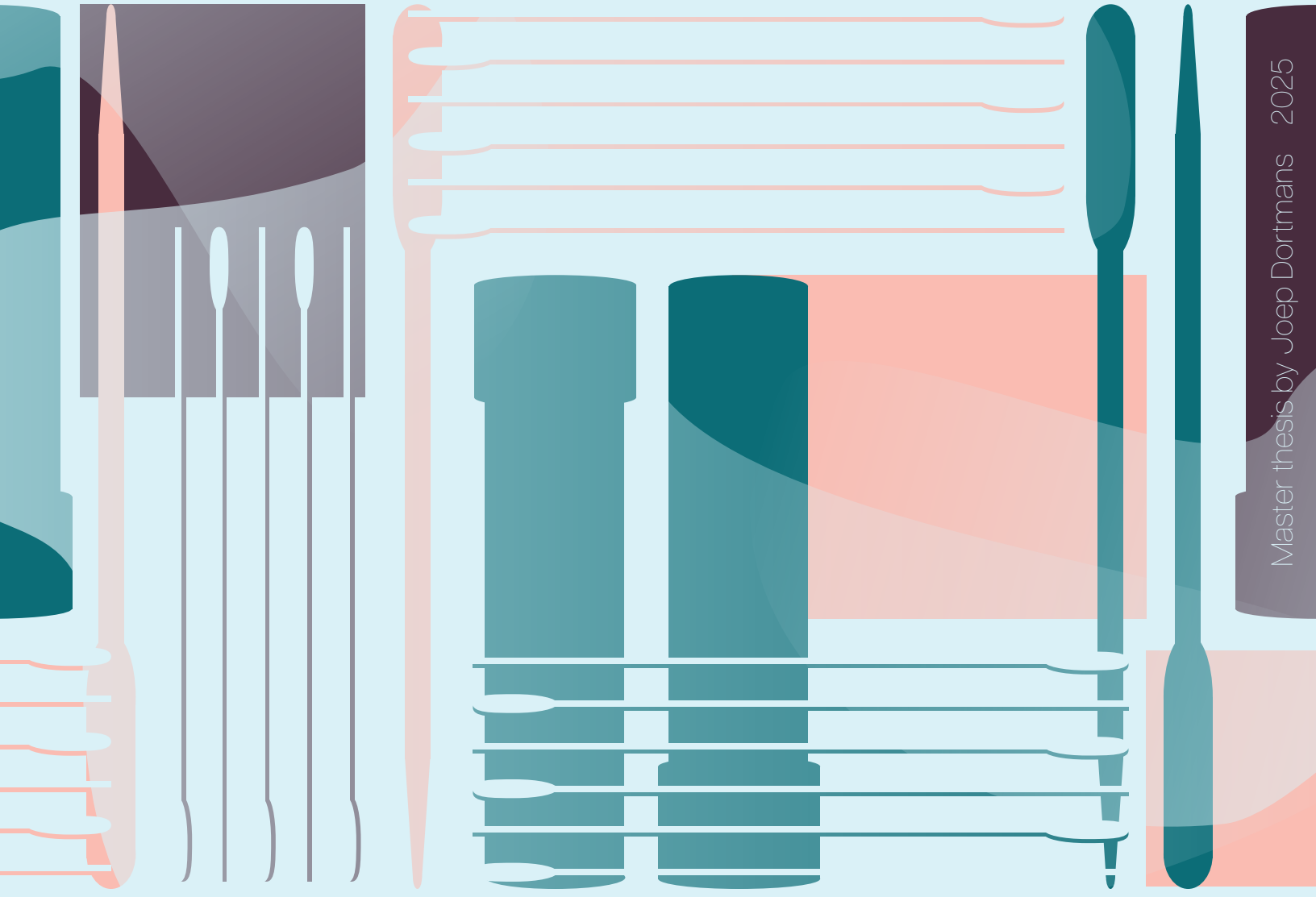
The Invisible Appointment

Enhancing Self-Efficacy and User Experience in Home-based STI Sampling



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Master Thesis | Design for Interaction

The Invisible Appointment

Enhancing Self-Efficacy and User Experience in Home-based STI Sampling

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Delft, The Netherlands

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PREFACE

After many weeks of hard work, I am very excited to present the result in the form of my master thesis report with you. I was very happy that my project idea of redesigning the self-sample test was embraced by both the GGD Amsterdam and my supervisors at the TU Delft. I would like to thank my supervisors at the TU Delft and the GGD for believing in me and the impact of the project. Finding, and being able to define my own project brief has contributed a lot to the ownership I felt toward the project while working on it. And this makes me even more proud of the insights the project provides.

I was very happy with and thankful for my graduation committee. I always liked our meetings and usually left Pieter's office more 'mentally untangled' and inspired than how I entered it.

As always, this design project brought me new experiences within new contexts and let me explore new ways of applying design research. I enjoyed exploring the medical domain at the GGD Amsterdam where I was met with open arms and received the support I needed to bring this project to a successful conclusion. Thank you for the time you invested in helping me, all the materials and words of advice.

Lastly and most importantly I want to thank my friends, housemates and family for supporting me the whole way with tons of encouraging words, insightful conversations and loads of helping hands. Helping me proofreading, making me dinner after another late-night study session or just cheering me up with fun times between that took my mind off the project when I needed to. Thank you so much!

Dear reader, I hope you enjoy reading this report!

Joep

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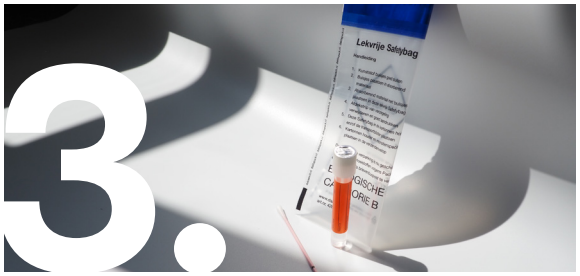

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GLOSSARY

Term	Intended meaning
Sexually transmitted infections (STIs)	*A collective term for infections that are spread by sexual activity*
Sexually transmitted diseases (STDs)	*A collective term for all diseases that are spread by sexual activity, including HIV and AIDS*
Chlamydia trachomatis (CT)	*A chlamydia infection is a sexually transmitted infection caused by the bacterium Chlamydia trachomatis. Usually treated with antibiotics.*
Neisseria gonorrhoeae (NG)	*A gonorrhea infection is a sexually transmitted infection caused by the bacterium Neisseria gonorrhoeae. Usually treated with antibiotics.*
General practitioners (GP)	*A doctor based in the community who treats patients with minor or chronic illnesses and refers those with serious conditions to a hospital or clinic.*
Streeklab	*The Regional Laboratory in Amsterdam that performs microbiological diagnostic testing for institutions and physicians in the region.*
Private sexual health clinics (PSHCs)	*A clinic that offers private care and specializes in the prevention and treatment of sexually transmitted infections.*
Self-test	*A diagnostic test for STIs that an individual can perform entirely on their own, including collecting the sample, conducting the test, and interpreting the result—without the involvement of a healthcare provider or laboratory.*

Term	Intended meaning
Self-sample test	*A self-sample test is a diagnostic method in which individuals collect their own biological sample at home and send it to a laboratory for professional analysis. The user does not perform or interpret the test themselves; results are provided later by a healthcare provider or online system.*
National Institute for Public Health (RIVM)	*A Dutch governmental research institute, responsible and the Environment (RIVM) for promoting public health, disease prevention, and a healthy and safe living environment through research, policy advice, and coordination of national health programs.*
Landelijke Coördinatie Infectieziektebestrijding (LCI)	*The division of RIVM that develops national guidelines and coordinates responses to infectious disease outbreaks in the Netherlands.*
Nucleic acid amplification tests (NAATs)	*Highly sensitive laboratory methods used to detect genetic material (DNA or RNA) of pathogens, such as bacteria or viruses, making them especially effective for diagnosing infections like chlamydia and gonorrhea.*
PCR tests	*A type of NAAT that detects the DNA or RNA of a pathogen by amplifying small amounts of genetic material, enabling identification of infections at low levels.*


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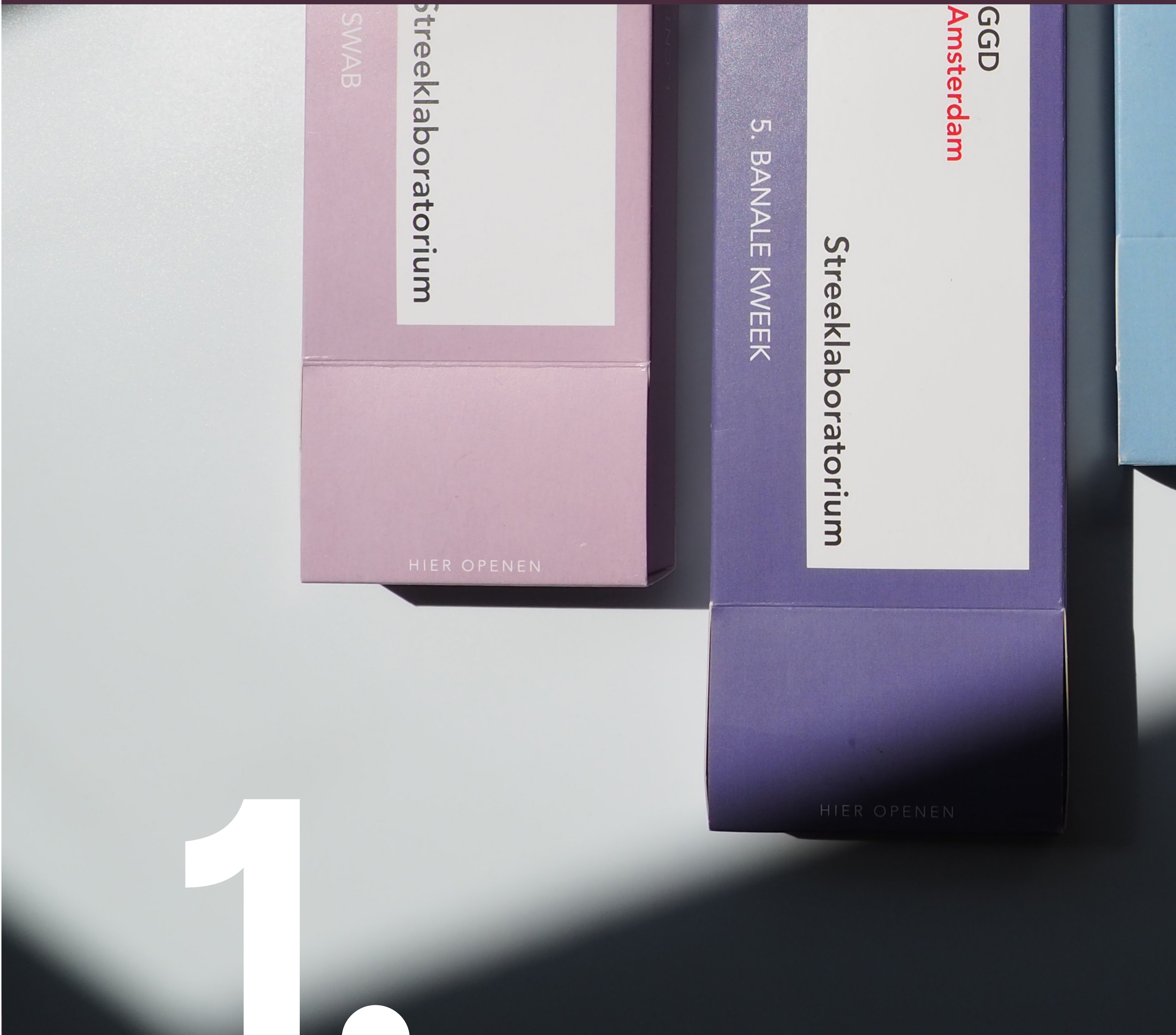
SUMMARY

This project proposes a redesign for the self-sampling test for Chlamydia trachomatis (CT) and Neisseria gonorrhoeae (NG), guided by principles of Design for Emotion. The goal is to uncover the nuanced emotional experiences users encounter during the sampling process and translate these insights into a more user-friendly and supportive design. Through techniques such as micro-emotion scans (MES) and the identification of motivational dilemmas, the research offers a detailed understanding of users' emotional experiences during key stages of the process. These findings inform a redesign that promotes emotional ease, addresses motivational conflicts, and empowers users to trust their ability to carry out the test correctly.

Sexually transmitted infections (STIs) such as CT and NG remain a significant public health concern, particularly among sexually active young adults. To promote early detection and treatment, the GGD Amsterdam provides a home-based self-sampling test, enabling users to collect their own samples in the privacy of their homes instead of a general practitioner's office or a GGD location. While self-sampling offers greater discretion and accessibility, it can also evoke negative emotional responses, such as doubt, insecurity, or anxiety, that may undermine users' confidence in performing the test correctly and influence their interpretation of the results.

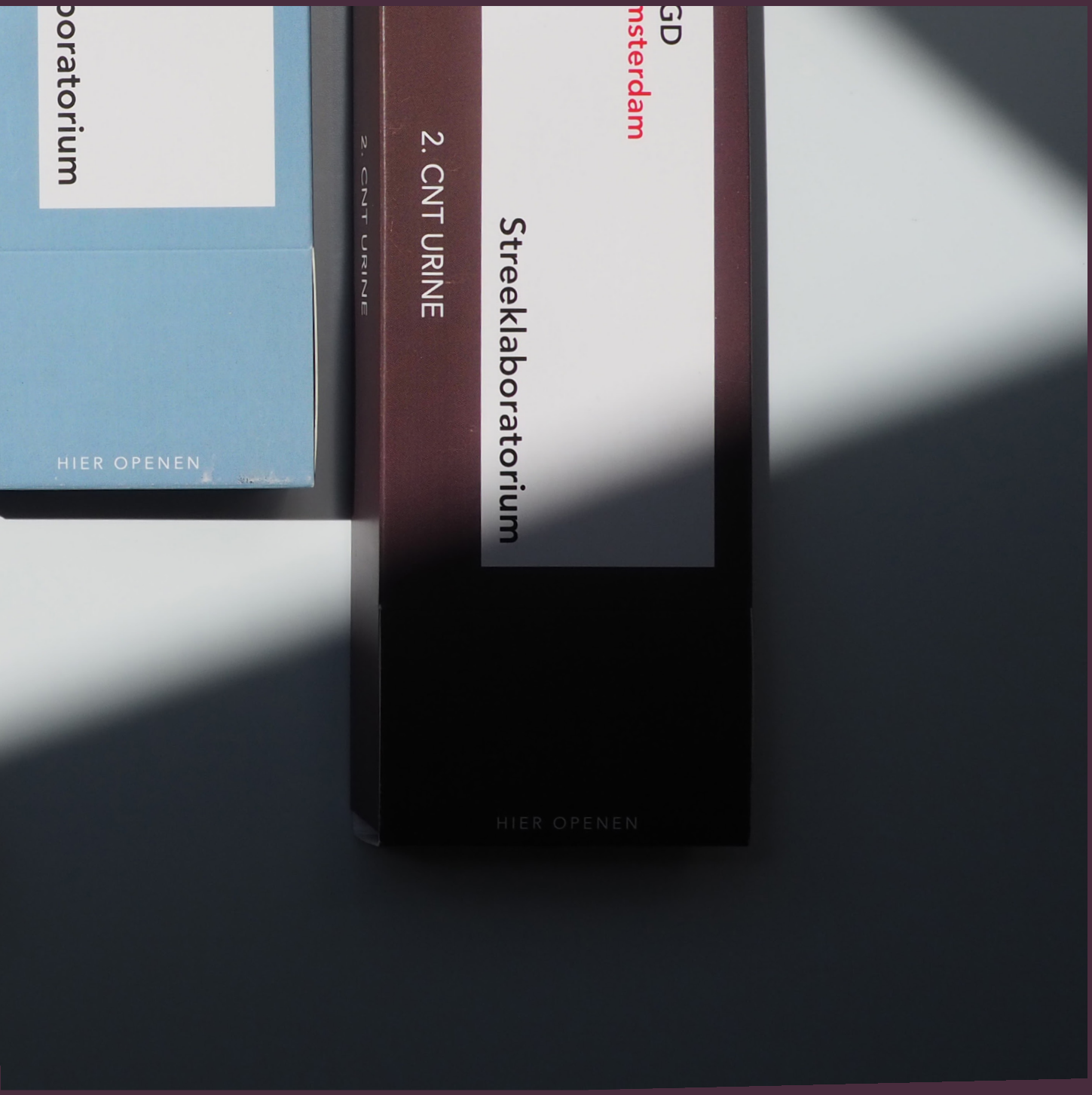
Extensive literature, desk and field research is conducted to get a better understanding of the usability and user experience when self-sampling. Findings point out that doubt and insecurity often stem from a lack of medical knowledge, the intimate nature of the procedure, and the absence of direct professional guidance. It is therefore not surprising that many users question their own ability to carry out the sampling correctly or worry about compromising the reliability of the results. Acknowledging and understanding these emotions is important. Examining them more closely offered valuable insights for improving the overall user experience and building greater confidence in the test through thoughtful design.

The proposed redesign (the Stepwise kit) was evaluated through user testing, a micro-emotion scan, and qualitative interviews. Results suggest the kit positively impacts users' self-efficacy, with participants reporting increased confidence in their sampling. This was mostly due to the step-by-step guidance, progress tracking, and focused information delivery. However, the evaluation also revealed a tension between minimizing cognitive load and the need for users to anticipate upcoming steps in a motive dilemma. These insights informed a set of recommendations for further development, emphasizing the importance of consistent usability for creating a design that supports the user's self-efficacy beliefs.



1.

Introduction



This chapter introduces the project's scope, key stakeholders, and target group. It also elaborates on how the design challenge and research questions were established, and explains the approach taken to address them. To obtain an understanding of the medical systems in place, I interviewed a researcher in the field of STD and sexual health and dermatologist at the GGD, a GP, a clinical microbiologist at the laboratory of the GGD and a doctor active at the STD department of the GGD.

1.1 Project initiation

The graduation project at Delft University of Technology (TU Delft) offers students the freedom to explore topics aligned with their personal interests. Throughout this project, I have taken the opportunity to focus on a subject that intrigued me: the design of medical consumer products. Unlike most consumer products, medical products are often not used by choice, but out of necessity and users engage with them because their health or comfort depends on it. This makes the user experience of these products, in my opinion, often overlooked.

Figure 1 - An overview of the region GGD Amsterdam

The home-based self-sample test is a good example of such a product. From personal experience I know that most people are not excited to get tested, but they recognize its importance in determining their health status. This makes it a fitting case for improving the user experience. In the Netherlands, a large share of self-sample tests is facilitated by the Dutch public health organization (GGD). To initiate this project, I reached out to the GGD in Amsterdam, who agreed to collaborate and support the development of the project.

The GGD of Amsterdam provides testing procedures for sexually transmitted diseases (STDs), free of charge for some parts of the Dutch society (Chapter 2.2). The organization is government funded and is the largest and oldest municipal health service in the Netherlands, employing approximately 1,200 professionals across more than thirty locations in the Amsterdam-Amstelland region. This region includes 6 municipalities (Figure 1), collectively serving around 900,000 residents (Gemeentelijke Gezondheidsdienst [GGD] Amsterdam, n.d.).

This graduation project is a self-initiated effort in collaboration with GGD Amsterdam, aiming to improve the user experience of the home-based self-sampling test. Given the GGD's extensive reach and the increasing demand for innovation in STI care, this project has the potential to make a meaningful impact on the experiences of GGD clients.

1.2 The stakeholders

In this paragraph, the stakeholders and their relationship with the self-sample test are introduced. Next to the main stakeholders, there are a couple that are directly and indirectly involved. These will shortly be addressed. The target group of the project is defined. Figure 2 shows an overview of the key stakeholders.

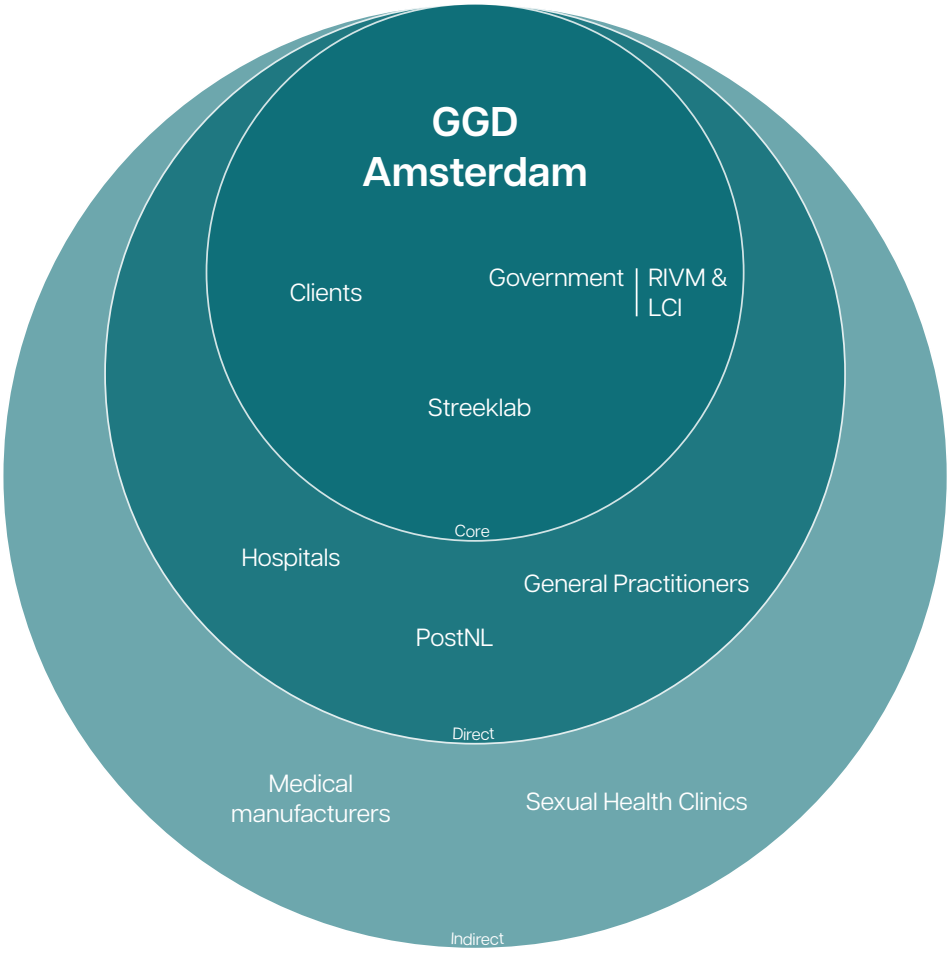


Figure 2 - Key stakeholder overview GGD Amsterdam

STAKEHOLDERS IN STI-HEALTHCARE

The GGD Amsterdam is the largest public health institution in the Netherlands, operating over 30 locations across the Amsterdam municipalities. Within this region, it works closely with **general practitioners**, supplying them with self-sample kits and laboratory testing. Samples collected at GP practices or GGD facilities are sent to the **regional laboratory (Streeklab)**, which, uniquely in Amsterdam, is co-located with a GGD site, maintaining fast communication and quick turnaround times for samples.

Due to high demand for STI testing, GGD Amsterdam is continuously seeking ways to expand its testing capacity. However, demand still exceeds supply, often resulting in the clinic being unable to accept new appointments. Clients are then referred to their GP or to **private sexual health clinics (PSHCs)**, which may not be free of charge (de Koeijer, 2025). The primary bottleneck limiting expansion is **insufficient government funding**, which restricts the number of consultations and pushes more clients toward PSHCs, increasing average sexual healthcare costs for young adults.

The GGD works according to guidelines administered by government institutions such as the RIVM and the LCI (see Glossary).

OTHER STAKEHOLDERS

The mailing service is handled by **PostNL**, which sorts the packages containing samples and delivers them in bulk mail bags to the Streeklab as shown in Figure 3. The self-sampling system depends on a fast and reliable mail delivery, as samples can become unusable after 3 to 5 days in transit, depending on the type of test.

The components of the kit, such as the pipette, cotton swab, and test tube, are purchased by the GGD from **pharmaceutical manufacturers**, as the GGD does not have the capacity to produce these items in-house. This has consequences for the scope of the project, as this redesign must

Figure 3 - The samples taken at home arrive in mailbag at the laboratory of the GGD

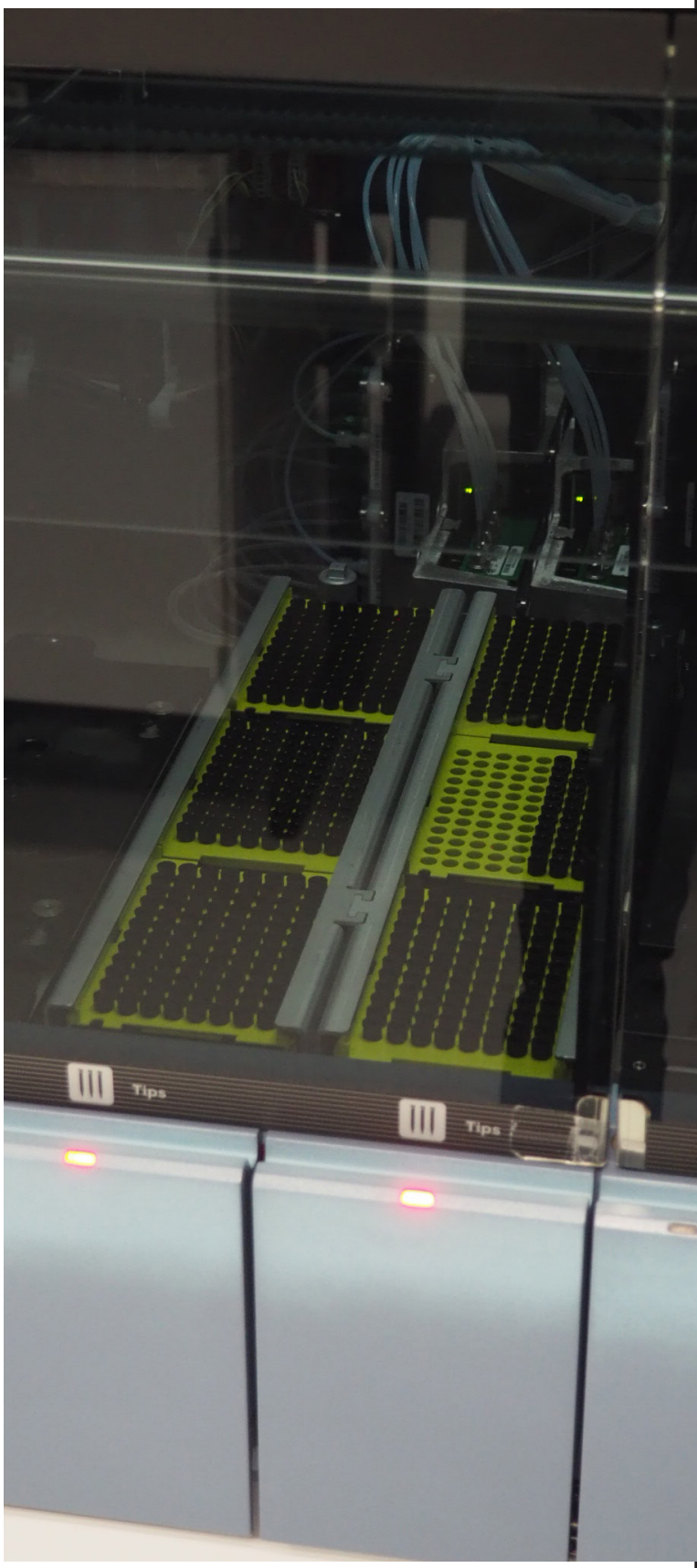
be done by the GGD as a standalone organization, the purchased products cannot be redesigned. The redesign is limited to components that are internally produced by the GGD Amsterdam. More clarification on these components is given in Chapter 7.4.2.

TARGET GROUP

The GGD focuses on providing sexual healthcare to all citizens, with extra attention to those with limited access to regular care. These “high-risk groups” include MSM, individuals with multiple recent partners (more than 3 in 6 months), people from STD-endemic regions (1st/2nd generation), sex workers, partners of high-risk individuals, and those under 25. Due to their increased risk of infection, they are offered free sexual healthcare by the GGD and get priority over clients with a lower risk of infection.

The groups without priority are more likely to be rejected by the GGD for testing on location. These groups will get tested at the GP or PSHCs where they are most likely to come in contact with the home-based self-sample test. I will elaborate more on the flow of patient management in the healthcare system later in Chapter 2.2.

