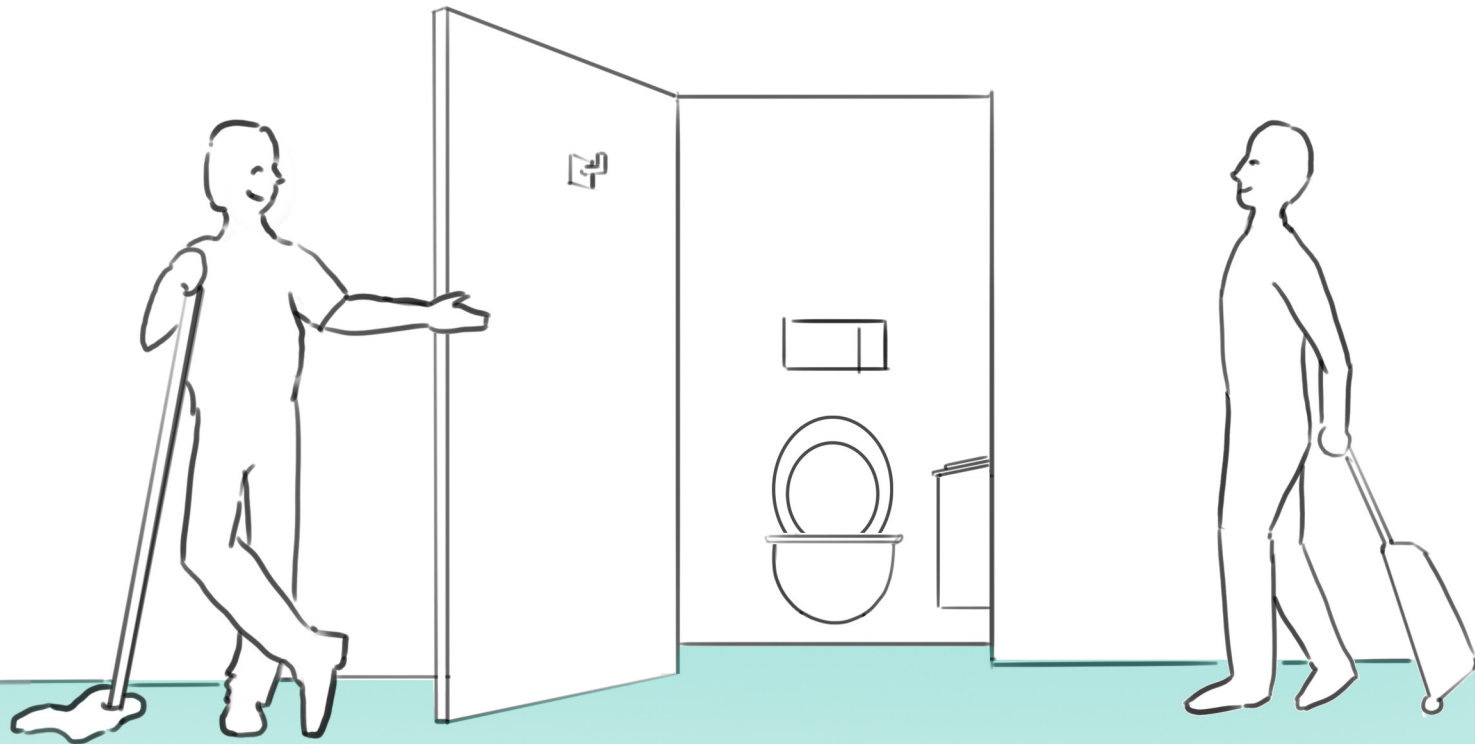


# Waste Disposal in the Toilet Cubicle

Prevention of Clogging in Wastewater Pumps through Behavioural Change in Passengers

Strategic Product Design  
MSc. graduation Yaël Moffie





# Waste Disposal in the Toilet Cubicle

Prevention of Clogging in Wastewater Pumps through Behavioural Change in Passengers

MSc. Strategic Product Design  
Graduation Report  
July 27th, 2021

**Yaël Dana Moffie**  
4441788

supervisory team



dr. P. Cankurtaran  
prof. dr. J.P.L. Schoormans



ing. B.M. Bosch  
C. Kilmamas Bsc.

# Preface

This thesis is the result of my graduation project for the master Strategic Product Design together with BAM Energie & Water Schiphol. For the past half year I have immersed myself in the world of Schiphol, construction and toilet etiquette. This opportunity showed me how design can make a change even in an environment which seems like a straightforward case. Although I think I will never stop learning, I am certain this helped to form me into the designer I want to be. I could not have done this project without the help and support of all the people around me and I would like to take this opportunity to thank all of them for this.

Thank you to my supervisory team, Pinar and Jan, for your guidance, clarity and for always being straightforward with me, and Bart and Celeste, for your knowledge, support and for the triggering exchanges of our different views on how to approach the assignment and knowledge. You all helped me to get where I am and to view not only this project, but any project from a new perspective, which I will gladly take with me into my working life.

Thank you to all the people at BAM, both within OPEX and outside, who made me feel so welcome, even though I came from such a different field. A special thank you to Bas H., with your unlimited knowledge on everything there was to know about the work lot 4 does, and for always having time to share it with me along with some good stories.

Thank you to all my friends who helped me in this process, whether through participating in my user interviews or simply by letting off steam over coffee, I could not have done it without you. Last but not least, thank you to the most important people in my life, my parents and Floris, who have always believed in me and cheer me up whenever needed.

This report also concludes my time at the faculty of Industrial Design Engineering of Delft University of Technology, which was an adventure all six years long. I will look back at this time with gratitude for the knowledge and beautiful experiences I have gotten and look forward to an unknown, but definitely exciting future, now as full-fledged strategic designer!





# Executive summary

As main contractor at Amsterdam Schiphol Airport, BAM Infra Energie & Water strives for optimal asset maintenance for each and every one of their assets. In order to achieve this, one of the components which needs to be improved are the amount of malfunctions of Schiphol's sewage pumping stations. These are caused by all types of obstructions, but especially towels and wipes. So far, BAM's technically oriented solutions have not shown sufficient improvement.

This was the base for this graduation project, in which I took a designerly, human oriented approach into solving the obstructions. I have tried to solve the obstructions at the source: the passengers at the airport. The goal of this project is to design a behavioural intervention, to prevent passengers from flushing waste down the toilets in the first instance.

After reviewing research done into behavioural change and toilet design, as well as an evaluation of the stakeholders involved, a user research was set up to identify the behaviour which causes the flushing of waste and the reasons behind this. This was done in the form of exploratory interviews among a population representative of the possible visitors passing by at the airport.

With the initial research, five design directions were established as a basis for ideation: signage, waste bins, towel dispensers, removing opportunity and feedback. A myriad of solutions were combined into an initial concept proposal, to be refined into a final, two-part concept:

1. A design of a new, user friendly and hygiene oriented waste bin, to be implemented in the individual toilet cubicles. The availability and user oriented design needs to make throwing waste into the bin more attractive than flushing it.
2. A repositioning of the cleaning personnel, where they are more in the forefront in a host-like manner. This will establish a connection with the passengers to give them a feeling of responsibility over the cleanliness of the toilet area, as well as a feeling of being watched to ensure the passenger behaves better.

Combining these two interventions should trigger the passenger enough to lower the amount of waste being flushed and eventually the number of obstructions in the pumps. To confirm whether this concept actually achieves the intended behavioural change, a second user test was performed, in which the user group gave their thoughts on the new situation with the help of a use scenario to help them imagine themselves in this situation.

With the user evaluation, as well as in-depth interviews with the three main stakeholders, BAM, Schiphol and cleaning company Vebego, the concept was optimised for implementation. The concept and its implementation came together in the final strategy, which consists of a detailed plan for a six month pilot to evaluate the effects in real life and the possible definite implementation of the concept after that.

# List of definitions

Due to the number of stakeholders and the specific context, this report contains many definitions and abbreviations. An overview of the most important ones can be found in the table below.

Abbreviation / definition	Explanation
BAM	BAM Infra Energie & Water Noord-West, commissioner of this project
AAS / Schiphol	Amsterdam Airport Schiphol
SPD	Strategic Product Design, the specific master specialisation for which this project is done
IDE	Industrial Design Engineering, the overarching study/faculty of SPD at Delft University of Technology
OPEX	Operational Expenditures, or maintenance
CAPEX	Capital Expenditures, or new projects
HCD	Human centred design
Wastewater pumping station	Installations for the collection and flow of wastewater, consisting of a wet well, pump and meter cabinet.
Wastewater pump	Main component of a wastewater pumping station, which is the asset which gets clogged often, the reason for this project.

# Contents

Preface	2	<b>Part seven: Appendices</b>	57
Executive summary	3	Appendix A: Insights exploratory interviews stakeholders	58
List of definitions	4	Appendix B: Questions exploratory interviews users	60
Contents	5	Appendix C: Insights exploratory interviews users	61
<b>Part one: Introduction</b>	7	Appendix D: Ideation	66
1. Project introduction	8	Appendix E: Scenario validation interviews users	71
2. Assignment	12	Appendix F: Insights validation interviews users	73
3. Project lay-out	14	Appendix G: Insights validation interviews stakeholders	78
<b>Part two: Analysis</b>	15	Appendix H: Transcript validation interview Vebego	82
4. Theoretical background	16		
5. Current solutions	20		
6. Stakeholders	22		
7. User analysis	24		
<b>Part three: Synthesis</b>	27		
8. Design directions	28		
9. Ideation	30		
10. Converging	30		
11. Final concept	32		
<b>Part four: Simulation, Evaluation</b>	35		
12. Validation interviews	36		
13. Validation evaluation	39		
<b>Part five: Decision, Iteration</b>	41		
14. Improvement of the concept	42		
15. Design for organisational change	44		
16. Strategic implementation	46		
<b>Part six: Concluding</b>	49		
17. Discussion and recommendations	50		
18. Conclusion	52		
Literature	54		



# Part one: Introduction

This chapter introduces the design project. A general introduction explains the context of BAM, Schiphol and the wastewater pumps to understand how this project came to be.

This general understanding paves the way for the assignment introduction, including the problem definition, the aim and scope of this project.

The chapter concludes with an overview of the project lay-out, including an explanation of the design methodology the research follows.

# 1. Project introduction

Koninklijke BAM Groep nv is the biggest contracting firm of the Netherlands, active in construction, infrastructure and maintenance. Their roughly 20.000 employees work all around the Netherlands, as well as the UK, Belgium, Germany and Ireland and further abroad if needed. At Amsterdam Airport Schiphol (from here on to be referred to as AAS or Schiphol), their subdivision BAM Infra Energie & Water regio Noord-West (from here on to be referred to as BAM) is responsible for - among other activities - maintenance of the wastewater pumping stations of the airport and the surrounding areas. This research focuses on the problem of clogging of these pumping stations. This is a frequent and time-consuming problem, causing wear on the assets and the malfunctioning of expensive parts.

## 1.1 Construction at AAS

In 2018, Schiphol reorganised the construction and maintenance contracts of their infrastructure (Schiphol, 2019). In the new long-term contracts, their infrastructure is divided into lots (percelen), which are allocated to various major contracting firms (see table 1), the so-called main contractors.

Each contractor is responsible for construction, investment and maintenance of the assets in their assigned lot. This includes working with the right subcontractors, which have often been around for a long period of time and know Schiphol better than anyone.

Part of the contract is also a shared strive for the optimum, specifically in the fields of sustainability, optimal return on assets, excellent organisation and innovation and digitalisation (Schiphol 2019). This urges all parties to stay ahead and innovate continuously.

This is the main reason why this project was set up by the team of the OPEX (maintenance) department of lot 4. Lot 4 is concerned with all the fluids, gasses and electronics which flow underground. This includes the origin of the assignment: sewage pumps for wastewater from Schiphol Airport itself.

Lot no.	Airport component	Responsible company
1	Runways	Heijmans Infra
2	Aircraft stands	KWS & VolkerRail (part of VolkerWessels)
3	Landside infrastructure	BAM Infra
4	Underground infrastructure	BAM Infra
5a	Terminal 1 & 2	Heijmans Utiliteit
5b	Terminal 3 & Schiphol Plaza	BAM Bouw en Techniek

Table 1: Allocation of the construction lot among the main contractors

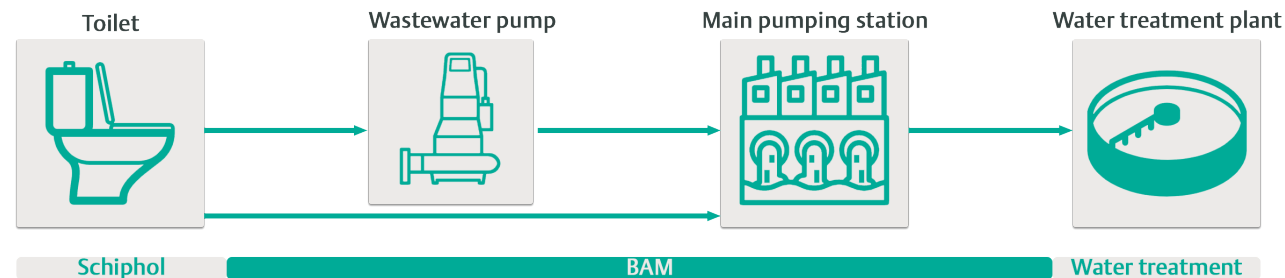


Figure 1: Schematic overview of the wastewater route and responsible parties



Figure 2: Wastewater pumping stations. From left to right: a main pumping station at Schiphol, examples of lower pumping stations and a schematic overview of the visible and invisible components of a pumping station. The lower images give a good indication of the size of the pumps.

## 1.2 Wastewater pumps

At Schiphol, wastewater from various sources and rainwater all flow together into the lower pumping stations (ondergemalen), of which there are close to eighty currently in use. These stations lead to seven main pumping stations (hoofdgemalen), which lead directly to the local water treatment plant (Nijs & Kruk, 2013). In some cases the smaller pumping stations are bypassed and the flow goes straight to the main pumping station. See also figure 1.

For the average person, the only thing there is to see is the power and

meter cabin next to a manhole, or in case of a main pumping station, an inconspicuous building. The actual pump is deep underground below this, as can be seen in figure 2.

BAM has initiated this design project, because the many wastewater installations suffer from clogging and obstructions in the pumps they contain. This is due to non-soluble rubbish, which ends up in sewage systems, for a large part because people flush it down the toilet (Unie van Waterschappen, 2019).



### 1.2.1 Different types of obstructions

The most common types of objects which cause the problematic obstructions at Schiphol are cloths, towels and wipes . These can come from both passengers, like baby wipes or paper towels, or personnel, like cleaning rags. These obstructions are so common, that in Maximo, BAM's maintenance data system, these malfunctions have even been designated a specific description category: vastgelopen/vervuiling (doekje/papier), meaning stuck / pollution (towel / paper). This has been indicated as a cause forty times since BAM started using Maximo about a year and a half ago.

According to one of the subcontractors which unclogs the systems for BAM (see also “stakeholders”), as well as Schiphol’s own subject matter expert, the most common materials found are paper handtowels, due to passengers from cultures used to squatting toilets. They supposedly use paper towels to cover the toilet seat in order to then squat down standing on top of it.

All other types of obstructions recorded in Maximo are in a general malfunctioning category. These other common obstructions include underwear, lost keys and phones and women’s sanitary products. The current Covid19 pandemic has also added facemasks and gloves to this (BAM Perceel 4, 2021).

A last type of obstruction, although with a minor role in this research, is struvite scale. Struvite are blocks of crystallised salt from urine, which gets stuck to the surface of the sewage systems. This crystallisation only occurs when there is not enough flow in the pipes to flush it away. This can be either because a toilet does not get flushed often enough, or in water-saving toilets.





Figure 3: Obstructions in wastewater pumps. Above obstructions by paper, below obstruction by towels and struvite scale



# 2. Assignment

## 2.1 Problem definition

This graduation project is engaged with the problem of clogged wastewater pumps. This problem, which costs the lot 4 OPEX team roughly €100.000,- each year in maintenance hours, parts and other costs, is one of the biggest challenges in BAM's strive for optimal asset maintenance. Although technical solutions have previously been tried, there has been little gain so far.

In order to achieve a solution, I have established that a big problem is the source of the clogging: human behaviour. Although it is difficult to pinpoint the exact origin of the objects which obstruct, for example because several wastewater sources, several toilet units, are connected to one pump, we can define the problem as one rooting in people: their incorrect use of the toilets, conscious or not, is causing clogging and is therefore problematic.

## 2.2 Aim

The end goal of this project is to lower the amount of obstructions by as much as 25%. However, as said, the problem I am directly addressing is the source of the obstructions. The aim of the design project is therefore to identify and understand the behavioural causes in passengers, and the underlying reasons for these behaviours. This is the base for the design of a product or service which intends to change passenger behaviour and a long-term strategy to improve asset maintenance with said design.

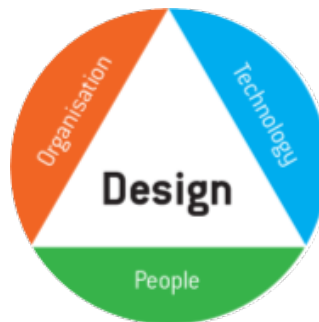


Figure 4: The balance of people, technology and organisation which forms the base of Delft Design

## 2.3 Approach

This project is executed as graduation thesis for the master Strategic Product Design of Delft University of Technology. This means at its core, it follows the values of Delft design: a balance between people, technology and organisation. More importantly it adheres to the implementation of strategic design, defined by Calabretta, Gemser and Karpen (2016) as

**“The use of design principles and practices to guide the co-formulation and co-implementation of (innovation) strategies towards outcomes that benefit people and organizations alike.”**

This is exactly the approach I follow: I have tried to improve the situation through design with a passenger centred focus, for example through user analysis, while at the same time benefitting and working for BAM and the other stakeholders.

This user centredness is specifically important because the users are the solution: their behaviour. Through user interviews the causes of the behaviours are identified, from which the solution can be designed. This is not all though, the users are involved in the whole process, so their input in a second user test provides insights into the potential success or failure of the concept, in order to improve it.

A similar level of involvement is asked from the stakeholders, who are consulted throughout the project for their knowledge and input.

## 2.4 Scope

Although BAM has put in some technical solutions like shredders already, this report looks into the human causes of the obstructions, in particular wrongful behaviour by passengers visiting the airport. This for example means struvite scale as obstruction is left out of the scope, since this is not caused by behaviour.

Some obstructions are caused by employees, e.g. cleaning rags of cleaning personnel. I have chosen to leave these outside of the scope due to the limitations of the duration of just 20 weeks of this graduation project. The outcomes may affect the employee's behaviour as well, but this would be a positive side effect, rather than an intentional end result.

It is also important to note that the proposed solution will be for a normal situation. Currently there are some problems caused by Covid19 and the lack of passengers due to the pandemic, but these are left out of the scope because this is a situation which is not expected to last indefinitely.

# 3. Project lay-out

The project is structured according to the basic design cycle as proposed by van Boeijen et al. (2014), consisting of analysis, synthesis, simulation, evaluation and decision. The analysis phase consists of researching the background of the problem, possible solutions and the users and stakeholders in order to have as much possible knowledge to start designing from. This is what happens in the synthesis phase. Here all the knowledge comes together in as many ideas as possible, which are then converged into one final design. To find out whether this design is realistic, the simulation phase consists of an experiment to establish the desirability, viability and/or feasibility of the concept. The evaluation and decision phases flow from this simulation, where the designer critically evaluates their work and decides how to go from there. This brings us to the final phase, iteration. A design is never finished, it can always be improved. That is why design is a cycle, in which one can always go back to an earlier stage. The iteration does not mean one starts over completely, but merely that improvements can be implemented by going through the cycle again. The second, third or umpteenth time is usually a more streamlined, quicker version of the cycle though.

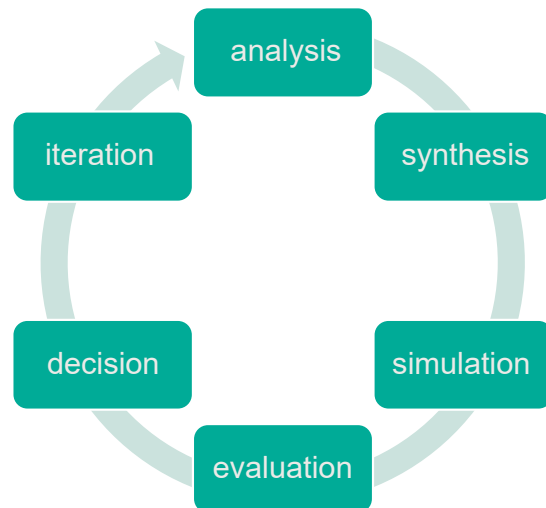


Figure 5: Basic design cycle. Adapted from van Boeijen et al., 2014

This cyclic approach will lead me to a final decision at the end, but also that iteration can take place at any time. Therefore the design can be improved continuously leading up to the final decision, leading to a more thorough decision in the end. Although the cycle is usually proposed for a segment of a design project, I have decided to apply it to the full project. A more common design process for a full design project like this is the double diamond approach, in which the designer diverges their knowledge to then converge it to define the project right, diverging again to get a wide range of solutions, to finally narrow them down to the right one. Comparing this to the design cycle, I think the double diamond does provide a great variety of solutions, but is too linear for the intended purpose: it just goes forward, without taking time to re-evaluate earlier decisions.

This report from here on is structured following the design cycle. The chapters are divided over parts named according to the phase of the cycle the contents fit into.

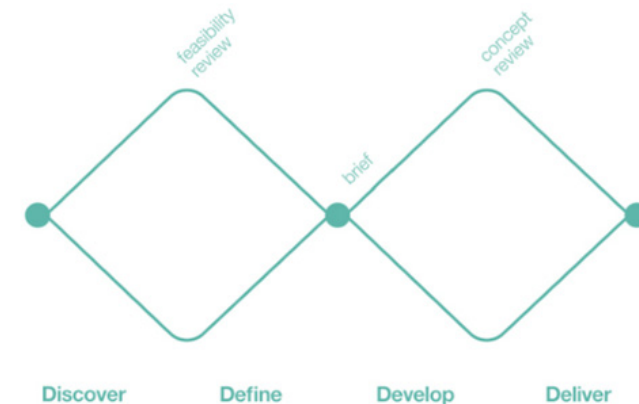


Figure 6: Double diamond design process (Tschimmel, 2012).

# Part two: Analysis

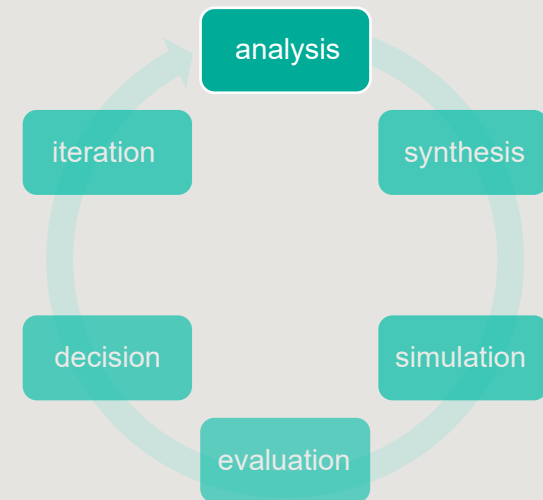
In the analysis phase of a design it is key to research everything there is about the problem, the approach, possible applications and the people involved. This is required in order to get the necessary knowledge to start designing with. This chapter is therefore divided accordingly.

The main approach in this project is based on behavioural change and the experience in the toilet. These are therefore the main topics of the theoretical background, which describes current knowledge and work which has already been done on the subject.

This approach is then made more concrete by showing examples of current applications of behavioural design at Schiphol, as well as current solutions BAM has in place for clogging in the pumps.

The chapter finishes with the people involved in the project: the stakeholders and the users. During the exploratory phase of the research I spoke to many people from different parties and described their involvement. The intended behavioural change is however meant to take place among passengers. The final part of this chapter therefore describes the explorative interviews I did with participants deemed potential users of the final product to research their thoughts and behaviour regarding the toilets at Schiphol.

The theory and results of the stakeholder and user interviews will be combined in the next chapter as a basis for the development of a design solution.



# 4. Theoretical background

## 4.1 Designing for behavioural change

Design generally has a human-oriented view. For decades already, designers have considered the impact products have on users and vice versa. In recent years, however, designers have realised humans can also be the solution and have thus gone deeper into the psychology of these users with the intention of influencing their behaviour. This is also what I am trying to do in this project, for which it is first key to know what has already been done.

A lot of research has been done into design for behavioural change in the past years. Although obviously different, there is still a lot of overlap. The most provided solutions include the use of triggers, feedback, guidance and examples of others (Cash et al., 2020). Their success rate increases when more than one is used in a design.



Figure 7: Fogg's behaviour model (Fogg, 2009) as taken from Ackermann (2020, p.17)

One such method which uses triggers to achieve behavioural change is by applying Fogg's behavioural model (FBM). This model explains that people exhibit certain behaviours, because behaviour is the product of motivation, ability, and triggers ( $b = mat$ ). Visualising this clearly shows how motivation and ability can be a trade-off, one possibly lower when the other is high (see figure 7), yet a trigger always needs to be high (Fogg, 2009).

Fogg later on shows how this model can be easily applied to cross the barrier, the action line/activation threshold, into achieving new behaviours (Fogg, 2019) or preventing behaviour by taking away one of the essential factors.

Lens	Application
Architectural lens	changing behaviour through the environment around the user.
Errorproofing lens	ensuring unintended behaviour gets avoided through design
Persuasive lens	the use of digital interfaces to guide users into changing attitudes
Visual lens	using semantics and metaphors to influence how users perceive the world around them
Cognitive lens	understanding the way users make decisions in order to influence their interaction with products
Security lens	applying measures to counter unwanted behaviour into design. This security is quite harsh and often not appreciated by users.

