleasant/pleasant	*3*	*2*	*1*	*0*	*1*	**1.4**
ugly/attractive	*3*	*3*	*2*	*1*	*1*	**2**
rejecting/inviting	*3*	*2*	*1*	*-2*	*2*	**1.2**
bad/good	*2*	*2*	*2*	*1*	*1*	**1.6**
repelling/appealing	*3*	*2*	*2*	*1*	*1*	**1.8**
discouraging/motivating	*3*	*2*	*2*	*-2*	*2*	**1.4**

Stand prototype results

	Participant 1	*Participant 2*	*Participant 3*	*Participant 4*	*Participant5*	**Average**
Technical/human	*2*	*-1*	*1*	*-1*	*-2*	**-0.2**
Complicated/simple	*3*	*3*	*2*	*1*	*1*	**2**
Impractical/practical	*3*	*3*	*2*	*1*	*2*	**2.2**
cumbersome/ straightforward	*3*	*2*	*3*	*3*	*0*	**2.2**
unpredictable/predictable	*3*	*2*	*2*	*3*	*1*	**2.2**
confusing/clearly structured	*3*	*3*	*3*	*1*	*1*	**2.2**
unruly/managable	*3*	*2*	*2*	*3*	*1*	**2.2**
unprofessional/professional	*3*	*2*	*2*	*0*	*-1*	**1.2**
cheap/premium	*-1*	*0*	*3*	*-1*	*-2*	**-0.2**
alienating/integrating	*2*	*2*	*1*	*-1*	*0*	**0.8**
unpresentable/presentable	*0*	*1*	*2*	*-1*	*-1*	**0.2**
conventional/inventive	*0*	*1*	*1*	*-2*	*-1*	**-0.2**
unimaginative/ creative	*-1*	*1*	*3*	*-2*	*-1*	**0**
conservative/innovative	*0*	*1*	*2*	*0*	*-2*	**0.2**
dull/captivating	*-1*	*2*	*2*	*-1*	*-1*	**0.2**
undemanding/chellenging	*-3*	*0*	*-1*	*-2*	*-1*	**-1.4**
ordinary/novel	*0*	*1*	*2*	*-1*	*-1*	**0.2**
unpleasant/pleasant	*2*	*1*	*1*	*0*	*-2*	**0.4**
ugly/attractive	*0*	*1*	*0*	*-1*	*-1*	**-0.2**
rejecting/inviting	*1*	*2*	*0*	*-2*	*-1*	**0**
bad/good	*2*	*2*	*1*	*1*	*0*	**1.2**
repelling/appealing	*1*	*1*	*2*	*1*	*-1*	**0.8**
discouraging/motivating	*2*	*3*	*0*	*-1*	*-1*	**0.6**

Appendix VII - H: Interview notes

Session 1

Participant 1 thinks it is good that red has priority over yellow and green, only thinks that it is “weird" that there is no majority system
Participant 2 thinks it is a downside that you can force someone else into adapting your preference, since you were there first.

As soon as the "ghost participant" switched to red, both participants reacted by switching to red
After a minute, Participant 1 switched to green, Participant 2 observed this and followed suit.
Both participants remained quiet after switching to green.

Participant 1 asks about where the prototype will be used, if it is the size of the prototype, he would prefer it to be in the office, if it is smaller he would like to own the product himself.
Participant 2 would like to take it home to use without other indicators, just for the people in proximity, preferred to be not connected to the office.

How did it go?
Participant 2: “I did feel like I wanted to ask for help, but that was not possible! Because of the dude sitting next to me who wanted that I remained silent"
He thinks that the mismatch (green -> red) would solve itself over time since there are enough available silent workspaces, or he would suggest sitting somewhere else to the person with the same preference as himself, but he only thought of this during the discussion
Participant 1: “It is that we are just with the 3 of us, and it is literally social pressure", he did not feel social pressured, yet admitted that due to the red light at his indicator, he was not going to talk
Participant 2: He liked the concept to communicate to others when you arrived first: "it is not silent because I sit here alone, I sit here alone because it is silent."

Were the prototypes clear?
Participant 2: it became pretty quickly apparent that the lights in the other rings were the preferences of the other people at the desk, but the indicator on top would make more sense in the ring which you slide up or down. The current order is: "I am this [pointing at the top], these are other people [pointing at the other rings], and this is me again [pointing at the indication ring]"
Participant 1: agreed to Participant 2, suggest that your own color is next to the slider

Would you prefer the slider ring on top?
Participant 2: possible
Participant 1: he liked the indication of yourself on top and the others below so you can quickly scan an area, upper layer clearer than the rest
Participant 2: if the indicator indicates a mis match, I don't need to have the other lights in my indicator
Participant 1: if you increase the number of rings, you get a Christmas tree (no longer distinguishable). If there is a large variance, make it yellow.