As a result, the home-based self-sampling test is most often used by individuals classified by the GGD as lower risk, typically those over 25, who are not eligible for priority testing and are more likely to be referred to their GP or a PSHC. That is why this group forms the target population for this project.



1.3 The home-based self-sample kit

Various self-sampling kits are available at the GGD for different STDs (Figure 4). The most commonly used tests at the GGD are for CT and NG (Bil, 2017), which require a urine sample from male clients and a vaginal swab from female clients. Given their widespread use in the Netherlands, the CT and NG self-sampling kit serves as a logical starting point for this research.

Figure 4 - The variety of self-sample test kits provided by the GGD Amsterdam.

To avoid confusion, it is important to distinguish between self-tests and self-sample tests. In everyday language, and sometimes even in research, these terms are used interchangeably, despite having distinct meanings in a medical context.

A self-test is performed and interpreted by the user without medical assistance, whereas a self-sample test involves the user collecting a sample themselves, which is then sent to a laboratory for analysis. Although self-tests have grown in popularity, especially since COVID-19, their accuracy is too low to be medically reliable (see interview with dermatologist, Appendix 2.1). Although there is no officially defined minimum sensitivity standard for self-sampling tests for CT and NG (RIVM, 2024).

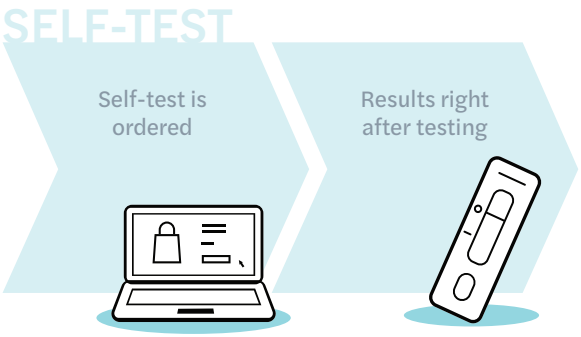


Figure 5 - Use steps of the self-test

The RIVM and LCI recommend nucleic acid amplification tests (NAATs), such as PCR, for reliable detection (RIVM, 2024).

SELF-TEST

A self-test provides quick results. Self-tests are simple to use (figure 5), affordable (typically €15 to €30), and no external involvement is needed. However, due to a high risk of missing infections, a positive result always requires confirmation through follow-up testing by a healthcare provider (Homed-IQ, 2025) (RIVM, 2024).

SELF-SAMPLE TEST

Therefore the self-sample test is the prefered testing method and forms the scope for this project. As these are analyzed in a professional laboratory using advanced methods like PCR (Figure 6). This ensures high accuracy and allows detection of a wide range of infections. Results typically take 1 to 5 days. Self-sample tests can involve various sample types, such as throat or rectal swabs. Unlike self-tests, a positive result is already lab-confirmed and usually does not require further testing (Homed-IQ, 2025) (RIVM, 2024).

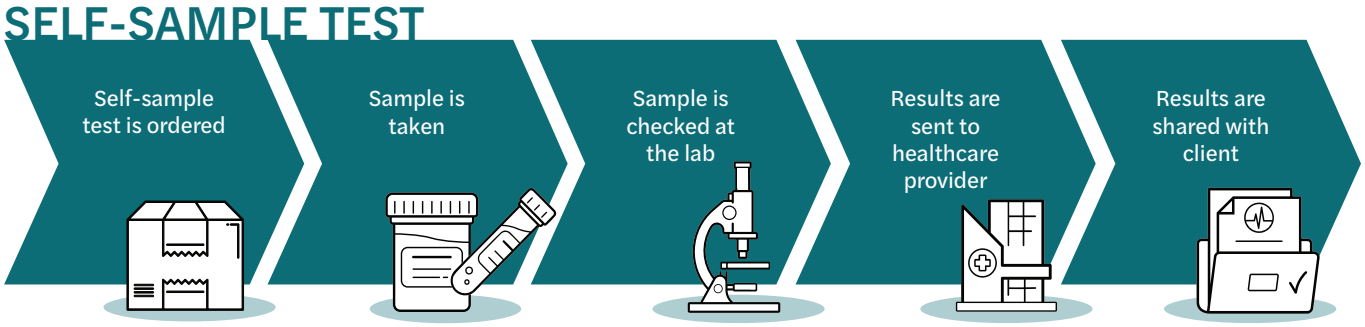


Figure 6 - Use steps of the self-sample test

INTRODUCING THE PRODUCT

This paragraph outlines what the home-based self-sample test looks like, what components it contains and what their functionalities are. The figures 7 and 8 show an overview of the contents of the test kit as supplied by the GGD Amsterdam.

URINE TEST

Box — The box and serves as protective cover for the sample

Envelope — Contains all returned materials

White bag — Protective layer for sending sample tube

Wrapper pipette tube — Extra protective layer for sample collection materials

Pipette — Used to transfer the urine to the tube

Sample Tube — Contains the sampled urine

Safetybag — The bag seals and prevents leaking

Instruction manual — Folded up paper manual for test

Figure 7 - The contents of the urine test kit as supplied by the GGD Amsterdam

SWAB TEST

Box — The box serves as a protection cover for the sample

White bag — Protective layer for sending the sample tube

Cotton swab — Cotton swab for sample collection in wrapper

Wrapper swab + tube — Extra protective wrapper for sample collection materials

Safetybag — The bag seals and prevents leaking

Sample tube — Seals the used swab with conservation liquid

Envelope — Contains all returned materials

Instruction manual — Folded up paper manual of the test

Figure 8 - The contents of the swab test kit as supplied by the GGD Amsterdam

THE MEDICAL RELIABILITY OF HOME-BASED SAMPLING

The self-sample method has proven to be reliable through extensive research. Studies have shown that self-collected vaginal swabs for chlamydia have sensitivities ranging from 90% to 100%, and urine-based self-sampling tests for chlamydia show sensitivities between 87% and 93%, with specificities around 99%. For gonorrhea, self-collected urine samples have demonstrated sensitivities of approximately 92% and specificities near 99% (Paudyal et al., 2015). So, even when the client takes their own sample, the sensitivity, specificity and accuracy are high.

An expert that works for the GGD suggests that clients may actually perform the self-sampling procedure more thoroughly than a trained professional. According to the expert, clients tend to insert the swab deeper and leave it in longer, often making additional movements to ensure they have done it correctly. In contrast, healthcare professionals are generally more concerned with minimizing patient discomfort and may therefore collect the sample more cautiously and quickly (see interview with dermatologist, Appendix 2.1).

POPULAR, BUT NOT YET PERFECT

Most STI testing in the Netherlands, including by GPs, the GGD, and private clinics, is increasingly conducted through self-sampling kits (RIVM, 2023). While precise numbers are limited, the trend toward internet-based self-sample testing is growing (RIVM, 2024), largely due to its convenience, reduced stigma, and improved accessibility (Spence, 2020).

Serlin et al. (2002) found that despite self-sampling is gaining popularity due to ease of access, participants trusted the results of a physician pelvic examination most, followed by urine sampling, and self- vaginal swabbing was trusted the least. This indicates that patients' concerns remain. Clients may feel uncertain about their ability to correctly perform the test, and some prefer in-person testing for the opportunity to ask questions and receive guidance from professionals (Spence, 2020). This highlights a trade-off between ease of access and the reassurance offered by traditional testing settings.

While multiple studies point out the users' lack of self-confidence and trust in the results, especially in self-vaginal swabbing, the underlying causes of these issues in the user experience are understudied and largely unknown. Understanding where these issues originate, particularly in the interaction between the user and the self-sample kit, can provide insights to establish an approach to address them.

1.4 Defining the opportunity

Self-sampling has been widely implemented in the Netherlands for roughly 15 years, with usage increasing by 29% since 2019 (RIVM, 2024). Health professionals continue to emphasize the many advantages of self-sampling, including reduced workload for medical staff and increased autonomy and privacy for patients (Mavedzenge et al., 2013). Despite these benefits, studies indicate that improving the user experience of self-sampling could further enhance its effectiveness (Flowers et al., 2023). Flowers found that improving the design of the self-sample kit can have a positive effect on user engagement, compliance and return rate of the samples. Nonetheless, surprisingly, the self-sampling kit used by the GGD has remained largely unchanged since its introduction around 2009.

MEDICAL ACCEPTABILITY OVERSHADOWING USER EXPERIENCE

This lack of innovation is not without justification. Studies consistently show that users accept the imperfections of the self-sample test. For instance, Paudyal et al. (2015) reported high acceptability, with 85% of participants over 21 different studies rating the method as satisfactory. Moreover, self-sampling at home has been associated with improved compliance. Graseck et al. (2010) found that users who opted for home-based sampling were twice as likely to test compared to those who had to visit a clinic.

While considerable research finds high clinical acceptability and reliability of self-sampling, the motivation to address the flaws in the subjective experience of users remains low. This results in a flawed self-sampling experience that has not been addressed over the past 15 years, despite research indicating the importance of doing so. Powell (2016), for example, found that users often feel unqualified to collect their own samples, which can result in distrust in the process and, in some cases, distrust in the test outcomes. This uncertainty may leave users dissatisfied or hesitant to rely on the results. Powell also suggests that adjustments to the self-sampling kit, particularly those that enhance user confidence and perceived accuracy, could positively influence the intention to use such tests.

ALIGNING PERCEPTION WITH PERFORMANCE

This notion of confidence in use can be interpreted as a user's belief in their own ability to perform the sampling procedure correctly. In psychological terms, this is referred to as **self-efficacy**, a concept introduced by Bandura (1977), which describes **an individual's belief in their capability to organize and execute actions required to achieve specific outcomes**. Self-efficacy plays a critical role in shaping behavior, motivation, and performance across various domains, including health-related practices. This concept will be further elaborated upon in Chapter 3.

In conclusion, although self-sampling is medically sound and highly effective, there remains a gap between its proven reliability and the user's perceived self-efficacy. Scientific evidence strongly supports the method as a valuable advancement in sexual healthcare, yet opportunities remain to improve the user experience. By enhancing self-efficacy through redesign, the self-sampling process can become more reassuring for the user, helping their trust align with the clinical reliability of the test.

The lack of knowledge seemed to lie in a detailed understanding of where exactly in the user's interaction with the self-sample kit these issues originate. This project aimed to explore that interaction more closely, to identify potential causes of the user experience challenges described above. Based on these findings, the goal is to propose a redesign that directly addresses the root of the problem.

Figure 9 - CNT swab test kit and CNT urine test kit of GGD Amsterdam

1.5 Project structure

The project was structured into four phases: context exploration, zooming in on UX, development of ideas and evaluation of the solution (see Figure 10).

Phase 1 | Context exploration
This phase involves several steps aimed at gaining a broad understanding of the GGD and the self-sampling test system. The context was explored through field research and qualitative interviews, while literature review provided insight into existing user experience issues.

Phase 2 | Zooming in on UX
A series of micro-emotion scans were conducted to gather detailed, test-specific data. Motive laddering techniques were used to understand the underlying goals and values of the user, and several motivational dilemmas were uncovered. The combined analysis of all findings led to key insights for a potential redesign.

Phase 3 | Development
Throughout this phase, ideas are generated that suit the defined solution space. Followed by multiple cycles of prototyping and testing alongside requirements. Further development of the concepts was done through generative sessions with other designers and experienced users. Medical experts were consulted to check for medical viability.

Phase 4 | Evaluation
The final concept was prototyped and evaluated through MESs with users that are familiar with the original product to be able to analyze the differences in user experience between the two self-sample kits. This leads to final conclusions and recommendations for further development and implementation.

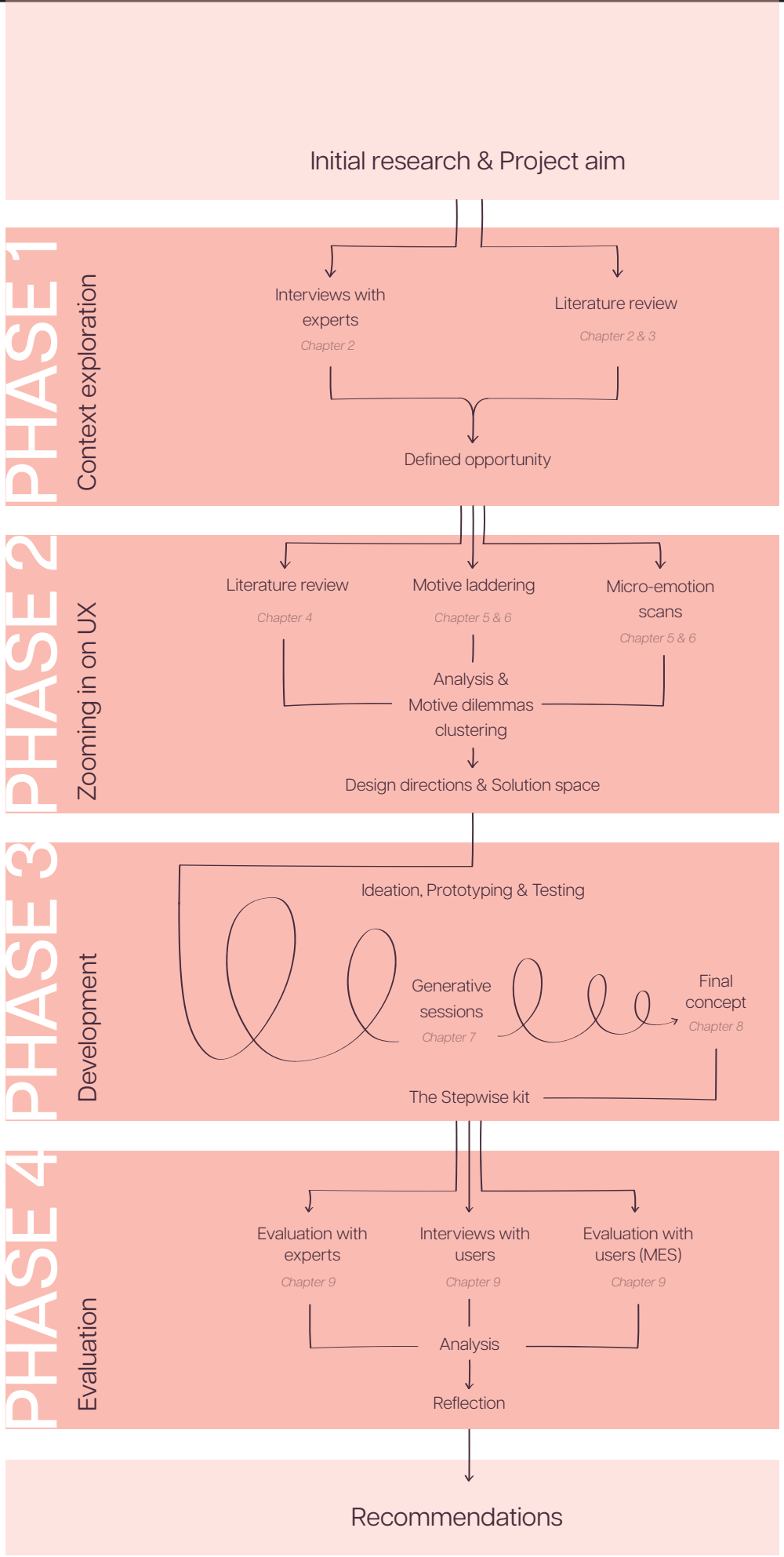


Figure 10 - The structural overview of the project


MEDISCHE POST
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Main insights | Chapter 1

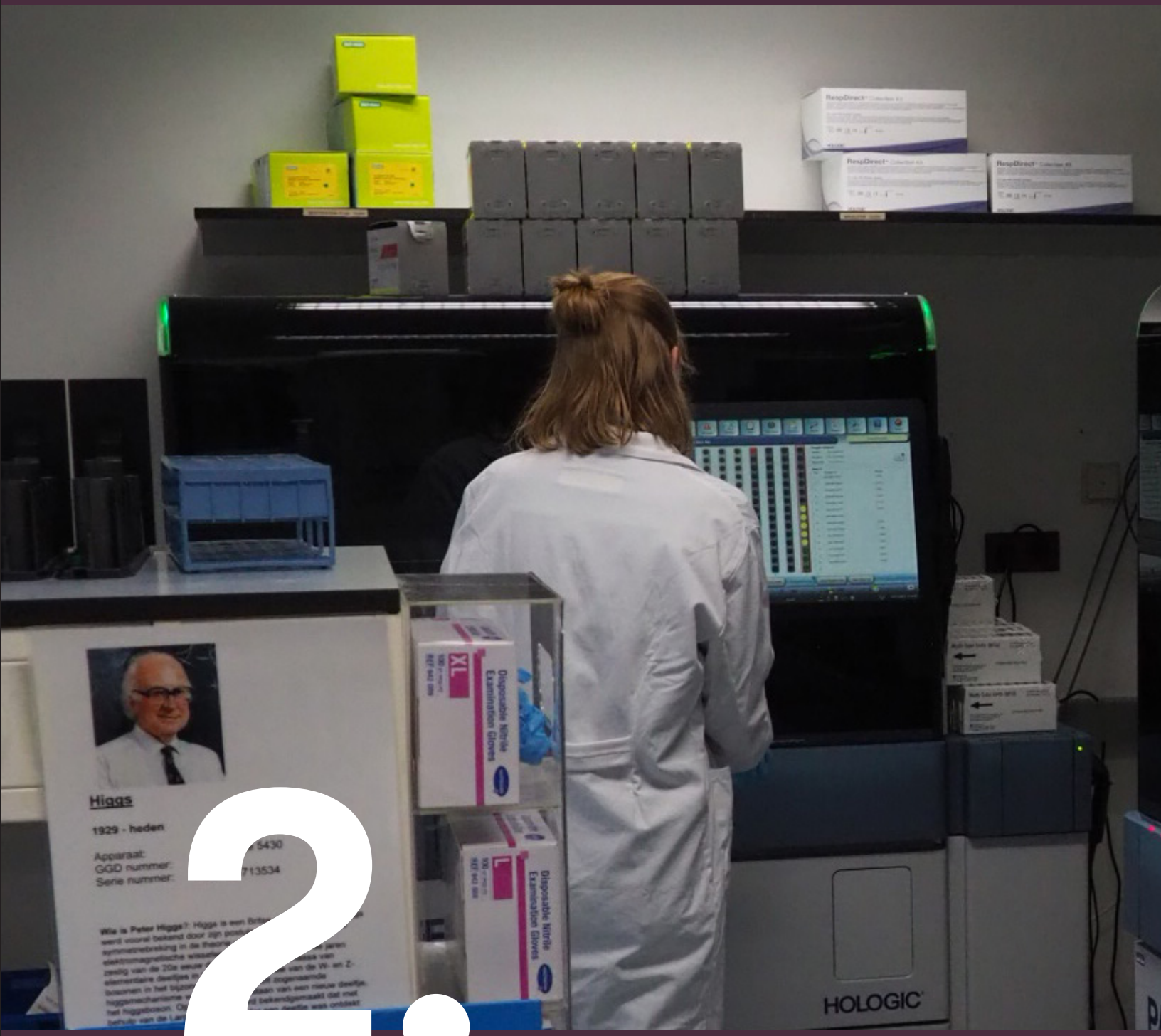
- *The GGD Amsterdam is constantly looking for new ways to* ***expand their testing capacity****. The GGD is limited by the number of consultations that they are able to provide due to an increasing* ***shortage of government funding****. Getting more clients to sample at home could increase their testing capacity.* ***This makes low-cost interventions the only practical option for the GGD moving forward.***

- *Due to the GGD's limited budget and the fact that most medical items in the self-sampling kit are externally procured, the design space is significantly constrained.* ***A redesign can realistically only influence the components produced in-house by the GGD, as modifying the outsourced medical elements would likely be too costly.***
  Components that can be redesigned are:

  > ***The manual***
  > ***The box***
  > ***Outer packaging***
  > ***The stickers***
  > ***The mailing envelope***

- *Despite the growing popularity of self-sample tests in recent years, a trade-off remains between ease of access and the reassurance typically provided in traditional clinical settings.* ***This highlights the need for a redesign that can help bridge that gap.***

- *Although self-sampling is medically sound and highly effective, there remains a disconnect between its proven reliability and the user's perceived self-efficacy while sampling. Although issues in user experience have been brought up in past studies, the self-sample kit has not changed over the years.* ***There seems to be a need for in-depth analysis of the user-interaction to get an understanding of where these issues originate from, and that is what this project aims to do****.*



2.

Context

This chapter explores the Dutch sexual healthcare system and the role that the self-sample test fulfills. I will give more clarification on the scope of the project and the context surrounding the self-sample test. To obtain a better understanding of the processes at work at the GGD Amsterdam three expert interviews were conducted (see Table 1). They are referred to throughout the chapter.

2.1 Context exploration

To understand the full context of the project, literature and field research were conducted. Exploration questions and the methods used to address them are outlined in this chapter.

EXPLORATION QUESTIONS

Understanding the context of the GGD Amsterdam and the self-sample test is essential when making the redesign. The main research questions that are answered in Chapter 2 are stated on the right and the sub-questions can be found in Appendix 3

How is the public sexual healthcare organized in the Netherlands?

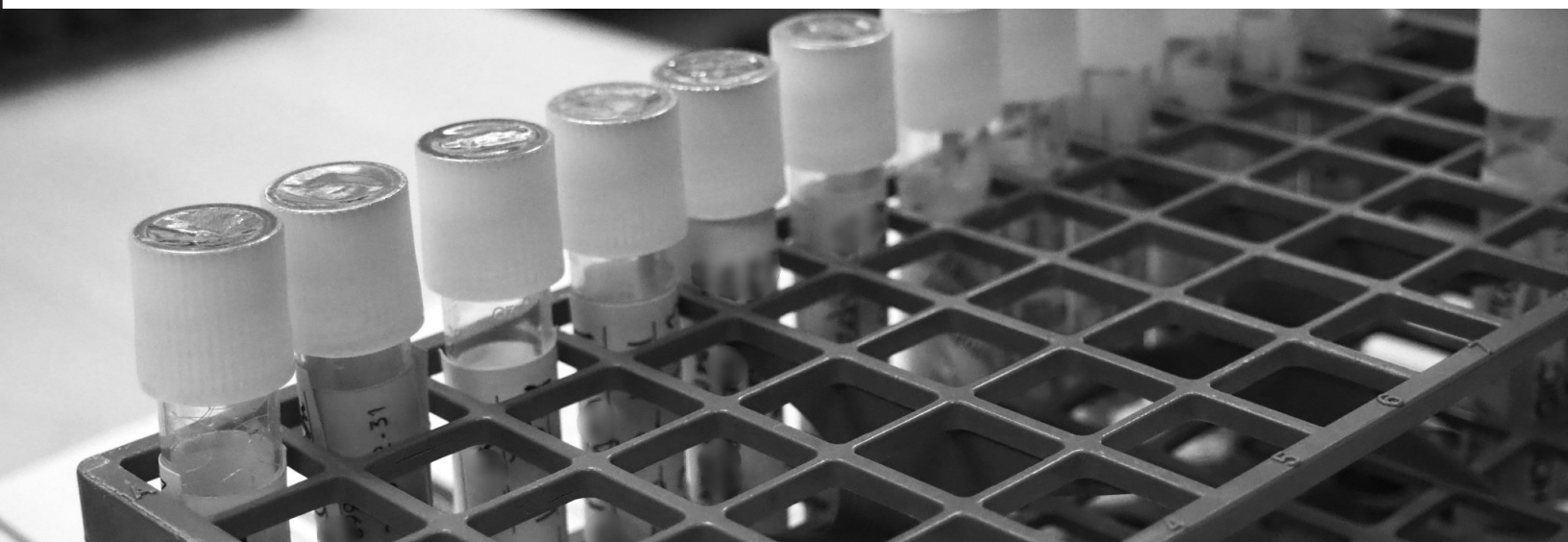
What are the specific roles that sexual healthcare providers fulfill, and in what scenarios do clients come into contact with the home-based self-sample test?

How are consultations organized and what are the priorities of the GGD in doing so?

What are the advantages and disadvantages of self-sampling methods according to healthcare experts?

EXPLORATION SETUP

The exploration of the context of the project is executed through a combination of literature research, field research and observations at GGD facilities and laboratory and qualitative semi-structured interviews with three healthcare professionals involved in different specializations at the GGD and one GP operating from their own practice (see Table 1).



Stakeholder	Details of interview participants	Amount
Dermatologist GGD	Researcher opperating at the UMC in the field of STD and sexual health and works as a dermatologist at the GGD. Interviewed about developments of STI-testing methods used by the GGD and the overall consultation system at the GGD-Amsterdam.	1
Attending physician STI care	Physician opperating at the GGD. Interviewed about how clients experience the self-sample test at the GGD location. The benefits and downsides of self-sampling.	1
Clinical microbiologist	Opperating at the laboratory of the GGD in analyzing and diagnosis of patients in colaboration with attending physician. Interviewed about the opperational systems of the laboratory and efficiency of the current processes.	1
General practitioner	Opperating at their own practice testing patients for STIs with home-based self-sample kits supplied by the GGD. Interviewed on their experience with the self-sampling method and needs of the patient when testing.	2

Location	Details of observation location	Amount
Doctors office GGD	The doctors office where the consultations take place was observed and the process of providing the client with the self-sample kit was explained.	1
Self-sample toilets GGD	The toilets especially equipped for patients go to take their sample at the GGD location in Amsterdam was observed.	2
The laboratory	Streeklab is where the samples are sent to for analysis. The laboratory and the opperational steps taken to analyse the sample are observed and explained.	1

Table 1 - Details on interviewed participants and observed locations for context exploration

2.2 Sexual health in the Netherlands

Sexually transmitted infections (STIs) have placed a growing strain on the Dutch healthcare system, with this burden only increasing in recent years. The RIVM reported that the Netherlands has seen a significant rise in STIs, particularly Neisseria Gonorrhea (NG) and Chlamydia Trachomatis (CT), among highly educated young adults in 2022 and 2023. Throughout the year 2023 there has been a total of 172.133 STI consults carried out by sexual health centers (SHC) alone. The number of STI consults at SHCs has increased with 19% in 2022 and then again with 5% in 2023 (RIVM, 2024). This surge not only affects the health of individuals but also adds significant pressure to an already congested healthcare infrastructure, particularly general practitioners (GPs) and SHCs.

LESS CAUTION AMONG YOUNG ADULTS

A possible cause of the resent increased number of cases might be a laxer attitude of this age group towards the use of protection. As recent investigations show that the use of the condom amongst young adults without an exclusive partner in the Netherlands is declining. 43% of men and 56% of women did not use a condom during their last one-night stand (Rutgers, 2024).

In conclusion, sexual healthcare has been a growing issue over the past years with a growing number of NG cases and recent trends showing it will put an even greater pressure on the Dutch healthcare system in the future. While funding for public healthcare organizations like the GGD is falling behind, anticipating this demand is increasingly difficult.

NEW TESTING POLICIES

From the start of 2025, the RIVM has a new directive for the testing for CT. SHCs will stop testing people without symptoms. RIVM is concerned that excessive treatment of CT will increase the resistance against antibiotics. Additionally, recent RIVM reports have shown that there is no evidence that widespread testing of people without symptoms leads to a decrease in the prevalence of CT in the population.

Routine testing, without symptoms, will still be done for gonorrhea. In 2023, the RIVM reported a 31% increase in clients diagnosed with gonorrhea at SHCs in comparison to 2022 (RIVM, 2024).

2.3 Self-sampling at GGD Amsterdam

To address the problems posed by the increasing strain on the healthcare system, self-sampling methods for STI testing were introduced around 2009 by the RIVM, offering an online and from-home alternative to traditional testing. The GGD confirms that the implementation of the self-sample test has helped, because it has increased the number of clients they were able to see. And they express the self-sample test suits their need for constant innovation within the department to keep up with the growing demand. (Dermatologist GGD interview, appendix 2.1) Professionals are generally convinced that self-sampling methods can significantly reduce the workload for healthcare providers (Mavedzenge et al, 2013).

TESTING AND CONSULT ORGANIZATION

At the GGD, clients from eligible groups follow a streamlined process when testing for chlamydia or gonorrhea, designed to be accessible and user-friendly. Upon arrival, they receive a code and wait until it's called. They are then given a self-sampling kit and directed to the "sample toilet" (Figure 11), where visual instructions automatically play on a screen once the test is scanned. Usually, unless screening points out otherwise, male clients provide a urine sample, and female clients use a vaginal swab. Samples are dropped off at a designated desk near the toilet area. According to one of the doctors working at GGD Amsterdam, most clients prefer this approach over a face-to-face consultation. The doctor knows from experience that most clients find self-sampling more comfortable and accessible. He believes self-sampling methods are more customer-friendly than being examined by a physician (Interview, Appendix 2.2). Clients with symptoms or a higher risk of infection are more likely to see a doctor directly, though they often still collect the sample themselves.