Table 2: Lockton's six lenses (Lockton et al., 2010)

This research by Fogg is also taken into account by Dan Lockton in the development of his Design with Intent method (Lockton et al., 2010). This tool involves six different approaches towards influencing behaviour, his so-called lenses. These lenses are based on patterns observed in human



behaviour, grouped into frames of reference to use for designers (see table 2). However, even with the connection to Fogg's trigger-based model, it is clear to see that some of the lenses, e.g. the persuasive lens or the visual lens, can also be connected to some of the other primary ways of influencing behaviour, respectively guidance and feedback.

An important factor to take into account when trying to influence behaviour is that humans actually show very fundamental behaviours. We would like to think of ourselves as very rational beings, but rational considerations cost us a tremendous amount of energy. More often than not, we behave according to emotion and habit (Cash et al., 2020).



Figure 8: Habit building loop (Clear, 2018).

However, a lot of behavioural interventions seem to originate from the human as deciding what he does rationally, but since this is often not true, these have little effect. This raises the question if behavioural change is actually achievable through design. Changing habits is extremely hard, but not impossible. Clear (2018) describes habits being built by a loop of a cue triggering a craving which leads to a response to provide a reward (see figure 8). That is why he proposes four laws to change habits, based on this loop: make it obvious (cue), make it attractive (craving), make it easy (response) and make it satisfying (reward). This also works reversed to break a bad habit. In the context of this project, breaking the bad habit

of flushing objects is possibly more achievable than establishing a new habit, considering the singular use of the toilets at Schiphol.

This brings us back to triggering, the most used way of influencing behaviour. How to trigger breaking the bad habit? This can be one of the questions moving ahead when designing.

## 4.2 Toilet experience

When looking at behavioural design, the context is very important. In this research, the context is the toilet and its surrounding areas. Although using the toilet is one of the most basic human needs, with an average use of about 2500 times per person per year, this need is not always taken into account. Organisations like the World Toilet Organisation and Maag Lever Darm stichting have been advocating for good and accessible toilets in the public space for decades already.

Greed (2003) underlines this need for availability, but first makes a clear distinction between two types of public toilets: toilets in the public space available to everyone, and communal toilets in private places, like workspaces. This research regards the first category, which poses a problem of lack of ownership: in an office building, one would use the toilet more frequently and therefore consider it more like one's own, whereas a toilet in the public space is usually only visited once. Users therefore tend to disregard the toilet's state, it is simply not their problem anymore once they walk out the door (Greed, 2003).

The design of public toilets in general is mostly practical: simple, with as little frills as possible, and placed in a way that ensures easy cleaning. This results in often very sterile-looking toilets. Although this does the job it intends to do, the experience for the user is not taken into account. The comfort of a user is dependant on not only cleanliness, but also look and feel of a toilet. Service Management magazine, an important source for the facilities industry, notes that by adding elements which stimulate the senses, like light, colour, sound or smell, one can positively influence the

the wellbeing of the toilet visitor (van der Riet, 2020). This is however, on top of the actual cleanliness, which needs to be in place first and foremost.



Figure 9: Stimulating the senses for a better toilet experience (van der Riet, 2020)

Differences in cultural expectations also play a role in the perceived toilet experience. First of all, the idea of what is hygienic differs. In some hygiene oriented cultures like middle eastern countries, Dutch people are considered to be dirty. This notion was unfortunately supported by the news that Dutch people are the least likely to wash their hands after using the toilet (Bruins, 2020). Furthermore, the type of toilet differs per country: in many Asian countries, people are still used to crouching toilets (Gregory & James, 2006). Although even there there is a shift towards sitting toilets, the mindset of people does not change that easily. It is another habit that needs to be broken, and therefore takes time.





# 5. Current solutions

## 5.1 Behavioural change in toilet design at Schiphol

This research is not the first time behavioural change is applied to toilet design at Schiphol. In the 1990's, Aad Kieboom came up with the little image of a fly in the urinals of Schiphol airport. This made men aim their urine stream at the tiny image of the animal, which nobody really likes, but is also not afraid of. It decreased cleaning costs due to spillage by an estimated 8% (Evans-Pritchard, 2013). This is also an example used by James Clear (2018) to illustrate how to set up environments to change habits by simply making cues very visibly obvious.



Figure 10: Urinal with a fly to aim as designed by Aad Kieboom (Evans-Pritchard, 2013).

A more recent example is the redesign of the toilet units of Schiphol, which is an ongoing process. According to Schiphol's reliability engineer, who was involved in the design process, the most important factor in the redesign was routing: by making the placement of the interior elements as logical as possible, the flow of the passengers is optimised and the experience improved.



Figure 11: Old and new design of toilet units at Schiphol

## 5.2 Prevention and solution of obstructions by BAM

At this moment, BAM has several solutions in place to optimise maintenance on the sewage systems and to solve the malfunctions due to obstructions. These vary in technicality and can be divided into two categories: corrective and preventive. The former are more traditional solutions, like additional flushing or manually cleaning out the pumps. The problem is how labour intensive they are, and they are usually too late. Only fixing problems when they occur increases costs and the wear on the assets. That is why in recent years, BAM and Schiphol have invested heavily into preventive measures.

The most important one is iView, a programme also known as the smart-pump-platform. In recent months, all pumps have been updated with sensors monitoring flow and power usage, which send continuous data to the iView system. These data can be used to predict upcoming maintenance and react proactively. For example: if a pump gives out a notification of very high power usage, it is likely to be clogged and the maintenance engineer knows they have one or two days to unclog

before the corresponding manhole overflows. Although the system is not perfect, since not all data is linked to possible malfunctions yet, it has already proven to be a powerful tool in predicting malfunctions: according to BAM's maintenance engineer, 80% of problems which used to turn into a malfunction, are now prevented.

Lot 4's project manager explained that when all else fails, BAM has a final rigorous solution: shredders. These are placed before the pumps and cut up almost anything into pieces small enough to pass easily through the system. At this moment there are shredders in place in three locations at Schiphol. Although proven to be a solid solution, they are unpreferable, due to their extremely high costs of implementation and maintenance. Since Schiphol encourages innovation in all its departments, significant steps have already been taken into innovation of the toilets as well. The new pier A will for example be fitted with toilets which flush with rainwater (Schiphol, n.d.), which would lower Schiphol's freshwater needs (Kuller et al., 2014).

# 6. Stakeholders

The context in which BAM operates at Schiphol is very extensive and specific. The airport and its surroundings are like a self contained city, quite separate from the city Amsterdam it belongs to; it even has its own emergency number instead of the common 112. To make all this possible, there are many stakeholders to consider. Several people from the various stakeholders have been interviewed to get a good overview of their respective involvement and problems in the process. An overview of the insights from these interview can be found in appendix A.

## 6.1 Schiphol

The most important stakeholder is the Royal Schiphol Group itself. As the commissioning partner, they provide and oversee the work. This means constant communication, compromising and preempting what the other needs. The size of the organisation sometimes makes this complicated, or makes Schiphol seem like a rigid partner, but at the same time, they are quite progressive: Schiphol's goal of becoming "Europe's preferred airport" leads them to constantly improving in order to stay ahead of other airports. This constant strive for the optimum, specifically in the fields of sustainability, optimal return on assets, excellent organisation and innovation and digitalisation, is also something they demand from their contractors and should be taken into account throughout everything they do (Schiphol 2019).

## 6.2 Subcontractors

As main contractor, BAM is tasked with contracting the right people to do the construction. Obviously they have their own mechanics and engineers, but they largely work with external parties. Good examples of this are plumbing companies Révé (lot 4) and TBK Installatietechniek (lot 5): both building service engineering companies specialised in maintaining and unclogging of sewages. They execute the actual unclogging of a pipe or pump for BAM. In conversations with a company director and one of the mechanics, they acknowledged the problem of the clogged pumps, saying paper towels are by far the most common obstruction.

## 6.3 Facility management (cleaning companies)

Whereas BAM is responsible for the drainages and pipes underground, the toilet facilities and pipes up to one meter behind it are the responsibility of Schiphol's facility management and the cleaning companies. There are four main cleaning companies at work at Schiphol: Vebege (until recently known as known as Hago airport services), Asito and ISS for the terminal, and Ragers for the baggage handling area. Their position is similar to BAM's as a main contractor, but for cleaning. This also means that they often hire smaller cleaning companies to assist them. Vebege's director also explained how the four companies collaborate very closely in their "cleaning collective". This optimises the collective work they deliver and eventually the experience of the visitors of the airport.

## 6.4 Competitors: Heijmans and VolkerWessels

As previously mentioned, Heijmans and VolkerWessels are BAM's main competitors at Schiphol. These contracting and construction firms are almost the same size as BAM, among the biggest construction firms in the Netherlands (Cobouw, 2019). Since they all have similar contracts with a length of three years, which can be extended with three years twice to a maximum of nine, they are all motivated to deliver the best work for Schiphol to ensure the continuation of their contract. Although there is a lot of exchange of personnel between them, in their day-to-day operations they keep to their own: a project manager of Heijmans admitted that they stick to the borders of their tasks and lot closely (see appendix A). They do, however, hire the same subcontractors in some cases. Heijmans for example, hires TBK for clogging in lot 5a, the same as BAM does for lot 5b.

## 6.5 Security

A lesser involved stakeholder, but nonetheless one that needs to be considered is the security at Schiphol. The international environment, with large numbers of people and cargo passing through every day, makes it important to monitor all the proceedings closely (van Wijk et al.,

2020). Besides the various external security parties like G4S which assist in this, the main monitoring and protecting is done by the Koninklijke Marechaussee (KMar). This is an important aspect to consider, since it shows that a lot of things are being registered at Schiphol also for other reasons than customer satisfaction. Not only does they monitor and protect, but the KMar themselves also innovate (den Hartog, 2014). This safety innovation does have overlap into our field in the sense that they might monitor whether or not the amount of time a person spends in the toilet to be suspicious. Whereas this is not behaviour we are interested in, it is interesting to know how behaviour can be approached from different aspects. In the described programme Tresspass people are anonymised and picked up by an algorithm before a KMar officer checks it out to purely catch behaviour and not invade privacy, which could be useful for our possibly sensitive topic as well (Chin-A-Fo & Wassens, 2019). At the same time, their close grip on security does sometimes complicate the work of BAM at the airport: construction workers cannot be everywhere at all times and especially for work on the airside of the airport, the KMar often needs to be informed in advance.

# 7. User analysis

In order to understand the behaviours which lead to wrongful flushing of toilets, I conducted exploratory interviews. In these interviews there was a specific focus on people's personal opinions and reasons for the way they use a toilet or the way they think others use a toilet.

## 7.1 Method

The interviews conducted were qualitative and the participants were the leading factor in the conversation. Although questions were prepared (see appendix B), these were not set in stone, but more used as guidance for the direction of the conversation. After several interviews the participants were also asked about their opinion on certain points which were brought up by earlier participants for comparison and – if possible – expansion.

Due to a lack of passengers at Schiphol and an unwillingness by the Schiphol Group to allow interviewing in the terminal, I made the choice to recruit participants from my direct circle of acquaintances. However, I did ensure to reflect the diversity of passengers in gender and cultural background, with a close to equal male-female ratio, as well as an equal Dutch-foreign ratio. The interviews took place via video calls.

Important to take into account was the sensitivity of the subject. It is to be expected that not everybody is comfortable talking about how they use the toilet, and therefore an atmosphere needed to be provided in which they would feel most comfortable to speak freely without feeling embarrassed. I tried to accomplish this by speaking to them in a neutral, non-judgmental manner. Furthermore, I did not ask the participants solely what they would do, but also what they think other people would do. This because, as IDE's professor in consumer behaviour explained, it is often much easier to talk about someone else than opening up about oneself. It is a simple manner of projecting one's own ideas onto someone else.

## 7.2 Results

All but one participant had enough experience to talk about the toilets at Schiphol airport. They are all satisfied with the state of the toilets, since they are reasonably clean and the cubicles sufficiently spacious for luggage. Necessary amenities like toilet paper and soap are available and there are enough toilets available. Several participants however, did compare the toilets to more high-tech toilets, showing that although Schiphol's toilets are fine, they can be better.

The toilets at Schiphol are seen as more than just toilets, many people use them as bathroom to refresh themselves. This is why some bring wet wipes or tissues with them. How they dispose of these differs: some are convinced they are soluble or careful to only buy soluble versions, some will only throw them in the bin and some will flush them regardless of solubility because of hygienic reasons.

**“Airports are the kind of places where you want to freshen up, get ready for the next part of your journey”.**

The international participants also showed the cultural difference in their approach of toilet use. Both the Indonesian and Korean participants explained their countries made a relatively recent switch from squatting toilets towards sitting toilets. This confuses people into sometimes standing on top of the seat to crouch down. In Korea they solved this problem by providing both types of toilets in public toilets. An Indian participant, however, does not see this as a problem for Schiphol, because in her country the people used to squat toilets are usually not wealthy enough to travel abroad. What did differ for the Indian context, as well as some others, was the preference of water to clean oneself over toilet paper. In these countries they use a sort of hose or a bidet. They believe this to be more hygienic, it cleans more properly than paper. This might point to a situation of over use of toilet paper here, in an attempt to get the same cleanliness.



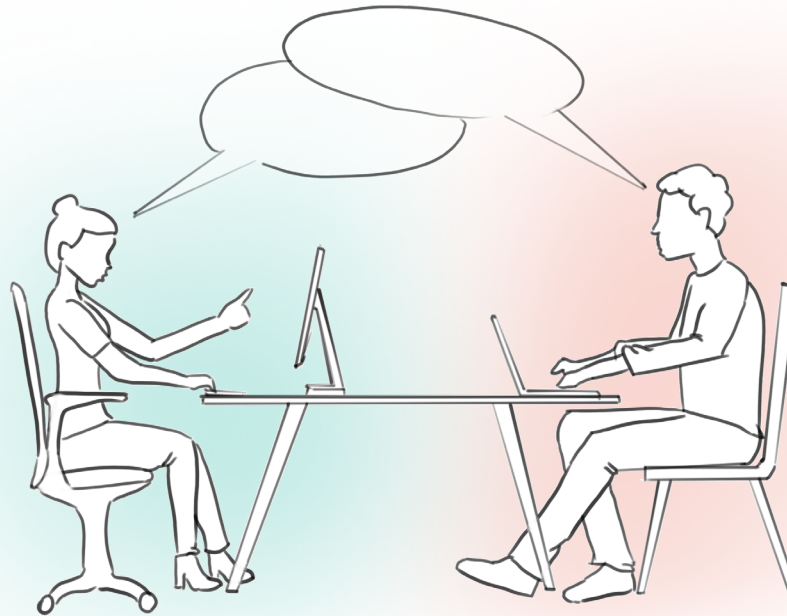


Figure 12: Interviewing remotely

Coming back to the general situation with all participants showed the bins also have a part in whether or not people flush waste down the toilets: the male participants mentioned there is often no bin available in the cubicle, and for women there is usually only a female hygiene bin. These bins are not meant for regular rubbish, only women's sanitary products, because, as Vebege explained, these are considered chemical waste. Even for that purpose, the participants expressed their dislike to use it, because they feel like it is often not clean and the small opening ("looking like a mail box") forces them to touch this unhygienic surface.

**"I have done it [flushing waste] in the past, when you are 15 and you think you think 'oh that is just fine', but nowadays I don't do that anymore [...] like tampons and such. When you do not feel like taking it with you to the waste bin."**

Avoiding touching surfaces in a public toilet was a topic which came up

several times. Participants explained they would use tissues or toilet paper if they needed to touch anything: door knobs, bins, flush buttons etc. Another example of this is completely covering the toilet seat with toilet paper. Participants who did not excessively use paper, were often the ones to clean themselves, with use of toilet paper and sometimes available seat cleaner solution. For both types of participants goes that whenever they would get feedback that the toilet was just cleaned, be it from the cleaning roster, or by noticing from sight or smell that it is really clean, they would leave out their preventive measures.

Finally, I asked them on their thoughts regarding paper towels or cloth towel rolls. Opinions were divided based on their consideration for hygiene or sustainability. Participants in favour of towel rolls all used them to be more sustainable, because these get washed and reused. Participants in favour of paper towels mostly thought towel rolls are

unhygienic, often one needs to pull them to get an unused piece. Participants also expressed their uncertainty on the working of the roll, thinking the towel just goes around to give them the same piece another person has already used.

After the general questions had finished, I explained the participants the reason and purpose of my research in more detail, which prompted them to evaluate reasons for behaviour themselves. The idea of people flushing underwear was triggering to especially male participants. One explained he understood, because “you do not throw human excrements in the dust bin”, referring to soiled underpants.

Some participants also came up with ideas for solutions. One suggested for example to make sure the shops at the airport only sell soluble wipes, to avoid confusion. Another would like to make the use of cleaning solution dispensers clearer, since it is often not indicated what these are for. Several mentioned self-cleaning toilets, like they have seen in Germany, and Sanibroyeurs, which are small shredders for individual toilets.

**“[toilet etiquette] is also about personal education, to respect another.”**



# Part three: Synthesis

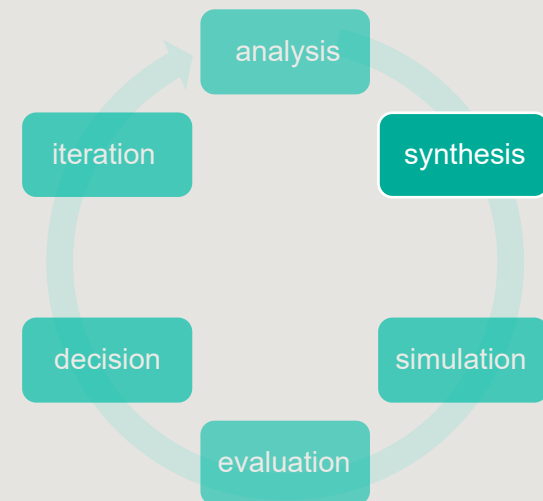
After acquiring the necessary knowledge during the analysis phase of the project, the synthesis phase is about combining and applying this knowledge into a solution for the problem.

This is done by first combining all the information from the analysis into design directions. These are essentially categories or dimensions which the solutions can fit in.

From these design directions comes the actual designing. The start of this is a matter of variety. This step, the ideation, means diverging as much as possible, putting every idea down, crazy or not.

After diverging comes converging, bringing down the number of ideas. This is done by first comparing the ideas to the Design with Intent tool by Lockton. This provides an initial proposal in which the product is not yet defined, but can be any of several promising ideas. These are first evaluated with several requirements from the theory to choose the right one.

This finally brings us to the completed concept, consisting of two parts, in order to try and influence the passenger in different ways to improve the chances of success.



# 8. Design directions

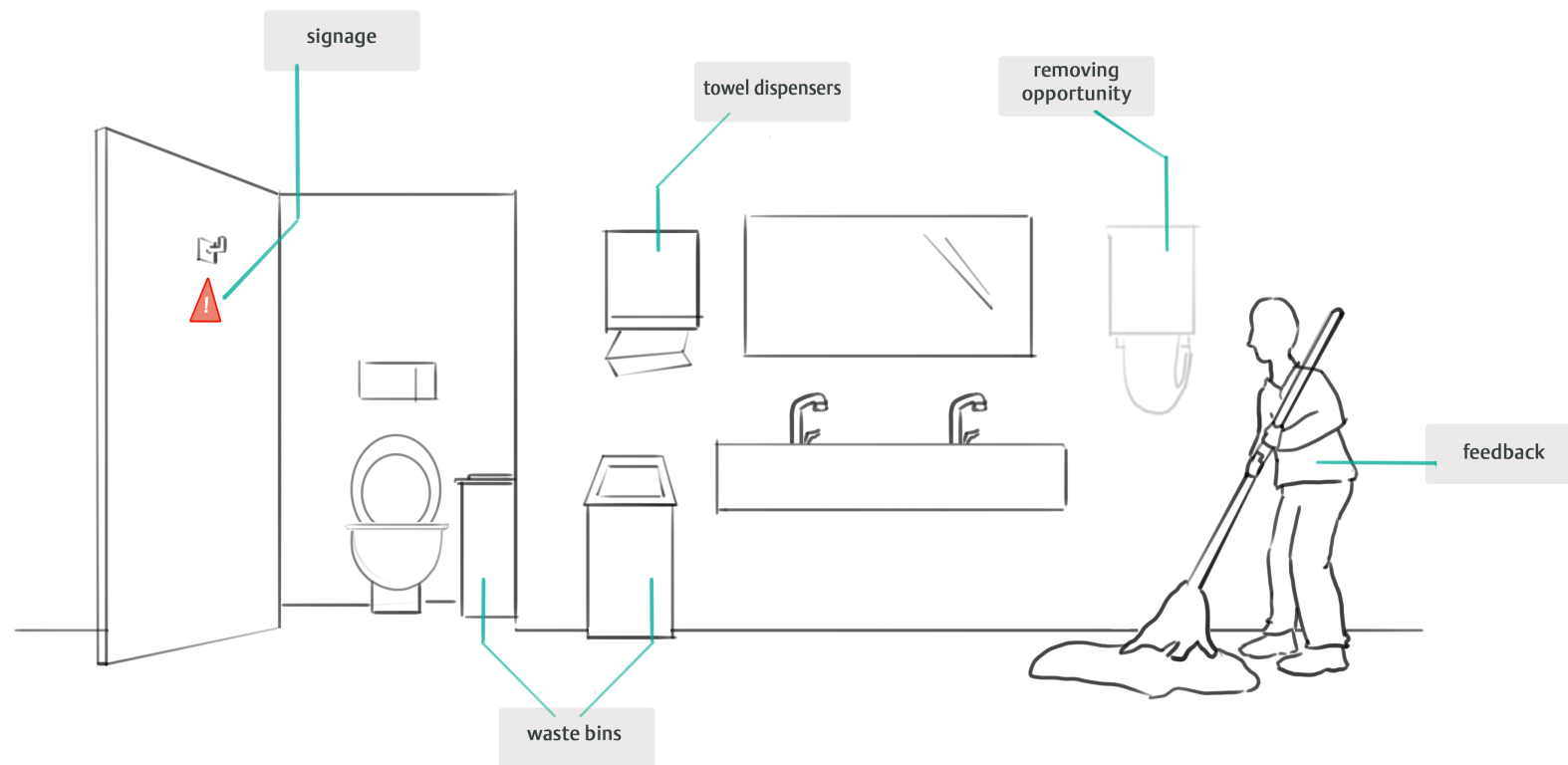


Figure 13: Design directions

From the insights acquired in the theoretical background research, the stakeholder analysis and the user interviews up until this point, I concluded that there are several areas which seemed to offer a lot of room for improvement. I have identified five categories of possible starting points for designing, the design directions:

1. Waste bins – Many interviewees expressed their dissatisfaction with waste bins in public toilets. In men's rooms they are often not present at all, so in case someone needs to throw something away they need to overcome the embarrassment of taking it with them to the bins outside of the cubicle. For women, even though there are bins available, they often prefer not to use them, either because they are meant just for sanitary products or because they look dirty due to the small opening of the lid. This causes both sexes to flush things which they are aware they should not.
2. Towels – A big cause of obstruction are paper towels meant for drying one's hands. Although requested from the sides of BAM, TBK and Heijmans, Schiphol does not use soluble versions everywhere, since these are more expensive. The user analysis furthermore showed that many users do not like the common alternatives of towel rolls or hand dryers, because they think these are dirty.
3. Signage – Many flushing mistakes are made due to either ignorance or because people do not feel responsible for public toilets. Clear signs on how to use the toilet room might encourage people to behave better. This can be both in general and on specific, for some cultures unknown items like seat cleaning solutions.
4. Feedback on cleanliness – Many users expressed that they look for signs that toilets are clean or recently cleaned. If they are not sure, they are more inclined to clean or cover the toilet seat, causing obstructions by the large amount of toilet paper used for this.
5. Removing opportunity – If the objects which obstruct the pumps are not available, they cannot be flushed in the first place, e.g. paper towels or insoluble wet wipes.

Although these design directions substantially differ from each other, they do not need to be approached separate. The final solution could very well be a combination of different solutions.

## 8.1 Strategic opportunities

Besides the above-mentioned design directions, which are product design oriented, the context also shows a lot of room for strategic improvements. A product design can often be implemented rather quickly, but in order to create sustainable long-term change, we need to look further than that.

1. Communication – although BAM and its competitor Heijmans face similar problems and both use the services of TBK Installatietechniek to solve obstructions, they barely communicate. Although understandable from a management point of view, trying to invent the wheel independently does not improve their work. The fact that all stakeholders involved in this research are very large corporations does not help either. Communication slows, or important requests misunderstood.
2. Maintenance/renovation plans – If toilets are clean, people tend to also treat them better. Whereas passengers are generally satisfied with the cleanliness of the toilets, the general look and feel of the toilet has a big impact on how the passengers feel about them. The newer toilet blocks at AAS have a luxurious, modern feel to them, which gives passengers the idea that they are cleaner than the older, tile washrooms. However, this look and feel can only be implemented during complete renovation of the toilet blocks, which needs to be planned well.
3. Suppliers – The types of supplies like toilets paper is very dependent on the subcontractors Schiphol hires. Changing to e.g. soluble solutions would require either this subcontractor to change supplies or for Schiphol to change their tender for hiring the right companies which use these. N.B.: Design direction 5. already leans in this direction already, although not very much in-depth.

# 9. Ideation

The aforementioned design directions provide enough room to start ideation from. For each direction ideation a combination of the methods How To's and Brainstorm were applied (van Boeijen et al., 2014). Since How To's provide small partial solutions and Brainstorm provides close to unlimited freedom to ideate, combining these two provides a large variety of solution combinations.

After ideating for each design direction separately, both the directions and the solutions were put together to brainstorm further. Full ideation can be found in appendix D.

# 10. Converging

## 10.1 Lockton's six lenses

From these first ideas, the most promising were chosen for further consideration (see figure 14). Because behavioural change is at the core of this research, these ideas were compared with the six lenses Lockton et al. (2010) uses to influence user behaviour through design (see table 2 in chapter 4.1). In order to make the right choice for the continuation of this project, the overlap with the lenses showed, initially, which of the ideas showed the greatest possibility of influencing behaviour. More overlap does not automatically mean more behavioural change, for example all ideas in the design direction "signage", which can easily be associated with the visual lens. It does, however, help for the first step of narrowing down the number of ideas into a first, rough concept.