The prototype shows the rings of adjacent indicators, do you think it is necessary to show that on your own indicator?
Participant 2: nope
Blinking is enough?
Participant 2: yes, it is easier to just look around than to identify who is who using the prototype
Participant 1: If it is just the adjacent people, it becomes too much lights

The other prototype indicates which person has which setting, would you prefer that? or is that too much?
Participant 1: depending on the size from the table, looking up is easier, “it is nonsense to have a screen when you can look up"

It was just mentioned, but you didn't think of it, but if you do, would this prototype trigger you to move to another location?
Participant 2: In this situation, it is a clear silence are and there are desks available around the corner, then I would move, in a more open area becomes more difficult to determine what to do, the function of the prototype only works if people abide by the rules, if I put it on red I would like other people to be silent, so therefore I would also be silent

Do you think this leads to workspace selection based on workstyle preference?
Participant 2: mostly red people would sit in another area, green and yellow can sit next to each other, it is oké if someone else talks, as long as they don't bother you, and since you are in yellow, others can identify that you only want to talk about work
Participant 1: it also depends on the difference between yellow and green. Yellow: I am working but you can interrupt me, Green: I am no longer working, we can chat. I don't know what it is, Red is I don't want to be interrupted

Does that make red scary?
Participant 1: definitely! very dominant, but the more interesting thing are the other two modes. Showing that you need to be silent in an area is where silent areas are for. There is a subtle difference between green and yellow which might require a tool, whilst for red you can address a specific room

Participant 2: I expect it to be mostly on yellow, since green is more spontaneous. If the conversation in yellow expands into a casual conversation I would switch to green, that just happens. When you change your mind, it can be weird if you change the indicator since you communicate to the other person that he needs to leave

Are you afraid it will take the spontaneous conversations away?
Participant 2: what I want is very dependent on the moment. the reality is that I need to perform A lot of work, yet I realize that I can sometimes do something different. I am not the kind of person that decides "until the break I don't want to hear anybody, in the break..." if someone is near, they

can have a conversation

But why wouldn't you set it on green?
Participant 2: green would be too much of an invitation, but maybe if everybody has an indicator this will be different
Participant 1: maybe another color? Since green is too invitational, therefore only yellow matters.

Do you have any questions or recommendations?
Participant 1: the slider would be nice if it was really smooth

You would prefer that over the buttons?
Participant 1: definitely. It could also be a bit smaller, depending if you need to take it with you

They start joking around that they can put it on green and talk about video games, then they start with the sudoku and participant 2 puts it on red, participant 1 on yellow.
When the “ghost occupant" puts it on red, participant 1 asks me what blinking meant
participant 1 put the indicator on green to see if it stops blinking, after which he puts it back in yellow,
participant 2 then proceed to put it his indicator in yellow as well
the “ghost occupant" responds by also going into yellow

participant 2: so now we are all open for conversations?
participant 1: yes
participant 2: how is your sudoku going? (work related conversation)
Participant 1: I have 2 (start collaborating)
The “ghost occupant" presses red and both participants start to whisper, discussing that they can also move to another workplace

Participant 2: we want to talk with each other, but the other person wants silence, do we need to move, or does the other person needs to move?
I point at the blinking and ask; “what do you think needs to happen?"
Participant 2: I decide, so I am the boss... (to the ghost participant)"sorry, do we disturb you? Go somewhere else quickly"

Participant 2: we are both blinking
Participant 1: maybe we need to go
Participant 2: it makes sense, because he needs to focus, so if he needs to move, he breaks his focus.
Participant 1: but if we leave, we also break his focus
Participant 2: but we can easily move, we only have a single sheet
Participant 1 “brings" his sudoku to the next workspace

How did it go?
Participant 1: I didn't know what to do about the blinking light
Participant 2: if there is just one person on red, and you want to talk, you can't really talk
Participant 1: but if there are clear agreements on what to do

Why did you come up with the idea to leave?
Participant 2: if it needs to be quiet, then it's stupid to say, hey we want to talk, can you go somewhere else? if you are already the active person, it is better to move yourself.

And do you (Participant 1) think that is fair, or would you do it different?
Participant 1: agreed with Participant 2, it is a way to say to somebody “I would appreciate if you go somewhere else" without creating a “huss".