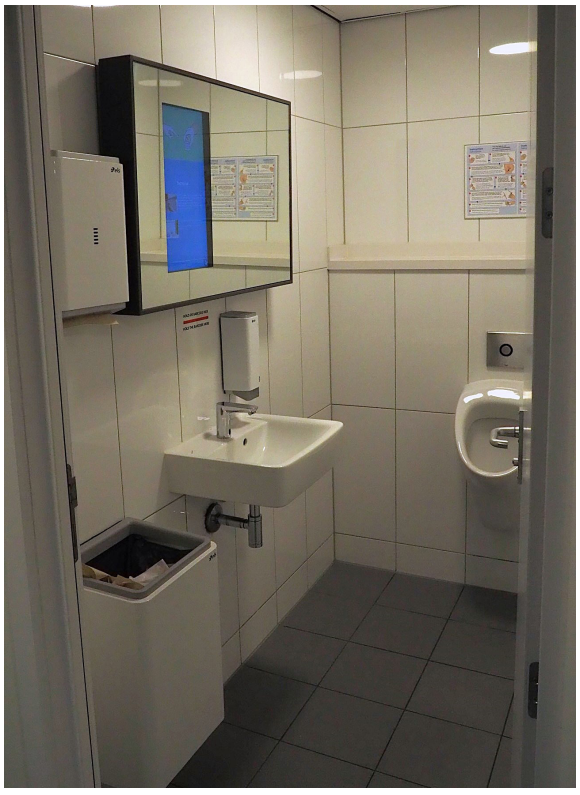


Figure 11 - The self-sample toilet at GGD locations

These clients are not tested though home-based self-sampling procedures. The clients that sample at home do so, because the demand for testing is much higher than the GGD can provide or

because they personally prefer this over testing at the clinic. To deal with the high demand, the GGD works with a waiting list system in which people with a higher risk of infection receive priority, as shown in Figure 12. The risk of infection is determined through questions about the sexual activity of the client by means of an online screening. An attending physician (see interview, Appendix 2.2) estimates that about 2/3rds of testing requests are denied. Denied clients are referred to their GP or PSHC, where the client is likely to test by means of home-based self-sampling. (see interview, Appendix 2.4)

The GP receives the self-sample kits from the GGD in that area. Patients that come in to be tested receive, in some cases, a self-sample test to perform on the toilet of the GPs practice, or in other cases, a test to take home and bring back or send back. In what scenario, what test is given seems to be according to the preference of the GP. This decision can be made according to practical reasons, such as a busy schedule, or the patient's preferences (see interview, appendix 2.4).

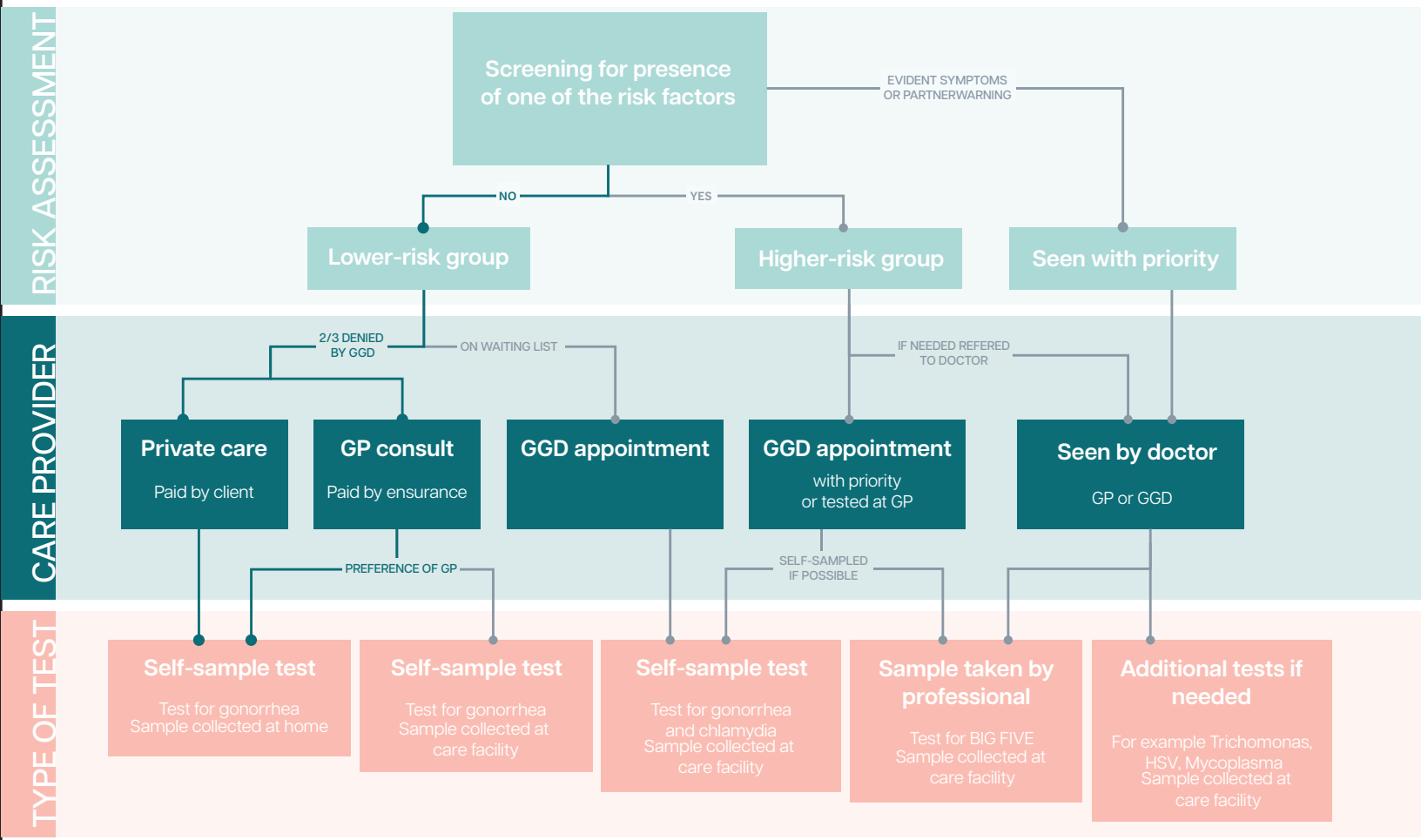


Figure 12 - Client test procedure flowchart

2.4 Product journey

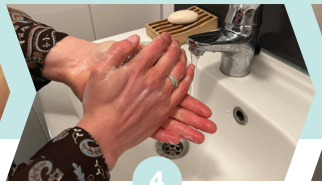
The home-based self-sample test can be obtained and used in different scenarios. To illustrate the usual use scenario of the self-sample test, a product journey map is created (Figure 13). This provides an overall indication of how the test is received, used and evaluated at the lab.

USE SCENARIO

1


2


3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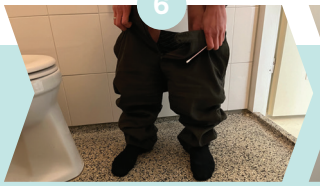
5

Currently, the kit is usually received at the GPs practice, after a consultation (1). The client takes the self-sample kit home with a referral letter from their doctor. At home they open the kit and take out the components (2).

They fill out their information, and the date on which the sample is taken, on a sticker (3), wash their hands (4), and take the swab sample with the cotton swab from the vagina, throat, or anus (6). The cotton swab goes into the tube with preservation liquid (7) and the client's information is stuck on the tube (8).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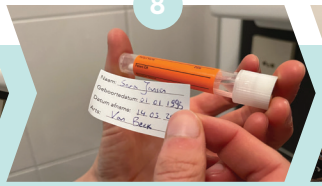
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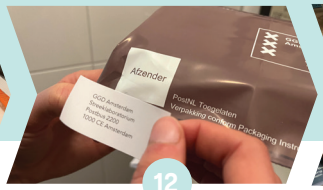


12


13


14

To comply with PostNL's rules for sending biological material, the sample is safely sealed in multiple layers of packaging (9 to 11) and sent to the Streeklab by mail (12 to 14).

LAB ANALYSIS

PostNL sorts the samples out from the mail and delivers them directly to the Streeklab in mail bags (1). The samples are sorted based on the type of lab analysis that is needed and the date the sample is taken (2 and 3). The aluminum top of the tube is punctured (4) and the sample liquids are transferred to containers suitable for automized testing procedures (5). The Panther runs a PCR test on all the samples (6). The results are then automatically matched to the corresponding sample number and sent to the respective client (7 and 8).

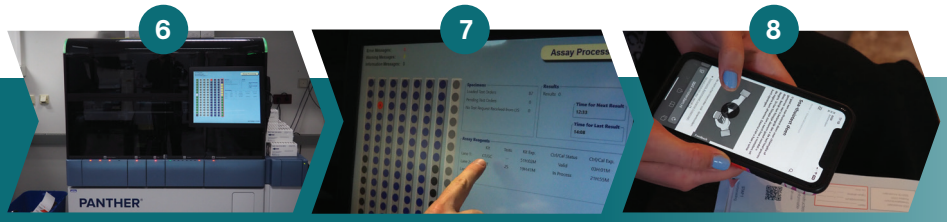


Figure 13 - Product journey map of the swab test

2.5 Overlooked Challenges in Self-Sampling

During the interviews with medical professionals, several of them voiced concerns about the shortcomings of self-sampling methods, which they feel are often overlooked. This paragraph outlines these issues, supported by some revealing quotes from the interviews.

EXCLUDING PATIENT GROUPS

Generally, healthcare providers, both at the GGD and in general practice, claimed to be satisfied with the introduction of the self-sampling method around 2009 (see interviews, Appendix 2). However, they recognize ongoing challenges. One concern is that the test requires patients to take more responsibility for their own healthcare. For some, especially non-literate individuals or those with mental disabilities, this expectation is too demanding (see interview, Appendix 2.1), potentially isolating groups that are already hard to reach for healthcare providers.

"You select a population that knows its way around the Netherlands just fine. But in doing so, you leave a lot of people out in the cold who probably need it much more."

(Dermatologist, 2024: Appendix 2.1)

CLINICAL LOOK VS. APPROACHABILITY

When discussing the look and feel of the GGD's self-sampling kit, healthcare professionals express mixed views: on one hand, they understand user concerns that **the kit may appear too clinical and intimidating**; on the other, they emphasize the importance of a **clinical appearance to convey medical credibility** (see interview, Appendix 2.1).

"That fear of – did I do this correctly and can I trust the results that I got – exists. And that is a problem."

(Dermatologist, 2024: appendix 2.1)

MISSED SAFEGUARDS

The GP expresses concern that many patients now request self-sample kits directly through the assistant, without a consultation. **While this increases convenience, it limits opportunities to detect signs of abuse or sexual violence** (see interview, Appendix 2.4).

LACK OF CONFIDENCE

The GP notes that, in some cases, **patients lack confidence in collecting samples** and may need encouragement. In rare cases, the GP assists with the procedure. The GP notices this more often with female patients then with men (see interview, Appendix 2.4).

"Sometimes female patients are afraid of the test or think they are not able to do it themselves."

(General practitioner, 2024: appendix 2.4)

"I think they want me to take the sample out of insecurity and want to know for sure that the sample is taken correctly. They do not want to, or dare to, take the responsibility for that."

(General practitioner, 2024: appendix 2.4)

USER ERRORS

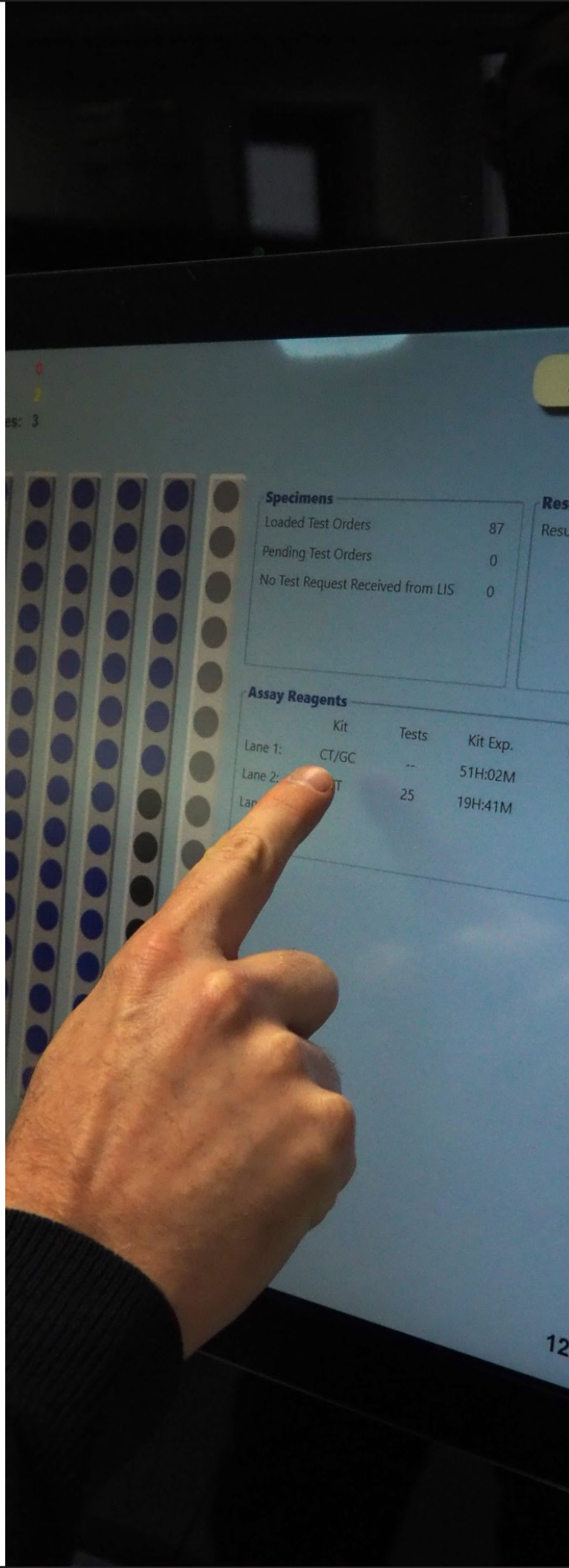
Experts at the lab also report frequent user errors with the returned samples, such as missing contents, discarded preservation fluids, damaged foils, or incorrect packaging. While the lab salvages what it can, some samples must be recollected. In such cases, clients are informed and provided with a new kit free of charge. This occurs in fewer than 3% of cases (see interview, Appendix 2.3). Healthcare providers do not have insights into what the cause of these user errors could be.

To find answers, more exploration of the usability and user experience of the self-sample test is needed. Referring to the defined opportunity in Chapter 1.4 there is reason to believe that a step towards a solution for both the user errors and the lack of the patient's confidence in their own ability to take a sample correctly (**self-efficacy beliefs**) lies in obtaining more knowledge that closely ties the user's experience to the self-sampling product.

2.6 Project implementation

More extensive and detailed data on the user experience is needed to accurately translate the data into a redesign. Therefore, this project aims to test the user's experience when self-sampling with a micro-emotion scan (Chapter 6). The goal is to use more detailed new insights to create a redesign that can be evaluated on proposed design requirements, based on the research results (Chapter 9).

This project adopted an emotion-driven design approach, as the primary opportunity lies within the domain of user experience. Emotion-driven design provides a framework for exploring and addressing the emotional and motivational dimensions of interaction with the self-sample test by investigating the user's emotions during the self-sampling process. This approach helps bridge the gap between the physical properties of the product and the emotional perceptions it evokes. Through structured emotional research methods, such as micro-emotion scans and the identification of motivational dilemmas, the design process incorporates the users' needs on both a functional and emotional level. The theoretical background and practical application of this approach will be further elaborated in Chapter 4 & 5.




2

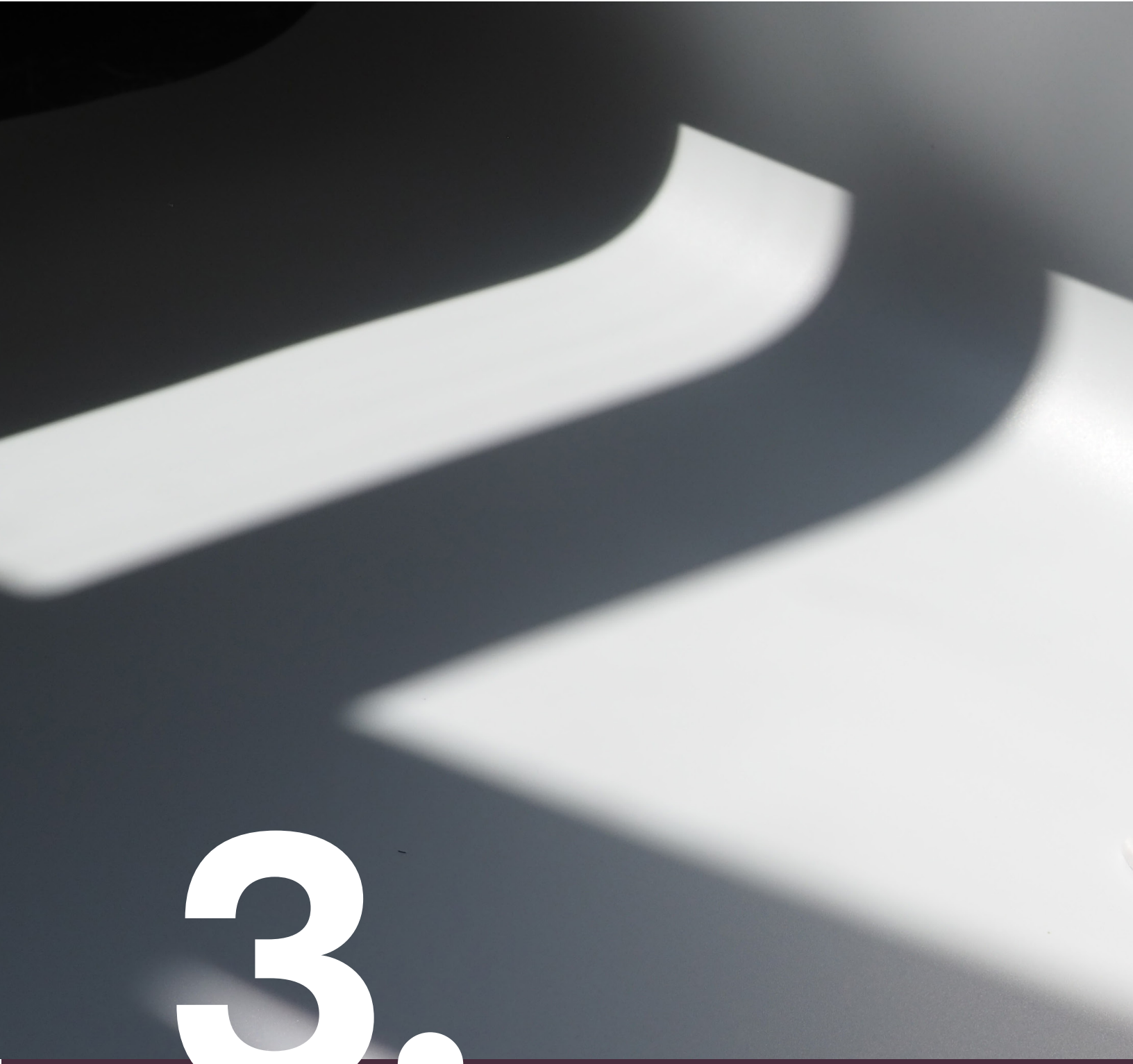
Main insights | Chapter 2

- ***Sexual healthcare in the Netherlands is under pressure.*** *Data from RIVM reports and current trends suggest that the demand for testing capacity at the GGD will continue to grow in the coming years, likely increasing reliance on home-based self-sampling due to its ability to reduce the time burden on healthcare providers.*

- ***The lack of self-efficacy beliefs of self-sample test users is recognized by healthcare providers*** *and STI-care professionals at the GGD, yet there seems to be no current solution to this problem. This indicates a gap that can be designed for.*

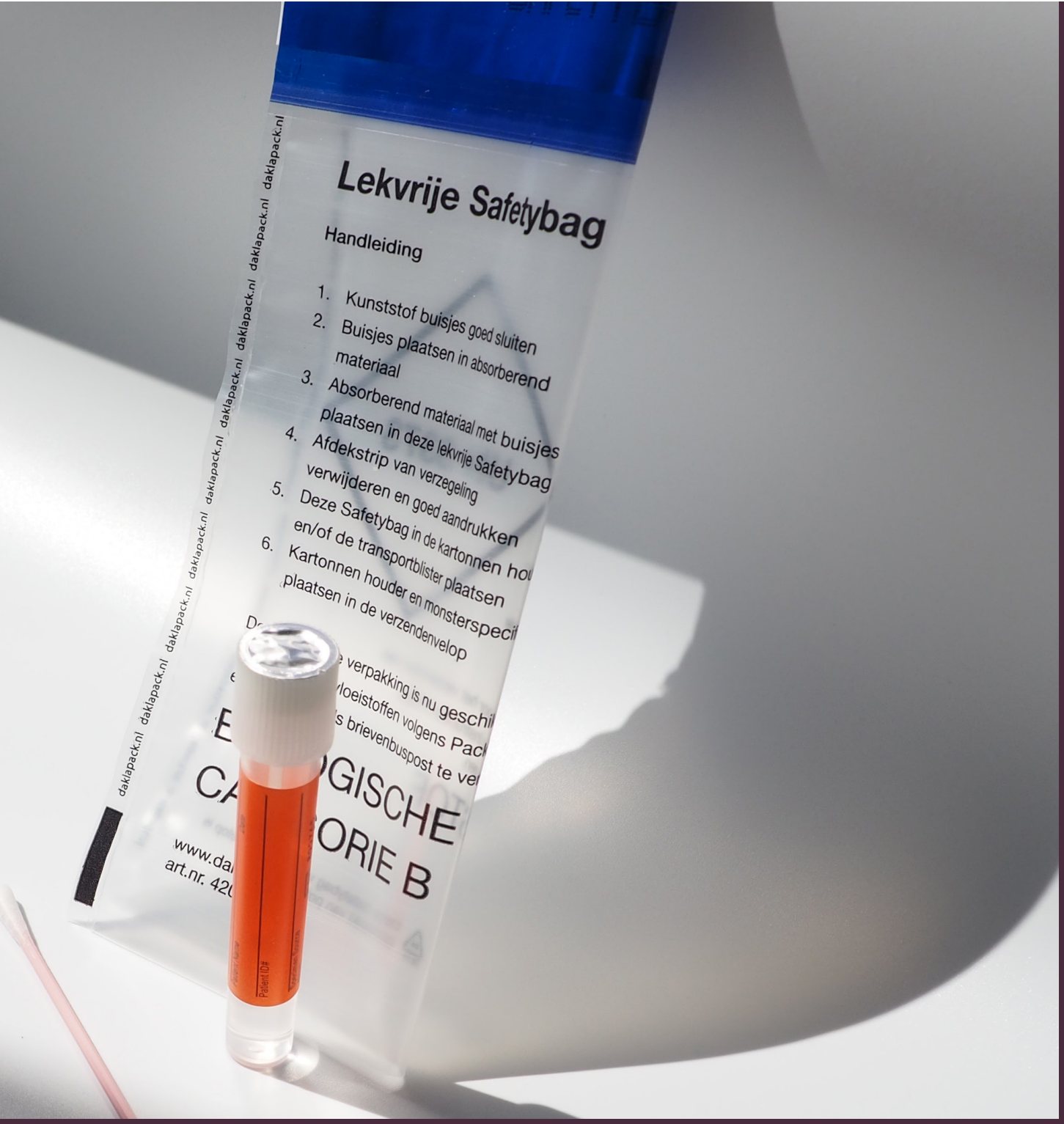
- *Sexual healthcare professionals understand the users' doubts about being able to use an* ***intimidating clinical-looking test****. However, they believe* ***a clinical appearance is a requirement to convey medical credibility.***

- *User errors happen, but* ***the direct cause*** *of these mistakes in sampling* ***is not yet known****. Because this process takes place in private, there is limited to no data available on how users experience this issue.* ***More research on the emergence of the identified use-issues is needed to accurately translate them into a redesign that addresses their origin.***



3.

Navigating self-efficacy



Where behavior and self-belief meet, lies self-efficacy. It is the voice in your head that says, "I can do this" or in its absence, "maybe I cannot". This feeling often determines whether we act, hesitate, or abandon a task. In the context of healthcare, particularly with self-administered procedures like self-sampling, self-efficacy becomes a necessity for patient participation. This chapter explores self-efficacy not just as a psychological concept, but as a design challenge: to foster confidence in the user's ability to complete a task that may feel unfamiliar, clinical, or intimidating. Drawing from psychological research and emotional design strategies, it is examined how belief in one's own competence can be supported through thoughtful, human-centered design.

3.1 Self-efficacy as a psychological mechanism

Since self-efficacy is strongly associated with the belief in one's own capability to perform a specific task, self-efficacy is therefore, firstly, task specific. So, the predictive power of experienced self-efficacy only upholds in settings with domain-specific measures (Gist, 1987). Which makes it hard to generalize the perception of self-efficacy, but when specifically focusing on self-efficacy within one task it can be determined and compared. Secondly, it is relative to the individual in question. One's self-efficacy can be affected by, for example, prior knowledge of the subject, previous experiences or personality traits. Bandura argues that self-efficacy is a key determinant of whether an individual will attempt a new behavior, persist in the face of challenges, and ultimately will succeed. He found that high self-efficacy leads to greater perseverance and higher likelihood of success, while low self-efficacy can lead to avoidance and failure (Bandura, 1977)

Self-efficacy

An individual's belief in their capability to organize and execute actions required to achieve specific outcomes

Bandura (1977)

3.2 Dependable self-efficacy

Bandura identifies four primary ways in which self-efficacy beliefs are developed (Bandura, 1977):

Mastery Experiences:
Successfully completing a task strengthens self-efficacy, while repeated failures weaken it.

Meaning that acknowledging the completion of tasks or even steps towards achieving the bigger goal can foster self-efficacy beliefs. In the context of self-sampling, this could relate to successfully completing previous tests or progressing through the earlier steps of the current testing process.

Vicarious Experiences:
Observing others who are similar to oneself succeed can enhance one's belief in their own ability.

Implying that the successes or struggles of others that are relatable can support your feeling of self-efficacy while sampling. This is an unexplored area for self-sampling, because the process is usually done in private and stories about it are not often shared.

Physiological and Emotional States:
Emotions or physical sensations like stress and fatigue can influence self-efficacy.

Reducing product features in the self-sample test that may trigger negative emotional responses can help maintain a more positive user mindset, thereby supporting stronger self-efficacy beliefs.

Verbal Persuasion:
Encouragement from others (e.g., doctors, peers) can help individuals believe they can succeed in the task ahead.

Verbal persuasion is done by the GP, as follows from the interviews (interview, Appendix 2.4), to convince patients that feel resistant to performing a self-sample test. GPs ensure the patient that obtaining the sample is easy and almost all other patients are able to perform them correctly. Tapping into another way of encouraging self-efficacy; vicarious experiences. Bandura states however, that the effect on the self-efficacy expectations is expected to be weaker than those that come from one's own accomplishments. Because verbal persuasion and vicarious experiences do not create an authentic experiential base.

BUILDING LASTING SELF-EFFICACY

Mastery experiences and physiological and emotional states do create stronger authentic experiences and have a higher likelihood of successfully stimulating lasting self-efficacy beliefs.

So, in order to design for self-efficacy, it is important to **implement a feeling of progression and success** in the self-sample process and reduce **any negative emotional or physiological triggers.**

REFRAMING AROUSAL TOWARDS POSITIVE ENGAGEMENT

Bandura describes how emotional states, such as fear, can lead individuals to exaggerate perceived threats, resulting in heightened anxiety. He argues that emotional arousal can hinder the adoption of new behaviors, often by triggering avoidance responses. Importantly, Bandura emphasizes that it is not the emotional or physiological state itself that determines self-efficacy, but how that state is perceived.

Building on this idea, I propose that emotional arousal can also have a positive influence on self-efficacy. For example, individuals who attribute a racing heart to excitement rather than to fear are more likely to approach a task with self-confidence. In this way, arousal can be energizing and motivating. Bandura also notes that reducing negative emotional arousal can enhance self-efficacy. Extending this logic, increasing positive emotional arousal may likewise strengthen self-efficacy. Thus, both the tempering of negative emotions and the stimulation of positive ones can encourage self-efficacy.