## 10.2 Initial concept: three step change

The attempted behavioural change can be achieved on many fronts, which became evident as well in the number of design directions and variety of design ideas. I would like to try to achieve the most impact by tackling the problem from several sides and combining several solutions. This way the concept has as much impact as possible on a bigger variety

Figure 14: Most promising ideas. From left to right: automatic sliding hygienic lid for bins, tablet to give and receive feedback on the toilets, feedback screens with entertaining informative waiting videos and the cleaner as host.



of users, just like Cash et al. proposed in their research into different ways of designing for behavioural change (2020, see also chapter 4.1). Furthermore, as proposed in the design directions, there are several strategic opportunities. Therefore the preliminary concept consisted of a three step approach, in which each step tackles the problem on a different level:

1. Passenger – As the main focus in this research, the passenger will be the first step. This means the products the passenger interacts with directly. This step should accomplish the greatest effect on passenger behaviour as easily as possible.
2. Cleaning personnel – They represent Schiphol in the toilets. Cleaners already have a big impact on the passengers' behaviour, since they are the assurance to people that the toilets have been cleaned, whether this is true or not. The director of Vebego confirmed this with their strategy of sending cleaning personnel to be present in busy toilet blocks. Users also tend to behave better in public toilets when a toilet attendant is present, due to the feeling of being watched. Therefore the second step is to increase the visibility of the cleaning personnel, by letting them act as a host instead of hiding in the background. By encouraging cleaners to be more open, a relationship with the passenger could be established which will make them care about the state of the toilets.
3. Organisation – The last, and most likely hardest change is the one which the passengers do not see directly. In order to tackle the original problem of obstructions, change should also be accomplished by BAM, Schiphol and the involved stakeholders themselves. In order to facilitate efficient work, sharing each other's specific knowledge is vital. In order to do so, communication needs to be intensified and/or made easier.

## 10.3 Concept choice

For choosing which ideas fit best for an optimal result, there are several things to consider. First of all, the fact that the proposed solution tackles

three different user groups. This would mean that the choice process needs to work for either all three user groups individually or as a whole. Since bundling capacity and tackling the problem from different side is the main reason the proposition contains three steps and three user groups, it is more desirable to keep them together in the choice process. This also prevents them from individually working against each other.

Second point to consider, is that the product choice (step one) has not been defined at this point yet. This has been intentionally left vague, to be able to ensure that in the final concept, the three steps will not interfere with one another. The choice of product will be made as a completion of the concept.

Lastly and most importantly, the complete concept needs to live up to the expectations of accomplishing behavioural change. For this reason, the list of requirements is based almost entirely upon the theory of design for behavioural change (chapter 4).

### 10.3.1 List of requirements

1. The concept should either increase motivation or ability or both, in order to trigger users into action (Fogg, 2009).
2. The concept needs to provide cues for the user to be obvious enough to start using it (Clear, 2018).
3. The concept cannot create friction between stakeholders, preferably increases the cooperation between them.
4. The concept needs to have behavioural change at its core.
5. The concept should have direct effect on the use of the toilet; achieve this behavioural change in a single use.

# 11. Final concept

The choice process showed how the first two steps of the initial concept are clear and promote behavioural change. The third step, however, does promote a change in mindset and ultimately behaviour, but has no relation to the passenger anymore. Organisational change is an important factor to consider, especially in a big multi-stakeholder collaboration like this, but should not get mixed up with the core of this research: behavioural change in passengers. I have therefore separated this from the final concept. It is discussed further in chapter 15.

## 11.1 Waste bin

The first part of the concept consists of a redesign and implementation of waste bins. The redesign is based on the current sanitary bins in the toilet cubicles (see figure 16a). The most important aspect is the use of a lid which opens automatically with use of a motion sensor. This would mean users do not need to touch the lid anymore, which is more hygienic, and therefore more attractive to use for our users who expressed concerns over the cleanliness of the bin. Although there are already bins with such a sensor on the market (see figure 16b), these all have a hinged lid



Figure 15: The new waste bin design

with a partition below for privacy, which makes the opening very small. The redesign slides open to the side, to ensure the opening is as big as possible, so users do not accidentally touch the lid after all. To ensure the contents are not visible, this lid is made out of a flexible material, which bends inwards, doubling as privacy partition.

In order to actually attract the intended behaviour of throwing away waste, a trigger for use is needed. In this case I opted for a movement trigger: whenever someone enters the toilet cubicle, the bin opens and closes automatically once. This makes it stand out more and show its function for first time users, thus improving both motivation and ability in Fogg's model (see chapter 4.1).



Figure 16a: The current sanitary bins at Schiphol.

Figure 16b: Already available sanitary bin with motion sensor

At this moment, none of the men's toilets have waste bins in the cubicles. This has shown to result in men opting to flush waste rather than dispose of it in the bins available in the hand washing area of the toilets. Therefore first and foremost it is necessary to start with implementing these bins in the men's rooms to make it easier to dispose of waste.

Waste bins for professional use can be expensive, so the investment to replace all bins currently at Schiphol would be quite high. That is why I propose to change only the lids on the bins already in place in the women's toilets.

## 11.2 Positioning of the cleaning personnel

Cleaning companies at AAS are given specific requirements regarding quality in their contracts, amongst which is customer satisfaction. To meet these, they do not only respond to notifications of soil, but also try to predict where they will be. Vebegeo has indicated, for example, that they use flight data to predict which toilet blocks will be crowded. In this case, they send cleaners to these blocks to be present for maintenance (since extensive cleaning is not possible during rush hours). Their presence alone, reassures people that the toilets are clean, so they are less likely to take matters in their own hand (one of the sources of obstructions by wipes).

I would like to extend this feeling, by establishing a connection between the passenger and the cleaner. By the cleaner not being purely in the background, but taking on a role almost like a host, speaking to passengers, welcoming them, putting them at ease, the passengers should have a feeling of responsibility for the toilets. This would mean that the idea that this public toilet is not their problem will be mitigated and therefore they will care for it a little more.

Figure 17: The cleaner as host

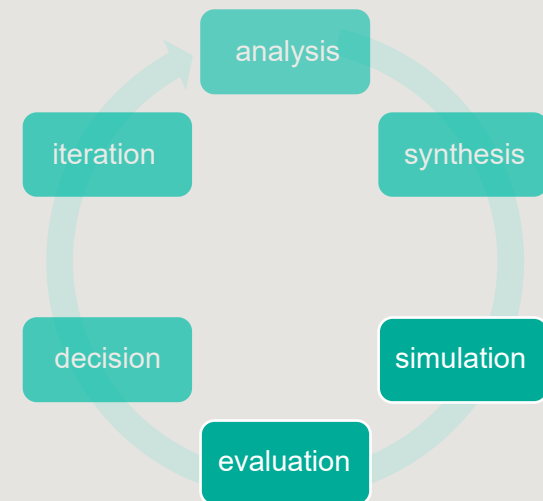




# Part four: Simulation, Evaluation

In order to evaluate whether the proposed concept achieves the intended goal of behavioural change and subsequently less blockage of the wastewater pumps, the concept was evaluated from two sides: passenger and stakeholder. Both groups are evaluated in a similar manner, but the outcome were expected to be different from the start, since they have different interests in the concept.

The outcomes of the simulation are all put together for a critical evaluation. This is meant to find the weak spots in the concept, to find the areas in which there is a possible need for improvement.



# 12. Validation interviews

## 12.1 Method

The simulation of the concept consisted of in-depth interviews with the user group and several stakeholders in the project.

For the user group, the concept was presented in a use scenario, with visuals in the form of PowerPoint slides, to make it easier for the participants to imagine themselves in that scenario. The scenario contained examples of products the participants already knew, like motion activated taps, before the actual concept. This is a way of preparing the participants through narrative, as proposed by van den Hende et al. (2012): the narrative works up to the new product so that it is not out of the blue, the participants already understand the benefits from their own earlier experience. The interviews took place partially online, partially in person, depending on availability.

The five participants for the user interviews were, just like in the initial interviews, a mix of men and women and of various nationalities, to ensure a reflection of the variation of people passing by at Schiphol airport. Two of the participants also participated in the initial interviews, in order to compare if their attitude towards the toilets changed with the new additions in place.

The interviews with the stakeholders were more straightforward: a two-page document describing the concept was sent to the participants in advance, so during the meeting, we were able to go straight to the details which are important to the respective stakeholder. This also means the questions were customised to the participants' specialisation and involvement in the process. Besides the concept, the organisational structure of Schiphol was also discussed, to understand whether the goal of lower maintenance cost can also be achieved through improved collaboration.

Considering the amount of information acquired from the earlier stakeholder interviews, I decided to focus on the three most important

### Scenario

*Below the scenario narrative used in the user evaluation interviews. These are accompanied by visuals in the form of slides, which can be found in appendix E.*

Imagine you are a passenger at Schiphol Airport. You just got off the aeroplane and are heading to the toilet to freshen up. (q: is this a situation you could see yourself doing?). (q: which toilet do you choose? The first you see or later on?)

You enter the toilet area (q: do you check if the area is clean? If yes, how?). At that moment you see a cleaner leave one of the cubicles (q: how does that make you feel?). The cleaner greets you kindly, motioning that you can go ahead and use the toilet (q: what do you think of this attitude? Should the cleaner be in the background or interact with you?)

Instead you walk to the sinks to freshen up. Image of motion sensor activated taps (q: What do you think of these type of products? How do you know that they are motion-activated? Do you prefer manual or automatic? Why?)

After freshening up, you move to the toilet. (q: Do you sit down? Do you do anything before sitting down?. In case you cover the seat, where do you throw the tissues/towels/... you use for this? Why would or wouldn't you throw it in the bin?)

This is the bin you encounter. It is motion activated, with the lid opening further than normal so you do not need to touch it, even not by accident like with a flap (klep) type bin. The flexible material folds inwards, doubling as privacy lid so you do not see the contents of the bin. (q: Would this bin catch your eye if it were there? Would it attract more attention if it automatically opened and closed upon entry to make its presence known? Would you be attracted to throw things in it?)

Finally, you leave the toilet to continue your journey. (q: do you think the changes improve your opinion of the toilets? What do you think of the experience of Schiphol, knowing they continue to innovate for customer satisfaction?)

stakeholders in this concept: Vebege, Schiphol and of course BAM. For Vebege I spoke again to its director, Schiphol's contact is their Reliability Engineer and from BAM I had a discussion with the regional manager of the area North-West Netherlands.

From all interviews, insights were written down and compared. A literal transcription was only done in case an interview was very information-dense.

## 12.2 Results

The results of the simulation interviews are separated into user and stakeholder results, due to the different approach (see method). These are combined for the conclusions.

General remark on participants: Approaches towards cleanliness did not differ hugely, there being no reason to expect any difference according to cultural background.

### 12.2.1 Users

People always choose the first toilet they see and do not want to search long. Especially after a long flight, people prefer to freshen up, so mostly terminal 3. Schiphol's size also plays a role in this because, as a participant said, "you don't know when the next toilet will be".

All participants look for cues that the toilet is clean, mostly visually. Important to note that if there is litter, it will attract people to litter more.

Simply the presence of a cleaner comforts people into thinking the toilet is clean. Feelings are mixed though on the cleaner talking to the passenger. Most participants do appreciate it, it makes them feel welcome, one even expects it: "I always find it very awkward when people do not greet you". The participants who dislike the idea of a cleaner addressing them, say so because either because they do not care ("I come for the toilet, I do not come here to talk to the person who cleans") or because they do not like the feeling of being watched.

All participants are extremely positive about motion-sensor activated products, for hygienic reasons: they do not need to touch it, even one going as far as saying "I would not want to go back to taps you need to touch." They all appreciate the idea of a bin with a motion sensor because of that. However, the sensors need to work immediately, the user should not need to try several times, because this will lead to frustration. Several participants also mentioned checking for instructions like icons where to position their hands in front of a sensor.

Not all men care for the privacy lid, but even if they do not care whether they can see the contents of the bin, they can imagine why others might appreciate it. Women do like it and appreciate the new way of opening without seeing contents, since they often struggle with pushing sanitary products through the small openings of sanitary bins.

Most participants are not fond of the bin opening and closing upon entry, because it might cause a scare, scepticism or seeing it as a toy.

Several participants commented on how the design of the bin influences the presumption of its cleanliness: "If a bin looks clean, it attracts use". The modern, clean look of the design is well received. The current sanitary bin, although clean, gives off a vibe that it may be dirty.

All participants appreciate Schiphol's efforts to innovate, although they are satisfied as long as the basics are there and it is clean. Several acknowledge that your experience in the toilet is lasting for the overall experience of Schiphol.

### 12.2.2 Stakeholders

All three interviewees showed interest in the concept as presented. After thorough walk-throughs of the different parts of the concept, the participants believed both parts of the concepts could possibly be a solution for the blockages, although their focusses and points of criticism were different.

### *Repositioning of the cleaner*

The cleaner as host is received very well by all three stakeholders. In the exploratory interviews Vebege's director already explained how they use flight data and the results of the FeedBackNow system to decide where to send their employees. If they expect a toilet unit to be very busy, the cleaner will be present for maintenance cleaning if needed, thorough cleaning takes place when it is quieter. Currently, the way the cleaner interacts, really depends on their personality, but Vebege has done research in trains which showed the presence of the cleaner influences the state of mind of the user. At Schiphol however, the cleaners are already called facility hosts. Schiphol's contact explained that during the tender process, the cleaning companies often propose similar positionings of their people: "...alles wat je omschrijft staat denk ik letterlijk in onze aanbestedingsbestekken naar de schoonmaakbedrijven toe, is precies wat wij willen. Écht schoonmaken is voor ons minder belangrijk dan de beleving van schoon zijn.". The reality is often not as good as these promises though, so he was interested to see how to achieve this goal. Both Schiphol's and BAM's representatives were worried about the implications of using the manpower for a different purpose, since "giving more attention to passengers is attention you cannot give to cleaning". When pointing out the need to simply educate the cleaners more, Vebege's representative explained that they already offer their people yearlong language courses. These are not only to fulfil Schiphol's requirement of knowing English, but also have a big impact on the wellbeing of the employees. Finally, BAM's representative compared the needed attitude change with that of the people from HelloFresh he encounters in his personal life, pointing out that they are clearly trained to be friendly and forthcoming during a short interaction, just as the concept proposes.

### *Waste bin*

The stakeholders all had different views of the waste bin. Whereas Vebege and BAM inquired about the technical details of the bin, Schiphol mostly looked at the viability of implementing a bin at all in the cubicles. With the current ladies sanitary bins, there is a problem of ownership:

these belong to an external company, which comes to swap them out. They take the bin as a whole away to clean them at a location outside of Schiphol. This exchange is also a cause of damages, which is why both Vebege and Schiphol's representatives noted the need for the new bin design to be vandalism-proof. Tests by these two have shown current no-touch bins to be too vulnerable, which is why Vebege is currently working on their own version of the sanitary bin. This concept seals female hygiene products to turn them from chemical waste into regular waste. A prototype of this bin is currently being tested. Although a collaboration in development with my design seems obvious, the purpose and as such design requirements of the two types of bins are too different to combine.

Important for Vebege is that with any bin the toilet can still be cleaned easily. This maintenance, together with the big costs of implementation (Schiphol estimates around €750.000) in the close to 1000 toilet cubicles of Schiphol is part of the doubts of viability the stakeholders showed. Cleaning one toilet unit already costs €145.000,- per year. At the same time all participants were curious to find out whether there is a need for implementation of bins at the men's toilets. An offer by Vebege to do a pilot researching the use and contents of these bins is well-received by the other stakeholders, who proposed a collaboration.

# 13. Validation evaluation

From the validation interviews discussed in chapter twelve there are several points to take away before moving forward into the next phase.

## 13.1 Baseline

First and foremost, the basics need to be in order: the availability, cleanliness and amenities of the toilets. Availability is important, because users will always search for the first toilet they see. Therefore these need to be strategically placed in such a way that a toilet is never far away. There has been no indication so far that the availability is not in order at AAS, but the users are not aware of this, as several reasoned they choose the first toilet they see because they do not know where the next one will be.

The participants also clearly showed that they check for cleanliness of a toilet before anything else. Even the goal of the cleaner-as-host concept part of giving subconscious feedback on the cleanliness of the toilets will have no effect if the user still notices that the toilets are not actually clean. The same principle goes for the availability of amenities, meaning toilet paper, soap and towels or hand dryers. Since various users mentioned it being essential before anything else, we can conclude a lack thereof could negatively impact the complete experience.

These three might seem obvious, but it is important to realise that a baseline is necessary to start improving from. Not all participants cared too much about innovation in the toilet, as long as they are clean and well equipped. Once they are satisfied about what they deem to be necessary, one can start getting them excited about new products they do not know they need (yet).

## 13.2 Concept

The evaluated concept adds a new element on top of this baseline and was thus the main critical point of evaluation. We can conclude from the interviews that it was in general well received by both the users and stakeholders. There are some critical points to consider about both parts

though.

### 13.2.1 Repositioning of the cleaner

The approach of the cleaner was received the best in the evaluation, especially by the stakeholders. If Schiphol could, they would already have all the cleaning personnel act this way. The user group was a little more divided, with some participants saying that they do not like the feeling of being watched. Although this might be an uncomfortable thought, it is not bad for the intended goal of improved toilet behaviour. If people feel watched, they tend to behave better, a phenomenon known as the Hawthorne effect (Spencer & Mahtani, 2018). However, the concept cannot lower the perceived comfort to such a degree that it ruins the overall experience, because both the theory and the user research showed the toilet experience is extremely important for people's general impression of Schiphol. This is why it is key to balance out the degree of presence of the cleaner: enough to either create a connection with the user and/or make them feel watched, but not too intrusive to avoid it becoming very uncomfortable.

### 13.2.2 Waste bin

The waste bin concept, although reasonably well-received, raised some points of criticism. In the first place the need for the waste bins: will people actually use them? Many users could not easily imagine what they might need a bin in the cubicle for other than female sanitary products, but there is a dedicated bin exclusively for those. Although the stakeholders are willing to test the need, they were concerned about the implementation: the costs and connection to the external company which switches out these female hygiene boxes at this time. Concluding from this, after testing the need for the bins, it would be wise to reconsider the implementation in the women's cubicles. Either implement the bins on just the men's toilets, or redesign the bin for the women's cubicles to be combined properly with the female hygiene boxes.

Focussing on the specific design of the bin, there were a lot of technical and aesthetic details to consider, like the visibility and working of the

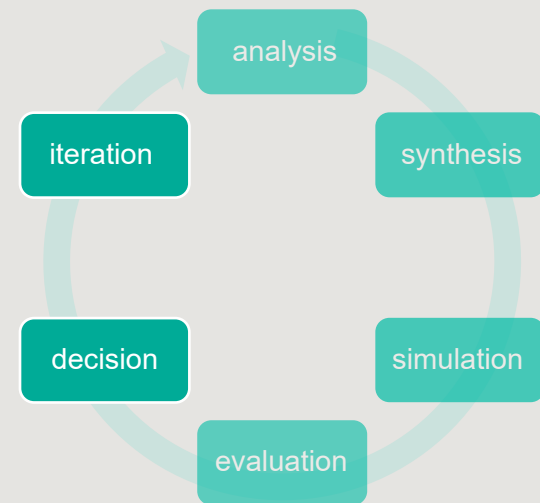
sensor, the hygienic look or the way it opens and closes. If this bin is to be produced, these are all points in which the design can be improved before it can be finalised. However, due to the costs of development from scratch, and since product development is not the focus of this project (this would be more appropriate to a project of the Integrated Product Design master), it is wise to consider leaving the design of the bin at the stage it is right now.

Lastly, many participants expressed their discomfort over the bin opening and closing upon entry, even beside the point of it likely costing too much energy requiring more frequent battery changes. This is therefore not a good idea to pursue, but raises the question what can be a good trigger instead? Is simply putting a bin in the cubicle enough to trigger passengers into using them?

# Part five: Decision, Iteration

Evaluation of concept showed several points of criticism. In this stage I made the decision which points to follow, immediately followed by new ideas for improvements.

It is important to note that there are two decisions and iterations in this part: decision and iteration on the concept, and decision and iteration on the strategy. The strategy consists of an explanation of a design for organisational change and the final implementation strategy for the concept. This implementation strategy is the most important aspect relating this project to SPD, because strategic design is not only about getting the product right, but also about getting the right product, in the right time and place.





# 14. Improvement of the concept

Based on the conclusions of the previous chapter, the concept is improved to be more suitable for both the users and stakeholders. Referring back to the points made by van der Riet (2020, see also chapter 4.2), it is first of all important that the concept not only needs to work as loose elements, but works as a whole to enhance the overall experience in the toilet. This includes adapting the attitude of the cleaners and the design of the bin to the vibe created in the toilet block (Schiphol, 2021).

At the same time, it is still a concept consisting of two elements with different manners of influencing behaviour, and should thus be improved on individual details as well.

## 14.1 Approach towards hospitality

To improve the part of the concept regarding the cleaner's attitude, it is first and foremost important that hospitality does not stand in the way of the actual cleaning, the technical cleaning as Vebego called it. Furthermore it is key to find the right balance between being more in the forefront, but not becoming too intrusive. This is to ensure enough connection with the passenger to either evoke a sense of responsibility or a feeling of being watched, but avoiding the passenger feeling so uncomfortable it influences their opinion on the experience overall.

These precarious balances need to be assessed in order to establish a teaching plan for the cleaners. I propose to apply the research by Pijls et al. (2017). They define six dimensions for hospitality which influence the experience of the guest the most: welcome, at ease, empathy, servitude, acknowledgement, autonomy. These can be summarised in three categories: inviting, care and comfort. Looking at the above described balance, there is a lot of overlap, which confirms the need for these dimensions to be applied into the education plan of the cleaners.

They state that hospitality needs to be an intrinsically motivated feature in order to work. So it is key to convince the cleaners themselves why it is good to adhere to, not only for the customer but more importantly for themselves. This fits with the education programs Vebego has in place already, which really aim to increase the personal development of their employees.

## 14.2 Waste bin redesign

The bin design needs considerable redesign, mostly to improve use and facilitate maintenance. The most important aspects in this redesign are listed below.

### 14.2.1 Improvement for use

- The sensor needs to be clearly visible, placed prominently in the middle, to make users understand instantly how to use the bin and where to hover their hands.
- Apply signage to indicate use and attract throwing waste in the bin. This will function as trigger for use instead of the initial open-close motion upon entry.
- A modern look with patterned surface design to hide blemishes and thus make the bin look more hygienic.

### 14.2.2 Improvement for maintenance

- The lid needs to be bulkier than the original to facilitate the batteries which power it.
- Second version for women's cubicles with two-compartment system female hygiene/waste
- Mount the bin on the wall, some distance above the ground to make sure the floor can still be cleaned.
- Improve sturdiness to prevent vandalism.
- Ensure that the bin adheres to Schiphol's high fire-safety requirements.

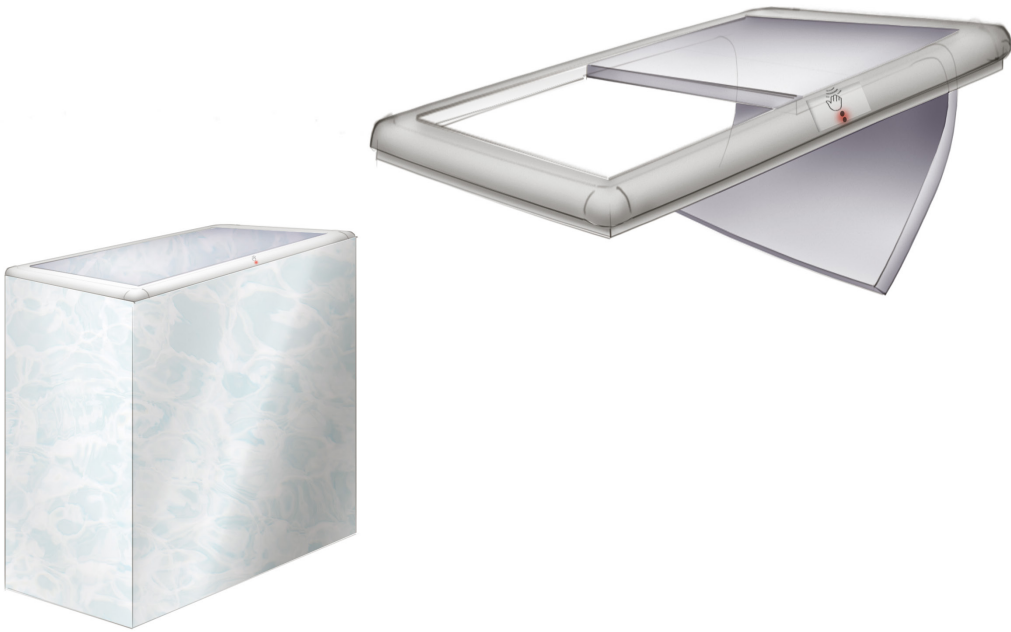


Figure 18: Redesign of the new waste bin



Figure 19: Signage to be put on the waste bin to indicate use

### 14.2.1 Use of existing product

However, since we concluded materialisation and detailing of the bin is not feasible within this design project, I made the choice to find an existing bin which fits as many of the requirements I put on the bin as possible. This will improve the chances of implementation as well.

An example of a bin close to the concept is the female hygiene unit by Initial. Its modern minimalist design not only makes it more attractive for the user, but is also meant for easy and hygienic maintenance. The compact, wall-mounted version makes ensures accessibility in the cubicle for both user and cleaner.



Figure 20: No touch female hygiene box by Initial

# 15. Design for organisational change

## 15.1 Improving collaboration between parties at Schiphol

By only targeting the passenger, a big problem within the working environment of BAM is being ignored: the collaboration between the many parties involved. If processes behind the scenes are not working efficiently, one cannot expect the intended place of change (the toilets) to be optimally established to facilitate behavioural change in the passenger. The Royal Schiphol Group is known to be a very siloed organisation, and by dividing their construction, renovation and maintenance sharply between different parties, this process of silos is reflected in the way these companies adhere to their own specific tasks. Throughout this project I have therefore attempted to also achieve a way to improve the collaboration between Schiphol, the main contractors, subcontractors and other parties they work with, as can be seen e.g. in the strategic design opportunities and the initial concept proposal.