You can also think that if someone changes status that you go along with that person
Participant 2: I felt that someone indicating that he wants to focus makes me also switch to that state

Did the blinking trigger you to take action?
Participant 1: it mostly made me wonder what I should do, not doing something. After not knowing what to do, I thought f*** that.

Because it was not clear or because of the implication?
Participant 1: I need a clear ruleset.

Participant 2: When you are both on yellow, you are open for a conversation, but you are not looking for it.
Participant 1: it can also be the case that you are open for a conversation when someone else needs you

Did the prototype enable you to communicate your own preference?
Participant 2: yes.
Participant 1: I am someone who goes along what other people do, so I would go along with the other users

Do you agree Participant 2? or are you more assertive when it comes to communicating that you need to focus?
Participant 2: more assertive, but also because you don't have to say it explicitly.

Do you think it is required to have interaction between indicators?
Participant 1: depends on visibility, if in sight, indications of others are not required. It seems obvious that mismatches are clear to adjacent occupants

Participant 2: what if you are sitting nicely, and someone comes to your desk and turns it red, do you get your things and go?
Participant 1: It also makes things clear, if people come and sit next to you and they set it on red, then you don't talk to them, but you can still talk
Participant 2: I would feel uncomfortable if everybody wants a quiet area and I...
Participant 1: If I was there first, then I would not feel uncomfortable, then you wouldn't sit there

Did you have any questions or recommendations?
Participant 1: I prefer the cylinder over the stand, it is easy in use, yet the other gives a clearer overview who is who
Participant 2: the cylinder feels newer; the stand looks dated

Participant 2: the ring not being transparent is a downside.

Participant 1: but you can see it on top

Participant 1: although the stand looks fancier, the mechanic of the cylinder feels better

Portable or fixed?
Participant 1: fixed, if every desk is equipped with this tool, why would you need your own?
Participant 2: if you make them fixed, it will make you feel uncomfortable when taking 2 places
Participant 1: you should make it pop up
Participant 2: I would prefer it to be fixed so you can use it singlehandedly, I like the “click-less” design

Would you prefer it to be smaller?
Participant 1: yes
Participant 2: No

Participant 2: concern; if everybody is green, it can turn the office in a bar
Participant 1: it is still an office

Participant 2: concern; would you dare to approach green indicators? Answer: it could be easier, assumption

Participant 2: it is nice that when you get stuck and need feedback, that you can see other people who are open for that

Participant 2: concern: complex problem questions.

Participant 2: agrees with the lighting on top for quick scanning in the office

Session 3

After introduction
Participant: I'll start working hard (puts the indicator on yellow)
Does not initially respond to the ghost indicator switching mode to focus. After a while, changes the indicator to green.

Participant; it is hard to identify which light corresponds with which indicator.

How did it go?
Participant; I liked it, it is inviting to interact with. However, you should make the colors duller and the selection ring brighter or transparent, it blocks what your setting is.
Blinking is distracting.

Does the blinking trigger you to take action?
Participant; not yet, it didn't bother me in this situation, but maybe if you are working a screen where it is more in line of sight it can be distracting.

Was everything clear?
Participant; this indicator shows the preference of others in rings, but I must look around to identify where those other rings are. Otherwise it is unclear

And compared to the other prototype?
Participant; for that purpose, the other prototype is more useful

Your general opinion of the two?
Participant; I think the cylinder is more enjoyable, "gezelliger"

Did the prototype enable you to communicate your preferred workstyle?
Participant; if you compare this to my job, you have a system where you can indicate if you can be interrupted or not based on your phone, but you only see that if you want to call someone, but not on the table

Do you think those two systems should be connected?
Participant; yes

You said that it is hard to identify who's ring is who's, do you think it is important?
Participant; in this situation [direct visibility] they add little, you can than ask yourself if the blink function adds value

One of the goals of the prototype is to communicate mismatches, would you solve that in another way or would you leave it out?
Participant; technically speaking, we have flexible workplaces, yet everybody always sits at the same workplace, but in principle you would like to sit in an area where the same workstyle

preference is,
therefore, it might be useful to indicate what the main purpose of an area is in general

When you started working, you said, “lets start working hard” and then you put it on yellow, why did you do that?
Participant; I was open for co-worker input

Do you think that the red mode is necessary?
Participant; When performing work others can have input on the yellow mode is nice, yet most of the time you do your own thing. If you are busy you put it on red, but if you are less busy you put it on yellow or green.
I think the three different modes are good.