3.3 The effect of positive emotions on self-efficacy

The broaden-and-build theory by Fredrickson states that positive emotions enhance cognitive and attentional capacities (Fredrickson, 1998), making it more likely for one to engage in creative or novel behaviors and are proven to foster self-efficacy. (Diener, 2020) Empirical evidence supports the relationship between positive emotions and self-efficacy. For example, Saavedra and Earley (1991) found that experimentally induced positive affect improved self-efficacy compared to negative affect. In addition, Wright and Mischel (1982) observed that participants who imagined positive scenarios for 12 minutes reported higher perceived performance on ambiguous tasks and expressed greater optimism about future outcomes. Research done by Forgas indicates that individuals in a positive emotional state tend to set more ambitious goals and maintain higher expectations. (Forgas, 1998) These findings collectively suggest that positive emotions do not only shape a more optimistic worldview but can also enhance a sense of achievement and self-efficacy in task performance like, for example, performing a self-sample test.

SCOPING POSITIVE EMOTIONAL GRANULARITY

Still, it remains somewhat unclear which emotions should be classified as positive or negative. Desmet (2012) identifies 25 distinct positive emotions in human-product interactions and provides a useful framework for defining them. Moreover, these emotions can be intentionally evoked through product design. However, it's important to recognize that not all positive emotions may influence perceived self-efficacy in the same way. For example, amusement may affect task performance differently than desire. Nonetheless, prior research has not differentiated between the effects of specific positive emotions on self-efficacy.

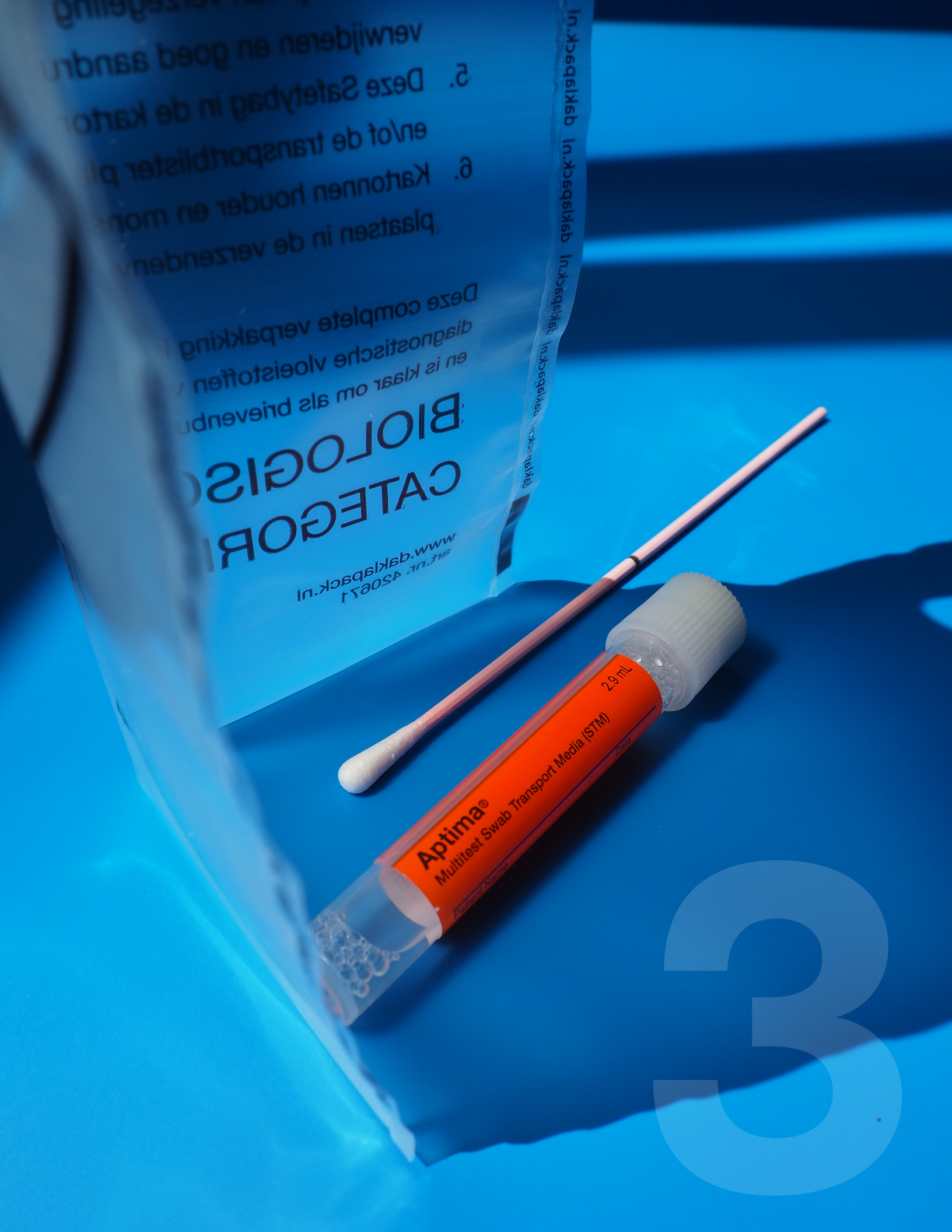
The overall emotional experience seems to be the determining factor for an enhanced perception of self-efficacy. The positive emotions felt while interacting with the product lead to that experience and can be designed for. So, redesigning a self-sample test that enables for an overall more positive emotional experience could increase the sense of achievement and self-efficacy regarding that task. As a result, users may feel more capable during the sampling process and more assured about the outcome afterward.

Main insights | Chapter 3

- *Successfully completing a task strengthens self-efficacy. Meaning that, according to the research presented in Chapter 3.2,* ***acknowledging the completion of tasks or even steps towards achieving the bigger goal can foster self-efficacy beliefs****. This offered direct design implementations that enable a way of conveying a feeling of progress or success through the design of the self-sample test. This implementation was used in the final design (Chapter 8).*

- *Developed self-efficacy from one's own previous successes or positive arousal forms a stronger base for self-efficacy beliefs than when it arises from external encouragement or seeing other's success. So,* ***acknowledgement of task completion*** *and the effect of positive* ***emotional states*** *have a stronger effect on self-efficacy than the other influential factors named in Chapter 3.2.* ***Therefore, in future design considerations, these influential factors are adopted as requirements.***

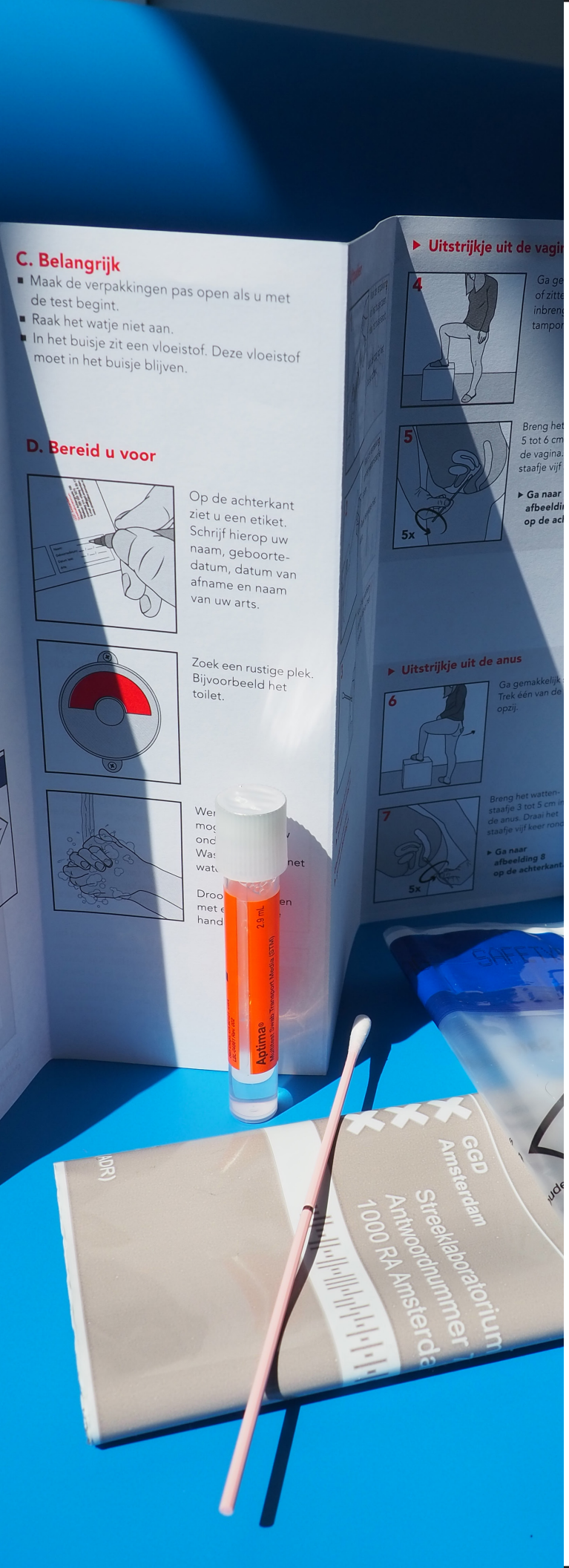
- *Stimulation of positive emotions and prevention of negative ones can support self-efficacy beliefs. This insight leads the project to pursue a redesign that* ***improves the overall emotional experience for the user to in that way have a positive effect on the users' self-efficacy beliefs.***


Aptima®
Multitest Swab Transport Media (STM)
2.9 mL
Patient Name
Date

4.

Design through emotional understanding

Designing the self-sample test with an aim for a positive emotional experience can enhance the self-efficacy beliefs of its users. This can be done though an emotion-driven design approach. In this chapter I elaborate on how emotions can be scientifically defined. Followed by an exploration on how emotions can be induced by product interaction and how those can be measured and used to the designer's advantage.



4.1 The human emotion

Emotions, and the way we experience them, are inherently ambiguous and often understood intuitively, making it difficult to define exactly what an emotion is. To this day, there is no universally accepted, objective definition of emotion (Desmet, 2024). However, for the purposes of this report, the following definitions will serve as a foundation.

Magda Arnold (1960) describes emotion as stemming from an evaluative process, where we are drawn toward what we perceive as beneficial and away from what we judge as harmful.

"The felt tendency toward an object judged suitable, or away from an object judged unsuitable, reinforced by specific bodily changes."

Arnold (1960)

Building on this idea, Richard Lazarus (1991) emphasizes that emotions arise in response to personally significant situations and represent mind–body reactions to how we interpret events. Like Arnold, Lazarus underscores the role of cognitive appraisal in shaping emotional experience.

"Emotions are organized psychophysiological reactions to news about ongoing relationships with the environment."

Lazarus (1991)

4.2 Product induced emotions

Product-induced emotions differ from general emotions in their origin, intensity, and duration. While everyday emotions arise from social interactions, personal experiences, or biological stimuli (Ekman, 1992), product-induced emotions emerge from user interactions with designed artifacts (Desmet & Hekkert, 2007). These emotions are often more subtle and nuanced and shaped by product aesthetics, functionality, and symbolic meaning (Norman, 2004). For instance, a well-designed product can elicit joy through its usability and aesthetics, while one that is poorly designed may induce frustration (Desmet et al., 2008).

Unlike spontaneous emotions triggered by immediate external events, product-induced emotions are often anticipatory or reflective; meaning that the emotions users experience in relation to a product are not always immediate responses to direct interaction. Instead, they can arise from expectations about future use (anticipatory emotions) or from reflecting on past experiences (reflective emotions). For instance, users may feel pride in owning a prestigious product or nostalgia when using an object linked to past experiences (Fokkinga & Desmet, 2013). Furthermore, product-induced emotions can leave prolonged impressions, as repeated use can create long-term associations (Ozkaramanli & Desmet, 2020).

MICRO-EMOTIONS

Fleeting product-induced emotions we call micro-emotions and though they may be small, they are not meaningless. They can have a big impact on our thoughts, ideas and actions that eventually can even create habits. They can dictate our moods and heavily affect our daily lives (Desmet, 2024). Moreover, there are established methods to measure and integrate them into product design.

4.3 Measuring emotions

Distinguishing between specific emotions presents its own challenge, as there is no fixed or predictable link between a stimulus and the resulting emotional response. The same situation can evoke entirely different emotions in different individuals. Nonetheless, emotional responses, especially those triggered by product interaction, can reveal what matters most to users. As Desmet (2002) notes, people tend to respond emotionally to what they care about, including the use, purchase, and perception of products.

So, measured emotions can be used as experiential markers that indicate the importance of interactional qualities between the user and the self-sample product. By connecting individual emotional responses to specific aspects of product interaction, this data can reveal deeper, overarching, user needs and concerns. These insights can form the basis for a redesign that not only improves usability but also addresses the emotional and motivational drivers of user behavior.

EMOTION-MEASURING APPROACHES

Measuring micro-emotions requires systematic methods that capture users' affective responses during and after interaction. Desmet (2002) introduced the **PrEmo tool**, a non-verbal self-report instrument using animated characters to represent 14 distinct emotions (e.g., joy, pride, annoyance, disappointment). This method helps overcome language barriers and allows users to express emotions more intuitively (Figure 13.1).

Another approach is **micro-emotion scanning (MES)**. This is an interviewing and observation technique developed by Pieter Desmet that captures the micro-emotions during product interaction and transforms this stream of emotions into a timeline (Desmet, 2023). This timeline provides the designer with a very detailed overview of what emotions arise from specific interactions that can substantiate and inspire novel design interventions.

When conducting an emotion scan, context is crucial as emotions are influenced by situational factors, personal background, and product expectations (Fokkinga & Desmet, 2013). These methods combined with **qualitative retrospective interviews**, ensure a holistic understanding of product emotions (Ozkaramanli & Desmet, 2020).

Figure 13.1 - PrEmo cards used during emotion mapping

4.4 Motives in conflict

We all know those moments of internal conflict during product interactions. You watch one more episode of your favorite show even though it is much too late. Or you eat that last snack just so it doesn't go to waste, even though you're trying to stick to a diet. This paragraph explores this tension and how it can be used as an inspirational source for product design.

EMOTIONAL MOTIVES

Measured micro-emotions can inspire and reveal what the user considers important. However, a deeper layer can be uncovered by understanding the user's motive for their emotional experience. Considering emotional granularity and personal individuality, it can occur that a motive has a different expression at a different moment in time, depending on mood, previous events, and many other factors. (Fokkinga & Desmet, 2013) Meaning, that motives cannot be assumed. Gutman and Reynolds (2001) provide us with a **Laddering theory** that helps to uncover motives by questioning. Laddering is a one-on-one interviewing technique that helps to dissect the multiple layers of motive that are called **motive-hierarchies.**

Within the multiple layers of the participants motives, the **motive sweet spot** (Desmet, 2023) can be found. This is the motive that sparks most inspiration or is most relevant in the eyes of the designer for meaningful design implementation (Figure 14).

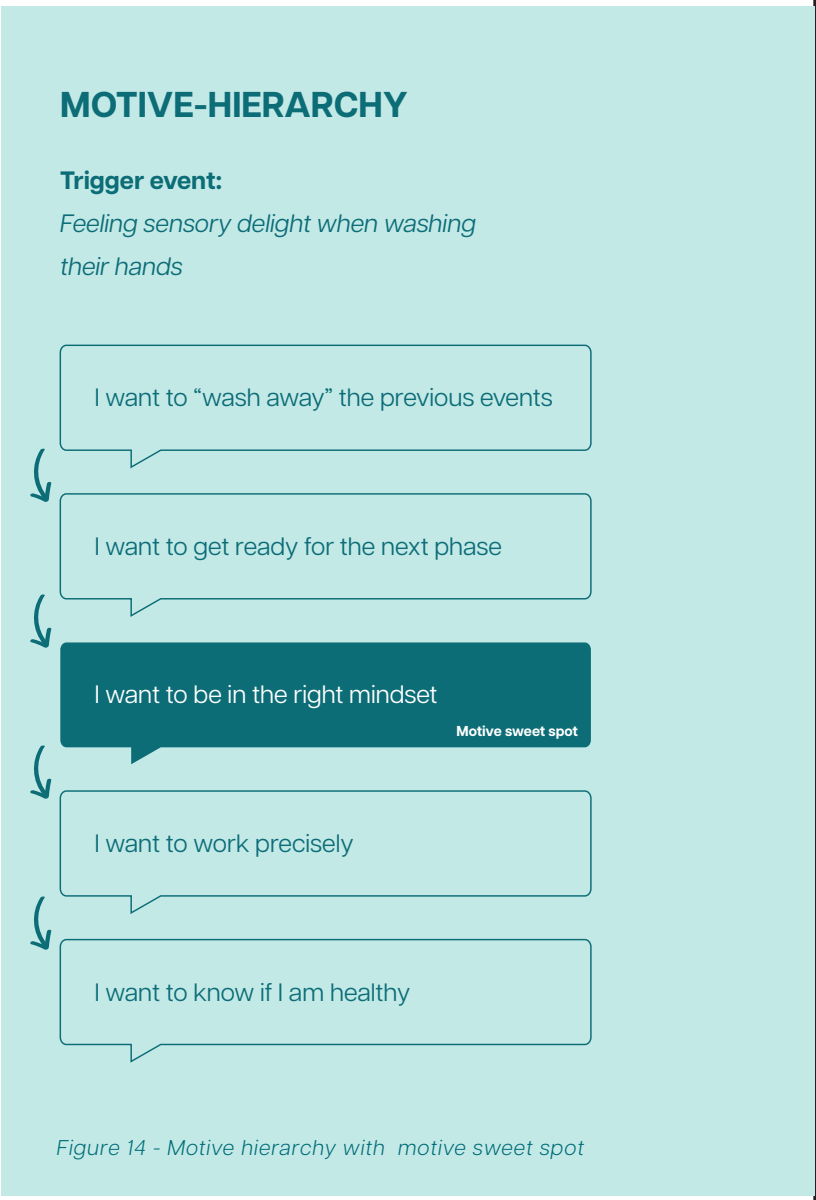


Figure 14 - Motive hierarchy with motive sweet spot

DESIGNING WITH MOTIVES IN CONFLICT

A motive dilemma arises when a user experiences conflicting motivations, such as the desire for convenience versus sustainability, when the recycling bin is far away. Usually, when facing a dilemma, we have to choose what need we want to fulfil at that given time, which is often stressful and difficult. Ozkaramanli and Desmet (2020) introduce dilemma-driven design that leverages these tensions to create more meaningful and engaging user experiences. Ozkaramanli and Desmet (2020) provide four ways to design with motive dilemmas; resolving, trigggering, acknowledging and amplifying.

These approaches were used in Chapter 6, where motive dilemmas during self-sampling were highlighted. During ideation in Chapter 7.2 these dilemma-driven design methods played a role in idea-generation.

Resolving
This approach aims to eliminate the dilemma by designing solutions that satisfy both conflicting concerns simultaneously, thereby reducing user conflict.

Triggering
Designers intentionally create or highlight dilemmas to provoke self-reflection and critical thinking, encouraging users to confront and evaluate their own conflicting values.

Acknowledging
Recognizing the existence of a dilemma without attempting to resolve it, offering support to users as they navigate their conflicting concerns.

Amplifying
Designers intensify the user's awareness of the dilemma, making the conflict more salient to stimulate deeper consideration and potential behavior change.

Main insights | Chapter 4

- *Micro-emotions can have a big impact on our daily life experiences, and they can be measured through micro-emotion scans and qualitative interviewing methods.* ***This research method offers a way to create a deeper and more detailed understanding of the user experience of self-sampling*** *and was applied to this project for that reason.*

- *Motives can be uncovered from micro-emotions by applying Laddering theory.* ***Understanding deeper values of the user could yield answers to what the source of the user-experience problems are that are found in previous research*** *presented in Chapter 1.4.*

- *Motive dilemmas arise when conflicting motives create tension, making it stressful and difficult to prioritize one over the other, often leading to negative experiences.* ***Designing to resolve dilemmas can enhance the user experience*** *and was therefore one of the design strategies used during ideation in Chapter 7.2 and implementation of the requirements in Chapter 8.*

5.

Exploring the emotional experience of self-sampling

In the previous chapters, the need for more detailed user-experience research was identified, along with possible approaches to address this gap. This chapter brings these insights together and proposes a research method to gather the data needed for a well-informed redesign of the self-sample test.

RESEARCH QUESTIONS

To get a clear understanding of the emotional experience of the user of a self-sample test, new data has to be created since this type of research has not been done before with a self-sample test. The aim of the study is to uncover the following research questions:

- ***What product interactions trigger emotional responses during self-sampling and what emotions do these responses involve?***
- ***What are the participants' deeper, underlying motives when self-sampling?***
- ***Do users trust their own ability to take a sample correctly, and how does this tie back to the emotional experience during sampling?***

The sub-questions can be found in the Appendix 3.

5.1 Method

Participants were recruited for this study N=12, consisting of male n=6 and female n=6 participants. Participants were selected based on specific demographic criteria to ensure a homogeneous sample within the target age group of 25 to 30 years old. This age group was chosen due to the differences in accessibility of sexual healthcare services; individuals under 25 have access to self-sampling STD tests at GGD locations with additional guidance, whereas individuals over 25 have a higher likelihood to conduct self-tests independently at home.

Sexual orientation was considered in the recruitment process, and participants were limited to those for whom standard self-sampling STD tests are applicable. Individuals who require specialized testing, such as men who have sex with men (MSM) and transgender individuals, were excluded from the study as their healthcare needs differ significantly. Additionally, participants without a religious background were selected to control for potential influences of religious beliefs on attitudes toward sexuality and STD testing. The study aimed for diversity in living situations, including participants living alone, with roommates, or with family members. See table 2 for more details.

Participant (ref)	Details of emotion-scan and interview participants
Male participant 1 (MP1)	Male, single, 25 years old, student, living with parents, no religious background
Male participant 2 (MP2)	Male, in committed relationship, 27 years old, student, lives alone, no religious background
Male participant 3 (MP3)	Male, in committed relationship, 26 years old, working, lives with roommates, no religious background
Male participant 4 (MP4)	Male, single, 28 years old, student, lives with roommates, no religious background
Male participant 5 (MP5)	Male, in committed relationship, 25 years old, working, lives with roommates, no religious background
Male participant 6 (MP6)	Male, single, 25 years old, student, lives with roommates, no religious background
Female participant 1 (FP1)	Female, single, 28 years old, student, lives with roommates, no religious background
Female participant 2 (FP2)	Female, in committed monogamous relationship, 30 years old, working, lives with partner, no religious background
Female participant 3 (FP3)	Female, in committed monogamous relationship, 25 years old, student, lives with roommates, no religious background
Female participant 4 (FP4)	Female, single, 27 years old, working, lives with roommates, no religious background
Female participant 5 (FP5)	Female, in committed monogamous relationship, 27 years old, working, lives with roommates, no religious background
Female participant 6 (FP6)	Female, single, 25 years old, student, lives with roommates, no religious background

Table 2 - Participant information of male and female participants individually

Participants were recruited through an initial screening questionnaire that collected demographic data. An intake conversation was conducted before obtaining formal consent, allowing participants to be fully informed of the study's objectives and procedures. After this conversation, participants were given time to decide on their participation. Those who chose to partake were provided with a sensitizing activity, which included watching two videos designed to familiarize them with the emotion extraction process.

5.2 Data Collection and Analysis

MICRO-EMOTION SCAN RESEARCH

Users often perceive themselves as emotionally unaffected by products, describing them as just tools. However, research suggests that products continuously evoke emotions, though these responses can be subtle and fleeting (Laurans, 2011). Capturing these emotions in real-time is important for understanding user experiences. However, in the context of self-sampling STD tests, direct observation and real-time interviewing would compromise participant privacy and disrupt natural usage.

To address this challenge, participants recorded voice memos during self-sampling to document their experiences. The real-time emotional responses were collected using micro-emotion scan (MES) techniques (Desmet, 2023). These voice recordings provided real-time data while maintaining the participants' privacy. Interviews were conducted immediately after test completion to ensure the experience was fresh in memory. To further stimulate emotional recollection, participants interacted with a new test during the interview.

QUALITATIVE INTERVIEWS AND EMOTION ANALYSIS

Following the micro-emotion scans, semi-structured interviews were conducted to explore underlying motivations for emotional responses. The Laddering technique (Reynolds & Gutman, 1988) was employed to link emotions to deeper needs and values. During these interviews, participants reflected on their voice recordings and were guided through a structured discussion to explore their emotional experiences in depth.

To enhance emotion extraction, PrEmo cards (Desmet, 2018) were used (Figure 15). These visual tools facilitated participants in articulating their emotional responses more precisely, helping researchers classify emotions and identify patterns in user experiences.

To minimize participant fatigue, only two key emotions per participant were explored in depth during the motivation extraction process.

ETHICAL CONSIDERATIONS

Given the sensitive nature of STD self-sampling, ethical considerations were important. Participants were fully informed about the procedures of the research and potential risks

before providing written consent. Privacy was a primary concern, and no direct observation or real-time questioning occurred during the self-sampling process. All voice recordings and interview data were anonymized and deleted after analysis to protect participant identities. Throughout the results section is referred to male participants as (MP[n]) and to female participants as (FP[n]).

Furthermore, participants had the right to withdraw from the study at any point without providing a reason. The study adhered to ethical guidelines for research involving human subjects and was conducted in accordance with standards of the Technical University of Delft (HREC).

Figure 15 - Test setup for building the MES timeline with PrEmo cards

5.3 Procedure

This section outlines the approach taken in the research, from the initial intake conversation with participants to the final cleanup question. It gets into how the tests were set up, how participants were prepared and guided through the process of exploring the emotional experiences associated with self-sampling.

INTAKE CONVERSATION

Before formally signing the consent forms, an open intake meeting with the participants was scheduled to inform them of the process, so that there were no surprises throughout the process and the participants were fully aware of what they were getting into. After this initial conversation, the participants were given time to make their decision to partake. From there on the participants established contact when they are interested in partaking in the research and to schedule a time.

When the time is scheduled, the participants will be asked to participate in a sensitizing activity that will consist of watching two videos that help the participants get familiar with the emotion extraction process.

The interview and the micro-emotion scan are both done on the same day, because they must happen shortly after one another. The motivation extraction was planned last. Due to consideration of participant fatigue, only two emotions were explored for underlying motives.

EMOTION SCAN SETUP

After checking in, the participants willing to participate are asked to sign the informed consent form that can be found in Appendix 4.2.

Introduction and sensitizing

Explanation is given to the participants about what the test will entail to prepare the participants to make the recording correctly. Shortly, all the steps of the research are revised to make sure there will be no surprises during the test. The participants were familiarized with the spectrum of emotions we are working with, by reading through the emotions together. So that the names of emotions were used as they are listed and defined in the “Human experience catalog” by Desmet and Fokkinga. Containing, 27 negative emotions (Fokkinga, 2015) and 27 positive emotions (Desmet, 2012).

To familiarize the participants with the test procedures and what is expected of them they watched two videos with a sensitizing exercise.

Opening questions

The opening questions are meant to sketch a contextual image of the level of experience in using self-sample tests and to inquire on how these experiences were for them and possibly how they shape their attitudes going into this test. For all questions, see Appendix 4.1.

Using the self-sample test

The participants were provided with the test and instructions like this would normally happen. They were given the time to perform the self-sample test however they would have done under normal circumstances. The participants were reminded that it is important to record themselves for the next steps of the research.

Interview questions

The interview questions are aimed to collect data on the overall experience of using the test. With the main goal to find out what the general experience was right after using the test. In addition, questions were asked to gain an understanding of how confident the participants are that they did the test correctly and whether they would trust the results that they will receive from the GGD.

Micro-emotion scan

To create the micro-emotion timeline, the voice recordings made by participants while using the self-sampling test were analyzed. The recording was reviewed step by step, following the sequence of actions taken during the test. Participants were provided with an additional test kit to help them demonstrate or recall specific actions as they narrated their experience. This precaution was taken because product-induced emotions are often fleeting and can be easily forgotten shortly after the interaction (Laurans, 2011).

Participants were asked to assign emotions to specific stimulus events, discuss these emotions, and elaborate on what happened and why they felt the way they did. Many emotional responses were clearly audible in the recordings through vocal cues such as intonation, hesitation, or spontaneous exclamations. To support reflection and emotional articulation, PrEmo cards (see Figure 15) were used. These cards helped participants identify, differentiate, and communicate their emotions more effectively. Each emotion was rated on an intensity scale ranging from +3 (strongly positive) to –3 (strongly negative).