I have determined the most important aspect in improving collaboration to be communication. Knowing who is in charge of which task and being able to contact them easily is already a big step in this direction. Communication could, for example, help a lot in the renovation of the toilet blocks. When is which one due for renovation? How can we implement the right customer satisfaction and behaviour related interventions at the right time? This would help in getting the right experience in the toilet which could also improve people's behaviour.

## 15.2 Possible solutions

An initial concept to improve collaboration through communication was a tool for all of the contractors and subcontractors of Schiphol, which shows more easily which companies have which specialisation and tasks. This would be similar to the "raakvlakkenmatrix" (intersection

matrix), a shared sheet with specialisations on the edges of each lot, which BAM already uses. The concept would have an additional option for communication and/or contact details, to simplify contacting each other. Taking away this lack of communication, puts it in the far end of the "ability" axis of Fogg's behavioural model. By also showing how this increases efficiency, it's worth will also be proven to Schiphol and the contractors, moving it up the "motivation" axis.

However, this product should also be accepted and updated by individual departments or even workers, in order for this to work. This is where the original raakvlakkenmatrix failed: it was just another tool that nobody actually used.

So what would be a feasible way of facilitating an easier knowledge exchange? One of the stakeholders proposed to keep it simple: as long as each company has one contact person who knows their way around their respective company and can refer on, the contact can already be improved without much hassle or interference.

**"... if I know who is the one I need. I can still say 'It is the task of Schiphol control centre', but ultimately I can also call myself..."**

Seeing as at this moment, Schiphol is supposed to be the facilitator of connections through their control centre, taking away the middle man does not seem like a bad idea. This is due to the way the control centre approaches connections between companies at Schiphol: they get notifications of malfunctions, errors or other requests and redirect it to the responsible person or company to solve them. According to one of the stakeholders, the person putting in the request, does not always know to whom their request was forwarded to. It might take months waiting for a malfunction to be solved, because the control centre has

put it through, but the solver has not taken it up and the requester does not know who to push to get it done.

This means the Schiphol control centre at this moment is both the cause and the solution of the communication problem. There are several possible solutions for this:

1. Intensify the control the control centre has by implementing a follow up of each request put in. This would mean they check whether a problem is actually resolved by whoever is responsible, and getting feedback from the original requester whether the result is satisfactory. This would mean more work, which goes against their goal of optimal efficiency.
2. Decentralise contact, where the control centre is no longer in charge of putting through requests. In this case they would leave communication in charge of the people needing it, at most facilitating by providing contact details.
3. Keep the control centre's task as it is, but let them provide more information. Who is working on the task? Taking privacy into consideration, this is still an option. However, should individuals not want their contact details shared, there would still be more clarification to the requester than in the current situation.

Considering Schiphol's goals of efficiency, but at the same time their task as overarching organisation, the third option is likely the most desirable and feasible in the current situation.

# 16. Strategic implementation

The strategic plan consists of two parts: short-term and long term. The short term plan contains a timeline of all the steps taken in order to get to possible implementation of the concept, whereas the long term plan is about the actual implementation itself.

## 16.1 Short-term: pilot and testing (six months)

The first stage of implementation is essentially preparation. Over a time span of about six months hence, the concept is going to be tested in real life to measure its impact on the situation in the wastewater pumps. This includes organisational events and several different actions regarding both parts of the concept. These are distributed over a timeline (see figure 21), in which several processes take place at the same time. For this reason, the timeline has been structured to show the processes towards the attitude change in the cleaners as stated above, and the processes regarding the bin implementation on the lower side of the line.

### 16.1.1 Establishing the collaboration

The beginning of the timeline starts right away, with the launch of the intensified collaboration between BAM and Vebego. BAM has originally been the initiator of this project, but since Vebego has the most knowledge on innovation projects like these, it is important to distribute the responsibilities and costs accordingly. As soon as the collaboration is solidified, together the companies stand stronger in their case towards Schiphol on why and how to move forward.

### 16.1.2 Defining the hospitality course

Once the parties have a go-ahead for the initiative, the next step is to define exactly the key points which need to be taught to the cleaning staff in order to achieve the right attitude. It is important to consider how long it might take to achieve a full attitude change in people in general, and then specifically for the often lower educated staff of the facility management. How can we ensure they understand the course material fully? Is there possibly a way to also get them to positively influence each other? These are all parameters to take into account and decide upon.

It is, however, not needed to reinvent the wheel. There are many companies who specialise in coaching and training professionals. One such company is Gastvrijheid in Bedrijf. Their 4P (people, place, product, process) approach towards hospitality, which is based on the aforementioned dimensions by Pijls et al., 2017 could be potentially very beneficial for our cause. This is why the next step on the top of the timeline consists of setting up a cooperation with Gastvrijheid in Bedrijf to get their professional input on the contents and organisation of the training for the cleaning personnel. This could be finalised relatively quickly, and then the course can proceed with the first, small group of employees. Once started it is important to constantly evaluate whether the training is well received by the participants and if it has any effect on their attitude, to be able to tweak it when necessary. In this the participants need to understand that although the change comes from within themselves, the evaluation comes from the passengers: even though 96% of cleaners think they are hospitable, in reality only 35% of customers thinks they are (Zweers, 2020). These first participants of the course will then be asked to put their newly acquired skills in specific toilet units to measure its effect.

### 16.1.3 Bin implementation

Meanwhile, we can implement the pilot trials of bins in the toilet cubicles. Vebego has already done research into the properties and qualities of different types of waste bins, which can be useful here in choosing the most attractive and user friendly bin in order to achieve the goal of attracting its use (see also chapter “iteration”). The most important factors to take into consideration are usability for the passengers and the cleaning staff. While for the passengers the points discussed in chapter “iteration of concept” are necessary, like not needing to touch and having a hygienic look, for the cleaning staff it is all about easy access and maintenance. Their time to clean a toilet cubicle is limited, so they need to be able to switch out the waste bag as quickly as possible, be able to know easily when batteries need to be changed and be able to clean the floor below the bin still.

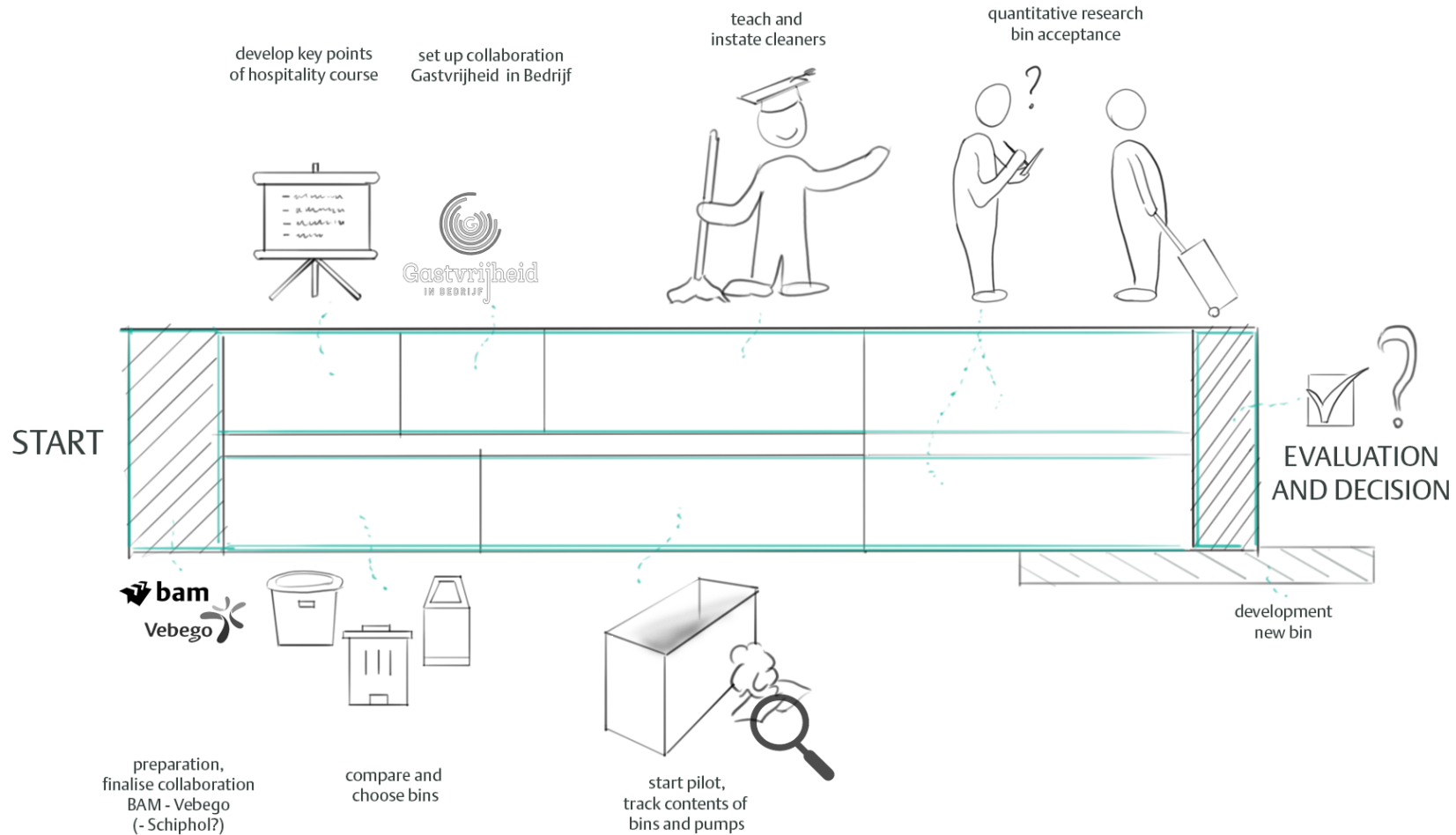


Figure 21: short term implementation timeline

These bins are then implemented into one or more specific toilet units, which are determined from the error data to be connected to a pump with a lot of obstructions. The toilets in which the cleaner-as host concept is being tested are determined based on the same criteria, but if possible in units connected to a different problematic pump, to be able to measure if one of the concepts has more impact on passenger behaviour than the other or not.

A third toilet unit with the two parts of the concept tested together can however be considered, to also be able to measure the theory proposed

in chapter “diverging”: that the combination of several ideas in one concept has more effect than a standalone product.

#### 16.1.4 Quantitative data gathering

Once the tests are in place, Vebege, BAM and possibly Schiphol can then move forward with a quantitative research researching the effects of the concept by (1) keeping track of the error data and contents of the pumps, (2) measuring the use and contents of the bins and (3) a survey of the customer satisfaction.

## 16.2 Long-term: continuation and implementation (several years)

After analysing the data a conclusion can be made on the effect the concept has. Even if the data shows that the interventions influence the number of malfunctions in the pumps considerably, a cost-benefit estimation will need to show whether the cost of implementation will not surpass the benefits of the lowered maintenance of the pumps. Otherwise, there is neither added benefit on Vebege's side to help BAM, nor a reason for Schiphol to invest in it.

### 16.2.1 Business case

If there is enough proof that it is a desirable, feasible and mostly viable idea, the next step is convincing Schiphol to give a go-ahead. This is dependent on the type of business proposal the initiators choose to follow: an improvement- investment- or innovation proposal (Vraagspecificatie Proces: Beheer, Onderhoud en Modificaties (VSP-BOK), 2019). In this case I would like to argue in favour of an investment proposal, meaning that the initiator proposes changes in management and maintenance of assets e.g. in the execution thereof, but of which the outcome falls partially outside of the term of the contract. Therefore the costs will be split between the initiator and Schiphol.

This will pave the way for large-scale implementation: all of the cleaning staff, including other cleaning companies, will be trained according to the hospitality concept. The bin implementation needs to be done more gradually, starting with the most problematic toilet units. This is also dependent upon which toilet units are eligible for upgrades when. According to Schiphol (2021) this is a gradual process, which will take another few years. Based on this blog page (Schiphol, 2021) , which also speaks of an in-between phase for older toilet blocks, I estimate complete renovation and therefore this long-term implementation to take about five years.

### 16.2.2 Ownership of female hygiene bins

It is also important to take into account the aforementioned problem of ownerships of the sanitary bins. Currently a process might be in place where the ownership will shift from the external party towards Vebege, but this is not set in stone. If this will not happen, either the owner of the sanitary bins will need to be involved, or the bins cannot be implemented in the women's toilets yet.

Dependent on which scenario will play out:

- a. Vebege will take over the ownership and maintenance of the sanitary bins in the toilets. This would mean that they will try to implement their own new sanitary bins first. These require electrical support to be put into the cubicles in any case, which leaves room for the proposed bin to be attached to the general electrical system.
- b. Ownership and maintenance of the sanitary bins will continue to be the task of an external partner who comes to exchange them. This would mean the bins are not attached to the cubicles and therefore require their own power source. I would opt for rechargeable batteries as power source.

Scenario a. would be most beneficial not just to Vebege, simplifying maintenance, but also for BAM. With the ownership of the bins outside of their range of influence, the design stays the same. This includes the small opening which was determined to hinder women from throwing away their sanitary products. If a new sanitary bin can be implemented, as Vebege intends to do if they acquire ownership, BAM can use their intensified collaboration to influence the design process. If designed well, following the behavioural principles proposed in this project, it could lower the amount of obstructions which are currently caused by sanitary products.

For practical reasons I made a choice not to develop my personal bin design further in the duration of this graduation project. However, considering Vebege's experience with the development of a similar product, it is worthwhile to re-examine this decision once the behavioural change is proved. This development would include the iterations mentioned in the chapter "iteration".



# Part six: Concluding

The final part of this report concludes the work done. Here I discuss the implications of the concept and strategy, and provide some take-aways for further research.

# 17. Discussion and recommendations

In this project I attempted to set the baseline for behavioural change as a solution for the clogging of BAM's sewage pumping stations. Considering this was the first time BAM worked with IDE, this human-centred design (HCD) approach was new to them. I found that, although many of the people I worked with at BAM had the tendency to first think about the technical or financial implications of the problem and possible solution, they were very open and willing to adopt this new approach, even if it took some time to get there. This openness and at the same time their efforts to help me understand their side of the problem and work they do, helped me tremendously in my graduation project.

## 17.1 Limitations of the research

### 17.1.1 Acquiring information

The aforementioned openness was unfortunately not the case when it came to contact with some of the stakeholders. Getting the right person or the right information was sometimes difficult, resulting in getting some crucial information only at the end of the project, when I could not make any major changes anymore. I suspect this may have influenced both my approach and my outcomes. I only learned during one of the last stakeholder interviews, for example, that there are more non-passenger toilets at Schiphol than passenger-toilets, and that the most problematic paper towels are only still in use for these non-passenger toilets. Had I known this earlier, also taking into account the cleaning rags found in the pumps, I would have likely opted to focus on the employees of Schiphol instead of the passengers. My first recommendation for further research is therefore a similar project targeting the personnel of the many companies in office at Schiphol, as well as a more thorough evaluation of the techniques of the various cleaners. In case a full project is not possible, it would at the very least be interesting to evaluate to what extent the behavioural interventions in this project also affect the behaviour of personnel.

### 17.1.2 User research

I limited the scope to exclude the current Covid19 situation from the beginning (see chapter 2.4). This unfortunately did not stop it from influencing the project. Covid significantly decreased the number of passengers at Schiphol, effectively eliminating my attempt at user observations and interviews at location. Although the alternative interviews with potential users from my social circle proved to be fruitful, letting people recollect their experiences still provides less information than asking right when it happens. This is not even considering the lack of age variation in the interviewees. For these reasons I strongly recommend the for the pilot proposed customer experience research to take place. It will strengthen the arguments for implementation tremendously, knowing what the actual passengers want.

## 17.2 Limitations of implementation

This graduation project might be finished, but the project is not. Although meant to become a realistic solution, the work done up until this point is relatively theoretical, which is understandable considering the academic nature of a master graduation project. As shown in the implementation strategy, the first step into actually realising the concept is the pilot. This is important, because it proves or disproves whether the theoretically possible behavioural changes will actually take place. This is easily measurable by the proposed tracking of the contents of the bins and could in theory be proved in mere weeks. However, the effects of the behavioural interventions on the obstructions in the pumping stations rely on more factors than the passenger toilets alone. Even if the pilot proves to have effect, this will take a lot more time. That is why the pilot takes six months and there is still a real possibility it will not work in the end.

### 17.2.1 Adoption by the cleaning personnel

One reason for the success or failure of the concept is how it will be received by the cleaners. Their low level of education and often non Dutch background has a big part in this. The lack of education might make it harder for them to grasp the contents of the course fully and as such not be able to fully apply the wanted hospitality. The foreign background makes it language-wise harder and might influence their notion of what hospitality is, which differs between cultures.

This was also a point made during a meeting with BAM and Vebego to discuss how to work together in this pilot: how will the new education practically work for the cleaners and how to ensure that it does not interfere with the courses they already get? This point is lacking in the research, because the contents of the basic training for the cleaners were not shared so far. These contents, along with an evaluation of how the cleaners implement this currently, need to be further researched.

### 17.2.2 Acceptance by Schiphol

A second reason for potential success or failure depends on Schiphol itself. Schiphol has shown to be apprehensive towards new innovations due to their pandemic related financial difficulties. At this moment, convincing Schiphol to invest would only succeed based on arguments for either process or customer experience improvement, according to a product owner of one of the innovations at the airport. Although the concept has the potential to improve both process and customer experience, this potential needs to be proven with airtight proof, which is only possible after the pilot.

## 17.3 Organisational structures

Lastly, I have discussed the possibility of improvement of the solution by means of organisational change (see chapter 15). The main method was improvement through communication. The feedback I have received on this regard were, however, very mixed. Especially some stakeholders on a higher managerial level claimed vehemently that communication was absolutely no barrier for their work. This led me to doubt the necessity of this part of my research. At the same time, these people showed great pride in their lengthy work experience on and around Schiphol. I therefore recommend a more thorough research into the organisational structures of Schiphol and its partners, with a particular focus on the influence of employment level and length on collaboration.

# 18. Conclusion

This graduation project followed the process of the design cycle in order to first get a deeper understanding in behaviour to then design a new concept to prevent passengers from flushing waste through the toilets of Schiphol airport.

With use of exploratory user and stakeholder interviews, several problem areas were identified in passenger behaviour, which were translated into design directions to ideate from. Wide ideation and consequent narrowing down finally provided a two-part concept. It consists of a repositioning of the cleaning personnel's presence, putting them more in the forefront, and implementation of a new waste bin design inside the toilet cubicles.

From the validating user interviews, in which I made potential users envision themselves in a use scenario, I concluded the repositioning of the cleaner showed an effect on passengers behaviour. It would either form a connection evoking a sense of responsibility or create a feeling of being watched, both resulting in improved toilet manners. I concluded that the redesign of the waste bin and placement in the toilet cubicle potentially attracts use, making passengers opt for throwing waste away over flushing it. However, in order to realise this part of the concept, considerable improvement and lengthy development are needed, which is not realistic at this moment.

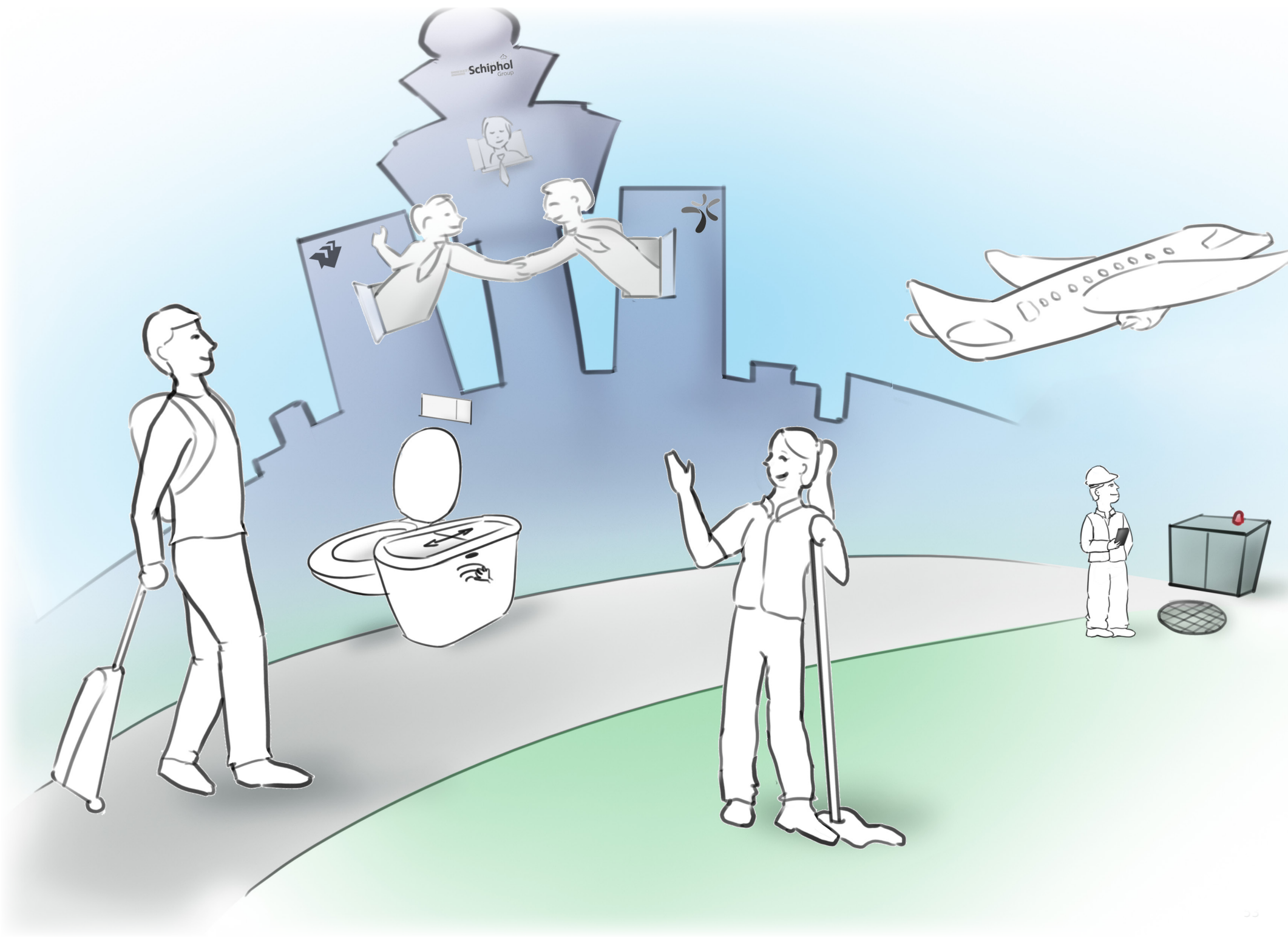
Instead, I opted to make use of existing waste bins for the time being. These were included in an implementation strategy, in which the placement of bins in the stalls and repositioning of the cleaners will be tested over the course of the upcoming six months, to then evaluate and hopefully implement them for the whole airport over the course of the next five years, attaching it to Schiphol's strategy for upgrading their toilet blocks.

Further research is needed on the connection of the personnel of Schiphol in the clogging of the wastewater pumps, as well as proof for acceptance of the concept by the cleaners and Schiphol. Nonetheless, this concept

may actually have significant impact on the number of malfunctions of lot four's wastewater pumping stations. I think this concept not only helps BAM to improve their maintenance, by lowering costs and ensuring assets will last longer, but it also improves the experience for the passengers. This will help in Schiphol's mission to become Europe's preferred airport.

This project was a good example of strategic design, and not just because of the implementation strategy. Merely the fact that BAM agreed to start working for the passenger directly is already a major strategy change. Since they are essentially hired to be in the background, the decision to go outside of the context of their lot is a quite rigorous one. Convincing their client Schiphol to accept this proactive stance is part of the strategy and should not be taken lightly. I am proud to have been involved in this change process.

Finally, over the full course of the project, I have constantly attempted to incorporate visual thinking into the process. This technique not only ensures an easier knowledge transfer by means of simple visualisation, but has also put a smile on many faces I encountered in the past months. My final deliverable is therefore a visualisation of the outcomes of this project in one last drawing, which can be found on the next page, as well as the poster showcase attached to this report.