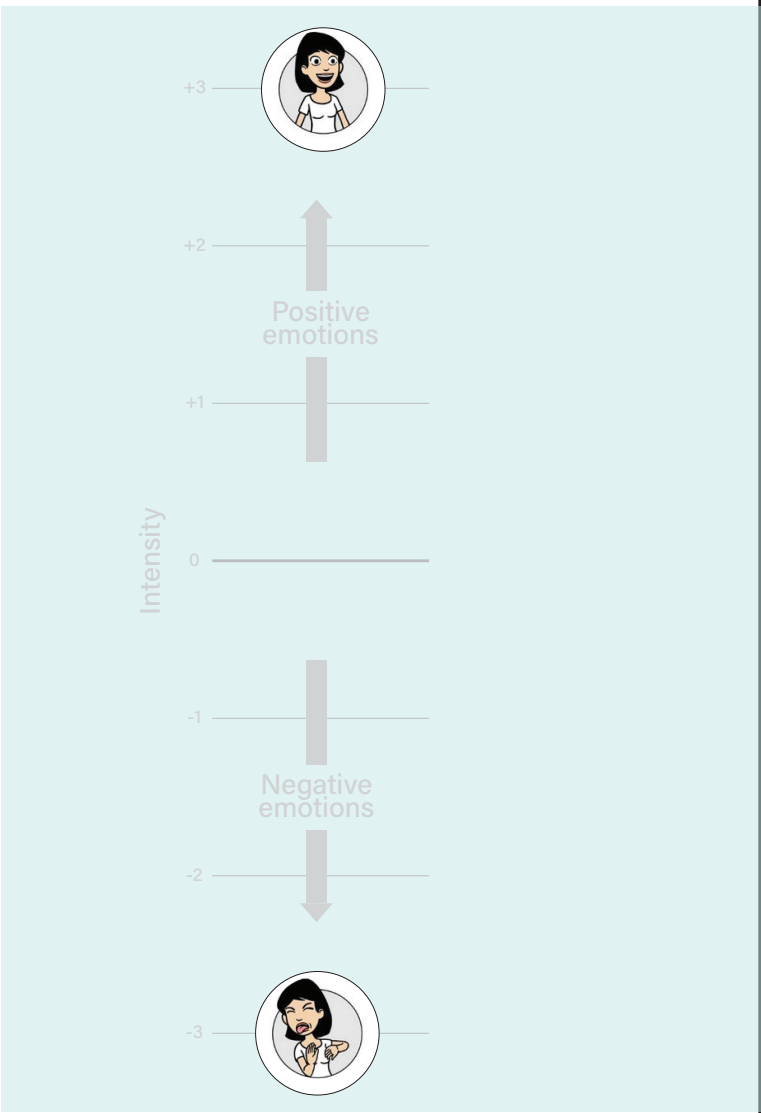


Figure 16 - Explanation MES timeline emotion ratings

Finding underlying motives

After the whole experience was covered, 2 or 3 significant emotions were marked and an emotion capture card (Appendix 4.2) was filled out for each. The laddering theory (Gutman 2001) was used to retrieve the underlying motives.

Cleanup question

After this last phase is completed, the research is concluded with a cleanup question: Do you have any other remarks that you feel we have not discussed so far?

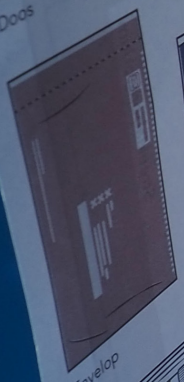
anwijzing
oor onderzoek naar chlamydia,
trichomonas. Dit zijn geslachtsziek-
test is voor mannen en vrouwen.

t maakt u een uitstrijkje uit de
e anus. Het is pijnloos en duurt
vijf minuten. U kunt de test op
ment van de dag afnemen. Ook als
eld bent.

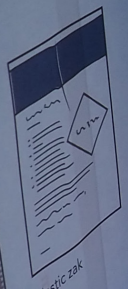
es de hele uitleg
eg staat op de voorkant en op de
kant van deze gebruiksaanwijzing.

Kijk of alles in de doos zit

Doos

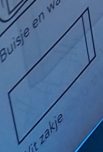


Envelop



Plastic zak

Buisje en wattenstaafje

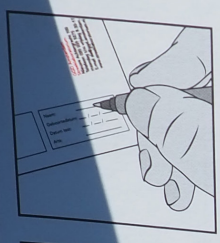


Wit zakje

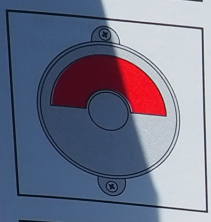
C. Belangrijk

- Maak de verpakkingen pas open als u met de test begint.
- Raak het watje niet aan.
- In het buisje zit een vloeistof. Deze vloeistof moet in het buisje blijven.

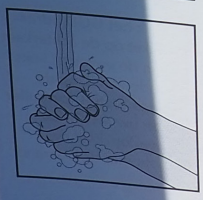
D. Bereid u voor



Op de achterkant ziet u een etiket. Schrijf hierop uw naam, geboorte-datum, datum van afname en naam van uw arts.



Zoek een rustige plek. Bijvoorbeeld het toilet.



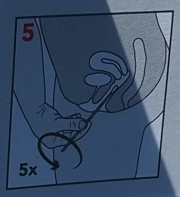
Wer
mog
ond
Was
wat
net

Droo
met
hand
en

Uitstrijkje uit de vagina

4

Ga gemakkelijk staan of zitten. Zoals bij het inbrengen van een tampon.



5

5x

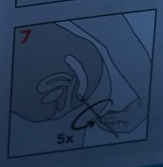
Breng het wattenstaafje 5 tot 6 cm in de vagina. Draai het staafje vijf keer rond.

▸ **Ga naar afbeelding 8 op de achterkant.**

Uitstrijkje uit de anus

6

Ga gemakkelijk staan. Trek één van de billen opzij.



7

5x

Breng het watten-staafje 3 tot 5 cm in de anus. Draai het staafje vijf keer rond.

▸ **Ga naar afbeelding 8 op de achterkant.**


Gebruiksaanwijzing
A. Lees de hele uitleg
De uitleg staat op de voorkant en op de achterkant van deze gebruiksaanwijzing.
B. Kijk of alles in de doos zit
Doos
Envelop
Plastic zak
Wit zakje
C. Bereid u voor
Uitpakken
Uitstrijkje
GGD
Amsterdam
Streeklaboratorium
Antwoordnummer
1000 RA Amsterdam

6.

Results

This chapter presents the micro-emotion scan timelines for both the urine and vaginal swab self-sampling tests, with selected emotions and motives further explored through context and user quotes.

Initial findings indicate that the vaginal swab sampling process evokes remarkably more negative emotions and moments of self-doubt compared to the urine test. Users reported doubt in their ability to perform the test correctly, and this resulted then in doubting the reliability of the test results.

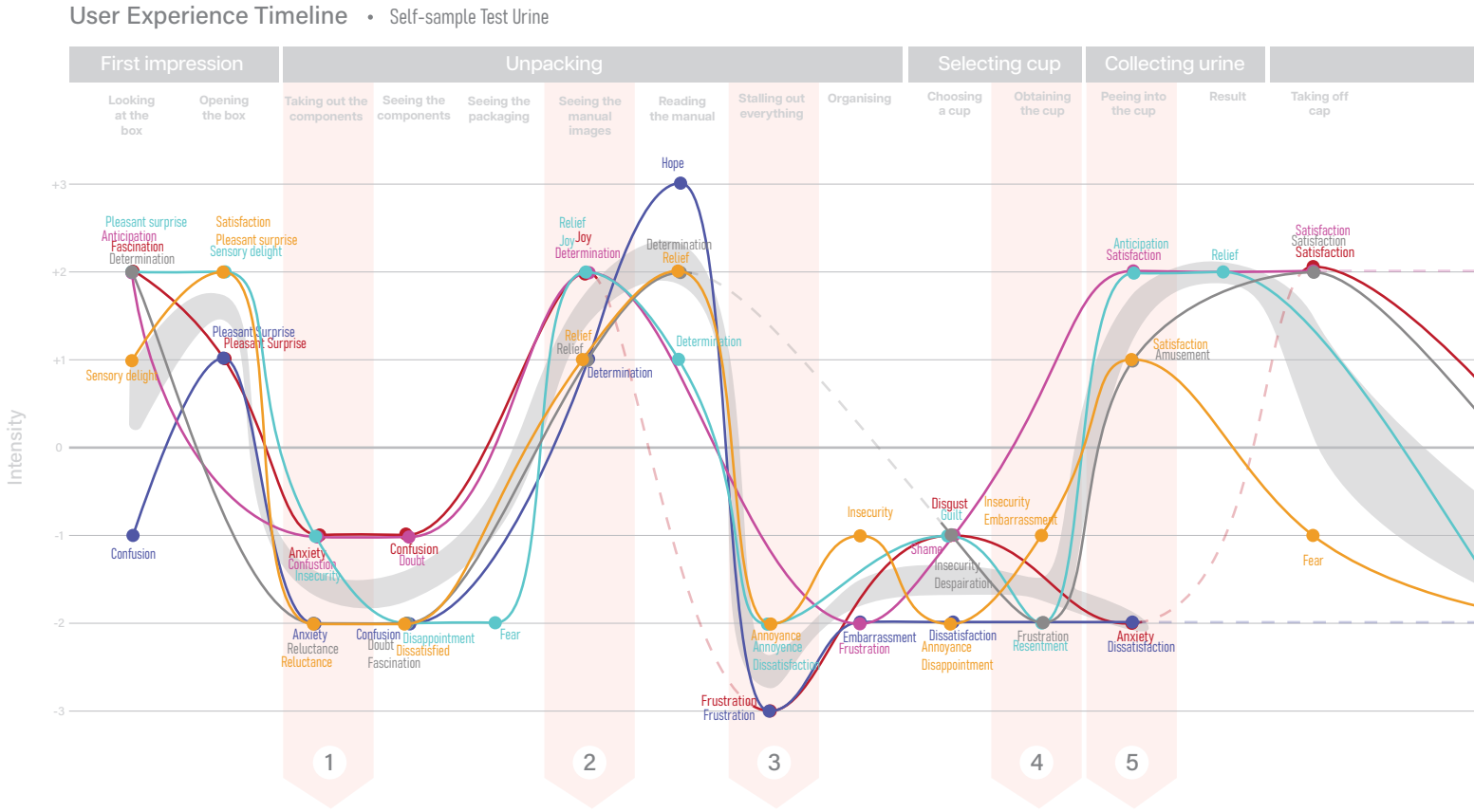
Emotions that stood out as particularly insightful were selected for further analysis using laddering theory (Reynolds & Gutman, 1988) (see Appendix 6), with the aim of uncovering the underlying motivations driving these emotional responses. The six most relevant user motives, those with the greatest potential to inform the upcoming design phase, are highlighted below the visual timeline in figure 17 and will be further explored throughout the chapter. These motives provide valuable insight into the users' underlying values and needs and a high likelihood to lead to a meaningful design intervention.

Not all insights are discussed in this chapter for the sake of readability. However, unnamed motivations may still be incorporated in later chapters and can be found in Appendix 6 for reference.


HOLOGIC
Aptima®
Urine Specimen
Fill Area
2.0 mL
2023-12-31
Aptima®
2.9 mL
Hologic, Inc.
San Diego, CA 92121 USA
LBL-04861 Rev. 002

6.1 Emotion-scan timeline urine self-sampling

The motives behind some of the emotions are elaborated on by discussing the stimulus event and a quote from the male participant (MP[n]) that experienced that emotion.



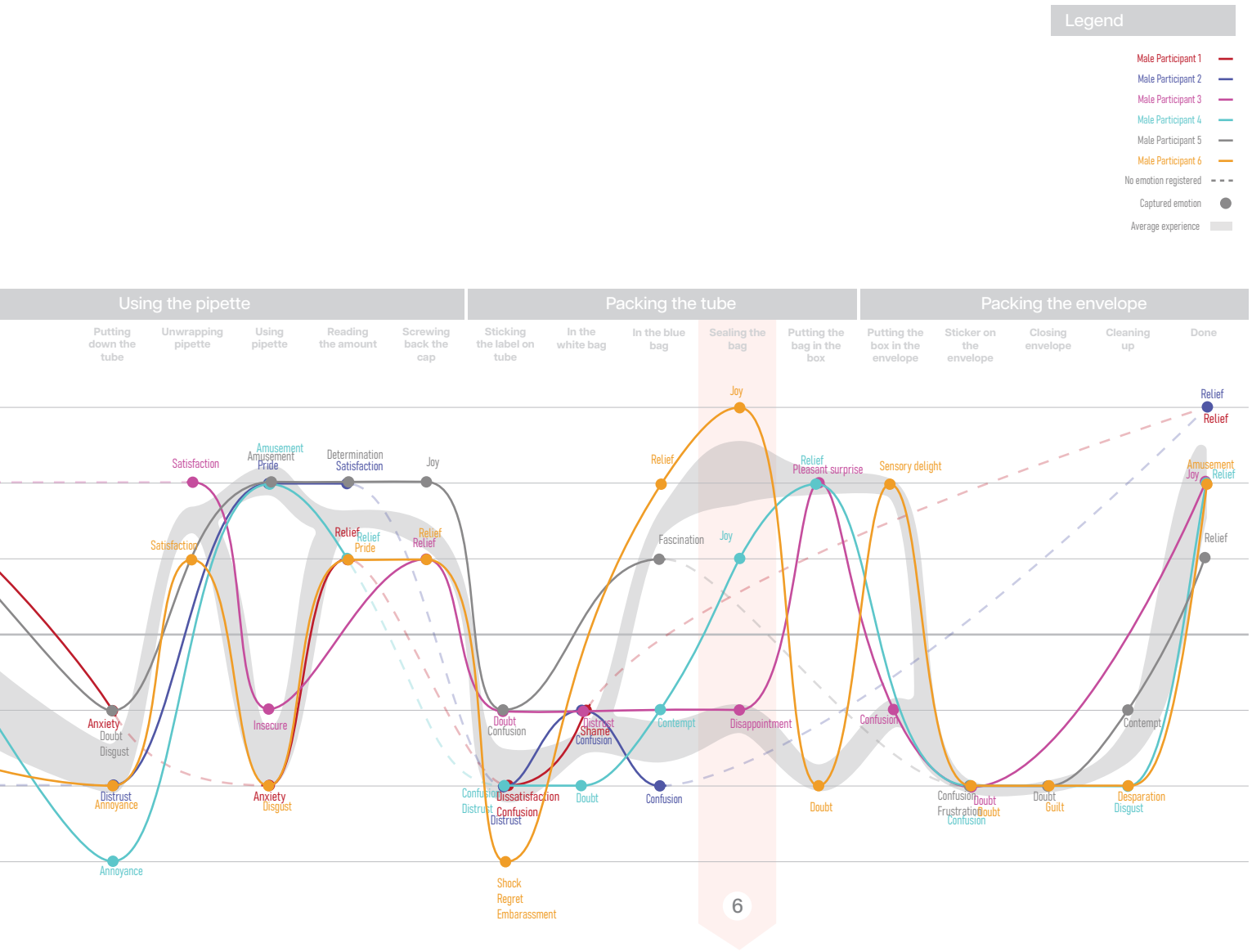


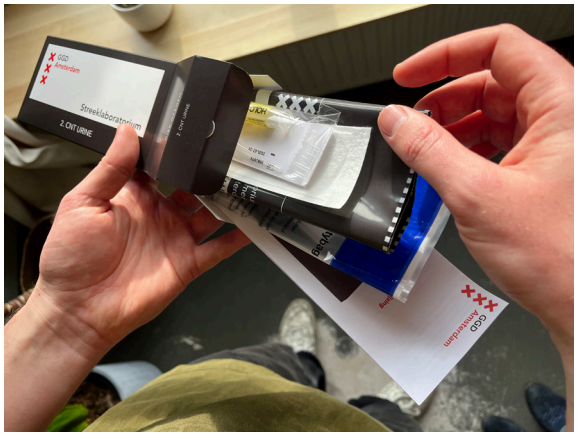
Figure 18 - Emotion-scan timelines, Urine samples taken by male participants.

1

Emotion:
Reluctance

Stimulus event:
See so many components suddenly suggest a difficult task

Motive:
I want the test to be straight forward and read as little as possible



Participants expressed feelings of reluctance when they first saw the components. The kit contained many (to the user) unfamiliar items.

"This might be harder than I thought it would be" *(MP4)*

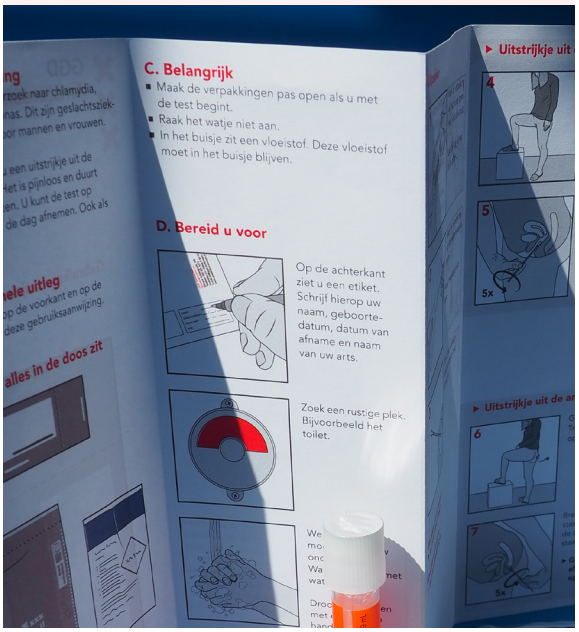
Although the box featured a wide lid that provided easy access to the contents, it also **revealed all the materials at once upon opening, potentially overwhelming users** with a sudden influx of unfamiliar information.

2

Emotion:
Determination

Stimulus event:
Knowing what to do after reading the manual

Motive:
I want to stay in my flow



The manual appears to have a positive effect on users. Participants report feeling determined after reading it.

"It is easy to understand, and I like the visuals!" *(MP1)*

It motivates them to proceed with the test. Participants noted however, that having to repeatedly switch between reading the manual and performing the next step disrupted their flow and was experienced as annoying.

"I don't like going back and forward between the two. I want to stay in my flow." *(MP3)*

3

Emotion:
Frustration

Stimulus event:
There is way too much material to stall out in the bathroom

Motive:
I want to work neatly and have a clear overview

Much frustration occurred when the components were stalled out. In many cases this happened in the bathroom where **there was never enough working surface to put things**.

Some material was placed on the sink, some participants had to work on the floor, leading to frustration. The number of different components and the inability to organizethem feels like it is working against them and preventing them from reaching their goal.

4

Emotion:
Resentment

Stimulus event:
The explaination seems to assume that he is stupid

Motive:
I am not stupid and I want to be treated accordingly

At times the manual contained instructions that seemed to state the obvious to some of the participants. Even though that information is there for a reason, the participants respond with resentment to receiving unnecessary information and feel treated like they are stupid. This indicates a balance; **too much information triggers a negative emotion** (resentment) and **too little information triggers another negative emotion** (doubt, insecurity or confusion) as seen multiple times throughout the emotion scan.

5

Emotion:
Amusement

Stimulus event:
Feels like he is doing something that is not allowed when putting urine in the cup

Motive:
I want to be able to make cheeky decisions

Amusement was triggered a couple of times with the male participants when extracting the urine sample.

"I felt like I was doing something that I am not allowed to do." *(MP6)*

This caused them to feel cheeky. The amusement later seemed to come from a dilemma in motives.

"I want to take a drinking cup to pee in, because it is easiest. But I feel like I should not pee in a cup someone can drink from later." *(MP4)*

This dilemma was slightly absurd to the participants and was therefore funny and amusing.

6

Emotion:
Joy

Stimulus event:
The feeling when ripping off the plastic strip

Motive:
I want the product to feel high-quality

Participants felt joy and sensory delight when taking the plastic strip of the glue layer. This interaction causes positive emotions because it gives a high-quality-feel to the product. Participants express the **importance of a high-quality-feel in thick materials and good seals** on the bags. These attributes add to trust in the product.

USER INSIGHTS AND AREAS FOR IMPROVEMENT

Self-efficacy beliefs

Interviews reveal that half of the participants described taking the urine sample as a mainly positive experience. Regarding perceived self-efficacy, **all participants believed they had collected the sample correctly.** However, 4 out of 6 participants expressed doubts about how they packaged the sample or how it would be received by the GGD. Still, all participants indicated full trust in the GGD's test results.

Overwhelming number of components

The micro-emotion timeline indicates more possibilities for improvement on the physical properties of the product. Unpacking the box triggered a wide range of negative emotions, that seemed to mainly be caused by the overwhelming number of medical-looking materials.

Instability of the test tube

When using the pipette, the tube has to be put down standing (Figure 19) . Which is hard to do, due to the small foot of the tube causing anxiety, distrust and annoyance.

Figure 19 - Placing the tube on the edge of the sink

The use of the pipette was experienced as amusing by some, but by others disgusting.

"Using the pipette made me feel like I was pretending to be a scientist in a lab."

(MP5)

"Pipetting was gross. I was scared I was going to spill pee on the floor."

(MP1)

Confirmation of the fill area indicator

The fill area indicator on the tube was experienced very positively, indicating clearly that the tube was filled correctly. When interviewing many named that moment as an indication that they were sure they took the sample correctly. This moment can also be read in the micro-emotion timeline as a peek of determination.

"It was filled right between the arrows, so I guess it must have been correct."

(MP3)

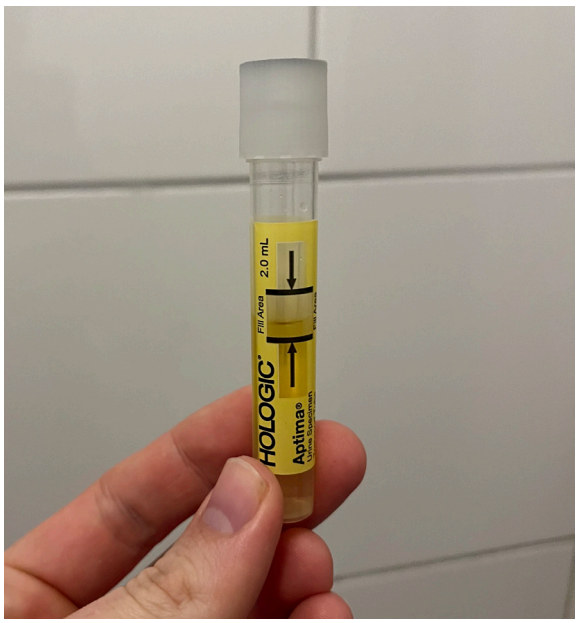


Figure 20 - Tube filled up to between the indication lines

Confusion about label placement

All participants were unanimously confused about sticking the label on the tube. There was no space on the tube to put the sticker without covering what seemed to be important information (Figure 20). The same goes for the stickering of the envelope. No clear indications of where to put the sticker for sending leaving the participants in doubt at the end of the process.

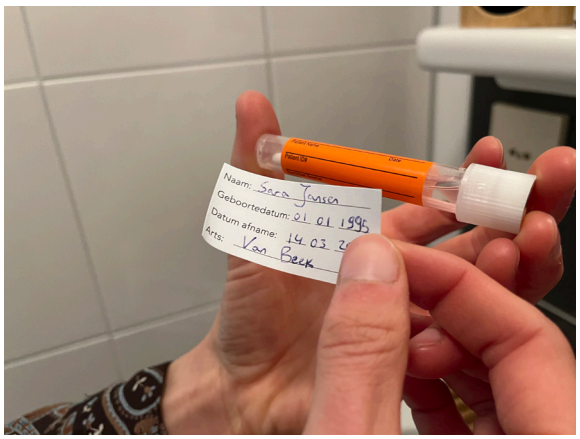


Figure 20 - Placing the sticker on the tube over label

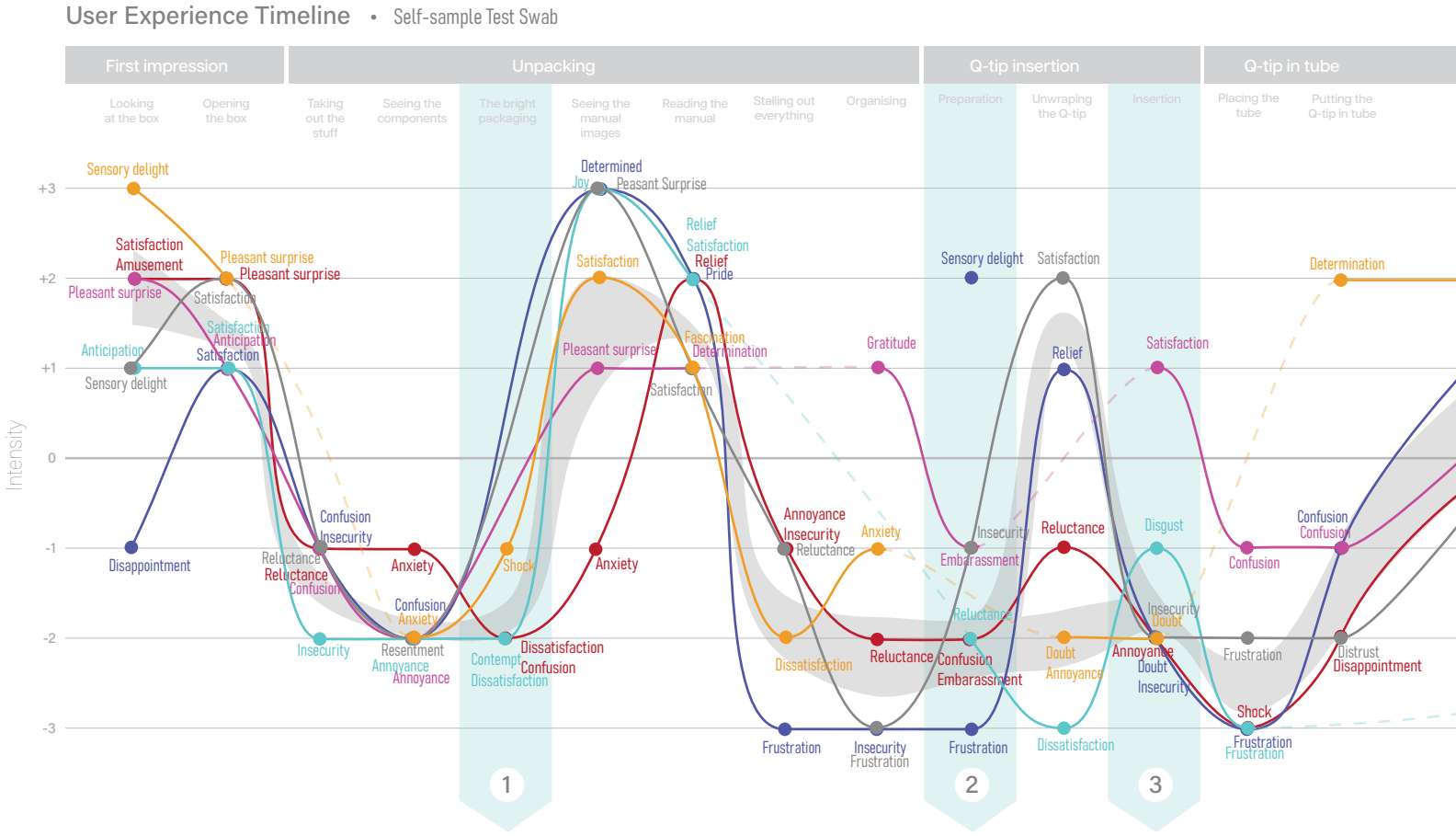
No lack of self-efficacy beliefs *was observed in any of the interviews with the male participants who took the urine sample. While some insecurity and anxiety were noted on the micro-emotion timeline just before taking the sample, very few negative emotions were measured during and after the process.*

The sampling process concluded with ***reading the amount indication*** *on the tube, which provided feedback to the users and evoked a positive emotional response in all participants.* ***They felt determined, relieved, and even proud. In the interviews, participants shared that this was the moment they knew for sure they had taken the sample correctly.***


HOLOGIC®
Aptima®
Urine Specimen
Fill Area
2.0 mL
Fill Area

6.2 Emotion-scan timeline swab self-sampling

The motives behind some of the emotions are elaborated on by discussing the stimulus event and a quote from the female participant (FP[n]) that experienced that emotion.