# Literature

- Ackermann, L. (2020). *Design for Product Care*. <https://doi.org/10.4233/uuid:9fe0a3cd-a7f7-4d29-bb44-6dc78575a2e8>
- BAM Perceel 4 (2021, January). *Storingsmeldingen afvalwaternet* [Powerpoint slides].
- Bruins, R. (2020, January 6). *Nederlanders wassen hun handen minst vaak na toiletbezoek*. Service Management. <https://servicemanagement.nl/nederlanders-wassen-hun-handen-minst-vaak-na-toiletbezoek/>
- Calabretta, G., Gemser, G., & Karpen, I. (2016). *Strategic Design* (1st ed.). BIS.
- Cash, P., Khadilkar, P., Jensen, J., Dusterdich, C., & Mugge, R. (2020). Designing Behaviour Change: A Behavioural Problem/Solution (BPS) Matrix. *International Journal of Design*, 14(2).
- Chin-A-Fo, H., & Wassens, R. (2019, November 29). Schiphol als 'levend lab'. NRC. <https://www.nrc.nl/nieuws/2019/11/29/schiphol-als-levend-lab-a3982129>
- Clear, J. (2018). *Atomic Habits* (1st ed.). Penguin Random House.
- Cobouw. (2019, November 22). Dit is de top 50 van 2019. <https://www.cobouw.nl/marktontwikkeling/artikel/2019/11/dit-is-de-top-50-van-2019-101278962#1>
- den Hartog, R. (2014, November 26). 'Niets geheim aan project Harvest'. KMarMagazine. <https://magazines.defensie.nl/kmarmagazine/2014/09/01-slimme-cameras>
- Dessing, G. (2020, June 23). *Smart Facilities Schiphol: betere dienstverlening met digitale 'zintuigen'*. Facto. [https://www.facto.nl/smart-buildings/artikel/2020/06/smart-facilities-schiphol-10114119?\\_ga=2.57944170.1303676255.1615974095-1991983368.1606300960](https://www.facto.nl/smart-buildings/artikel/2020/06/smart-facilities-schiphol-10114119?_ga=2.57944170.1303676255.1615974095-1991983368.1606300960)
- Evans-Pritchard, B. (2013). *Aiming To Reduce Cleaning Costs*. Works That Work. <https://worksthatwork.com/1/urinal-fly>
- Felëus, E. (2019). *Schiphol Smart Building 2030*. <https://www.schiphol.nl/nl/innovatie/pagina/gedeelde-visie-voor-smart-schiphol-airport-city/>
- Fogg, B. J. (2009). A behavior model for persuasive design. In S. Chatterjee & P. Dev (Eds.), *Persuasive '09: Proceedings of the 4th International Conference on Persuasive Technology* (pp. 1–7). ACM. <https://doi.org/10.1145/1541948.1541999>
- Fogg, B. J. (2019). Fogg's Behavior Model. *Behav. Des. Lab., Stanford Univ., Stanford, CA, USA, Tech. Rep.*
- Greed, C. (2003). *Inclusive urban design: public toilets*. Routledge.
- Gregory, M. E., & James, S. (2006). *Toilets of the World* (Illustrated ed.). Merrell Publishers Limited.
- Kuller, M., Dolman, N., Spiller, M. & Vreeburg, J. (2014). Haalbaarheidstudie: regenwater opvangen en benutten op luchthaven Schiphol (Feasibility study: Rainwater harvest and use at Schiphol airport).
- Lockton, D., Harrison, D., & Stanton, N. A. (2010a) *Design with Intent: 101 Patterns for Influencing Behaviour Through Design v.1.0*, Windsor: Equifine
- Lockton, D., Harrison, D., & Stanton, N. A. (2010b). The Design with Intent Method: A design tool for influencing user behaviour. *Applied ergonomics*, 41(3), 382-392. <https://doi.org/10.1016/j.apergo.2009.09.001>
- Nijs, B. L. M., & Kruk, P. (2013, November). *Functioneren en model dwars-olering N.V. Luchthaven Schiphol*. Waternet sector Afvalwater, Beleid en Assets.
- Pijls, R., Groen, B. H., Galetzka, M., & Pruyn, A. T. (2017). Measuring the experience of hospitality: Scale development and validation. *Inter-*

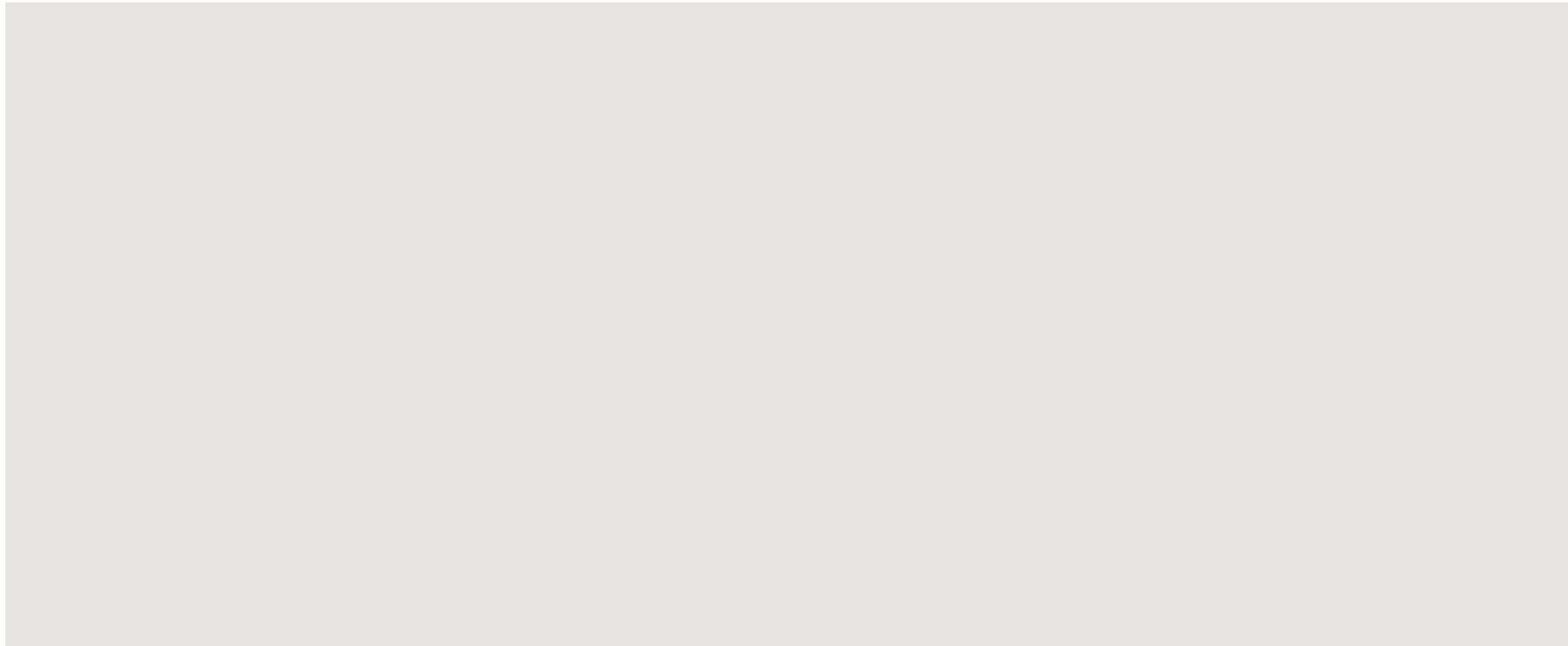


- national journal of hospitality management*, 67, 125-133.
- Schiphol. (n.d.). *Pier A will be the most sustainable pier*. Retrieved 26 June 2021, from <https://www.schiphol.nl/en/schiphol-group/page/pier-a-will-be-the-most-sustainable-pier-at-schiphol/>
- Schiphol. (2019, January 29). *Schiphol en Nederlandse bouwbedrijven gaan strategische samenwerking aan*. Schiphol Newsroom. <https://nieuws.schiphol.nl/schiphol-en-nederlandse-bouwbedrijven-gaan-strategische-samenwerking-aan/>
- Schiphol. (2021, May 20). *Upgrade module*. <https://www.schiphol.nl/nl/innovatie/blog/upgrade-module/>
- Service Management. (2020, July). *Partner of Choice* (No. 2020). Vakmedianet. [https://digimagazine.partnerofchoice.nl/service\\_management](https://digimagazine.partnerofchoice.nl/service_management)
- Spencer, E. A., & Mahtani, K. (2018, January 12). *Hawthorne effect*. Catalog of Bias. <https://catalogofbias.org/biases/hawthorne-effect/>
- Tschimmel, K. (2012). Design Thinking as an effective Toolkit for Innovation. 10.13140/2.1.2570.3361.
- Unie van Waterschappen. (2019, March 6). *1,5 miljoen Nederlanders spoelen billendoekjes door de wc*. <https://www.uvw.nl/15-miljoen-nederlanders-spoelen-billendoekjes-door-de-wc/>
- van Boeijen, A. G. C., Daalhuizen, J. J., Zijlstra, J. J. M., & van der Schoor, R. S. A. (2014). *Delft Design Guide* (2nd ed.). Amsterdam: BIS Publishers.
- van den Hende, E. A., Dahl, D. W., Schoormans, J. P. L., & Snelders, D. (2012). Narrative Transportation in Concept Tests for Really New Products: The Moderating Effect of Reader-Protagonist Similarity. *Journal of Product Innovation Management*, 29, 157–170. <https://doi.org/10.1111/j.1540-5885.2012.00961.x>
- van der Riet, A. (2020, September 15). *De sanitaire ruimte als beleving*. *Service Management*. <https://servicemanagement.nl/de-sanitaire-ruimte-als-beleving/>
- van Engelen, E. (2021, January 20). *Stoomreiniging en probiotische reiniging: een gouden combinatie?* *Service Management*. <https://servicemanagement.nl/stoomreiniging-probiotische-reiniging/>
- van Wijk, A., van der Torre, E., van Barneveld, G., & Wolsink, J. (2020). *Ondermijning op en rond luchthaven Schiphol*. <https://servicemanagement.nl/wp-content/uploads/2020/05/Ondermijningopenrond-luchthavenSchiphol.pdf>
- Wendel, S. (2020). *Designing for behavioral change: applying psychology and behavioral economics* (2nd ed.). O'Reilly Media, Inc, USA. <https://learning-oreilly-com.tudelft.idm.oclc.org/library/view/designing-for-behavior/9781492056027>
- Zweers, M. (2020, May 4). *In gesprek met Mieke van Sark-Bouwhuis van Gastvrijheid in Bedrijf*. Schoonmaak Nederland. <https://www.schoonmaaknederland.nl/mieke-van-sark-gastvrijheid-in-schoonmaak>





# Part seven: Appendices



# Appendix A: Insights exploratory interviews stakeholders

The interviews described here are all exploratory interviews and therefore are not transcribed verbatim. Below the most important insights are listed.

<b>Date</b>	<b>Participant</b>	<b>Insights</b>
04-03	Company director TBK installatietechniek	<p>Subcontractor, working together with the main contractors of Schiphol for decades already (before BAM was Engie). TBK does the execution of the sewage works. Interviewee thinks the biggest cause of blockages are paper towels. At this moment they encounter another problem: due to a lack of passengers (Covid) not all toilets get flushed enough, so struvite scale (urinsteen) builds up on the inside of the sewer pipes, causing more blockages. Other things which frequently end up in sewage system are items which fall out of pockets, like phones and keys. He contributes a lot of problems to lazy behaviour.</p> <p>It is also very hard to make Schiphol understand that preventive maintenance is cheaper in the long run than corrective measures. Lastly he thinks there was bad transfer of knowledge from Engie to BAM/Heijmans.</p>
23-03	Sustainability expert BAM Infraconsult	<p>Interviewee's main task is to intrinsically implement sustainability into the core of BAM's way of working, to eventually be able to meet clients' demands before they ask for it.</p> <p>In the Netherlands we do not realise how well off we are, and how different our priorities regarding sustainability therefore are compared to other countries.</p> <p>Interviewee is interested in knowing how to position the concept. Adding sustainability in the story will make a strong case for Schiphol, e.g. since they want to be 3 – 4% more energy efficient every year.</p>
25-03	Projectplanner Heijmans Schiphol + mechanic, TBK	<p>Heijmans, BAM's direct competitor which maintains terminal 1 and 2 at Schiphol, has similar problems as BAM regarding blockages. They both use the services of TBK installatietechniek to execute the work, but other than that and the occasional work that has overlap in their respective areas, the two companies barely communicate. For Heijmans, pier D gives the most problems, due to old, unlogically built systems.</p> <p>Replacing problematic old sewers or preventively maintaining systems in general is something Heijmans also tries to invest in, but convincing Schiphol to invest preventively is hard. Only after showing the costs (€400/corrective cleaning) did they agree. BAM is suspected to be better at convincing Schiphol, but</p>

Heijmans also switches peoples functions around a lot more: Interviewee does not work in the sewage water systems anymore at time of speaking.

14-04 Subject matter expert  
Schiphol airport

Up until recently, interviewee was the main contact within Schiphol for BAM regarding the sewage systems, leaning on years of knowledge of the systems. He has many experiences with blockages, like when the cleaning companies bought too cheap toilet paper, which would clump together. At some point he knew exactly which toilet units were problematic, so they would flush them with high pressure preventatively (now transferred as task of main contractors).

At this moment he believes the biggest problem are people from middle-eastern countries who use paper towels as seat covers to then squat on top of the seat. That is why they have stuck stickers to the towel dispensers, but is sceptical of stickers as a solution: “het plakken van stickers, die tijd hebben we wel gehad”. Instead, interviewee is strongly convinced the use of data is a potential solution for many problems. Using data to maintain assets and avoid complaints is in general a very important goal of AAS.

Regarding the idea of behavioural change in the toilets, he sees the toilet as an experience: if it looks nice, people will use it more properly. AAS has done research into the overall appearance of the toilets. Investments at this moment are also mostly customer oriented.

15-04 Director Vebego  
international

He thinks the collaboration between Schiphol and BAM works very well, e.g. in the implementation of iView. Vebego international is a family owned cleaning company, one of the biggest in Europe. They are one of the four main cleaning companies at Schiphol. They also work together closely with the others (Asito, ISS, Raggars) in their cleaning collective, although easiest with Asito because they are the only one there as long as Vebego. Contact with BAM is good, with Heijmans less so, due to their frequent changing.

Speaking to its director about the paper towels, he does not believe how they can be a problem, except for in the disabled toilets. To prevent over use of the paper towels they have already switched from separate towels to rolls of thinner paper which is taken out per piece instead of by several. Vebego is responsible for buying these supplies, but suppliers (and thus choice) are limited. They do actively prevent the cleaning rags from being flushed, these need to be returned after the shift by the cleaners.

Vebego puts a lot of effort into innovation, mostly sustainability, efficiency and customer satisfaction related. Examples: ecologically degradable cleaning solution, sensors in wastebins to track their how full they are to optimise the moment of emptying (40% reduction in waste bag use) and a new female hygiene box which seals the waste to turn it from chemical into regular waste. Big focus on data driven solutions.

Influencing passengers: Most important is the first impression, which people judge based on “eyecatchers”: very obvious waste lying around. That is why first focus is to make sure no waste is on the floor and bins are not piling up. Vebego has done tests with letting cleaners drive along in trains to reassure people of its cleanliness. At Schiphol they use flight data to predict which toilet blocks will be busy and they sent cleaners there to mostly be there, maximum do some maintenance cleaning.

Finally, they are not only responsible for cleaning, but also maintaining the toilet blocks in state of delivery. If there is a renovation, they are involved in the redesign. However communication of timeline for renovation is often badly communicated by Schiphol. They would much rather fix some things themselves, instead of relying on other people.

# Appendix B: Questions exploratory interviews users

## General questions

- Age, nationality
- Do they have a lot of air travel experience?

## Research specific questions/ situations

### *For internationals:*

- Can you tell me something about the toilet culture in your country? What types of toilets are common for example?
- Can you describe your thoughts on toilets in the Netherlands when you first arrived here? Was it different? Did you have to adapt your use?

### *For everyone*

- What is your general opinion on public toilets, especially at airports? Schiphol?
- Do you think they are usually clean?
- Are there strange things you have encountered when using public toilets, e.g. clogging, dirt etc.?
- Why do you think people do these kind of things?
- When you enter a public toilet, what is the first thing you do? (*ask further, would you just sit down regularly or not, why?*)
- Do you bring your own wipes or toilet paper? Do you know people who would? Why would or wouldn't you/they?
- Do you ever use seatcleaner liquid or a toilet seat protector if these are available?
- If you encounter such a situation (*show photo washroom*) in which you can choose between a cloth towel or paper towels, which one do you choose and why?



# Appendix C: Insights exploratory interviews users

Date	Participant	Comment on participant	Insights
22-03	Male, 25, Dutch	Law student, highly analytical and observant	<ul style="list-style-type: none"> <li>- Passengers make a hasty, dirtyish impression probably due to their travel stress.</li> <li>- People use the washrooms at Schiphol like bathrooms, for refreshment, more than they would in different toilets (especially transfers).</li> <li>- Maybe people dump stuff which they cannot take through security?</li> <li>- He always throws stuff in the bin, never in the toilet</li> </ul>
23-03	Female, 26, Dutch	Former psychology student, lots of experience living abroad	<ul style="list-style-type: none"> <li>- She feels like the rubbish bins are only meant for sanitary products, not for regular rubbish.</li> <li>- Cleans the seat, except when she gets feedback that the toilet was just cleaned (seeing the cleaning lady). Describes herself as a child of a germophobe.</li> <li>- Prefers towel roll for sustainability reasons.</li> </ul>
24-03	Female, 27, Indonesian	Too little experience with Schiphol to talk about it.	<ul style="list-style-type: none"> <li>- In Indonesia they changed from squat toilets to sit toilets only around the beginning of the century, causing people to stand and squat on the seats.</li> <li>- Dislikes that there are no bidets in NL.</li> <li>- At first did not understand how towel rolls work, prefers paper towels for hygiene.</li> </ul>
25-03	Female, 25, Dutch	Recording not great due to wind	<ul style="list-style-type: none"> <li>- Toilets are very available, except for near the gates.</li> <li>- Clogging she has encountered were due to a lot of paper.</li> <li>- About flushing things: "I have done it in the past, when you are 15 and you think you think 'oh that is just fine', but nowadays I don't do that anymore [...] like tampons and such. When you do not feel like taking it with you to the waste bin." (because there was no bin available and taking it was awkward).</li> </ul>

			<ul style="list-style-type: none"> <li>- If there is no toilet paper, she says ripping up the cardboard roll is a last resort, also because it consists of layers and “probably just dissolves in the water”.</li> <li>- If the toilet is dirty she will try to touch as little as possible, even using paper to touch the door handle. She will not clean the seat, just hang above it.</li> <li>- Is fan of self-cleaning toilet seats in Germany, but there you pay for the toilets and she feels you cannot do that at a toilet.</li> <li>- Looks for visual feedback if a toilet is cleaned, e.g. seeing cleaning personnel walking around.</li> <li>- Prefers towel roll for sustainability reasons and because it feels nicer to the touch.</li> <li>- Always pulls towel roll further after she is done, because that is social to next person, so they have a clean piece, hoping they will follow suit and make it a system.</li> </ul>
29-03	Male, 29, Chinese/Dutch	Used to work at Schiphol Plaza for several years. Self-described clean freak	<ul style="list-style-type: none"> <li>- Feels like even though the toilets at Schiphol are well-maintained and clean they are simple and a bit outdated (compares to luxurious toilets at new Munich airport). Nothing wrong, but nothing extra, like all the high-tech gadgets in Asia, especially bidets.</li> <li>- Uses visual feedback to see whether it is clean (spettters) and sometimes checks cleaning roster. Often stills puts paper on seat.</li> <li>- Applies the double flush method. Thinks blockages are often due to “incorrect use”, especially too much paper. Thinks people flush things in public toilets because it is not their problem.</li> <li>- Agrees with the use of Schiphol’s toilets as bathroom, has brushed his teeth and changed clothes there himself.</li> <li>- Values the Etos at Schiphol for supplies to freshen up, thinks there should be more, as well as showers like some other airports have.</li> <li>- “Airports are the kind of places where you want to freshen up, get ready for the next part of your journey”.</li> <li>- Admits to flushing self-brought tissues/wet wipes, but does checks whether they are biodegradable.</li> <li>- Absolutely hates towel rolls, because they often block and does not know where the towel goes after so probably unhygienic.</li> <li>- If in an emergency he uses the paper towels, he would flush them, but for other purposes he throws them in the bin.</li> <li>- Maintenance of the bins in the washrooms is good, but has no clue whether there are bins available in the toilet cubicles.</li> </ul>

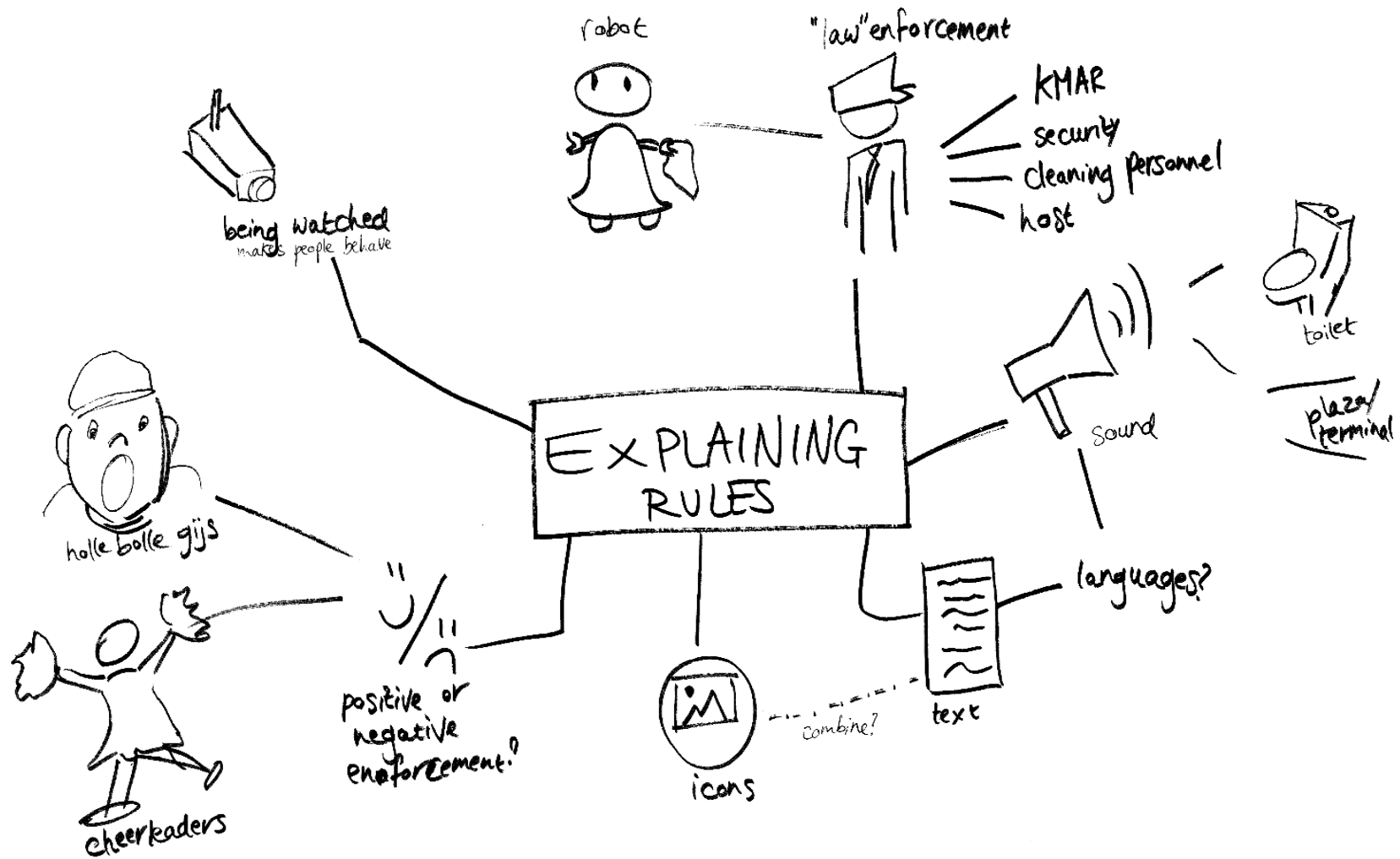


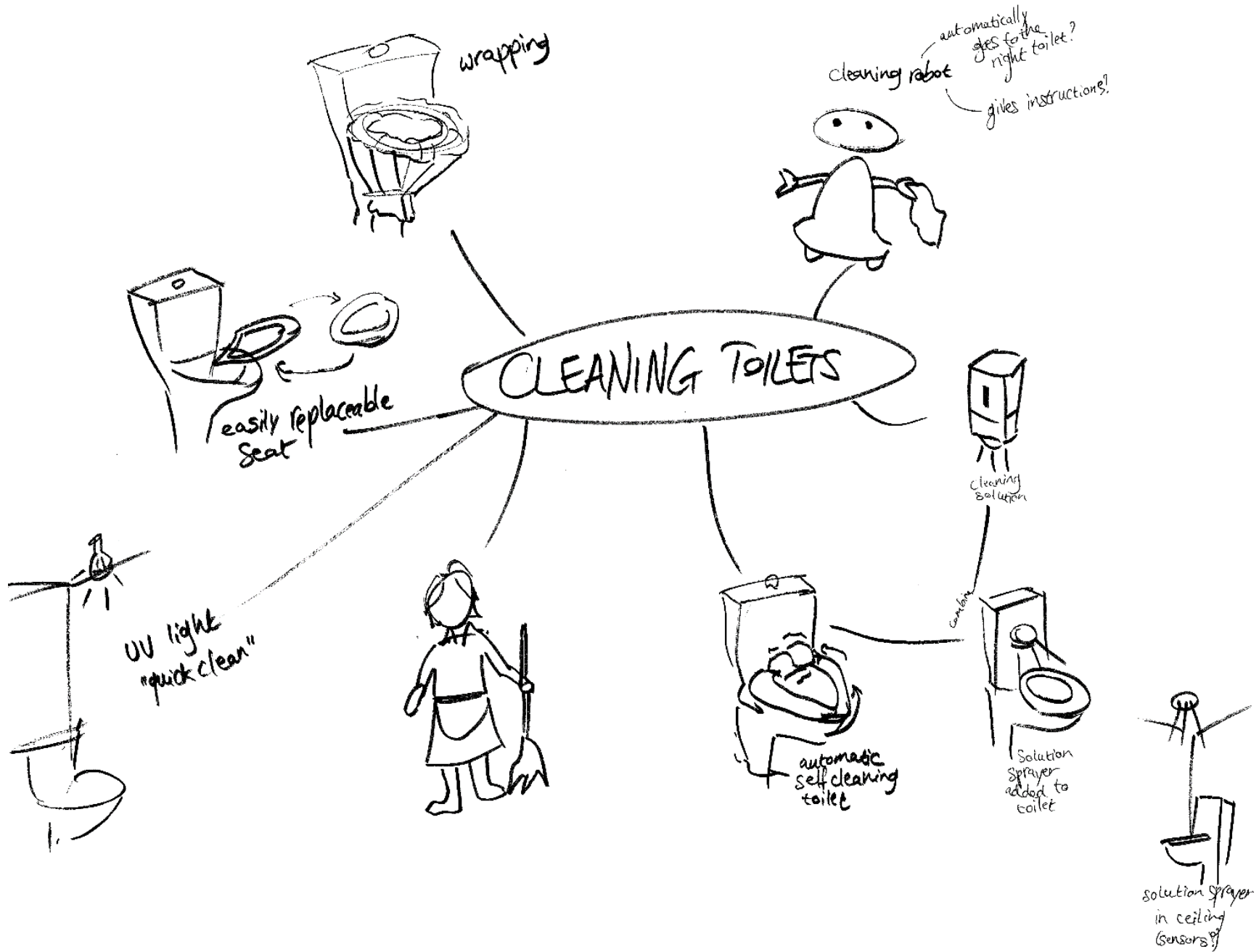
			<ul style="list-style-type: none"> <li>- Thinks wet wipes these days are more often soluble, and Etos should sell only soluble, because people will still throw them in anyway.</li> </ul>
30-03	Female, 27, Korean		<ul style="list-style-type: none"> <li>- Very satisfied about public toilets in NL, since they are usually clean and have toilet paper/soap etc., but also feels like they can always be better, e.g. comparing them to high tech airport Incheon in Seoul.</li> <li>- Not a fan of squatting toilets, thinks these are old-fashioned, but does have friends who prefer them.</li> </ul>
31-03	Female, 37, Indian		<ul style="list-style-type: none"> <li>- Always covers toilet seat with toilet paper.</li> <li>- Tries to avoid using the toilet in aeroplanes as much as possible, therefore always going to toilet at airport.</li> <li>- Feels like the look of the toilet has a big impact on the comfort and assumption of cleanliness. The older toilets at Schiphol (white and grey tiles) feel purely functional, sterile, whereas the newer ones with wood panelling (after being shown picture) feel more comfortable, cleaner – she made a connection with a (fancy) hotel toilet, which she assumes is being maintained better.</li> <li>- Made point that people who are used to squat-toilets are usually not the ones wealthy enough to travel, so squatting should be less of a problem in Schiphol’s context.</li> <li>- Also feels like bins in toilets are just for sanitary products, would however take it with her to a bin outside if necessary.</li> </ul>
31-03	Male, 26, Indian		<ul style="list-style-type: none"> <li>- “They try to maintain it, but with the amount of footfolk they have it is challenging”. Compares to faculty toilets in the evening. Understandably not optimal.</li> <li>- Public toilets in India, although sparse, are cleaner because they use water to clean instead of toilet paper. He feels dirty when using paper → cultural difference.</li> <li>- He thinks cleaning before and after use is “basic decency”, but was surprised about seat cleaning solution dispensers. He had come across them, but never realised that was their use, because there were no instructions.</li> <li>- Would throw away wipes if there is a bin, “because then that is the logical thing to do”, but there often is no bin, so then he flushes them.</li> <li>- On knowing whether to flush wipes: points out new way of packaging where the most important things are on the front of the package. However he thinks the unavailability of a waste bin is a bigger problem than people not knowing if flushing is possible.</li> <li>- Use of toilets is dependent on the duration and type of flight. If people have a layover they will use the washroom as bathroom.</li> </ul>