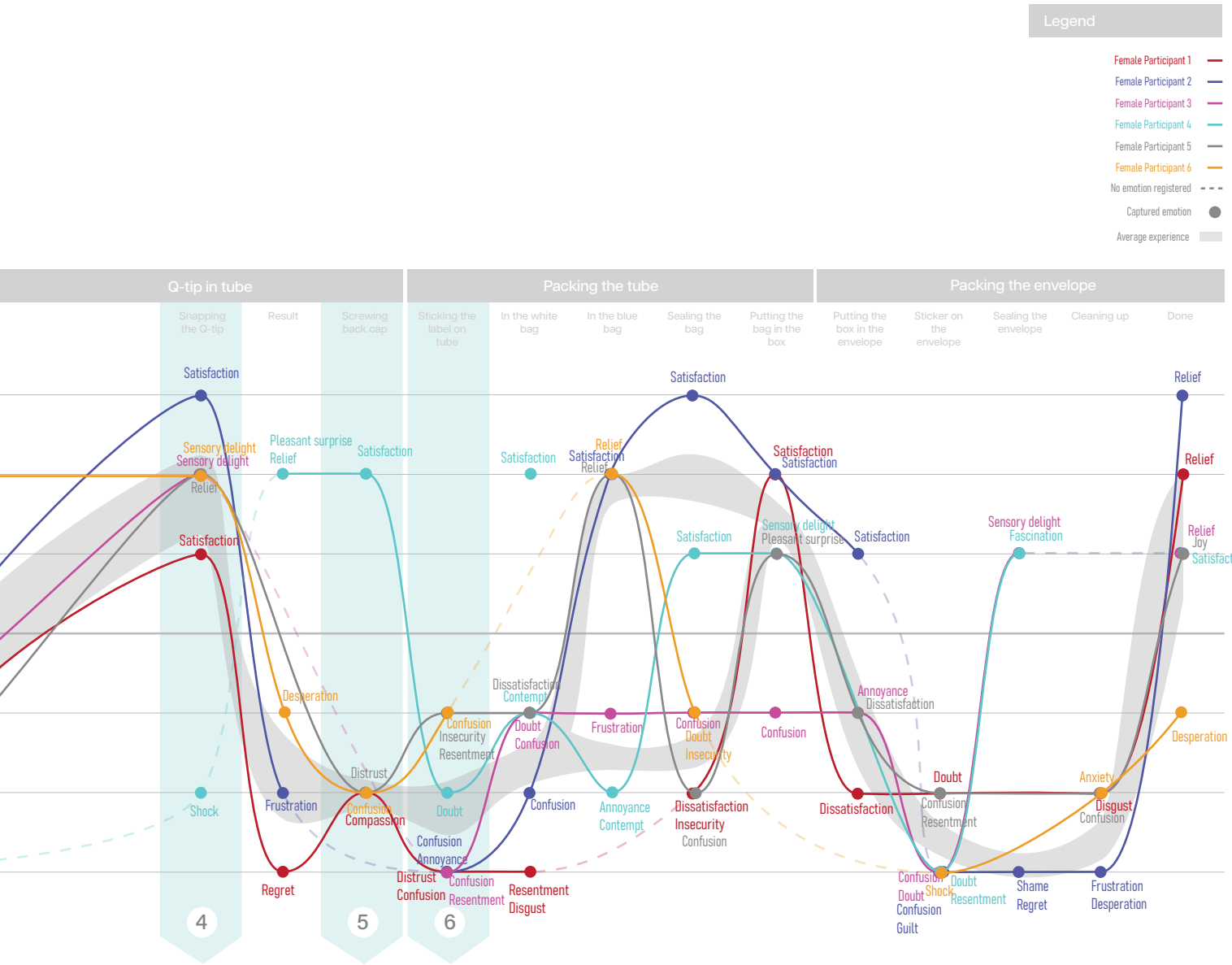


Figure 21 - Emotion-scan timeline, vaginal swab samples taken by female participants.

1

Emotion:
Contempt

Stimulus event:
Seeing the bright orange packaging of the tube and q-tip

Motive:
I want them to take into account my skills as a non-profesional

The orange packing and the medical symbols on the bag triggered a feeling of contempt. Because the participants were unable to understand the meaning of the symbols, they questioned why they would be on the package. The bright orange color scared the participants, and this triggered contempt since they wanted to be put at ease by the look and feel of the test and this was achieving the opposite.

2

Emotion:
Sensory delight

Stimulus event:
Washing my hands before starting is like a ritual

Motive:
I want to be in the right mindset before starting the test

The manual instructs the users to wash their hands before starting the test. A participant explained that this triggered a feeling of sensory delight for her.

"I like washing my hands before I start a new task. It feels like a ritual-reset."

(FP2)

The participant wants to be in the right mindset (calm and focused) before starting the test. Washing hands helps her to change her mindset.

3

Emotion:
Doubt

Stimulus event:
Unsure whether the insertion went correctly

Motive:
I want to know for sure, so I can move on (mentally)

Some participants felt doubt during and after inserting the Q-tip. There is no resolution to their doubt afterwards, because of a lack of feedback on whether the insertion was deep enough, long enough or whether they made the right movements. This lack of knowing causes that they cannot mentally move on and get stuck in that feeling of doubt.

4

Emotion:
Sensory delight

Stimulus event:
The snapping sound and feeling of the q-tip breaking

Motive:
I want to feel that I did it right

In this scenario, we somewhat see the opposite. There is clear feedback to the user that they snapped of the Q-tip in the correct way as it is accompanied by a nice snapping sound and visually breaks in exactly the right spot. Causing the positive emotion of sensory delight.

5

Emotion:
Compassion (to self)

Stimulus event:
The tube tiped over and some liquid spilled out

Motive:
I want to do the test correctly

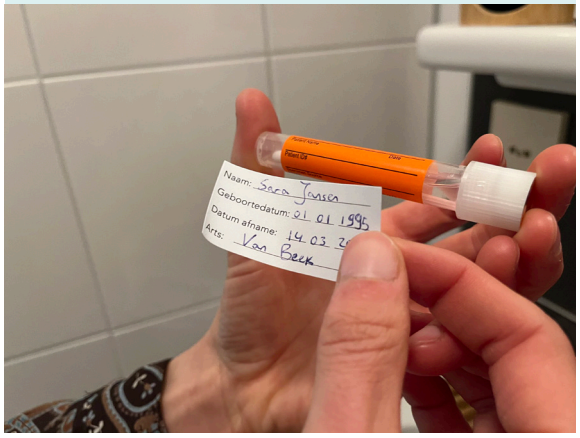
This participant had tipped over the tube, causing some liquid to spill out. First, she responded with regret and insecurity, because she was uncertain if the test would still be accepted by the lab. She transformed this feeling into compassion for herself. The test does not provide any information on what to do in these kinds of situations, so users just assume outcomes.

6

Emotion:
Doubt

Stimulus event:
Not knowing how to put the sticker on the tube correctly

Motive:
I need a relief from the constant stress of not knowing



Putting the sticker on the tube caused doubt with many participants. There is no space on the tube to put a sticker on and again no feedback on whether the user makes the right decision. This leaves the participant again with an unresolved feeling of doubt.

"This made me so confused, because I had the feeling putting a sticker there would have to be wrong. So I thought I might have gotten the wrong tube in mine."

(FP4)

USER INSIGHTS AND AREAS FOR IMPROVEMENT

Self-efficacy beliefs

In contrast with the male self-sample test, this test was not perceived as a positive experience by any of the participants. The micro-emotion timeline for the vaginal swab is for the largest part in the negative area of the graph. The perceived self-efficacy of the female participants seems to be lower as well. Only 2 of the 6 participants believe to be certain they took the sample correctly and 5 out of 6 express doubts about how they packed the test and about whether it will arrive at the GGD correctly. Only 2 out of 6 participants would certainly trust the results if they receive them.

4 out of the 6 participants would want confirmation in the form of another test or a consultation with a doctor to be sure. An astonishing difference in perceived self-efficacy from the male self-sample test.

Unclear instructions

Participants expressed frustration about the instructions for inserting the cotton swab (Figure 22). They found the guidance ambiguous, leaving too much room for interpretation, and lacking in reassurance. Users suggested that clearer instructions, explicitly stating what to do and emphasizing that inserting the swab for a second more or less does not matter, would provide the affirmation they need.

"If the instructions would just tell me when I did it right, I would be happy."

(FP4)

"I do not understand whether it is meant like 'stirring' or 'rotating', I do not understand the arrow."

(FP6)

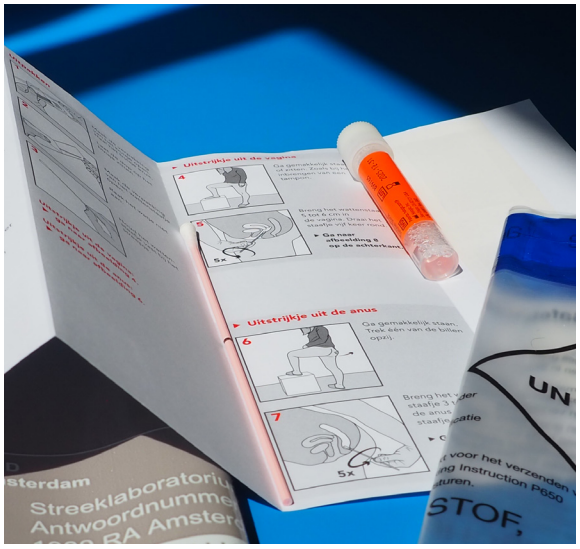


Figure 22 - The visual instructions for taking the swab

Reluctance while unpacking the box

From the micro-emotion scan timeline, we can draw some other insights. We see the same drop in the line when unpacking the box as with the male participants, indicating that same mix of confusion, reluctance and insecurity when seeing all the medical-looking components.

Cotton swab insertion

The emotions during and after insertion of the cotton swab (Figure 23) were quite negative with many instances of doubt and insecurity. These emotions are largely caused by not knowing whether the insertion was deep enough, long enough or the movement was correct, and this doubt stays unresolved throughout the next steps.

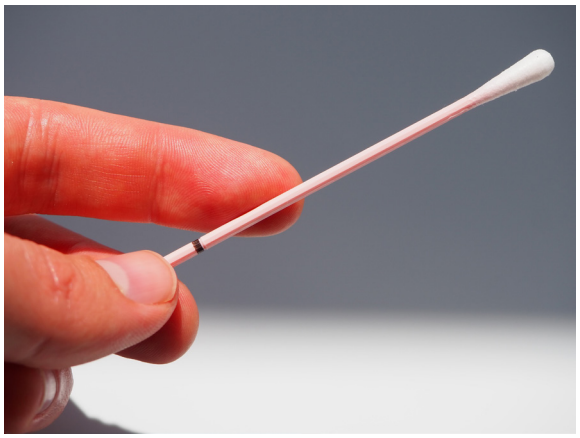


Figure 23 - Close up photo of the cotton swab

Sealing the safety bag

Packing the tube in the safety bag is for some a relief to see their sample protected in the bag and for others, due to the adhesive edge, reason for doubt and insecurity because they know the process is irreversible. They worry that they might have forgotten something.

"This made me feel like I am almost done."

(FP4)

"Now I need to be very careful to check everything before I close this"

(FP1)

"Oh no! I forgot to put the sticker on the tube... do I open it again?"

(FP3)

6.3 Conclusions based on MES results

Although a deeper understanding of the emotions was retrieved from understanding the motivations behind the micro emotions, certain trends can already be recognized by interpreting the timelines and interviews with participants.

The data shows an evident difference between the perceived self-efficacy of female users that used the swab test, versus male users that used the urine test. ***Male users more often feel confident that they took the sample correctly than female users.*** *For all female participants this doubt about correct execution of the sampling process is connected to an uncertainty to trust the results. This is in line with other studies that found the least trust in the swab test results compared to other forms of self-sampling (Chapter 1.4). A possible cause could be the unresolved feeling of doubt that overshadows the experience of most female participants that in its place is caused by the* ***lack of affirmation feedback****. The reason for this assumption is that for the male participants there is a clear feedback point that consoles the user that sampling went correctly, namely the indication arrows when filling the tube. Just like the female participants, male participants experienced negative emotions before this point too. Like, anxiety about what was coming and insecurity about making the right decisions. But these emotions seem to be resolved when they read the fill indication arrows on the tube. Seeing the line between the arrows is met with a feeling of satisfaction, relief, pride, and determination. Whereas,* ***for the vaginal swab test, there is no such feedback that confirms the sample is taken correctly.*** *The swab will look the same as before insertion, and the user is left with an unresolved feeling of doubt and insecurity that they still feel after completing the test.*

DESIGN OPPORTUNITY BASED ON MES RESULTS

Can we design a vaginal swab test that provides affirming feedback to the user after doing the test correctly? *By, for example, implementing a perceivable or instructional cue that provides female users with the same sense of relief, pride and determination as the arrow indications on the urine test do. Ways of providing this feedback cue can be explored. This feedback could be a reaction to actual measurements, or a feedback cue that establishes a feeling of affirmation based on nothing; a placebo-like effect. Previous research points out that this is an option, because the problem lies in the perception of the user and not in the medical correctness of the test.*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1. CNT SWAB

6.4 Motive dilemmas

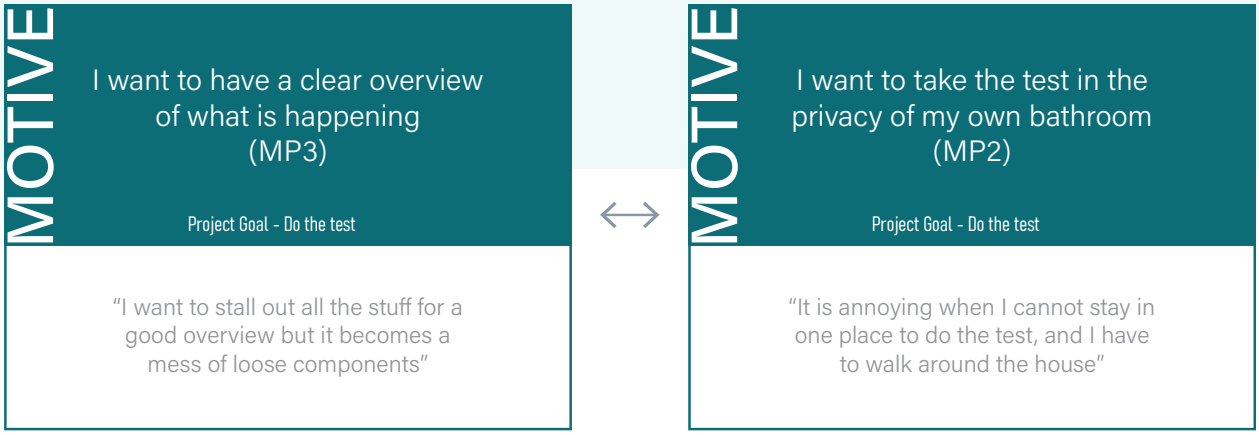
The motives identified through the laddering theory (Reynolds & Gutman, 1988) and were translated into clear design opportunities. Out of the 16 conflicting motives discovered, the five most relevant ones are presented in the following section. This is followed by an analysis of their impact on the redesign process, outlining key considerations for future design iterations. The unnamed motive cards and motive dilemmas can be found in Appendix 6.

OVERVIEW vs PREFERRED TEST LOCATION

This conflict highlights a flaw in the current product. The motive stems from users' frustration when trying to lay out the self-sample test components to create an overview. However, this goal is hindered by the cramped space of the bathroom (the preferred location) and the large number of components.

Design opportunity

This inspires to design ways to allow the user to organize the components neatly in the small context of a bathroom. It could call for a packaging design that pulls out the components already in the right order and with built-in holders, so components do not scatter through the bathroom.

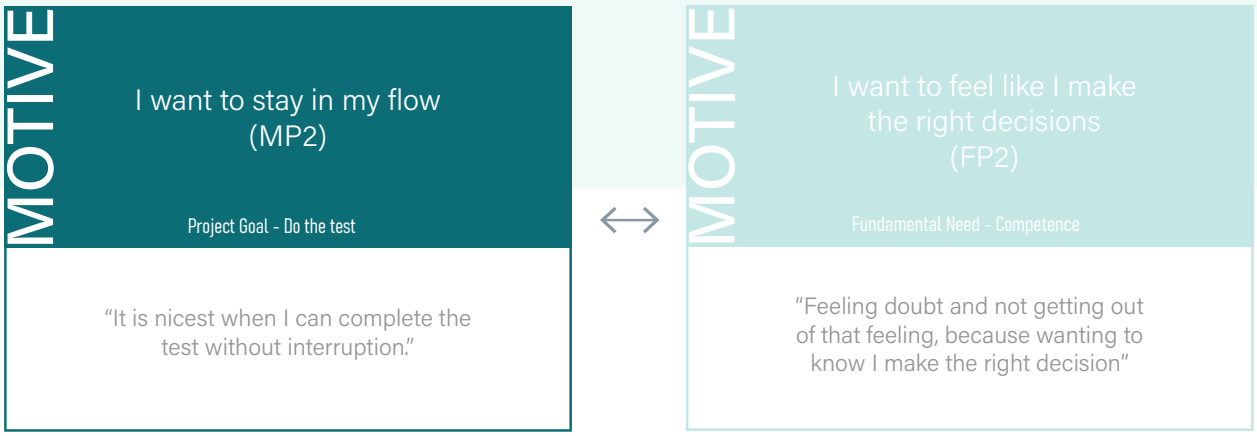


FLOW vs CERTAINTY

This dilemma describes the struggle of the user going back and forth between reading the next steps in the manual and executing them and going back to the manual again because of feeling insecure and in doubt about doing the right thing. The user is constantly interrupted by having to switch between the two.

Design opportunity

This offers potential to explore the possibilities of designing interventions that allow the user to stay in the flow while sampling. For example, providing different, less interruptive ways of providing information to take away that reoccurring feeling of doubt.

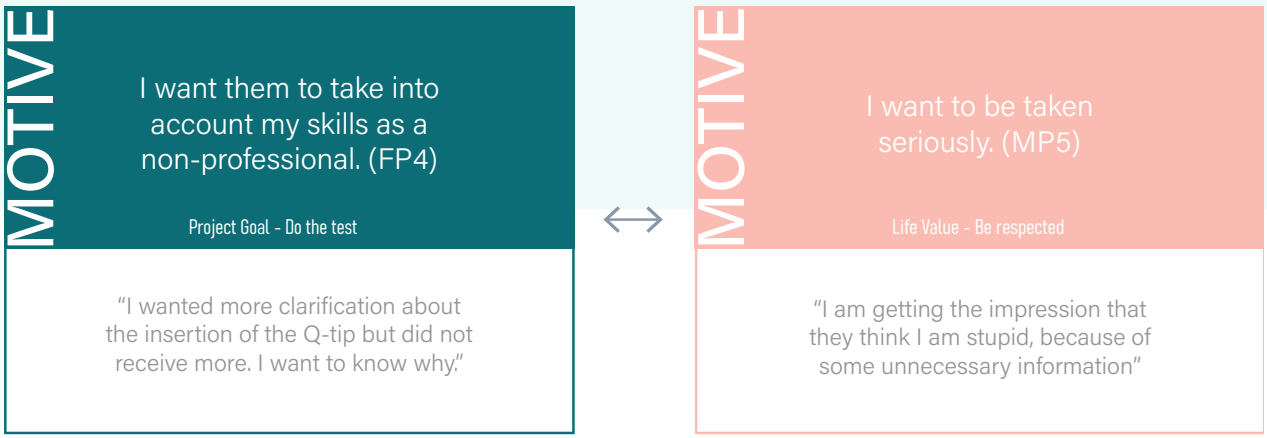


UNDERINFORMED vs UNDERESTIMATED

This dilemma highlights the importance of offering the right amount of information. Participants appreciate receiving enough information to reduce doubt and build confidence. However, when presented with information they perceive as unnecessary, they feel resentment and a sense of being disrespected.

Design opportunity

This presents a clear criterion for future information design: how can we provide users with ample information without making others feel their competence is underestimated?

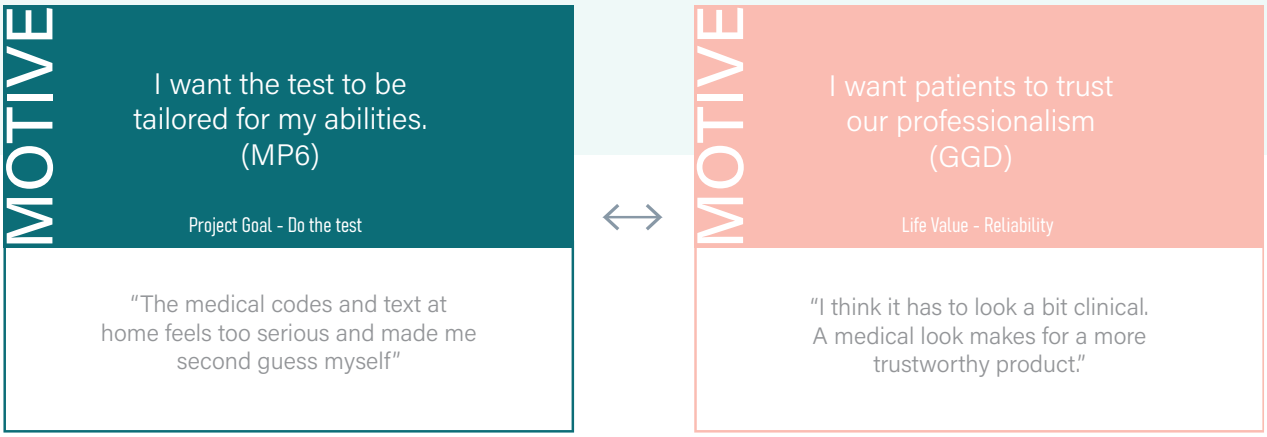


A RELIABLE LOOK vs AN ACCESSIBLE LOOK

This dilemma lies between the client and the healthcare provider. Healthcare providers believe that the product's clinical look and feel enhances the client's trust in the test. However, this same clinical appearance also gives users the impression that the test is not designed for them to use. While there is some merit to the GGD's perspective, it is equally important to ensure that the clinical design doesn't cause clients to doubt their own abilities.

Design opportunity

The design challenge is to strike a balance: creating a self-sample test that feels approachable and user-friendly for the client, while also conveying the necessary sense of medical trustworthiness.

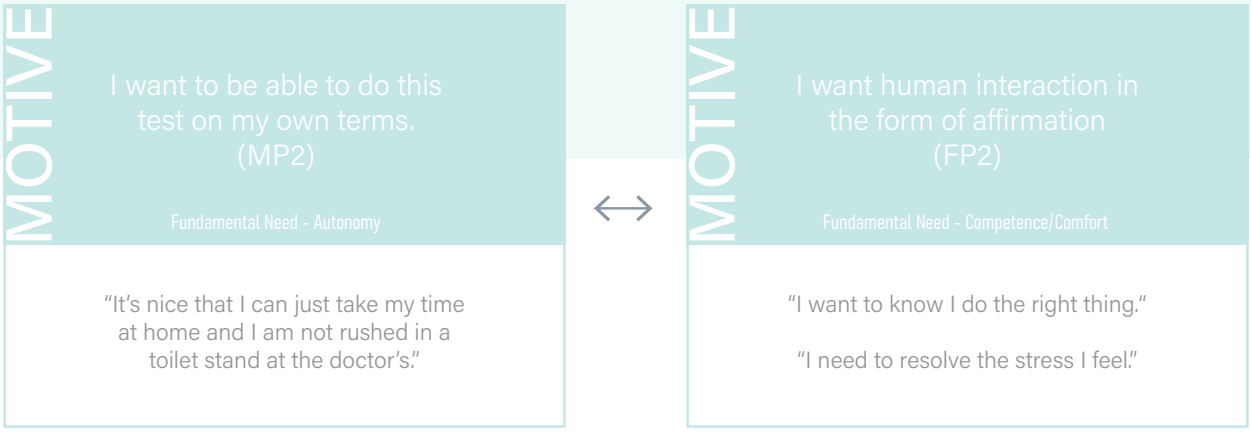


AUTONOMY vs AFFIRMATION

One of the main benefits for clients is the gain of autonomous behavior due to the ability to test where and whenever they want. One of the most comprehensible losses when self-sampling is human interaction. Participants mostly missed affirmation, that makes them feel in control of what they do and relieves stress for peace of mind.

Design opportunity

Users used to find affirmation in human interaction with a professional. The opportunity lies in designing ways of providing affirmation for the client while using the test at home. Or perhaps the solution lies in acknowledging the absence of affirmation and giving them a way to find that affirmation themselves, by for example, providing an option to find more information.



6.5 From opportunities to design directions

The results of the research yielded ample design opportunities, both related to reducing pain points and addressing need conflicts. For the current project, I decided to continue the design process with a specific selection of directions, which are translated into design requirements presented in Chapter 7.6, based on the following analysis.

PRACTICAL ALTERATIONS IMPROVING EMOTIONAL STATES

Firstly, there are a couple of design opportunities that are easily applicable and can make a big impact on the overall experience of self-sampling. The many different components cannot be stalled in the bathroom, causing annoyance and frustration. These opportunities arise from product properties that can be improved upon through a multitude of iterations in the redesign, elaborated on in Chapter 7.2. The need is translated into the design requirements R1 and R8 (see Chapter 7.6).

SUPPORTING SELF-EFFICACY THROUGH AFFIRMATION

Additionally, I want to explore the possibilities to encourage the user's self-efficacy during swab sampling by providing affirmation in the form of feedback cues from the product. The results provide reasons to believe that the lack of affirmation in the swab test is the main cause for an overshadowing feeling of doubt that negatively stains the experience of self-sampling for participants (Appendix 5). Interviews with users confirm this observation, as participants clearly expressed that they missed some form of confirmation (Appendix 6). The need for affirmative feedback was incorporated in the requirements as R2 and also plays a role in achieving R1 (Chapter 7.6). This affirming feedback could be delivered either through physical design modifications to the sampling kit or by altering the way information

and instructions are presented. Further testing, as provided throughout Chapter 7, is required to determine which approach is most effective and appropriate.

REMAINING CLOSE TO THE INITIAL GOAL

These design directions are prioritized over other design opportunities yielded by the research, mainly because they tie back to the initial goal of the project: creating a redesign that fosters a feeling of self-efficacy. These directions offer concrete, designable ways to reach that goal. A redesign that fits its context well has the potential to improve the user's emotional state while sampling, by reducing measured emotions like frustration, annoyance, and confusion, which can in turn positively affect self-efficacy beliefs through physiological and emotional states (Chapter 3.2). Exploring ways of providing affirmational feedback is also believed to support self-efficacy through mastery experiences (Chapter 3.2).

Restating the design goal

Based on new insights gained through research, the initial design goal can now be rearticulated to provide clearer direction for the project. The original goal did not specify how a sense of self-efficacy could be effectively fostered through design. However, the analysis presented in Chapter 6.4 outlines several design directions that inform this process. As a result, the design goal is refined and expanded as stated below.