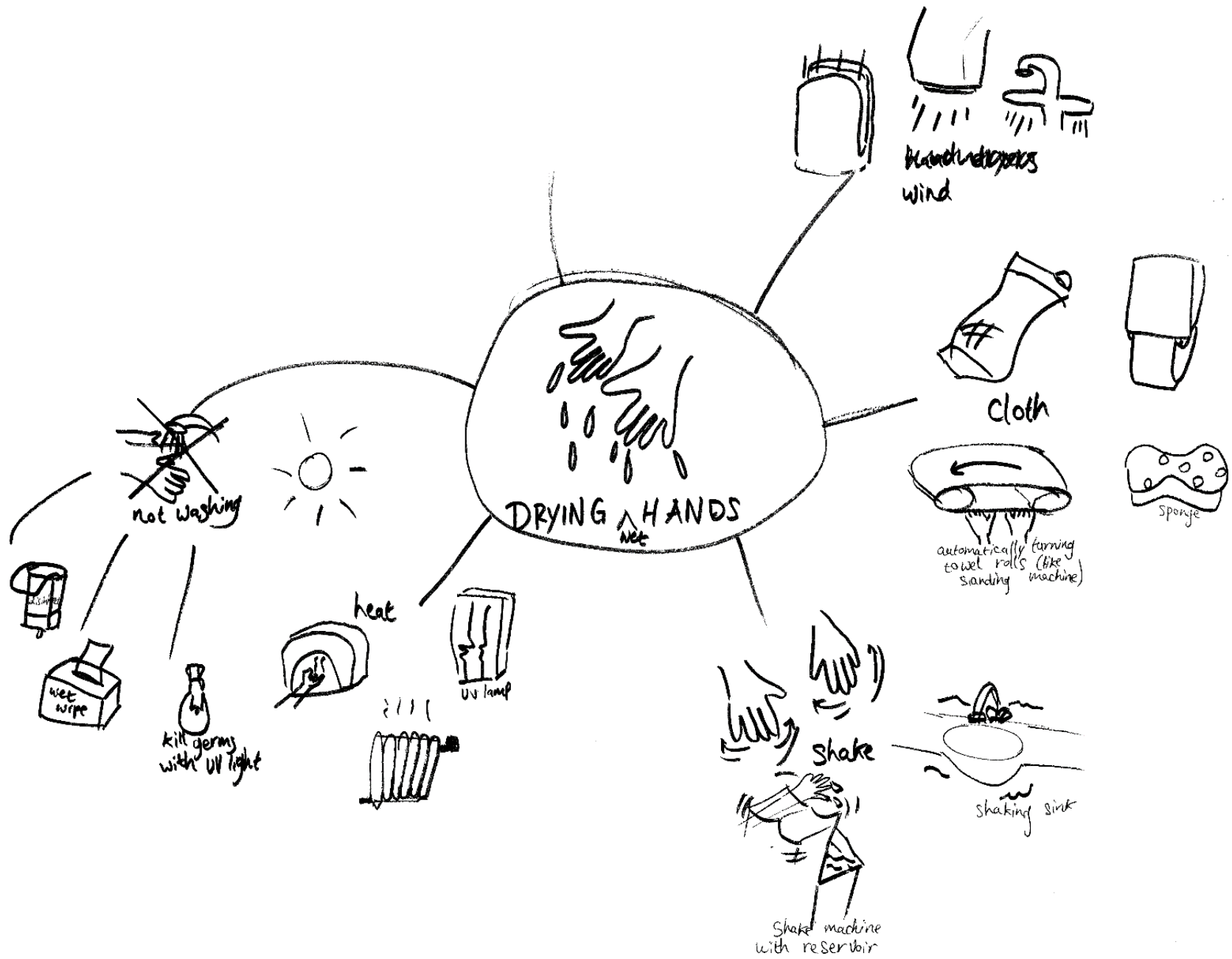
			<ul style="list-style-type: none"> <li>- Because of need to freshen up after long flight, there should be more toilets right after you get out of the aeroplane, before you get to immigration.</li> <li>- Understands what happens why people flush underwear: “you do not throw human excrements in the dust bin”. Not about underwear, but the contents of it.</li> <li>- Does not like the towel rolls, because you need to pull them further to have a fresh piece but people do not do that for the next. If it is automatic, then he would use it for sustainability reasons.</li> </ul>
01-04	Female, 27, Italian		<ul style="list-style-type: none"> <li>- Schiphol toilets very clean, very available, amenities always available. Look and feel neutral, not particularly happy about the yellow vibe. However a lot better than Galileo Galiei Airport in Pisa and the airport of Genova, because those not always smell clean and look very basic. Likes that the cubicles at Schiphol are big enough to take her luggage in.</li> <li>- Smell is very important to her, provides her the most feedback on cleanliness.</li> <li>- “If the light colour is white I associate it with cleanliness, if it is towards yellow, I associate it with a more cosy environment, if the light is blue I will hate it because that light drives me crazy and if it is pinkish I will associate it with a disco or a strip club”. (continues to explain how these are the different colours she encountered in public toilets, pink in Gatwick airport, pink is supposed to calm people down, but it does not work for her).</li> <li>- She hates the type of toilet cubicle doors which are transparent to see their availability and turn opaque when you go in. She prefers to have more privacy from a thick door, also to block out sounds.</li> <li>- Overall likes automatic toilets because she does not need to touch them, but thinks they are too unpredictable, not knowing whether they activate or not. Always doublechecks if they flush. Prefers pedal-activated flush.</li> <li>- Always brings tissues with her just in case and always flushes them, because it is “disgusting to throw them in the bin.”</li> <li>- Considers tissues soluble because they are thinner than regular toilet paper. Feels it is way more hygienic to flush, also baby wipes.</li> <li>- Does not want to touch the bins that “look like a mail box”, will touch it with toilet paper if she really needs to throw something away, because things might get stuck because the opening is so narrow.</li> <li>- Will take rubbish with her to big washroom if there is no bin.</li> </ul>

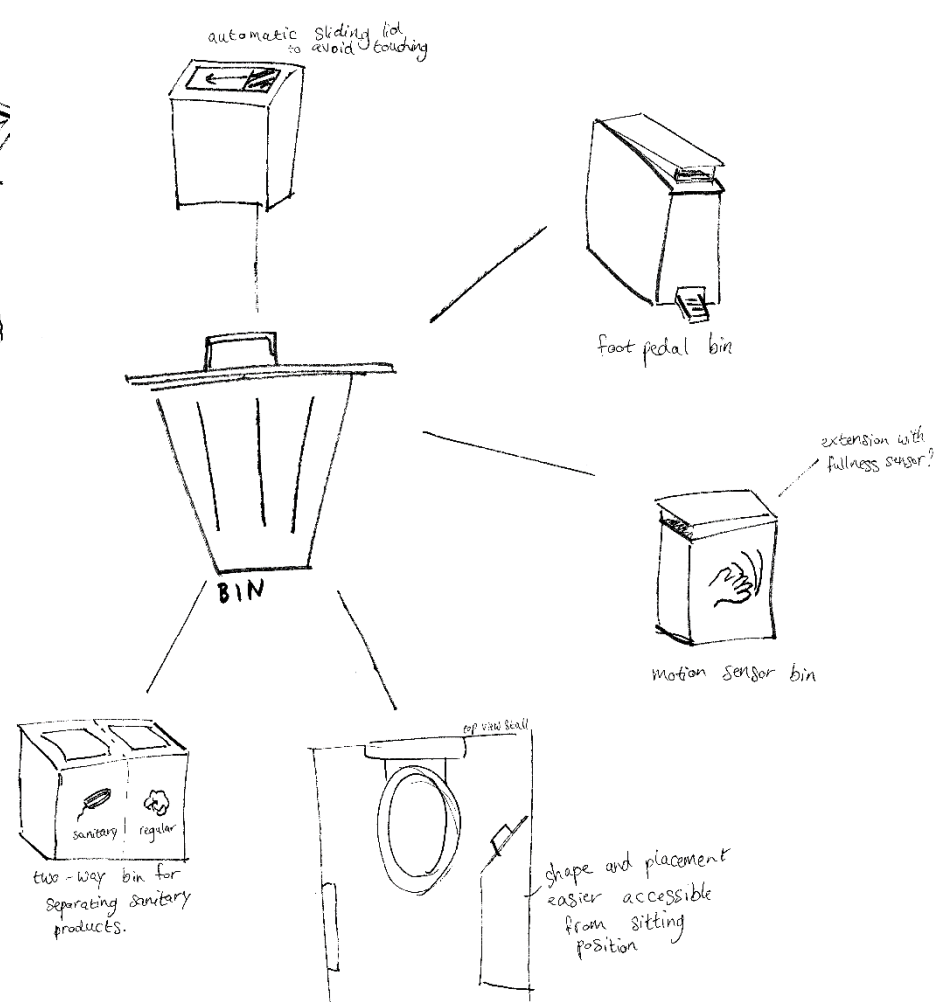
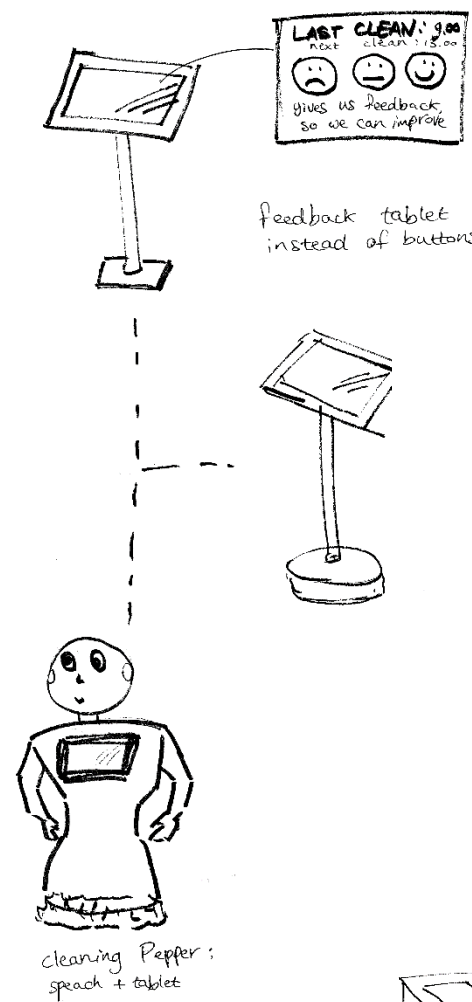
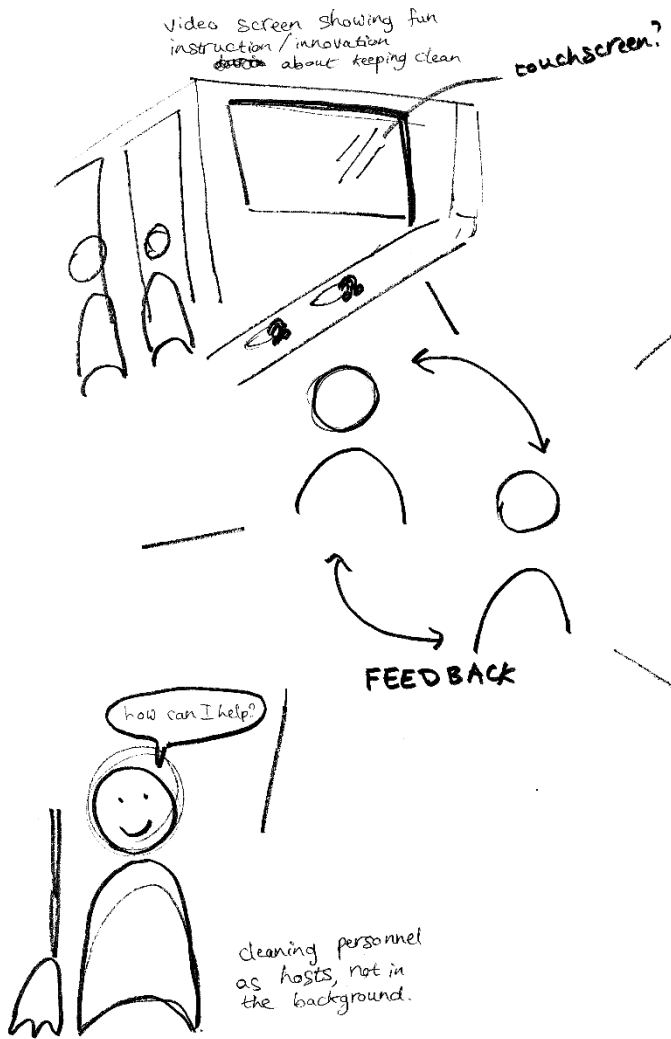
			<ul style="list-style-type: none"><li>- Does not understand how people not wash their hands or leave the toilet dirty.</li><li>- Did notice people really use the sinks in airports to wash themselves.</li><li>- Thinks Italians have a “hygienic stigma” and therefore flush a lot.</li><li>- Believes culture plays a big role in my research. In Paris and London people throw more into the bin. Also about “personal education, to respect another”.</li><li>- Very iffy about towel rolls, really dislikes them due to hygiene.</li></ul>
--	--	--	--

# Appendix D: Ideation

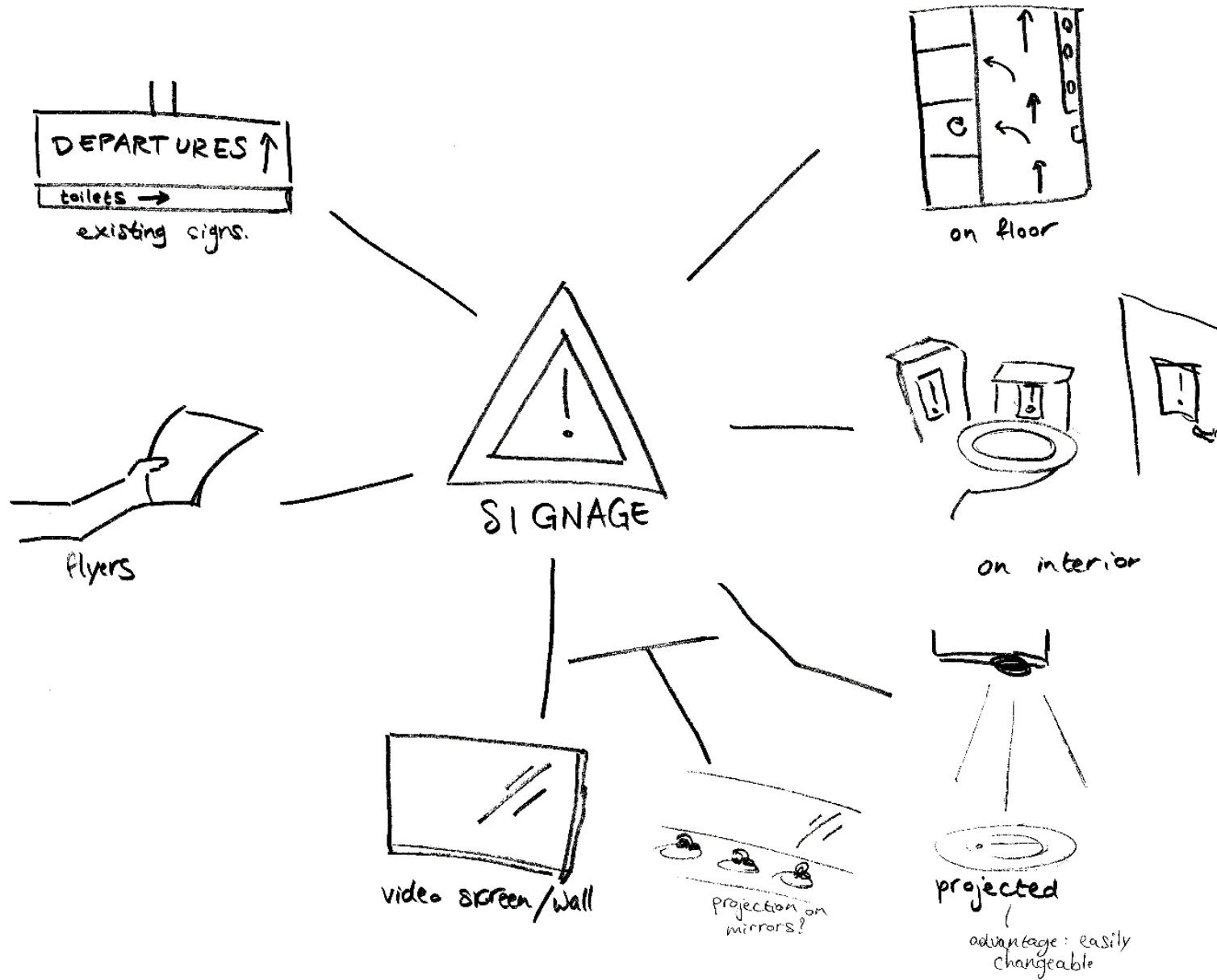












# Appendix E: Scenario validation interviews users





# Appendix F: Insights validation interviews users

Date	Participant	Comment on participant	Insights
02-06	Male, 27, Surinamese	Thinks his opinion on toilets and toilet etiquette comes from his upbringing, not cultural	<ul style="list-style-type: none"> <li>- Always goes to the first available toilet, because he feels not so fresh after a flight.</li> <li>- A cleaner leaving always gives “a comforting feeling, then it will probably be clean”.</li> <li>- He does not actively look for cues that it is clean, but if it is it does make him happy. A dirty toilet will cause him to rush, a clean one will comfort him that he can take his time.</li> <li>- “I come for the toilet, I do not come here to talk to the person who cleans”. Prefers privacy.</li> <li>- “I would not want to go back to taps you need to touch.” Especially so you do not need to touch after you have washed. Knows where to hold his hands from experience and seeing the sensor, works very well.</li> <li>- Usually cleans seat with cleaning solution from dispenser in cubicle.</li> <li>- Flushes regular wipes, because he assumes they are soluble.</li> <li>- Prefers sensor, because pedal bins often do not function well and require an extra action. The bin does need to be big enough so you do not need to tamp when it is full</li> <li>- Never put thought in not seeing contents, but can imagine other people not wanting to see it</li> <li>- Values a bin for wet wipes to clean yourself with, because not all of them are soluble. Cannot think of other purposes.</li> <li>- Thinks the bin opening and closing will startle people, as well as taking up too much energy. Better to attract with sound and a simple icon what to throw in it.</li> </ul>

			<ul style="list-style-type: none"> <li>- Thinks cleaner will change people's attitude, but waste bin will not so much.</li> <li>- Innovating for customer satisfaction is nice. In general, a tidy (without litter on floor), modern toilet will give him the feeling not to pollute, but if there is waste, he will add to it (compares to a pile of dirt on the street)</li> </ul>
04-06	Male, 23, Dutch		<ul style="list-style-type: none"> <li>- If he can plan his toilet visit, then he would rather go to the toilet after a flight, because the toilet in an aeroplane are small (participant is tall).</li> <li>- Checks visually if toilet is clean, but will use anyway</li> <li>- "it is being cleaned, that is nice". Finds the cleaner talking "gezellig", just socially, but feels no obligation towards him. But he can imagine that it does create a connection which establishes this feeling.</li> <li>- "vuil trekt vuil aan"</li> <li>- Understands tap because of lack of knob and sees sensor. Likes these type of taps with specific exception of Dyson tap-dryer complete system, because sensors for water and air are too close together.</li> <li>- Never realised that the toilets at Schiphol flush automatically.</li> <li>- He does not use wet wipes, but if he would, he would flush them, because there is usually no bin ("bijzonder vaak afwezig").</li> <li>- He is not sure if he would need it, but the idea of the availability of a bin appeals to him.</li> <li>- His experience with motion-sensor activated bins is mediocre, because the sensor is usually near the feet, so he does not know where to move to activate it.</li> <li>- Does not care about the contents of the bin, so no added value in privacy lid.</li> <li>- He thinks the experience in the toilet has a major impact on your overall experience, mostly because it is often the last thing before the end of your journey</li> <li>- Participant really likes the fancy design of the new toilets. Thinks the look and feel really adds to a good experience. "world of difference" with older toilet blocks, which are fine as long as they are clean, but the new ones are better.</li> <li>- "If a bin looks clean, it attracts use". The current sanitary bins do not look user friendly, his gut feeling tells that the current bin is probably dirty for some reason, the design is not attractive to him at all.</li> <li>- Because participant cannot imagine any scenario in which he needs to throw something away in the toilet cubicle, I explained the scenario of</li> </ul>



			<p>an accident, and he understands you would want to throw away your underpants. He cannot imagine someone would flush that.</p>
04-06	Male, 26, Indian	Repeat participant from exploratory interviews	<ul style="list-style-type: none"> <li>- Chooses first toilet, because “you don’t know when the next toilet will be”</li> <li>- Checks visually for cleanliness.</li> <li>- If the cleaner just gets out of the toilet, he does not use that specific toilet, because it is still damp and using it will make it even more dirty, but it is generally reassuring that it is clean</li> <li>- Likes being talked to, because it “builds a certain relationship, he does not feel distant”, which he appreciates because it shows that the people from Schiphol have a “positive vibe”. He thinks the idea of being viewed would build a sort of obligation, curtesy to the cleaner to behave.</li> <li>- Finds not knowing the range of a motion sensor confusing, how it will respond. Definitely does not want to use manual instead though, because it is touched by so many people, but the sensor does require more information or more predictability.</li> <li>- Has never seen a bin sliding open, but likes it. He understands the privacy flap from image and appreciates that he does not need to see other people’s waste.</li> <li>- Mentions experience with Brabantia automatic bin, prefers redesign, because sliding takes up less space than flap opening.</li> <li>- He would be intrigued by it, but needs “certain nudges for me to understand how it works”.</li> <li>- If the bin opens and closes without warning he would likely play with it, but the first time it would probably cause scepticism, because the use is not clear yet like with the automatic toilet.</li> <li>- If Schiphol does not continue to improve, it is too easy for passengers to choose a different lay-over. “You do not remember your flight ... but the experience in the airport does account for a big part of your overall travel journey”.</li> </ul>
04-06	Female, 27, Italian	<p>Repeat participant from exploratory interviews</p> <p>Participant reacted very much to images, describing details like the toilet being downstairs or the cleaner</p>	<ul style="list-style-type: none"> <li>- Participant will always go to toilet immediately after leaving aeroplane. Chooses first block, except when it has just been cleaned to not mess up the work of the cleaner when it is still wet. Definitely before baggage reclaim, to not have to carry her heavy bags in there.</li> <li>- Cleaner in toilet does assure her that it is clean, but does not make her feel embarrassed. She dislikes the cleaner speaking to her though, because she dislikes the feeling of being watched, or knowing someone can hear her pee.</li> </ul>

		not wearing a mask. She did say the images worked well for the imagination of the situation	<ul style="list-style-type: none"> <li>- She understands from the lack of a pedal or twisting knob that the tap is automatic. It annoys her when the sensor does not immediately work, because you wave your hands and wonder if you are doing it wrong or the tap is broken.</li> <li>- Feels in general that motion sensor activated products are nice, but the sensor should work according to your expectation.</li> <li>- Has never used a motion activated bin, but does like the idea.</li> <li>- Has concerns over how the bin design will stay clean. She thinks from the image that it is white plastic, proposes a darker or patterned material which will not show dirt as much (70's pattern on sanitary bins at Rotterdam Airport?).</li> <li>- The sensors need to be clearly visible, so it is clear to people how to use the bin the first time.</li> <li>- Opening and closing upon entry will be "like the toilet is alive, so I think that it can become too much".</li> <li>- The idea of innovations is nice to her, but as long as the basics are available and clean, she does not care that much.</li> <li>- She thinks it is good for Schiphol to keep improving for customer satisfaction, because it might convince her to pay extra to fly from there instead of a nearby airport.</li> <li>- When implementing new innovation, it is important to communicate what you do and why.</li> </ul>
06-06	Female, 24, Dutch		<ul style="list-style-type: none"> <li>- Participant prefers to go to toilet before a flight, to avoid needing to use it in aeroplane. Chooses first empty toilet she sees, since they are often busy.</li> <li>- Checks visually, but will not clean herself with wipes or anything.</li> <li>- Presence of a cleaner gives a clean feeling. Him talking to her feels friendly, but also expected: "I always find it very awkward when people do not greet you".</li> <li>- Likes motion-sensor, because of hygiene, but she always needs to search for the sensor. Knobs are practical because she knows where to find it, but in general prefers sensor-activated products, because they are more hygienic. Expects there to be a sticker where to place your hand</li> <li>- In case toilet is dirty, she would rather Hoover, if needed wipes with a piece of paper</li> <li>- She cannot imagine needing a waste bin in the toilet cubicle for anything other than sanitary products for herself, but can imagine people throw regular waste into these sanitary bins out of laziness.</li> </ul>

			<ul style="list-style-type: none"> <li>- She does like the no-touch idea, because she does not like touching the sanitary bin lid. Similarly does like pedal bins.</li> <li>- About her experience with no-touch bins: "...they [colleagues] were no techies (techneuten), the thing worked on batteries, so then it was declared broken, while the batteries simply needed to be replaced. But I found it very pleasant, because you did not need to touch the most dirty part."</li> <li>- She talks about her struggles when depositing sanitary products through the small opening, also because you need to push to get things in horizontally. She thinks this is a very big bottleneck, the lid is the dirtiest part, really something she needs to push herself to get past.</li> <li>- Likes the double purpose of the flexible lid, but questions how far it closes, because if it closes completely when you are depositing, then products may get stuck on the privacy lid or leave trails.</li> <li>- She likes the lid opening and closing on entry, would maybe be startled the first time, but not too bad.</li> <li>- She certainly does not think Schiphol is obligated to put in so much effort into innovating, but it is nice. "...all those technological gadgets, I find them a plus, but not a must."</li> <li>- Thinks the cleaner creates a situation in which people think "what might they think about me", so very useful, the bin is nice, but less necessary.</li> </ul> <ul style="list-style-type: none"> <li>- She assumes men are sloppy (sloddervossen)</li> </ul>
--	--	--	---



# Appendix G: Insights validation interviews stakeholders

## VebeGo

Clarification that the concept is based on ladies' sanitary bin. I ask whether it might be worth it to invest in bins at the mens' toilets: yes, first check whether it will make a difference, but they now have good ways of statistically measuring if it changes something about the passenger experience.

Makes point about the current sanitary bins: these are not theirs, an external company comes to pick them up and exchanges them, so they can empty and clean them at an external location. They are now developing a new sanitary bin which would seal sanitary waste. Improved (first version had a lot of errors) prototypes would be delivered 4-6, which would first be tested in the office and then at the WTC toilet at Schiphol. These need very small openings to prevent small children's arms getting in. Although it is intended for just female hygiene products, it seals anything that can get through the opening, even though they know a lot of different products end up in the sanitary bin.

Notes to make sure there is enough room to clean around a bin and for people use the cubicle easily. Now bins are placed at front for easy exchange, but also when placing it next to toilet, sitting comfortably at the toilet is complicated, possibility of touching bin with leg. A hanging bin is certainly a good solution for cleaning around it.

He agrees my bin design can achieve its goal. Note which material to use, because of fire safety rules of Schiphol. Questions the energy source of the bin, because e.g. replacing batteries for this many bins is a lot of man

power. Current no-touch bins, opening with a flap, are too sensitive to vandalism, due to people forcing it open or closed. Might be less with my design, but make sure that people cannot let things stand on top of it. Also make sure the lid is attached to bin well, so people cannot steal it, but also easy to change the bag for the cleaners.

Talking about the cleaning staff simply being present in the toilet block: they usually check a toilet after use, maintain if necessary. Complete clean is done after the room is empty.

They are measuring the possible barriers for especially men due to most of the cleaners being women. What does a cleaner do now and how much time does this take? Based on that they will plan presence of cleaners with expectations of how busy it will be. Especially using FeedBackNow system they measure if presence of cleaners have influence on passengers and whether this differs for men or women.

On my repositioning proposition: There is definitely a difference between introvert or extrovert cleaners, but this is now just personal. They know from research in the train that greeting a passenger changes the perception of the cleaner, but not to what extent.

On the language barrier with cleaners: they are required to know English and a second language. VebeGo has a lot of Ghanese employees, who happen to speak fluent English. They do offer a yearlong Dutch language and writing course to their people several times a year. Learning and acquiring a diploma in this course has a big impact on the wellbeing of the employees.

On a tool to search for expertise's between companies to improve communication. He suspects that such a system will be maintained badly, would prefer to have a contact person in each company who knows their way within that company so they can refer him more easily. He also likes simply meeting people to get to know each other. The Schiphol regie centrum is an example of that, but they never provide feedback on what happened to their complains/errors. Provides example of rolbanen, of which it was not clear who was responsible for maintenance, and Schiphol did not respond to the question who had to do it.

He is positive about the making a difference between "gastvrijheid en technische schoonmaak". Putting a bin at the mens toilet is certainly something they would like to think about and try it out, but he wonders how the concept would work when combining it with a ladies hygiene bin. He is interested in testing the effect of a bin at the men's toilet, to evaluate the use and type of contents.

## BAM

Participant has questions about how privacy lid works. Talks about sensors in bins at vebego, questions why current volume sensors are not implemented on the bin. BP acknowledges that our works borders on Vebego's. Before covid there was intensive partnership bam-vebego, specifically on knowledge exchange. Not with other cleaning companies.

Questions why specifically men's toilets (unclear description?), and if we can take from data if the problem lies there. Questions if bin at men's toilet will solve the problem of errors. Proposes to sit with three together with RW to talk about the continuation of project. Questions about using flight data to find errors (explanation why not possible) and about cultural problems. Questions about paper towels

On collaboration and communication between companies: Participant likes the close contact with Vebego, although he does not have that with the other cleaning companies, he does not know them that well. He likes how all cleaning companies have collaboration in their contracts,

combined KPI's for example. Also on innovation they work together a lot and if one company has a lack of personnel, the other will back them up to fulfill the KPI.

He does have a lot of contact with the other main contractors (Heijmans, VolkerWessels), weekly. I ask whether this is on a managerial level and if it harder on a lower level, using example of person not knowing their colleague at Heijmans, but he says that was purely because he is new. He says it is usually quite easy for people to find their equal at the other contractors, because a lot of people, like him, have worked at Schiphol for years and know each other. He is originally from Heijmans, so he knows that company especially well, but also with VolkerWessels he can just walk in and they with him.

He understands the cleaner positioning from personal experience with toilet attendants, but questions the financial consequences of this extra attention.

He talks about people counters behind the mirrors by Vebego (need to ask RW about this). Questions how this would change people's behaviour → make clear point in report on how this is subcontious

Regarding hospitality training: he talks about his experience with HelloFresh, where the people are always extremely helpful and leave a very good impression, so maybe we can take something from their type of training and apply this on the cleaners. Maybe establish collaboration with HelloFresh for training?

He certainly thinks this concept might achieve its goal, and if needed they can do a financial analysis on costs and benefits, maybe split implementation costs with Vebego (mentions BAM already made the investment of hiring me, fair point).

I ask about verbeter/investerings/innovatievoorstel. He explains how verbetervoorstel = costs for bam, but if made in first of three contract years, the investment might be won back over the rest of the contract due to besparing, investeringsvoorstel = costs split between Schiphol and bam, because the outcome is outside of the term of the contract with bam, and innovatievoorstel = costs for Schiphol.

On possibly extra needed collaborations for implementation contract: HelloFresh, and intensify knowledge exchange on innovation with VebeGo: “Ik dacht bij Rob, ‘ik heb geen raakvlakken met hem’, maar uiteindelijk waren die er veel meer, ik heb heel veel van hem geleerd en dat vond ik juist supergaaf”. Except for himself, he thinks there is barely any contact between OPEX and VebeGo.

## Schiphol

Works at Schiphol 20 years (see also point made by BAM participant regarding many people with long term employment for knowledge). He questions the scope of passengers, because towels look like cleaning rags, but they cannot find the origin of these towels. His responsibility is until 1 m behind the toilet.

Problem of paper towels cluttering should not occur with passenger toilet blocks, because they changed from z-folded paper towels, of which one always takes too many, to paper towel rolls of material that is thinner and more soluble. Point here is that toilets at Schiphol are divided between passenger and non-passenger. In non-passenger toilets there are possibly still problematic z-folded paper towels, approach here is purely functional.

Female hygiene box is a big problem they have for years, tried all types available, then asked VebeGo to develop new. It also needs to fit within the process with Beres, the owner of the bins, Schiphol rents them. They try to have as few bins as needed due to fire hazard, because they cause a lot of damages, e.g. when people put things on top of them.

They already call the cleaners “facility hosts”, he questions how this concept is going to achieve its goal. So what to do extra from what they already do: “Ik zoek naar de toegevoegde waarde van de facility host, want alles wat je omschrijft staat denk ik letterlijk in onze aanbestedingsbestekken naar de schoonmaakbedrijven toe, is precies wat wij willen. Écht schoonmaken is voor ons minder belangrijk dan de beleving van schoon zijn.” In the tenders the cleaning companies certainly propose that the cleaners are hosts, but the reality is never as good as that. He questions whether the repositioning is actually going to

achieve the behavioural change intended, because the most extreme cases will always stay.

How big is the problem? Purely cleaning costs Schiphol ca. €11 million for the passengers sanitair alone “als je meer aandacht gaat geven aan passagiers, kun je niet schoonmaken”. Cleaning toilets and such costs 40 times more than cleaning terminal, about €1450 /m<sup>2</sup>/jaar. One toilet unit is about 100<sup>m</sup>, so about €145000/toilet unit/year in purely cleaning, without maintenance. He likes the design of the waste bin.

Talking about the design improving the willingness to use, we get to the preference of the new, modern toilet units over the old ones: Schiphol has done quantitative research into this improvement and the routing is a very important factor in user satisfaction, i.e. the placement of different elements in the toilet unit, making the flow logical.

Regarding how realistic my concept could be: He is currently working on the replacement of tops of bins in general area of toilet unit, €70 each for 550 bins. He expects my bin design to cost €500 - €1000, and they have about 1000 toilet cubicles, so full placement would cost around €750.000, without the costs of emptying. It might be a solution, but an expensive one and therefore not realistic. He does believe in the facility host idea, but that is because this is exactly what they would already like to get from the cleaning companies.

On innovation of facilities at Schiphol, they are a big supporter: before Covid, they had a project called Toilet of the Future (TOF), in which every innovation possible would be added, even sensors of water flow to measure whether toilet might be getting clogged, similar to sensors on pumps (both originate from department digital). However “corona heeft ons drie jaar teruggezet in de tijd” financially and in manpower. They would like to continue TOF when they have money, you could also measure paper used and paper collected in bins and difference could be flushed.

He is very interested in a quantitative research whether the passenger misses a waste bin in the toilet cubicles. Participant is mostly interested in the user experience, especially for the business case, to make the

investment worth it. No clue when investments are possible again, due to lack of passengers. They work with 5 scenarios, varying from 20-70 million passengers/year, currently closer to 20 million passenger scenario. Normally 220.000 pax/day, currently at 50.000 pax/day and that is a big increase.

He thinks collaboration with partners of Schiphol is very good, always space for innovation and discussion. Quality of communication is really dependent on quality of partner in general, some companies are better than other. In the companies he works with, they tried to tackle this with the schoonmaakcollectief, which worked very well, e.g. with the FeedBackNow system, which was implanted by the collective as a whole. He disagrees with the product owner of the FeedBackNow system that

this system is final, talks about similar systems with iPads which could yield a lot more information. He also researched with top-scoring airports on passenger experience and they mostly invest in the complete picture with light, smell etc.

“Vergis je niet, je hebt meer niet-pax dan pax-toiletten”

He also believes in shredders like BAM has in some places, or a combination of bins at the front and shredders at the back of the system.

He is interested in a pilot with bins as proposed by Vebego, to see what kind of waste this will show and whether there will be a difference between men and women.

# Appendix H: Transcript validation interview Vebeego

This interview with the director of Vebeego international, is the only interview which is fully transcribed, due to its information density. A report of the conversation in English can be found in appendix F.

00:00:27

*YM:* Ja, klopt. Nee, daarom. Ik wilde het eigenlijk gewoon gisteren sturen, zodat u het inderdaad vanochtend nog kon bekijken. Maar als je dan zo doorgaat dan heb je niet in de gaten dat het al de volgende dag is. Ja, zoals ik ook al schreef, bestaat het uiteindelijke idee eigenlijk uit twee delen.

00:00:43

*Vebeego:* Mm-hmm.

00:00:50

*YM:* Ze hebben die prullenbak, dat herontwerp en daarvan komt het idee dat de gebruikers hebben gezegd dat ze die prullenbak best wel vies vinden om te gebruiken en daardoor het liever niet in de prullenbak gooien. Ook omdat de klep vaak best wel klein is.

00:01:06

*Vebeego:* Ja.

00:01:06

*YM:* U zei in het vorige gesprek dat dat kwam om te voorkomen dat er kinderhandjes tussen kwamen.

00:01:11

*Vebeego:* Ja, dat had te maken met ons andere apparaat, waar wij nu mee bezig zijn, met het ontwerp.

00:01:13

*YM:* Oké, toch wel.

00:01:18

*Vebeego:* Ja. Als je het hebt over de prullenbak, heb je dat dan over de damesverbandcontainer, luieremmer of heb je het over de handdoekbak? Dus die in de \*grote ruimte\* hangen?

00:01:31

*YM:* Nou, eigenlijk was het de bedoeling dat het inderdaad vooral de damescontainer is. Ik wilde allereerst vragen of het een idee is om dit ook uit te breiden naar de herentoiletten. Op dit moment zijn er, voor zover ik weet, geen prullenbakken aanwezig op het herentoilet. Klopt dat?

00:01:52

*Vebeego:* Nee, alleen in de \*grote ruimtes\* zijn er afvalbakken aanwezig. Ja.

00:01:55

*YM:* Ja, en daar zit dus inderdaad een probleem van gêne. Als er iets is dat ze moeten weggooien, dan willen ze dat liever niet meenemen naar de grote ruimte. Zou dat iets zijn waar in geïnvesteerd zou worden?

00:02:13

*Vebeego:* Ja, als het uiteindelijk iets oplevert. Dat moeten we dan gaan meten. Dan is dat altijd de investering waard.

00:02:20

*YM:* Ja.

00:02:20

*Vebego:* Maar dan moeten we eerst gaan kijken wat het oplevert, maar we hebben tegenwoordig goede systemen om statistisch te meten of zaken een positieve invloed hebben op de beleving van een passagier.

00:02:35

*YM:* Ja, precies. Nou ja, voor de BAM kwam het inderdaad ook omdat er sommige voorwerpen in kwamen die duidelijk wel van de mannentoiletten kwamen, zoals bijvoorbeeld onderbroeken en dergelijke. Dus ja, dan is het inderdaad de vraag: is het het waard om nu ook over te gaan tot prullenbakken in de toilethokjes zelf?

00:02:55

*Vebego:* Mm-hmm. Waar we even naar moeten kijken, natuurlijk, is de [onhoorbaar] van het herentoilet. Daar zie ik wat minder een probleem dan bij een damestoilet. Als je natuurlijk kijkt naar de huidige damesverbandcontainers. Dat zijn containers die opgehaald worden, die worden gewisseld.

00:03:16

*YM:* Gewoon in zijn geheel?

00:03:18

*Vebego:* In zijn geheel, ja.

00:03:19

*YM:* Oké.

00:03:20

*Vebego:* En door een bedrijf dat die containers... Dat heeft natuurlijk ook te maken met logistiek. Die zetten een oude container neer, die zijn ook niet gebonden aan Schiphol.

00:03:30

*YM:* Oké, dat verklaart inderdaad wel waarom. Dat was inderdaad één van mijn vragen ook. Ik heb rondgekeken in de verschillende toiletten en zowel de oudere als de nieuwe toiletblokken hadden dezelfde ouderwetse damesverbandbakken.

00:03:46

*Vebego:* [onhoorbaar] met [onhoorbaar] deksels. Ja.

00:03:46

*YM:* Maar dat komt dus gewoon omdat die niet onder jullie beheer vallen?

00:03:53

*Vebego:* Nee. Dat heeft te maken met het feit dat die buiten Schiphol geleegd en gereinigd worden. Het is [onhoorbaar] constant door gewisseld en het zijn niet bakken die dan alleen op Schiphol worden gebruikt. Maar die gaan weer de voorraad in en komen bij kantoorgebouwen terecht. Ze komen in ziekenhuizen terecht. Ze komen echt overal terecht. En je moet ze met een deksel erop afvoeren, want als je dat niet doet, dan wordt het een erg smerige boel.

00:04:22

*YM:* Ja. U zie inderdaad de vorige keer dat dat onder chemisch afval valt, dus dan kan ik me dat voorstellen.

00:04:32

*Vebego:* Wat wij hebben, is het alternatief wat we nu zelf aan het ontwikkelen zijn en ik kreeg van de week bericht, maar ik moet even kijken wanneer die afgeleverd worden, want de verbeterde versie zou... Even in mijn mailbox kijken. Ik kreeg vrijdag: het zal binnenkort afgeleverd worden.

00:04:59

*YM:* Ja, want ik heb inderdaad na ons vorige gesprek ook met een andere medewerker van u gesproken geloof ik?

00:05:04

*Vebego:* MW denk ik?

00:05:08

*YM:* Maar die was daarna op verlof, dus die heb ik helaas niet nog een keer kunnen spreken.

00:05:12

*Vebego:* Die is [onhoorbaar] weer terug. Die was met ouderschapsverlof.

00:05:16

*YM:* Ja.

00:05:16

*Vebe*go: Dat hebben mannen tegenwoordig ook. Even kijken hoor. Zojuist een afspraak gemaakt voor de aflevering. Deze worden komende vrijdag - en dit was van afgelopen vrijdag - afgeleverd bij ons op kantoor. Dus vanaf aankomende vrijdag hebben wij in ieder geval drie van die apparaten op kantoor en dan gaan we zelf eerst kijken of de communicatie werkt. Of we de rol makkelijk kunnen wisselen en de andere punten die ze verbeterd hebben, of die verbeterd zijn. We krijgen er drie en we gaan eerst een test doen bij ons op kantoor. Daarna gaan er drie op proef de terminal in. Dat is inderdaad waar ik het toen over had tegen jou, maar dat was inmiddels weer terug, vanwege de vele storingen. Daar zit een opening in die klein moet zijn, vanwege het feit... Het is een pers, een mechanisme. Als daar iemand een armpje in zou steken en dat armpje wordt erin geseald. [onhoorbaar].

00:06:28

*YM:* Ja, en dat inderdaad zou er dan voor zorgen dat het damesverband, dat dat bij het gewone afval kan, toch?

00:06:35

*Vebe*go: Ja, maar dan heb je het wel alleen over dameshygiëneproducten en niet over luiers en andere zaken, want daar is het gat gewoon te klein voor. En ook niet over andere dingen die we nu in de huidige bakken wel eens terugvinden, net als boeken, paraplu's, ondergoed, allerlei andere zaken. Kijk, een paraplu zullen ze niet heel snel in het toilet stoppen, maar natuurlijk wel ondergoed en dat soort zaken die dan niet door zo'n opening passen.

00:07:04

*YM:* En hoe zou dat dan gescheiden worden? Want er zijn nog steeds inderdaad mensen die de damesverbandbak gebruiken als gewone prullenbak. Sealt dat ding dan alles?

00:07:19

*Vebe*go: Hij sealt uiteindelijk alleen dat wat door de opening heen kan.

00:07:22

*YM:* Oké.

00:07:24

*Vebe*go: Dat is geen probleem. Maar ja, als het natuurlijk wat groter van formaat is, maar dan zou je het apparaat even moeten zien, dan wordt dat niet geseald. Het andere probleem is dat we in een toilethokje redelijk beperkt zijn qua ruimte. Alles wat je er neerzet, daar moet je ook achter en omheen kunnen schoonmaken. Mensen moeten de ruimte hebben - wat heel veel mensen doen - om een koffer mee te nemen in die toiletruimte. De meeste mensen durven hem niet buiten te laten staan.

00:07:53

*YM:* Nee.

00:07:53

*Vebe*go: Dus je bent wel redelijk beperkt in de ruimte.

00:07:56

*YM:* Ja, op zich, of in ieder geval, dat is ook wat ik uit mijn interviews met gebruikers heb gehoord, is dat zij de ruimte in de toiletten op Schiphol ruim voldoende vinden. Ook inderdaad om bijvoorbeeld je koffer mee te nemen. Ook het feit dat er haakjes zijn en dergelijke. Dat scheelt wel. Maar ik kan me voorstellen dat als er een nieuw soort prullenbak in moet, dat dat dan minder wordt.

00:08:21

*Vebe*go: Ja. En het wordt ook lastiger om eronder en erachter schoon te maken.

00:08:25

*YM:* Ja, nou ja, nu staan die prullenbakken best wel vooraan in tegenstelling tot andere toiletten die ik heb gezien. Is dat vooral vanwege de logistiek dat die dingen weg moeten?

00:08:44

*Vebe*go: Ja. Inderdaad dat ze makkelijk weggehaald kunnen worden.

00:08:47

*YM:* Ja.

00:08:48

*Vebego:* En als je ze naast de toiletpot zet, dan is er eigenlijk te weinig ruimte om te zitten, want als je op de toiletpot zit, kom je met je benen of je billen tegen dat apparaat aan. Dat vinden die mensen natuurlijk helemaal niet fijn.

00:09:06

*YM:* Er zijn ook wandoplossingen, die echt aan de muur gehangen worden. Is dat dan een soort van tussenoplossing voor voorin of achterin?

00:09:20

*Vebego:* Ja, dat is in ieder geval een tussenoplossing voor het schoonmaken. Dus als je kijkt naar de dameswandcontainer die wij nu ontwikkeld hebben, die wordt opgehangen boven de vloer. Je hebt ook hangende toiletpotten. Zodat je in ieder geval dag daaronder goed kunt dweilen en de vloer schoon kunt dweilen. Als het moet, kun je hem ook weghalen als je de wand moet reinigen voorbij de afvalbak. Je moet er in ieder geval te allen tijde wel goed bij kunnen, op de achterwand, want daar zitten spatten en allerlei viezigheid op, om die te kunnen reinigen.

00:09:55

*YM:* Ja. Even kijken. Als we terugkomen op het ontwerp dat ik dan heb bedacht. Ziet u daar wat in, in de zin van het doel dat ik probeer te bereiken?

00:10:15

*Vebego:* In ieder geval wel qua doel. Zeker omdat mensen er niet aan hoeven te komen en het dan voornamelijk wel op het herentoilet of op een damestoilet, in aanvulling op een damesverband oplossing is, of daar misschien [onhoorbaar] oplossing. Waar je wel tegenaan gaat lopen, zijn een paar dingen denk ik. Ten eerste het materiaal waar de deksel van gemaakt gaat worden. Je kunt kunststof gebruiken, maar kunststof moet aan zware eisen voldoen volgens brandweervoorschriften. Je mag niet alle soorten kunststof gebruiken. Er is zo'n boek met materiaaleisen als je op Schiphol iets wil doen. Ik heb gehoord dat bij de eerste damesverbandcontainer, die was ook van een bepaald kunststof, die is afgekeurd, omdat die kunststof te veel rook gaf. Aluminium mag bijvoorbeeld ook niet, want aluminium, als dat eenmaal

brandt, dan komt er te veel warmte vrij. Er is een hele lijst van voorschriften. Daar is altijd een oplossing voor te vinden door het gebruiken van het juiste materiaal. De andere vraag is de voeding van de deksel. In het kader van \*zero waste\* en in het kader van voorzieningen die er natuurlijk in een toilethokje zijn, ga je de voeding regelen. Batterijen zijn de meest praktische oplossing.

00:11:46

*YM:* Maar die moeten eens in de zoveel tijd vervangen worden dan.

00:11:49

*Vebego:* Ja. Moeten vervangen worden inderdaad. Er zijn nogal wat afvalbakken. Ik zie dan [onhoorbaar] batterijen met oplaadbare batterijen voor me, een hele wand waar iedereen zijn batterijtjes om kan wisselen. Daar zit nog wel een praktische uitdaging.

00:12:06

*YM:* Dat is de reden waarom... Want er zijn al veel motion sensor gestuurde prullenbakken op de markt. Dat is één van de redenen waarom die nu nog niet in gebruik zijn?

00:12:17

*Vebego:* Ja. Plus het feit dat de meeste die er zijn, hebben een opengaande klep die weer dicht gaat. Dat is behoorlijk vandalismegevoelig en storingsgevoelig. Die deksels gaan nogal vaak kapot.

00:12:34

*YM:* Oké, maar wat gaat er dan kapot aan? Dat die klep niet goed...

00:12:39

*Vebego:* Dat mensen dingen gaan forceren. Dus erop duwen of er iets op hebben staan op het moment dat het open wil of moet. Die scharniermechanismen zijn over het algemeen, zeker in kunststof, redelijk zwak.

00:12:54

*YM:* Ja, maar mijn mechanisme is dan niet gebaseerd op een scharnier, maar op een flexibel materiaal dat erin schuift. Denkt u dat dat dan minder vandalismegevoelig is op die manier?



00:13:06

*Vebe*: Ja. Dat is wel mijn vermoeden, maar ook dat zullen we moeten testen. Als [onhoorbaar] of het minder storings- en vandalismegevoelig is. Je moet kijken wat er gebeurt als mensen toch denken: Ja, ik zet daar even mijn handbagage bovenop. Wat er dan gebeurt.

00:13:23

*YM*: Ja, dan is het de vraag of je dat mogelijk moet maken, want een heleboel van dit soort prullenbakken zijn inderdaad ook gewoon schuin, zodat je er niks op kunt zetten. Misschien dat dat dan ook een idee is.