DESIGN GOAL

Redesign the home-based self-sample test kit for chlamydia and gonorrhea in a way that ***fosters the feeling of self-efficacy*** *with the user by implementing ways of* ***affirmative feedback while sampling,*** *and* ***improving the ease of use*** *within the context of the bathroom.*

Main insights | Chapter 6

- *The results of the Micro-Emotion Scan (MES) indicate that male users report greater confidence in having performed the self-sampling procedure correctly compared to female users. This difference appears to stem from the difference in affirmational feedback provided by the test types.* ***Specifically, the urine test offers immediate visual confirmation when the tube is filled, whereas the swab test lacks such feedback.***

  This presents a clear design opportunity: the swab test can be redesigned to ***incorporate a form of affirmational feedback****, similar to that of the urine test, in order to improve user confidence.*

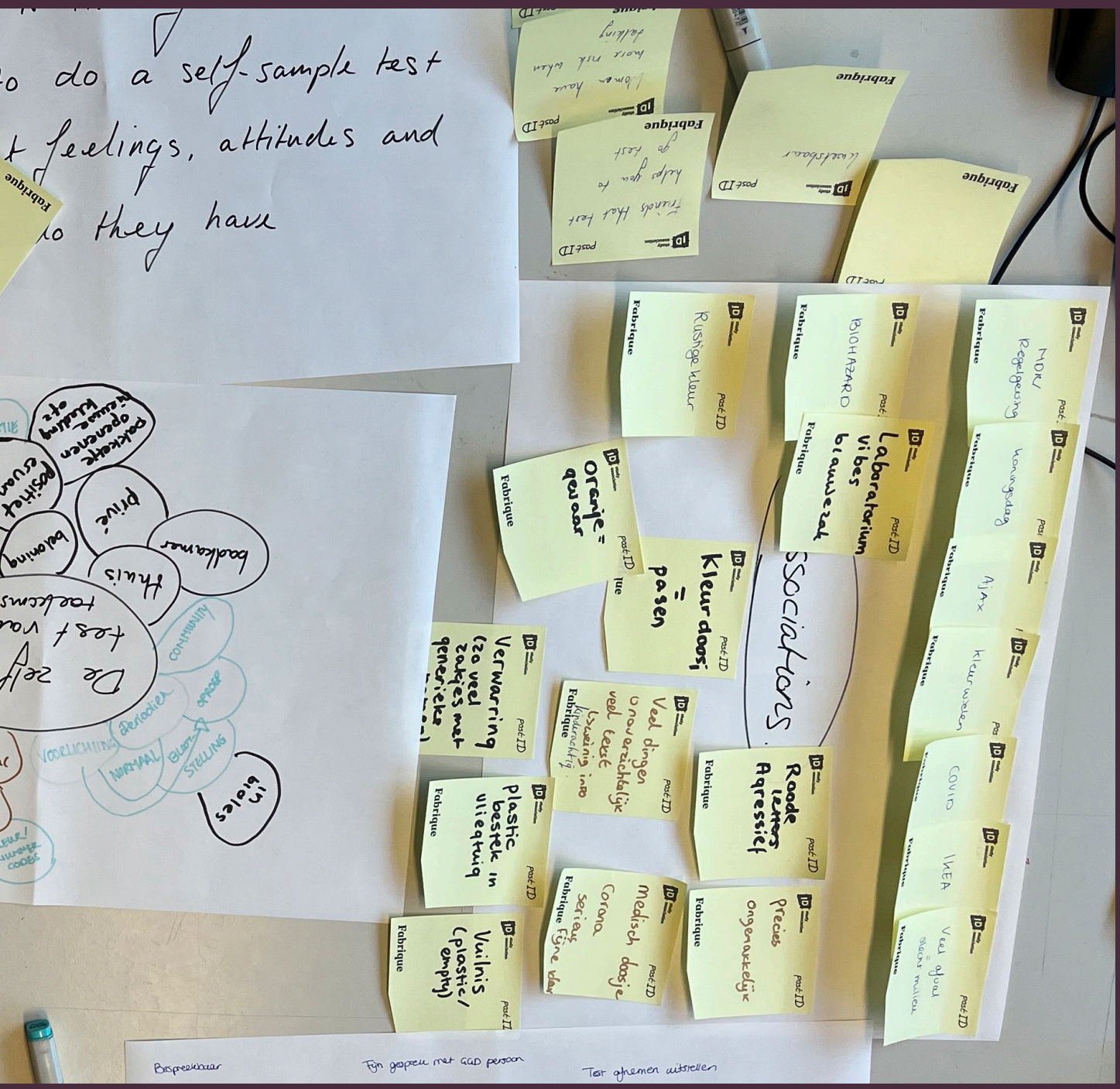
- ***The results indicate many other design opportunities to improve the (emotional) user experience.***

  > *The test can be redesigned to better fit the context of use, usually in the bathroom.*
  >
  > *Improvements in information design could increase clarity without undermining the user's existing knowledge or autonomy.*
  >
  > *The test's usability can be optimized to ensure a seamless experience, minimizing interruptions and allowing the user to remain in a state of flow during the self-sampling process.*

- *The analysis of these results has led to several potential design directions aimed at* ***enhancing the user experience*** *and* ***fostering a stronger sense of self-efficacy****, particularly for users of the swab test.*

7.

Redesigning the test



This chapter elaborates on the design process and the choices that led to the final design. The process consists of four phases, which are first explained in general. Then, the design choices and new insights for each phase are discussed. These new insights were developed through generative sessions, prototyping, and testing.

7.1 The process

The process of going from research-based insights to a redesign of the test-kit consists of several phases, visible in Figure 24, and starts with the ideation phase. Within this phase I diverged on the scale of possible solutions as far as I could. Firstly, drawing from my own inspiration that was built up during research, I ideated though a How-to method. After depleting my own inspiration, more diversity was sought through a brainstorm session with around 60 design students. This resulted in a total of about 50 potential ideas that are revised on feasibility and assumed effect. These ideas were clustered and filtered down to 10 ideas that were iterated upon through rapid prototyping in the second phase. At the end of this phase some ideas were left behind and the ones that showed potential were combined into one concept. This concept was prototyped again and tested on the envisioned effects with users and experts, resulting in the final design.

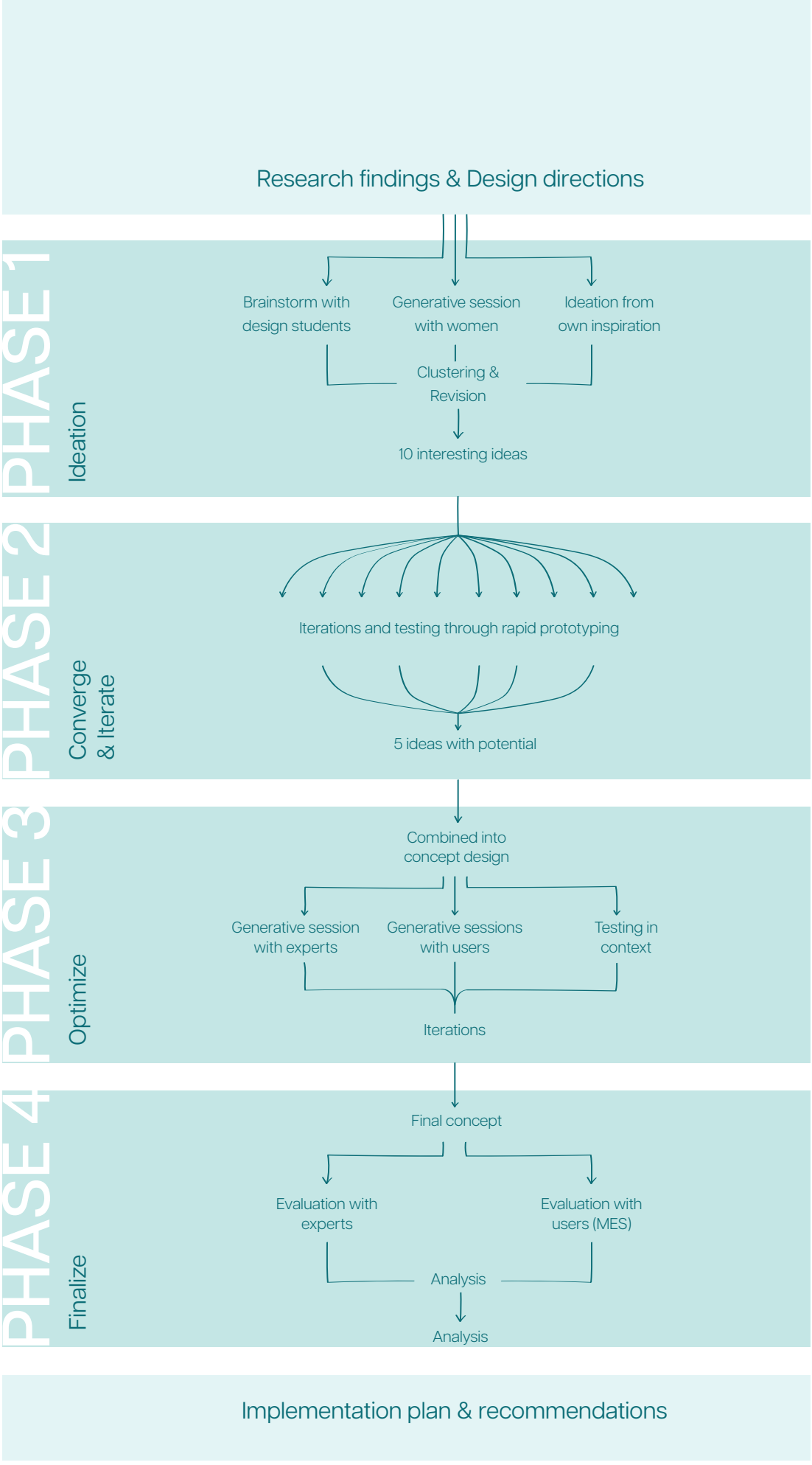


Figure 24 - Schematic simplified overview of the design process in four phases

7.2 Phase 1: Ideation

This phase is about the generation of a wide range of ideas and then narrowing them down through evaluation and clustering.

METHODS

Throughout this phase, and the rest of the project, as design is not a linear process, several rounds of ideation were conducted. Before seeking inspiration from users, designers, or experts, I aimed to exhaust my own ideas and inspiration developed during the research through sketching (Appendix 9.1) and writing them down in **How to's**. Design directions and insights were translated into individual "how to" statements, enabling targeted exploration of partial solutions to the issues and design directions identified in Chapter 6.

The following how to's were used in this phase. How to:

> **Give affirmative feedback**
> **Place objects in bathroom**
> **Contain components**
> **Open container gradually**
> **Provide information**
> **Protect sample**
> **Create overview**

The ideas that emerged from the "how to" statements were each developed around a single boundary, allowing room for out-of-the-box thinking. These initial ideas were then combined and refined to address the broader set of constraints surrounding the self-sample product, ensuring the outcomes remained somewhat realistic and feasible. A full overview of the idea sketches that emerged from the How to-method can be found in Appendix 9.

Additional brainstorming

To broaden my perspective on possible solution spaces, I conducted a brief brainstorm session with approximately 60 design students who were familiar with the problem and research insights. The ideas generated during this session (Figure 25) were refined and added to the collection.

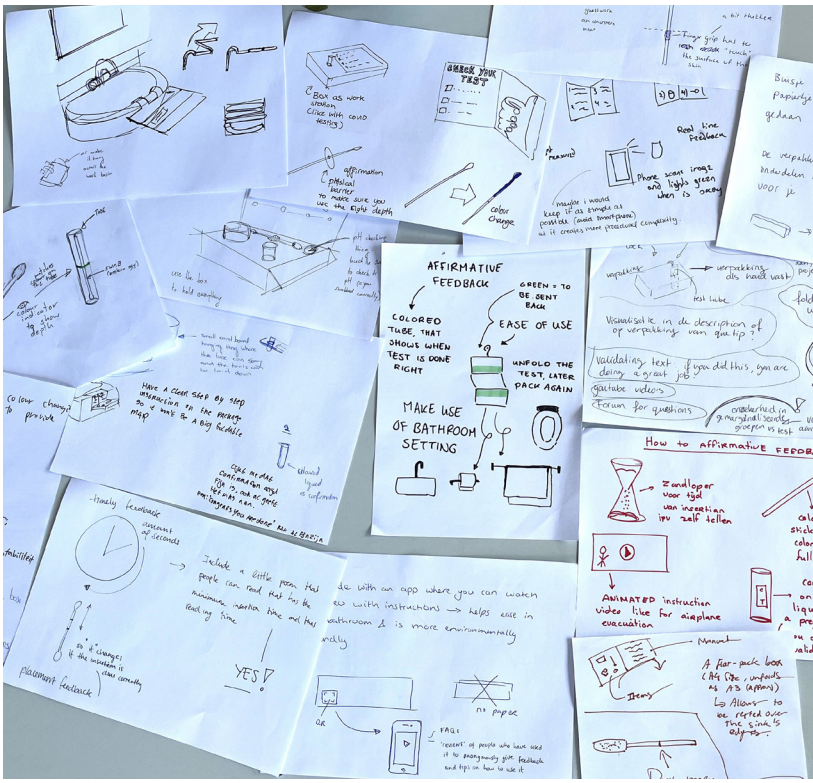


Figure 25 - A fraction of the results from additional brainstorming with 60 students

Generative session with female users

A generative session with experienced female users was done. The generative session was structured according to CoDesign principles established by Sleeswijk Visser et al. (2005).

The aim of this generative session was to gain insights on the female perspective of self-sampling. I arranged this session because I am aware that as a male designer, I might be oblivious to some aspects of the female experience of self-sampling. The following **goal statement** of the session was presented to the participants:

What is it like for a woman to do a self-sample test and what feelings, attitudes and concerns do they have when getting tested?

Participants generative session

The session included three female participants (PG1, PG2, and PG3), aged between 25 and 28 years (see Table 3). According to Stappers and Sanders (2003), ensuring less than half of the participants had a creative background, such as a designer or architect, can enhance the depth and richness of the insights generated. To balance these dynamics, one of the three participants was purposefully selected for her background in product design.

Participant (ref)	Relevant details of participants generative session
Part. generative session 1 (PG1)	Female, single, 28 years old, student, experience with self-sample test procedures, no religious background, medically educated background.
Part. generative session 2 (PG2)	Female, single, 27 years old, working, experience with self-sample test procedures, no religious background, engeneering background
Part. generative session 3 (PG3)	Female, in committed monogamous relationship, 25 years old, student, experience with self-sample test procedures, no religious background, background in product design

Table 3 - Relevant details of participants generative session

SESSION LAYOUT

The session was structured to explore the full extent of the experience domain as described by Sanders (2001), aiming to capture a comprehensive understanding of the female user experience. It included open discussions where participants responded to one another's past experiences, shared opinions and associations with the current product, and engaged in both individual and collaborative idea generation for future improvements (see Appendix 8.1 for session materials and structure).

INSIGHTS FROM THE GENERATIVE SESSION

In terms of the product's current appearance, participants associated it with seriousness and even danger, primarily due to the abundance of text and the clinical, stern look of its components. The product initially seemed complicated, although the actual testing process turned out to be relatively simple. This disconnect led participants to view the design as misleading.

Several aesthetic and material choices also evoked negative associations. The plastic-wrapped tube and cotton swab reminded participants of **in-flight cutlery, cheap, disposable, and low in quality.** Upon opening the box, the product's fragmented appearance and excessive plastic bags led to associations with waste and litter. Other words participants used to describe the product included: **awkward, precise, laboratory-like, and aggressive.**

CLUSTERING

The ideas that came out of the session are revised and added to the collection. All ideation methods combined, yielded around 50 initial ideas (Figure 26) that were sketched out and clustered based on the focus of the solution the idea offers (Saldana, 2009). The following clusters were formed.

> **Comfort through familiarization**
> **Gradual introduction of components**
> **Verbal affirmation feedback**
> **Haptic affirmation feedback**
> **Visual affirmation feedback**
> **Ease of use within the context**

The most promising ideas of each cluster were selected and refined more, resulting in **10 interesting ideas** each with their own envisioned effect and interaction.

IDEATION CLUSTERS

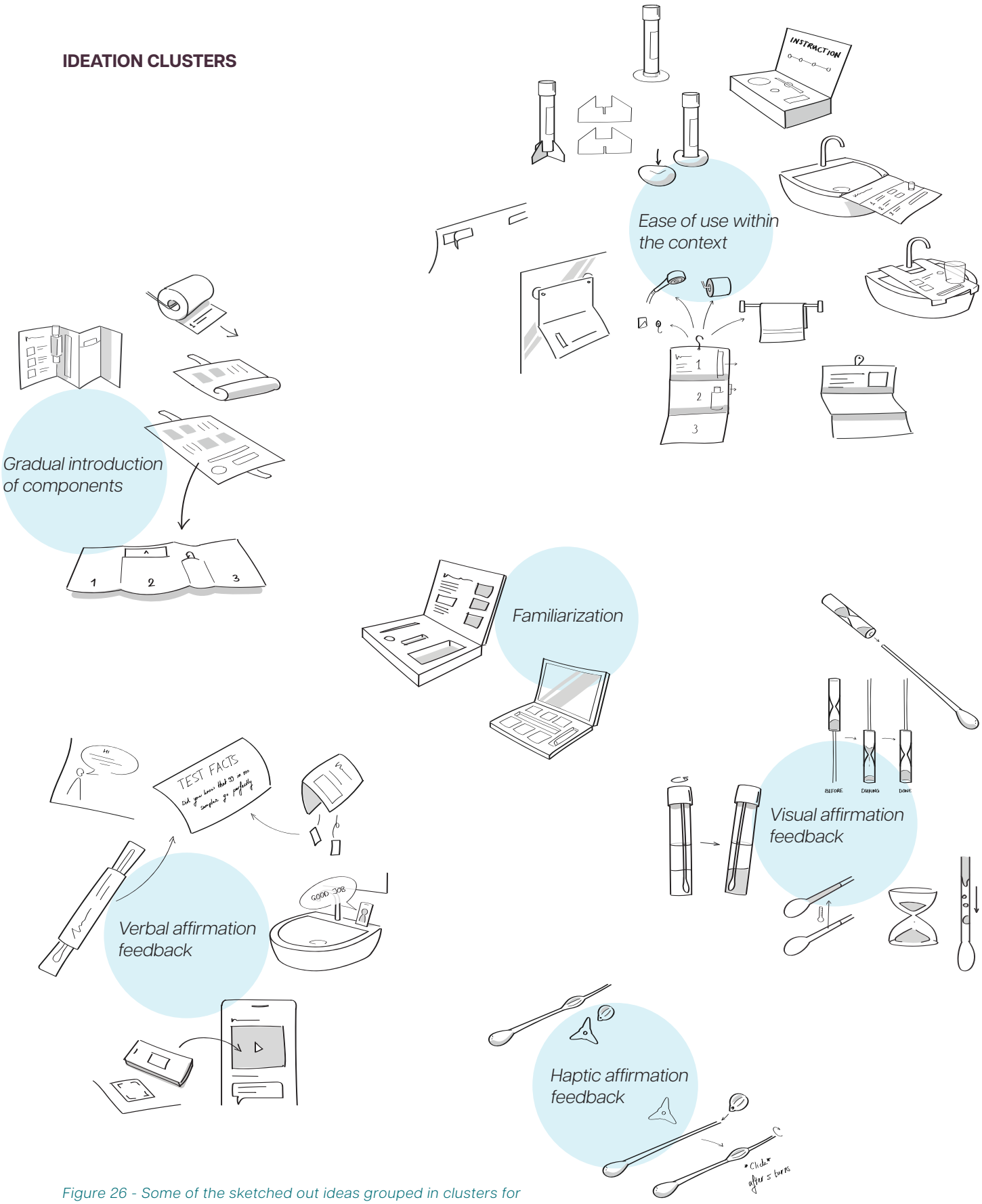


Figure 26 - Some of the sketched out ideas grouped in clusters for potential solution spaces

7.3 Phase 2: Converge & Iterate

This phase is about the first steps of realization of the 10 chosen ideas. The method of this phase is explained, and the determining factors for continuation or termination of the ideas are discussed.

METHOD

Ten ideas were prototyped and briefly tested for feasibility and intended effect. Low-fidelity prototypes revealed which approaches aligned with expectations from earlier sketches, and which fell short after one or two iteration rounds. Ideas that failed to function or evoke the intended interaction were either discarded or improved. This process led to the selection of five promising ideas that were further developed. In Table 4, the iteration rounds and pictures of the prototypes (for more, see Appendix 10) in that round are shown. More elaborate descriptions of the ideas can be found in Appendix 8.2. This process resulted in the selection of **5 ideas that showed potential** and were further developed.

CRITERIA

In the decision-making process of phase 2, several factors influenced whether an idea met the criteria for continued development. These criteria were primarily practical, focusing on feasibility. The 3 criteria, and some of the decisions that are made, are outlined in the following section.

Simplicity

One of the research findings was that users often feel overwhelmed by the number of components and steps involved in the self-sampling process. More steps logically increase the risk of user error. Therefore, maintaining a simple and streamlined design is essential. Any idea that adds significant effort or complexity is discontinued. For example, while **Idea 1** proved effective, adding a foot to the tube would introduce an extra component and step, compromising the simplicity of the product.

Feasibility for the GGD

As a publicly funded organization, the GGD operates under strict budget constraints and relies on large medical manufacturers to supply standardized components at low cost. This limits design changes to only those elements the GGD can directly influence, meaning the core procured components cannot be redesigned, because the GGD will not have the resources to realize these redesigns. So, ideas like **Idea 8** are probably not feasible for the GGD.

Inclusiveness

The GGD serves a diverse group of clients with varying contexts of use. While it's impossible to design for everyone, the goal is to keep the product as inclusive as possible. **Idea 10** was discontinued for this reason. The prototype already revealed how difficult it is to design a sink stand that fits all sinks, especially considering that not all users prefer to take the test over a sink. **Idea 7** was continued despite not all users might be able to scan a QR code, because this seems to be a minor inconvenience for a small group of the users.

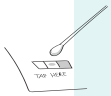
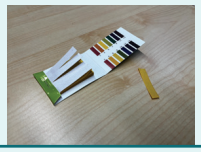
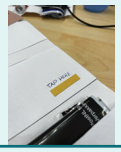
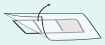
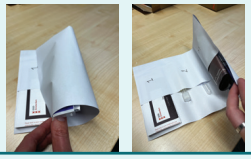
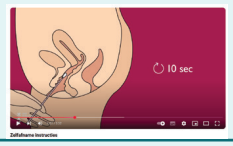
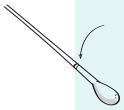
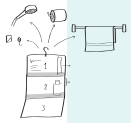
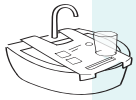
Idea	Initial drawing	ITERATION 1	ITERATION 2	ITERATION 3
1 **Added stand for the sample tube**			Discontinued	
2 **Tube-stand in the box**			Discontinued	
3 **Tube-stand in the manual**				 ✔ Continued
4 **PH-check strip for swab**			 	✔ Continued
5 **Compartment packaging**				✔ Continued
6 **Lid turning into tube-holder**			Discontinued	
7 **More information QR-code**			✔ Continued	
8 **HP-indicator on cotton swab**		Could not prototype	Discontinued	
9 **Hanging the manual**			 	✔ Continued
10 **Sink stand**			Discontinued	

Table 4 - Schematic overview of the iteration rounds and the rapid prototyping done in each round.

7.4 Phase 3: Optimize

In Phase 3, the selected ideas were merged into a single concept. Individual aspects of the concept were tested in a design session with experienced female users, who provided feedback and shared concerns for further refinement. A separate design session with GGD medical experts assessed the medical viability and feasibility of the concept. The prototype was then iterated and tested again with users in the bathroom context.

METHOD

The design ideas presented in Chapter 7.2 were further iterated, adapted, and used as design artifacts in a **session with experienced female users**. The aim of this session was to refine the concepts and find more insights based on expert preferences. Participants shared feedback and concerns about each artifact, helping to align the designs more closely with user needs.

This session, along with a parallel expert session, followed an approach by Stappers & Giaccardi (2017). By engaging

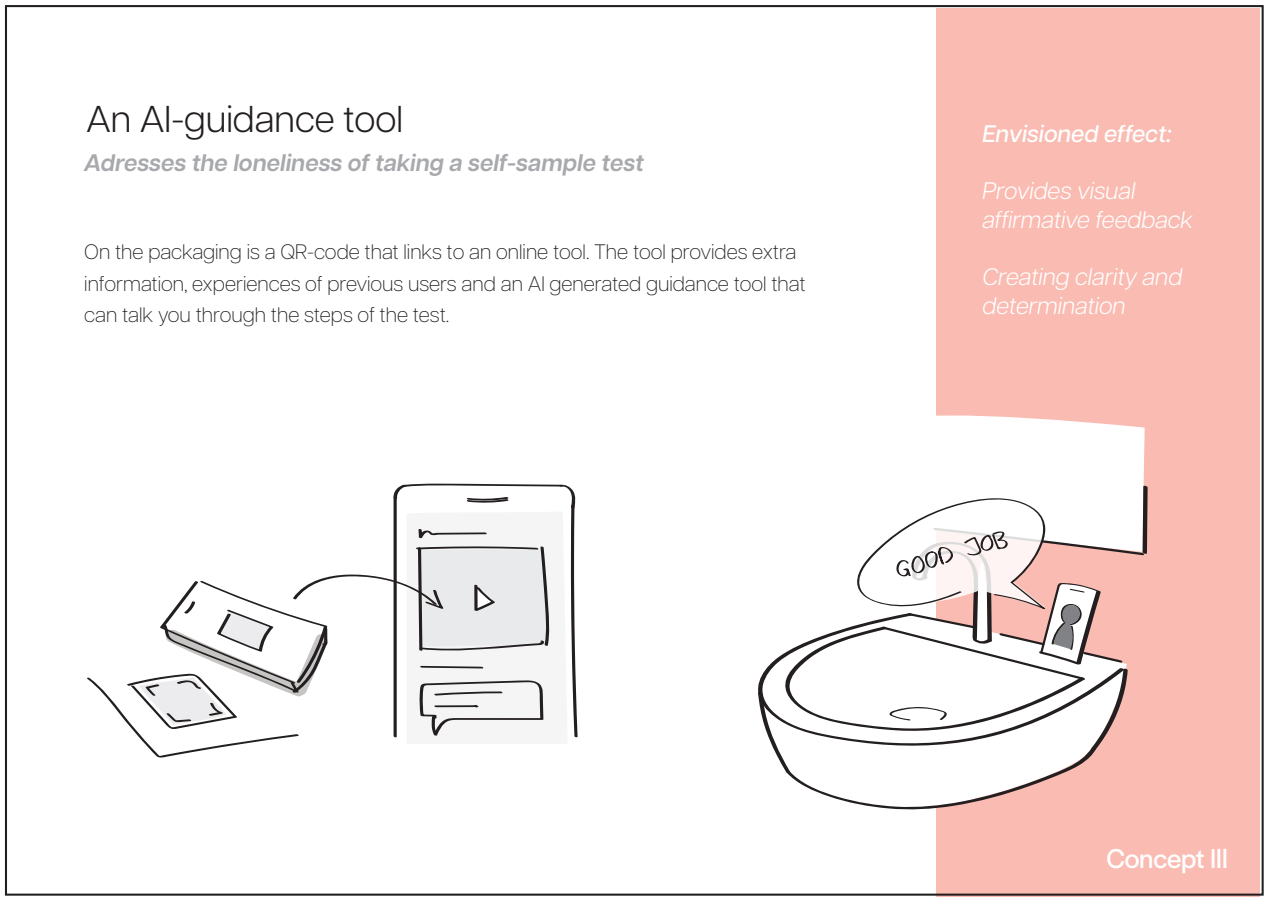


Figure 27 - Concept card as presented to the experts in the design session

users and experts in discussion around concrete solutions, this method helped clarify and evolve design goals while allowing new insights to emerge.

Each concept was presented through a sketch and short explanation (see example concept card, Figure 27) to the two experts and the three female participants. For the participants' details, see Table 3 and Table 5. Participants were then invited to respond freely to each concept. More insights can be found in Appendix 8.

SESSION WITH EXPERIENCED FEMALE USERS

In this section the main insights from the design session with experienced female users will be shared. The rest of the insights and the concept cards can be found in Appendix 8. The participants are referred to as PG1, PG2 and PG3 (Table 3). Findings are illustrated with quotes from the interviews in Appendix 8.1.

The compartment packaging

The new way of packaging in compartments is perceived as pleasantly calmer. The participants like the idea of having the components when and where they need them.

"This seems very calm to me which is exactly what I am looking for when doing this. You can clearly see the beginning and the end."

(PG2)

However, concerns were raised on the accessibility of information. The participants pointed out that some of the information might be overlooked because it is not visible when stored in the compartment.

An AI guidance tool

This was a continuation of the QR code that provides more information. The QR code leads the user to a platform where additional information can be found, experiences from other users are shared and an AI tool can help you while sampling by providing you with real-time instructions.

The idea of an AI tool was not perceived as appealing to the participants. The idea that someone is in the same space with them while sampling, even though this is not actually the case, was found repulsive.

"The AI during sampling would be horrible. A robot telling you that you are doing great. Like, sorry why are you here?!"

(PG3)

The prospect of being able to watch more instructional videos on the platform was very appealing to the participants.

"For me the AI is not necessary, but the visual videos would be much nicer for me."