00:13:38

*Vebe*: Dat zou dan in ieder geval helpen. En de deksel moet wel vastzitten aan de bak. En het op de één of andere manier wel mogelijk maken dat de bak ook geleegd wordt. Waar moet het vastzitten? Wij zien dat mensen dit soort dingen ook leuk vinden voor thuis. Dat is hetzelfde met spoelmechanismen. Er verdwijnen complete spoelmechanismen uit toiletten.

00:14:01

*YM*: Dat vind ik echt indrukwekkend.

00:14:03

*Vebe*: Ja, wij ook. Heel indrukwekkend. Maar die worden compleet uit de wand gehaald.

00:14:10

*YM*: Oké, daar ga ik dan inderdaad over nadenken, hoe je dat zo vast kunt zetten dat het wel makkelijk te legen is, maar niet makkelijk weg te halen is. Want inderdaad, mijn gedachte hierbij was: We doen alleen een deksel, zodat het wel makkelijk te legen is en makkelijk te vervangen is eigenlijk.

00:14:28

*Vebe*: Dan ben je binnen no time je deksel kwijt.

00:14:28

*YM*: Ja, dan is het gewoon weg. Ik denk te goed over de mensheid.

00:14:41

*Vebe*: Ja, ik ook hoor. We hebben zelfs overwogen om GPS-trackers in

die spoelsystemen te gaan doen, zodat we konden kijken waar ze dan blijven.

00:14:51

*YM*: Ja, dat soort dingen zullen inderdaad wel gewoon voor de materialen gestolen worden. Het lijkt me niet iets dat je uit baldadigheid doet.

00:15:00

*Vebe*: Nee. Je moet ook gewoon gereedschap erbij hebben, anders lukt dat niet. Maar ook bijvoorbeeld die houten knoppen die we in de toiletten hebben zitten, die worden er ook gewoon afgedraaid en meegenomen. Zo'n setje kost 150 euro, dus het is ook best de moeite om mee te nemen.

00:15:18

*YM*: Ja. Oké. Dus vooral vandalisme proof en ervoor zorgen dat het voor de schoonmaak makkelijk op te ruimen is.

00:15:33

*Vebe*: Dus vandalisme proof, schoonmaakgevoelig en de elektronica, nou, de voeding, blijft een zaak en de beperkte ruimte die je in een sanitair ruimte hebt. Dat zijn wat uitdagingen.

00:15:48

*YM*: Dat kan ik me voorstellen. Dan het tweede deel van mijn ontwerp. Dat was meer servicegericht, dus dat was dan vooral de herpositionering van de aanwezigheid van de schoonmakers. U vertelde de vorige keer ook wel dat als het heel druk is, dan stuurt u ze er naartoe, gewoon puur om daar te zijn, om het gevoel te geven dat het schoon is? Maar dan zijn ze daar alleen maar op de achtergrond aanwezig toch? Mensen zien dat...

00:16:18

*Vebe*: Nee, ze zijn wel echt in de ruimte. Ze staan niet bij de ingang. Maar ze kijken wel, als iemand van het toilet afkomt, kijken ze even of het toilet nog schoon is als ze die gelegenheid hebben. Dan zijn ze echt in de ruimte. We hebben overigens op dit moment wel een discussie met de vakbonden in het kader van de anderhalve meter afstand. [onhoorbaar] op Schiphol, [onhoorbaar] voor de schoonmaker even niet

te doen is dat de schoonmaker in de ruimte is als het druk is. Maar daarna kan de schoonmaker, dat zie je nu ook, die haalt dan even een doek door de wasbak heen. Als er geknoeid is bij een wasbak, wordt dat even snel opgedweild. Ze zijn er echt wel aan het werk, maar ze kunnen niet intensief schoonmaken als er veel mensen zijn. Dus dat gebeurt eigenlijk pas als de gate leeg is, de toiletgroep weer leeg is, dan heb je de grote schoonmaak.

00:17:12

*YM:* Ja, dus het is vooral een soort onderhoud.

00:17:15

*Vebego:* Ja. Waar we nog niet achter zijn, we gaan binnenkort \*monitoren\*, we zijn nu data aan het verzamelen. Wat zijn de culturele barrières van aanwezigheid van iemand in het toilet? De meeste van onze schoonmakers zijn vrouwen. De vraag is of het in alle herentoiletten zomaar geaccepteerd wordt, dat daar een vrouw de hele tijd tussendoor loopt. Dus we willen daar meer naar gaan kijken. We zijn nu allerlei data aan het verzamelen. Allereerst: wat doet een schoonmaker nu? Hoe lang is die in een toilet? Van begin- tot eindtijd, wat heeft-ie dan gedaan? Daarna gaan we een plan maken om te kijken, met de vluchtdata die we hebben, waar gaat het druk worden? Waar gaan we een schoonmaker positioneren? We hebben van die FeedbackNow-kastjes. Dan gaan we kijken of de aanwezigheid van een schoonmaker op een bepaalde manier, een positief of negatief effect heeft in een toiletgroep en of er dan een onderscheid is tussen mannen- en vrouwentoiletten.

00:18:17

*YM:* Ja, wat ik dus uit mijn initiële onderzoek heb begrepen, is dat de aanwezigheid al een soort van geruststelling is voor mensen.

00:18:25

*Vebego:* Absoluut. [onhoorbaar].

00:18:27

*YM:* Maar mijn idee was dan om dat een soort van verder te trekken, dat een schoonmaker ook kan functioneren als een soort van gastheer of

gastvrouw. Maar dat zou inderdaad impact hebben op de manier of en hoe iemand met de passagier communiceert.

00:18:44

*Vebego:* Ja, dat zien we gevoelsmatig wel. Een schoonmaker is er in alle soorten en maten zeg ik wel eens. Je hebt mensen die heel erg extravert zijn en echt, bijna een [onhoorbaar] toneelstuk opvoeren in een toiletgroep. Je hebt nog steeds de schoonmaker die wat teruggetrokken is, zich [onhoorbaar] ongemakkelijk voelt [onhoorbaar] de mensen en met het hoofd naar beneden kijkt. Dus daar zijn we ook naar aan het kijken. We weten gewoon dat wanneer een schoonmaker een gast begroet, dat dat een positieve impact heeft. Dat weten we niet direct van Schiphol, maar wel uit een onderzoek wat wij bij NS hebben gedaan, waar we schoonmakers hebben die in de trein meereizen. Daar hebben we echt een heel ander competentieprofiel op uitgekozen. Eigenlijk maken die mensen niet schoon, maar maken ze vooral een praatje, spreken ze mensen aan. Ze zeggen goedemorgen of goedenavond. Ze ruimen snel een beetje op. Het heeft een behoorlijk effect op de gemoedstoestand van reizigers.

00:19:54

*YM:* Dus het is zeker de moeite waard om eventueel schoonmakers ook daarop te trainen, om dat op die manier te doen?

00:20:02

*Vebego:* Zeker.

00:20:04

*YM:* Want ik merkte, in ieder geval, dat is mijn eigen ervaring, ik wilde in mijn onderzoek op Schiphol gewoon een willekeurige schoonmaker aanspreken en dan krijg je ook al snel een taalbarrière, omdat een heleboel van het schoonmaakpersoneel niet van Nederlandse oorsprong is.

00:20:18

*Vebego:* Nee, dat is overigens ook geen eis. De eis is dat ze Engels spreken. Dat is een absolute eis. En een tweede taal.

00:20:26

*YM:* Engels en een tweede taal. Oké. Ja, niet mijn ervaring dat dat ook

echt zo is, maar misschien dat dat dan bij uw concurrenten, op Plaza bijvoorbeeld, misschien geen eis is?

00:20:41

*VebeGo:* Het is wel een eis dat ze zich verstaanbaar kunnen maken aan passagiers. Nu hebben wij het voordeel, we hebben heel veel mensen uit Ghana. Ghanezen spreken vloeiend Engels.

00:20:52

*YM:* Oké, dat scheelt.

00:20:55

*VebeGo:* De meeste verstaan Nederlands en ik probeer ook altijd te communiceren in het Nederlands. Maar ik ga ook heel snel over op Engels, omdat ze gewoon vloeiend Engels spreken.

00:21:05

*YM:* En als er dan een schoonmaker is die dat niet zo goed kan, worden er dan ook vanuit het bedrijf of vanuit Schiphol mogelijkheden gegeven om het te leren?

00:21:17

*VebeGo:* Ja. [onhoorbaar] bij concurrent is. Maar we geven een aantal keer per jaar een taal cursus. Dat is dan een cursus Nederlands voor mensen op dit niveau. Die cursus is georganiseerd door de schoonmaakbranche, omdat in de schoonmaak natuurlijk de taalbarrière sowieso aanwezig is. Die cursus geven we een aantal keren per jaar, zowel voor medewerkers, maar we hebben ook voormannen, dus leidinggevend, die niet alleen de Nederlandse taal in woord machtig moeten zijn, maar ook in geschrifte. Dus die krijgen dan ook een Nederlandse schrijfcursus. Dat is een cursus, die duurt, afhankelijk van hoe snel je opschiet, minimaal een jaar, en dan komen ze ook echt naar \*kantoor\*, in een klasje, met een professionele taaltrainer. Dan hebben ze taaltraining.

00:22:06

*YM:* Wauw. Dat is wel heel mooi.

00:22:07

*VebeGo:* Dan krijgen ze een certificaat en zijn ze zo blij als maar kan.

00:22:11

*YM:* Dat kan ik me voorstellen. Ja, dat is eigenlijk gewoon een win-win voor zowel u als de medewerkers, als de passagiers.

00:22:19

*VebeGo:* En voor heel veel mensen is het één van hun eerste en enige diploma's.

00:22:20

*YM:* Wauw. Ja. Ik had inderdaad op uw website gelezen dat u best wel veel doet voor sociale omstandigheden, maar inderdaad, zo specifiek is goed om te weten. Dan heb ik nog een punt dat losstaat van mijn concept. Dat is eigenlijk de samenwerking tussen verschillende bedrijven op Schiphol. Daar hebben we het de vorige keer ook al kort over gehad. Toen vertelde u dat er al een goed samenwerkingsverband is tussen de verschillende schoonmaakbedrijven. Maar hoe is de communicatie? En toen zei u dat er vooral met Heijmans bijvoorbeeld nog redelijk contact is, maar dat het moeilijk is, omdat mensen vaak van positie veranderen daar? Ik dacht eraan om de communicatie tussen alle stakeholders op Schiphol te verbeteren doordat mensen makkelijker op expertise kunnen gaan zoeken met wie ze kunnen samenwerken. Zou dat u in uw werk ook helpen? Stel, je hebt een soort van database en dan kun je zoeken op expertise. Bijvoorbeeld, ik heb nu iemand nodig die veel weet van rioleringen. Dan kom je bij de afdeling OPEX van BAM terecht.

00:23:47

*VebeGo:* Ja, dat ligt even aan BAM zelf dan in dit geval, dat BAM het ook prima moet vinden. Daar gaat het vaak om, dat ze de regie een stukje uit handen geven en vrijlaten in hun eigen organisatie. Want achter elke vraag zit... Je hebt eerst de vraag en er zit een stukje kennisdeling. Maar uiteindelijk kan er ook een actie achter zitten die kosten met zich meebrengt. Dan is eigenlijk de vraag: hoe is bij het BAM op Schiphol de communicatie georganiseerd, met name daar waar het gaat over opdrachten?

00:24:23

*YM:* Ja, het lijkt af en toe nog best wel ingewikkeld te zijn. Dan is er een Excel van wie waarover gaat, maar dat wordt dan niet geüpdatet. Het is

nog steeds moeilijk om te vinden met wie je nou eigenlijk contact moet hebben. Dus ik dacht eerder aan een soort van centraler systeem met alle bedrijven van Schiphol.

00:24:44

*VebeGo:* Ja, ik denk dat dan gebeurt wat nu bij BAM ook gebeurt, dat het systeem, dat is mijn ervaring, dat dit soort systemen heel slecht onderhouden worden. Bij wisselingen wordt het gewoon niet aangepast. Ik zie daar overigens meer in, wanneer elk bedrijf dat zou hebben en dat die één centraal contactpunt hebben die de weg in een bedrijf weet. Als ik altijd dezelfde contactpersoon heb als externe bij BAM, die mij in ieder geval verder kan helpen en door kan verwijzen, [onhoorbaar]. Dat hoeft niet een technisch-inhoudelijke functie te zijn. Maar dat moet vooral iemand zijn die de weg in een organisatie weet. Dat je op die manier dat tot stand brengt. Daarnaast denk ik, wat altijd heel erg helpt, dat heb ik zelf ook gezien, mensen in de praktijk leren kennen en daar op één of andere manier een klik mee hebben, dan weet je elkaar ook wel te vinden.

00:25:44

*YM:* Ja, ik zie inderdaad ook heel vaak dat het gebeurt dat er gewoon een simpel kennismakingsgesprek is als er weer een nieuwe stakeholder bijkomt. Maar ja, inderdaad, als dat dan het centrale contactpunt wordt, dan kan ik me voorstellen dat dat ook al een heel eind op weg helpt.

00:26:02

*VebeGo:* En wat dan ook belangrijk is, is dat zo'n contactpunt ook door koppelt of terugkoppelt als er iets wel of niet gebeurt. Dan zie je bij Schiphol Regiecentrum is bijvoorbeeld een voorbeeld van zo'n contactpunt, maar dan voor Schiphol, als je een storing hebt of iets anders. Wat daar vaak gebeurt, je legt je storingen daar neer en vervolgens hoor je eigenlijk helemaal niks meer. En dan constateer je dat de storing is opgelost, of je constateert dat het nog steeds niet is opgelost en dan ga je weer bellen. Dan zeggen ze: "Ja, we hebben het daar en daar uitgezet." Eigenlijk vind ik dat op het moment dat zij hem ergens uitzetten, dat er al een melding terug zou moeten komen naar degene die de storing heeft gemeld: "Bedankt voor je melding. We hebben de storing daar en daar uitgezet." Ik denk dat daar nog wel wat

op te automatiseren valt, want het is nu allemaal handwerk van mensen achter de telefoon of achter hun systeem.

00:27:00

*YM:* Want in zo'n geval zou je ook bijvoorbeeld meer erachteraan gaan bij de persoon waar het terecht komt.

00:27:07

*VebeGo:* Ja, als ik weet bij wie ik moet zijn. Dan kan ik nog zeggen: "Het is de rol van Schiphol Regiecentrum." Maar uiteindelijk kan ik ook zelf gaan bellen: "Joh, deze toiletdeur gaat al vier dagen niet dicht. Dat is toch heel vervelend."

00:27:21

*YM:* Ja, precies. Ja, daar hadden we het inderdaad de vorige keer ook al over, dat het soms moeilijker is om iets zelf in de hand te nemen.

00:27:34

*VebeGo:* Het is dezelfde discussie over de rolpaden op Schiphol, na de laatste aanbesteding is de schoonmaak van die rolpaden tussen wal en schip geraakt. De main contractors deden het vroeger, in de vorm van [onhoorbaar], waren ook verantwoordelijk voor de reiniging van die rolbanen. De nieuwe contractors zijn daar niet meer verantwoordelijk voor. De schoonmaakbedrijven worden erop aangesproken. Want als iemand zo'n vieze rolbaan ziet, zegt die: "Er wordt slecht schoongemaakt." Maar het is ook niet de verantwoordelijkheid van de schoonmaakbedrijven. Buiten ons zicht heeft het blijkbaar driekwart jaar geduurd voordat er overeenstemming was hoe het aangepakt zou moeten gaan worden.

00:28:24

*YM:* Dat was dan puur door die overgang van het oude systeem naar de main contractors?

00:28:29

*VebeGo:* Naar de nieuwe. Maar wij kregen ook niet te horen waar het aan lag. Elke keer als we Schiphol belde: "Jongens, elke maand sturen gewoon een fotootje met een reminder." Dat het toch smeriger was geworden. Dan kregen we: "Ja, we zijn ermee bezig." Waar ze dan mee bezig waren en waar de bottleneck zat, dat werd niet gecommuniceerd.

Eigenlijk werd het gewoon wijzen naar mekaar. Schiphol vond dat de main contractors het moesten doen en de main contractors zeiden: "Het zit gewoon niet in ons contract." Uiteindelijk denk ik dat de main contractors gelijk hebben gekregen, want we hebben nu een uitvraag gekregen om een prijsopgave te doen, voor het reinigen van rolpaden.

00:29:09

*YM:* Wauw. Maar dat heeft dus zo lang geduurd.

00:29:11

*Vebeego:* Ja. Het heeft driekwart jaar geduurd. Driekwart jaar zijn die rolpaden gewoon niet schoongemaakt. Ik weet niet of je wel eens van Plaza richting WTC gaat? Als je daar naar beneden kijkt [onhoorbaar] omhooggaande baan is, het smerigste dat je ooit gezien hebt.

00:29:28

*YM:* Misschien dat ik er een keer naar gaan kijken.

00:29:32

*Vebeego:* [onhoorbaar].

00:29:41

*YM:* Oké. Ik denk dat ik nu wel door mijn vragen heen ben eigenlijk. Als er nog iets is dat u vanuit uzelf te zeggen heeft over mijn ideeën?

00:29:55

*Vebeego:* Ik denk dat het idee van de rol van de schoonmaker en onderscheid maken tussen gastvrijheid en technische schoonmaak, is gewoon een goed idee. Je hebt overigens ook, daar hebben we zelf nooit aan gedacht, een bak op het herentoilet is misschien denk ik ook wel een goed idee. Nog even los van het feit dat je dan alles gelijkstelt. Het enige waar ik nog mee zit, hoe kun je en een damesverbandcontainer hebben en nog een bak op het damestoilet?

00:30:26

*YM:* Ja, dan ga je denk ik in de richting van een ontwerp zoals van die recycling bakken, dat je meerdere kleppen hebt.

00:30:36

*Vebeego:* Alleen dan kunnen de bakken niet meegenomen worden.

00:30:40

*YM:* Nee, nou ja.

00:30:41

*Vebeego:* Zolang het het huidige systeem blijft.

00:30:43

*YM:* Ik krijg hier zeker al ideeën over. Over misschien een aanpassing, waardoor die erop geklikt kan worden of iets.

00:30:49

*Vebeego:* Ja. Met magneten of zo. Als die bakken van staal zijn, kunnen ze [onhoorbaar] als er een stalen wand in zit, dan kan het ook nog, of iets waar je hem aan kunt klikken. Je beperking is ruimte en elektra. Nu moet ik zeggen, als we uiteindelijk met die dameswandcontainers die wij hebben doorgaan, dan moet er in elk toilethokje sowieso elektra komen.

00:31:16

*YM:* Dus dat wordt sowieso al overwogen.

00:31:19

*Vebeego:* Daar wordt dan wel naar gekeken, om overal elektra te maken. Maar met name op het herentoilet is het wel een slim idee om te kijken wat dat voor effect heeft. Al zet je er maar een tijd een aantal neer om eens te kijken wat er allemaal in komt en wordt er gebruik van gemaakt? Binnen een proefopstelling, dat je een toiletpot neemt die drukbezocht is. Dat zal absoluut een idee zijn wat de moeite waard is om verder door te pakken.

00:31:47

*YM:* Dat is goed om te horen.

00:31:50

*Vebeego:* Mocht je daar interesse in hebben en stappen willen maken, dan moet je even contact opnemen, want dan ga ik je contact brengen met Maarten. Hij regelt ook alles rondom data en het meten van tevredenheid, om te kijken of we in één van de herentoiletten, in overleg met Schiphol, afvalbakken kunnen gaan plaatsen in het hokje zelf.

00:32:12

*YM:* Ja, ik denk dat het heel mooi zou zijn en zeker het onderzoeken waard is in hoeverre dat gaat helpen. Voor mij persoonlijk is het dan de

vraag of dat nog kan binnen de context van mijn afstudeerproject, omdat ik nog maar anderhalve maand heb, maar dat zou dan inderdaad een vervolgproject kunnen zijn. Zeker.

00:32:36

*VebeGo:* Als daardoor het aantal verstoppingen ook nog afneemt, zit daar absoluut een casus onder.

00:32:40

*YM:* Ja, precies. Ja, mijn doelstelling vanuit de opdracht die ik van BAM gekregen heb, was een vermindering van 25 procent verstoppingen. Als dat door simpelweg prullenbakken te plaatsen al zou kunnen, zou dat een hele mooie, simpele oplossing zijn.

00:33:00

*VebeGo:* Ja. Volgens mij afgelopen jaar moet het gelukt zijn, of niet? Ten opzichte van 2019.

00:33:05

*YM:* Ja, ik geloof gisteren of eergisteren noemde ze dat er is in de maand

mei amper storingen waren geweest. Maar ja, als er ook amper passagiers zijn.

00:33:16

*VebeGo:* [onhoorbaar].

00:33:19

*YM:* Nee, dit onderzoek is inderdaad echt vooral gefocust op de normale situatie en het is toch wel de verwachting dat we teruggaan naar die situatie.

00:33:28

*VebeGo:* Maar goed. Dan kan je aanbeveling in ieder geval zijn om daar een vervolgonderzoek naar te doen. We zijn zeker genegen om daarin mee te gaan en in mee te helpen en mee te denken.

00:33:38

*YM:* Schitterend. Dank u wel.

00:33:41

*VebeGo:* En als je de damesverbandcontainer nog wilt zien, dan moet je MW even bellen. Heb je zijn nummer nog?







# IDE Master Graduation

## Project team, Procedural checks and personal Project brief

This document contains the agreements made between student and supervisory team about the student's IDE Master Graduation Project. This document can also include the involvement of an external organisation, however, it does not cover any legal employment relationship that the student and the client (might) agree upon. Next to that, this document facilitates the required procedural checks. In this document:

- The student defines the team, what he/she is going to do/deliver and how that will come about.
- SSC E&SA (Shared Service Center, Education & Student Affairs) reports on the student's registration and study progress.
- IDE's Board of Examiners confirms if the student is allowed to start the Graduation Project.

**! USE ADOBE ACROBAT READER TO OPEN, EDIT AND SAVE THIS DOCUMENT**

Download again and reopen in case you tried other software, such as Preview (Mac) or a webbrowser.

### STUDENT DATA & MASTER PROGRAMME

Save this form according the format "IDE Master Graduation Project Brief\_familyname\_firstname\_studentnumber\_dd-mm-yyyy". Complete all blue parts of the form and include the approved Project Brief in your Graduation Report as Appendix 1 !



family name \_\_\_\_\_  
 initials \_\_\_\_\_ given name \_\_\_\_\_  
 student number \_\_\_\_\_  
 street & no. \_\_\_\_\_  
 zipcode & city \_\_\_\_\_  
 country \_\_\_\_\_  
 phone \_\_\_\_\_  
 email \_\_\_\_\_

Your master programme (only select the options that apply to you):

IDE master(s):  IPD  Dfl  SPD

2<sup>nd</sup> non-IDE master: \_\_\_\_\_

individual programme: - - - (give date of approval)

honours programme:

specialisation / annotation:

### SUPERVISORY TEAM \*\*

Fill in the required data for the supervisory team members. Please check the instructions on the right !

\*\* chair \_\_\_\_\_ dept. / section: \_\_\_\_\_  
 \*\* mentor \_\_\_\_\_ dept. / section: \_\_\_\_\_  
 2<sup>nd</sup> mentor \_\_\_\_\_  
 organisation: \_\_\_\_\_  
 city: \_\_\_\_\_ country: \_\_\_\_\_

comments  
(optional)  
 :  
 :

**!** Chair should request the IDE Board of Examiners for approval of a non-IDE mentor, including a motivation letter and c.v..

**!** Second mentor only applies in case the assignment is hosted by an external organisation.

**!** Ensure a heterogeneous team. In case you wish to include two team members from the same section, please explain why.

**APPROVAL PROJECT BRIEF**

To be filled in by the chair of the supervisory team.

chair \_\_\_\_\_ date \_\_\_\_ - \_\_\_\_ - \_\_\_\_ signature \_\_\_\_\_

**CHECK STUDY PROGRESS**

To be filled in by the SSC E&SA (Shared Service Center, Education & Student Affairs), after approval of the project brief by the Chair. The study progress will be checked for a 2nd time just before the green light meeting.

Master electives no. of EC accumulated in total: \_\_\_\_\_ EC

YES all 1<sup>st</sup> year master courses passed

Of which, taking the conditional requirements into account, can be part of the exam programme \_\_\_\_\_ EC

NO missing 1<sup>st</sup> year master courses are:

List of electives obtained before the third semester without approval of the BoE

name \_\_\_\_\_ date \_\_\_\_ - \_\_\_\_ - \_\_\_\_ signature \_\_\_\_\_

**FORMAL APPROVAL GRADUATION PROJECT**

To be filled in by the Board of Examiners of IDE TU Delft. Please check the supervisory team and study the parts of the brief marked \*\*. Next, please assess, (dis)approve and sign this Project Brief, by using the criteria below.

- Does the project fit within the (MSc)-programme of the student (taking into account, if described, the activities done next to the obligatory MSc specific courses)?
- Is the level of the project challenging enough for a MSc IDE graduating student?
- Is the project expected to be doable within 100 working days/20 weeks ?
- Does the composition of the supervisory team comply with the regulations and fit the assignment ?

Content:  APPROVED  NOT APPROVED

Procedure:  APPROVED  NOT APPROVED

comments

name \_\_\_\_\_ date \_\_\_\_ - \_\_\_\_ - \_\_\_\_ signature \_\_\_\_\_

\_\_\_\_\_ project title

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

start date \_\_\_\_\_ end date \_\_\_\_\_

**INTRODUCTION \*\***

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

space available for images / figures on next page

introduction (continued): space for images

image / figure 1: \_\_\_\_\_

image / figure 2: \_\_\_\_\_



**PLANNING AND APPROACH \*\***

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

start date \_\_\_\_\_ - \_\_\_\_\_ end date \_\_\_\_\_

### MOTIVATION AND PERSONAL AMBITIONS

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

Vertical dashed line on the left side of the page.

### FINAL COMMENTS

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

Vertical dashed line on the left side of the page.