(PG2)

The PH-tap indicator

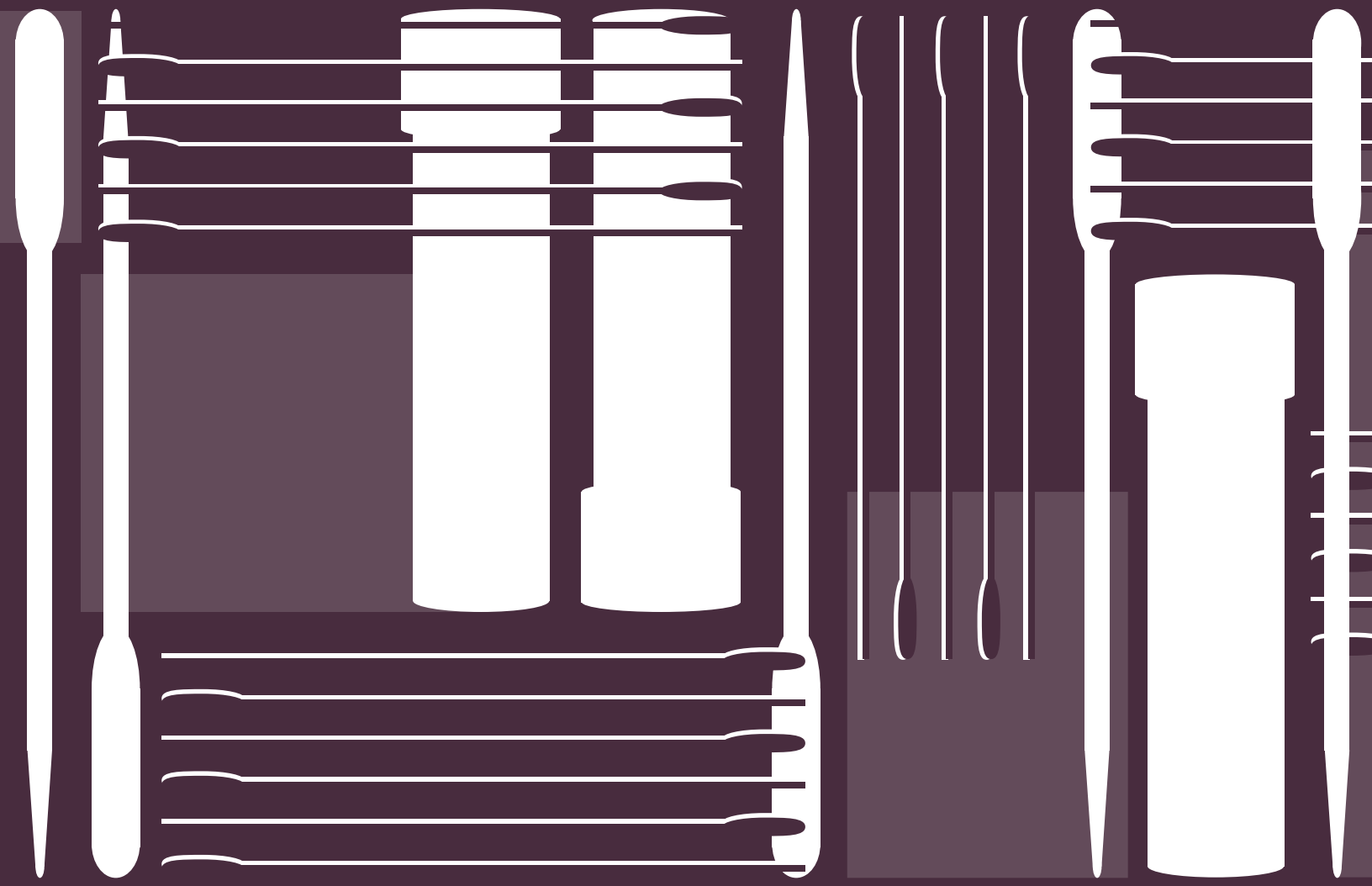
Participants shared the belief that when tapping the cotton swab against the PH-indicator the sample would be contaminated and unusable.

"Because it will get contaminated and then that will have an effect. The paper is not clean."

(PG2)

Another concern raised by participants was the potential for misinterpretation of the pH strip. **Users might mistakenly assume that the color change indicates whether or not they have an STI**. This misunderstanding would be problematic, especially since correcting it through instructions alone may prove challenging.

Figure 28 - Generative session with expert female users



Conclusion

Direct feedback from female users on the presented concepts provided valuable insights into how they might perceive, adopt, or reject the proposed interventions. The interviews revealed a strong aversion to any increase in the number of steps required to complete the test. Participants expressed concerns that **additional steps could introduce confusion** and increase the likelihood of errors, resulting in more opportunities for uncertainty during the process.

Participants responded positively to the idea of simplifying the test kit to create a clearer and more intuitive overview. While they emphasized the need for comprehensive information, they also stressed that this **information should be delivered more efficiently**, ideally distributed throughout the process rather than presented all at once at the start, as is currently the case.

Regarding the concepts aimed at providing new forms of affirmative feedback, participants indicated that these were understood but viewed them as unnecessary. They felt that clearer instructions within the existing manual would sufficiently address the need for reassurance. This opened possibilities to comply with **R2: provide affirmative feedback in other ways**, for example the way information is provided.

SESSION WITH MEDICAL EXPERTS

The same concept cards are also presented to the two experts with the same sketch and an explanation of the intended effects. See the example of a concept card in Figure 27. The goal of this session is to align the concepts in an early stage to what is medically possible in the eyes of medical experts in the field.

Participants

Two experts from GGD Amsterdam participated in the session, both bringing extensive experience in STI outpatient care and medical research related to STI services. One expert, a physician-biologist, is affiliated with the GGD laboratory where sample analyses and patient diagnoses are conducted. The other is a researcher specializing in STI treatment and care in the Netherlands connected to the Amsterdam UMC.

Insights

The session provided new contextual insights into the laboratory where the STI tests are analyzed. **The experts confirmed that modifications to the procured components are not feasible,** as these are part of an automated process that would be too expensive to alter, placing such changes beyond the scope of the GGD. The proposed idea of **offering visual, affirmative feedback resonated positively with the experts.**

They also recognized the lack of ease of use as a relevant and familiar issue. However, the medical experts expressed **reservations about introducing additional physical components or steps** to the test, due to concerns about potential increased complexity and a higher risk of user error.

Clarification on contextual limitations

With regard to the lab analysis of the samples, the liquid inside the test tube and the shape of the test tube should remain the same. The shape is unchangeable, because the machines used for testing rely on it. For a more detailed overview of the product journey see Chapter 2.3.

The challenge is addressing these issues by only modifying the items produced in-house. Since the goal of this project is to develop a redesign that the GGD can independently implement, it is essential that the proposed solution does not rely on the cooperation of external manufacturers. This approach empowers the GGD to directly improve the user experience for their clients and results directly in **R10: Feasibility for the GGD Amsterdam.** Which is considered in the final design.

TESTING IN CONTEXT

To incorporate and test some of the findings from the research through design session with experts (Chapter 7.4.2) and the session with experienced female users (Chapter 7.4.1), I created 3 new prototypes that met the new criteria and insights established in Chapter 7.3.2. The goal of testing the new prototypes was to evaluate the assumed effects of the iterated concept and to compare three versions that shared the same core functionalities but differed slightly in their implementation. The new implementations included:

Gradual introduction of components and information through envelope packaging with varying pocket designs across the three versions.

Improved ease of use in the bathroom context by incorporating three different hanging mechanisms for the envelope, reducing the need for operating surfaces during sampling.

Affirmative feedback via a pH-indication strip, which changes color to signal a correct sample. In each prototype the strip is located in a different spot.

Two female users tried out the three different prototypes that represented different features to implement the new ideas, as illustrated in Figure 29, 30 and 31.

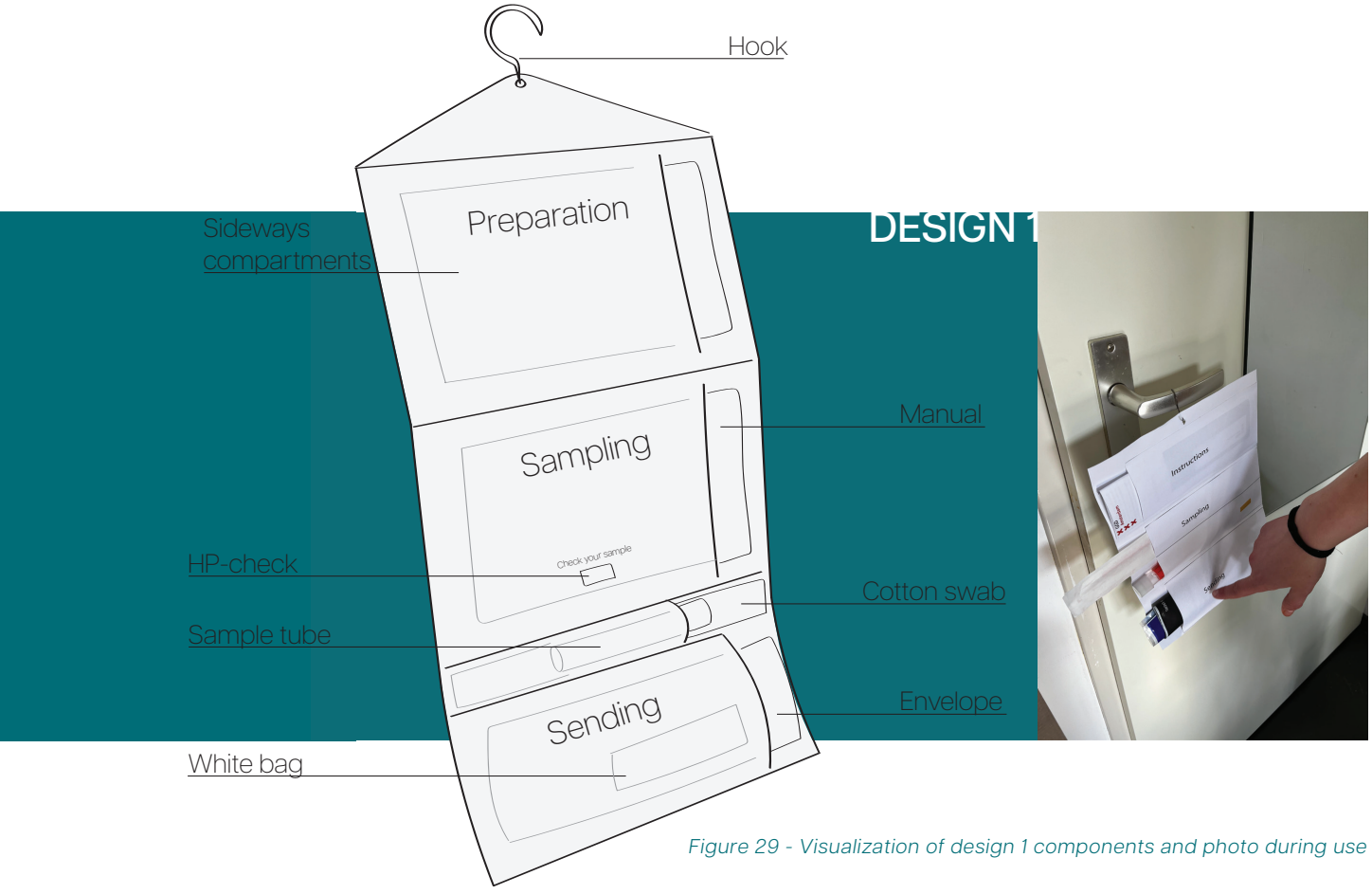


Figure 29 - Visualization of design 1 components and photo during use

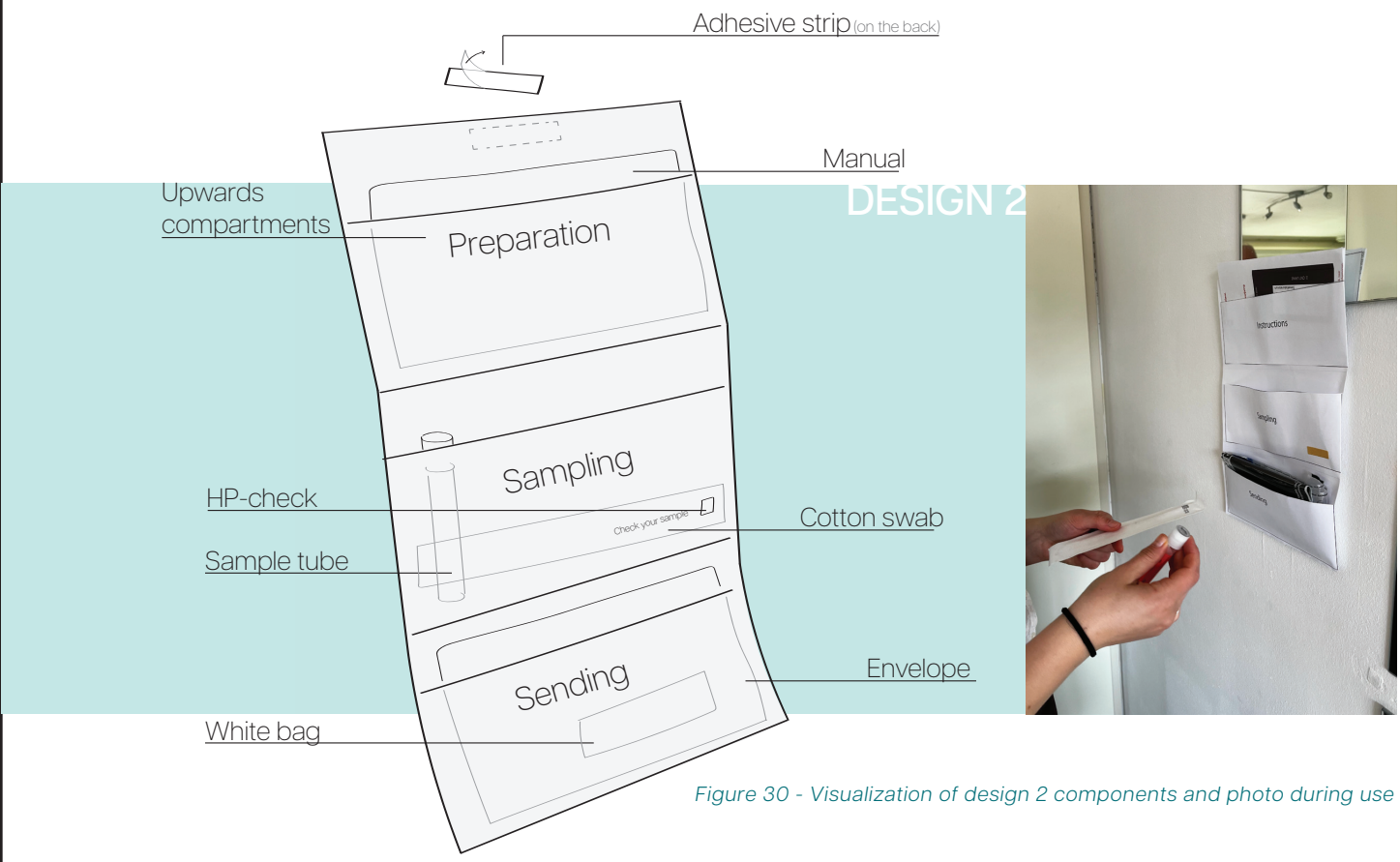


Figure 30 - Visualization of design 2 components and photo during use

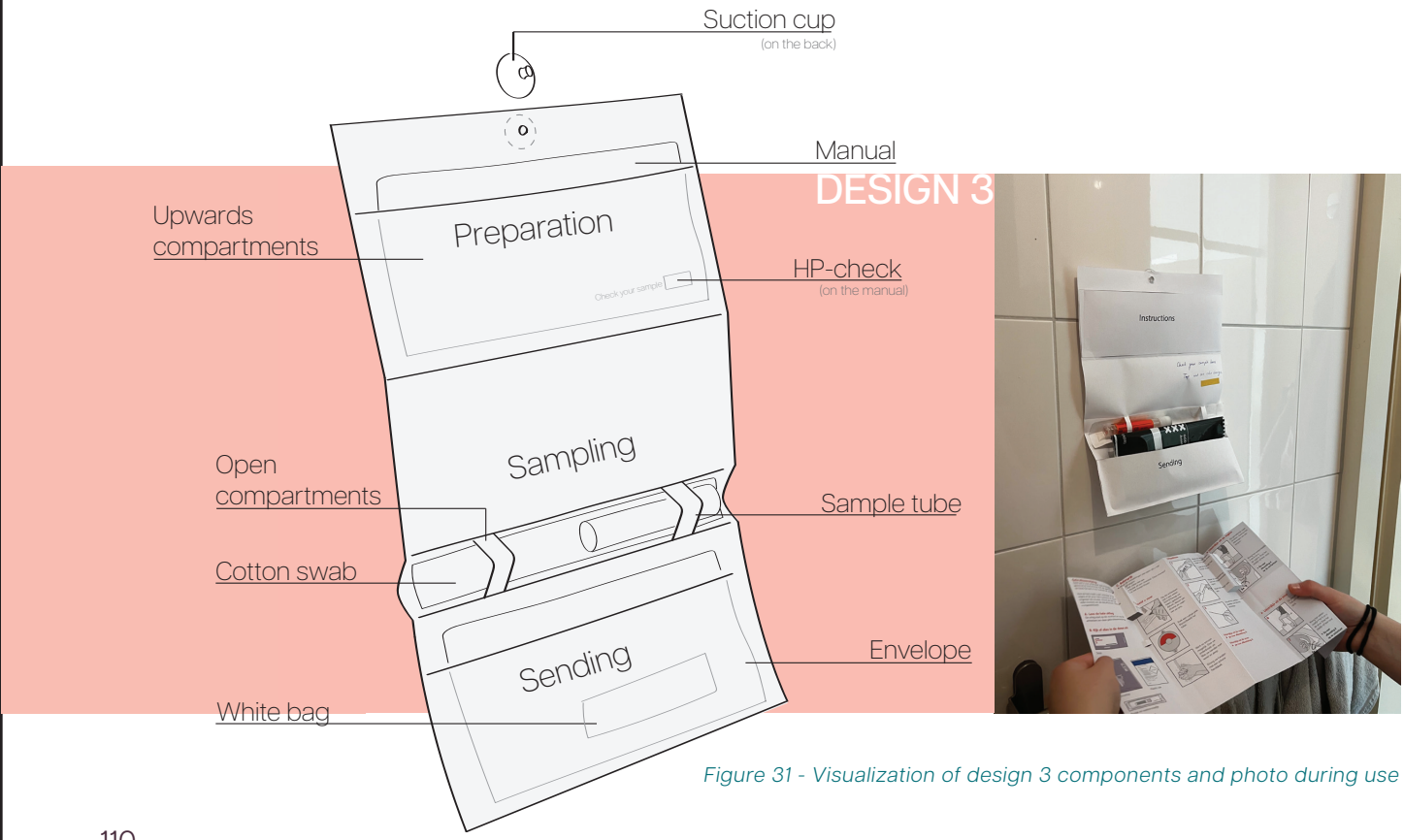


Figure 31 - Visualization of design 3 components and photo during use

User Reactions

Participant interaction with the prototypes revealed that the redesigned packaging with separate compartments improved their ability to understand and organize the required tasks (see interview; Appendix 7.1). The option to hang the prototype on the wall allowed users to engage with the test hands-free, reducing the need to juggle individual components. Among the hanging solutions, the suction cup was preferred, as it allowed flexible positioning and offered numerous placement options.

"For me the compartments definitely improve the workflow of the test."

(User 1, Appendix 7.1)

Participants tested the pH-indicator strips and found the tapping interaction and visible color change playful and unexpectedly enjoyable. However, the color change was too subtle to serve as reliable affirmative feedback. Rather than reassuring users that the sample had been taken correctly, it tended to create more doubt. So, for further implementation, more change in color is needed in order to establish the envisioned effect.

"Maybe if I tap too much or even swipe over the strip it would affect my sample too much? I was worried about that."

(User 2, Appendix 7.1)

Implementations for final concept

The redesigned envelope, featuring sideways compartments and a suction cup for wall or mirror attachment, proved effective, particularly when the contents were clearly visible to the user.

However, the previously proposed use of a pH-indicator strip as a form of affirmative feedback will not be implemented. While intended to reassure users, this feature introduced additional steps that risked causing confusion and raised concerns about potential contamination of the sample.

7.5 Renewing the Design Goal

The initial goal of the project was to understand why users feel a lack of confidence in their own ability to take their own sample correctly, self-efficacy, and find emotional responses to self-sampling in order to find out how I can address these issues through a redesign of the self-sampling kit, while ensuring alignment with existing literature and incorporating feedback from medical experts regarding the medical validity of the proposed design.

Nearing the end of the project, this initial goal still holds. However, based on insights from research testing and design iterations, the manner in which the goal is achieved has shifted slightly. This section is dedicated to rephrasing the design goal and explaining how this change conveys the goal of the project better.

Previous Design goal:

Redesign the home-based self-sample test kit for chlamydia and gonorrhea in a way that fosters a feeling of self-efficacy with the user by providing affirmative feedback while sampling, and improving the ease of use within the context of the bathroom.

(Chapter 6.5)

This design goal implies that affirmative feedback on the correctness of the sample is needed from the self-sampling product while it is used. Although this project explores ways to provide this feedback (Chapter 7), application of product alterations that are needed to provide this feedback are out of the scope of what is obtainable for the GGD Amsterdam.

The renewed design goal incorporates this by shifting the means of how self-efficacy is promoted through the redesign. The new design goal focusses on obtainable ways of promoting self-efficacy beliefs.

New Design goal:

Redesign the home-based self-sample test kit for chlamydia and gonorrhea in a way that ***promotes a sense of self-efficacy by reducing the arousal of negative emotions, acknowledging progress, clarifying instructions, and improving ease of use*** *in the bathroom context.*

7.6 Design requirements

To ensure the steps toward the final design align with the insights gathered throughout the process, it is developed and evaluated against a set of design requirements. These requirements are derived from literature, interviews (Chapters 1, 2, 3, and 4), study findings (Chapter 6), and feedback from users and medical experts involved in healthcare, medical research, and laboratory testing (Chapter 7). Listed below are the requirements, along with a brief description and reference to their origin in the project.

The design requirements are interconnected on many levels, but in order to create an overview, they were divided into three subgroups: User experience requirements, usability requirements and embodiment requirements. The requirements were numbered R1 to R12 and referred to as such throughout the report. More elaborate reasoning behind the requirements can be found in Appendix 8.3.

USER EXPERIENCE REQUIREMENTS

R1 **Promote a sense of self-efficacy**

(see literature; Chapter 3.2 and results; Chapter 6.4)

The final design should **enhance the user's sense of control, offer better overview, and foster a feeling of accomplishment** throughout the sampling process.

R2 **Affirmative feedback**

(see results; Chapter 6.2.3 and prototype testing; Chapter 7.4.1)

The redesign should **provide the affirmation the user needs to resolve feelings of doubt after a decision is made.**

USABILITY REQUIREMENTS

R3 Improved overview

(see results; Chapter 6.3 and session with female users; Chapter 7.4)

The redesign should **create a sense of closure after each phase** by signaling completion and removing or minimizing information that is no longer relevant. The redesign should **enhance the user's sense of overview and control.**

R4 Clarity

(see results; Chapter 6.2 and session with experts; Chapter 7.4)

The redesign contains instructions that are both **clear and concise**, to provide essential information without patronizing or overloading the user.

R5 Segmentation of information

(see results; Chapter 7.4.1 and literature; Chapter 8.1.1)

The redesign should incorporate a **step-by-step introduction of tasks**, to reduce feeling overwhelmed and enhance overall task performance.

R6 Simplicity

(see session with female users; Chapter 7.4 and interview with experts; Appendix 8.2)

The redesign must **reduce the number of steps needed to take the sample as much as possible** and **arrange the components of the test** in a way that interpretation of when and how to use the components is easier.

R7 Inclusiveness

(see interview with experts; Appendix 2.1)

The redesign should **ensure that the test's versatility is not compromised.** For example, by being mindful not to exclude certain groups in society.

EMBODIMENT REQUIREMENTS

R8 Context suitability

(see results; Chapter 6.2 and prototype testing; Chapter 7.4.3)

The redesign should **help to reduce frustration and discomfort**. By better fitting the context, the new design should support a more positive emotional state during sampling.

R9 A medically reliable appearance

(see interview with experts; Appendix 2.1 and results; Chapter 6.3)

The redesign should **convey medical reliability** though the designed look and feel of the product.

R10 Feasibility for the GGD Amsterdam

(see interview with experts; Appendix 2.1 and session with experts; Chapter 7.4.2)

The product must be **feasible for the GGD as an independent organization**, without having to rely on external medical manufacturers. Simultaneously, the redesign must stay within a similar price range for manufacturing.

R11 An approachable appearance

(see results; Chapter 6.3)

The redesign should **appear approachable to users** by providing clear achievable steps and gradual introduction of new information and components.

R12 High-quality look and feel

(see results; Chapter 6.3 and session with female users; Chapter 7.4)

The materials used for the redesign should **feel sturdy** and have a **clean finish.**

Main insights | Chapter 7

- *Ideation is started by implementing the insights from Chapter 6 and rewriting them as **how-to's**. Working with how-to's focused on only one insight enabled creative freedom at the start of ideation. How to:*

  Give affirmative feedback
  Place objects in bathroom
  Contain components
  Open container gradually
  Provide information
  Protect sample
  Create overview

- *The iteration, testing and prototyping of 10 ideas in phase 2 lead to new insights and requirements that the ideas would have to meet. Running into and trying to solve shortcomings of the ideas helped in defining new directions and letting go of inadequate solutions. The ideas had to pass the following criteria:*

  Simplicity
  Feasibility for the GGD
  Inclusiveness

- *The 5 concepts selected in phase 2 are refined and tested by means of design sessions with medical experts and users. Leading to new insights and concerns.*

  A clarified view on what is feasible for the GGD
  Users emphasize the need for simplification of the use-steps
  Users explain that affirmative feedback might not be necessary if the instructions are clearer about how to take the sample.

- *The PH-indicator does not work well enough to provide affirmative feedback and the components should be at least partially visible when stored in the envelope.*

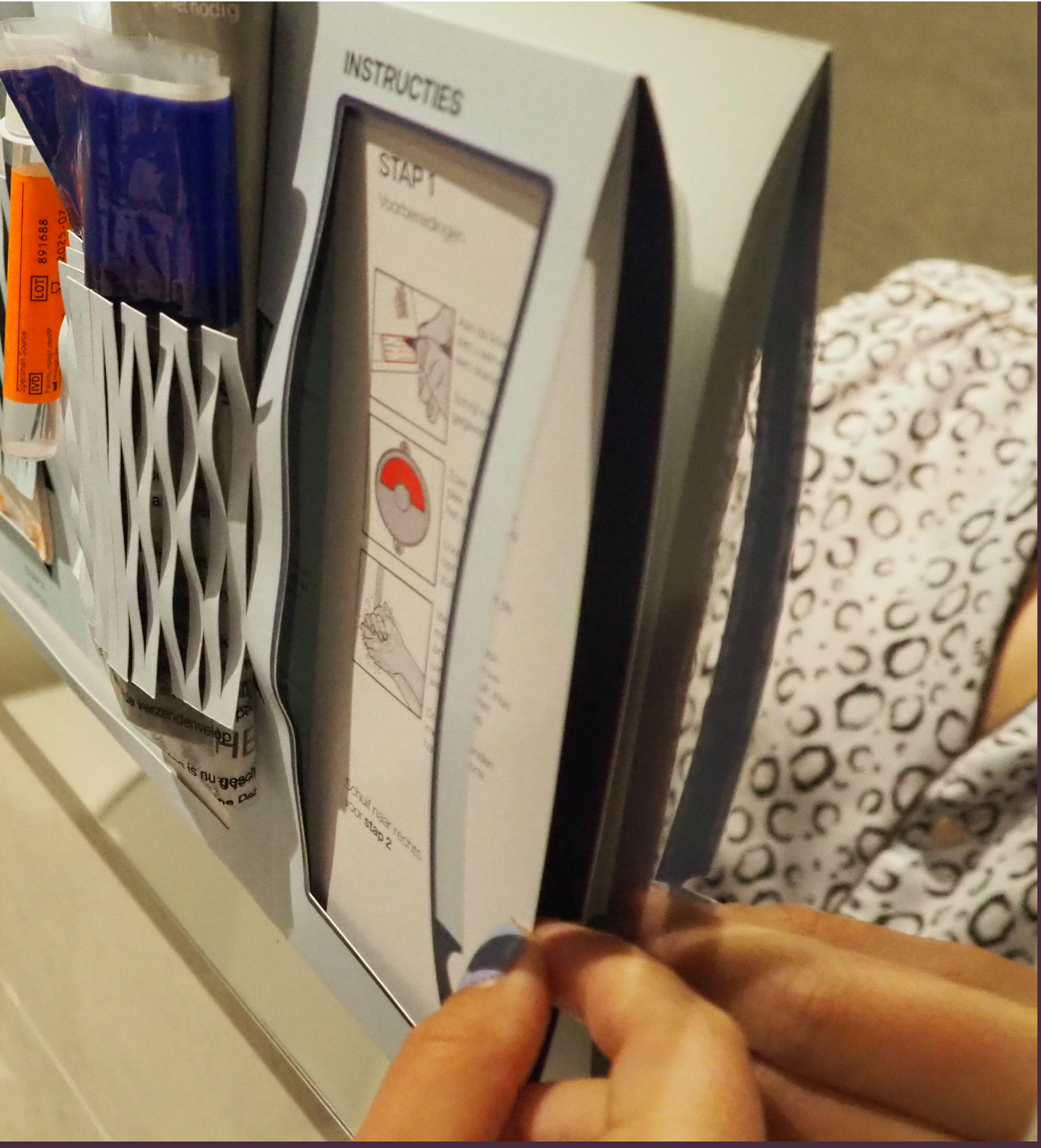
- *The collected insights result in a **renewal of the design goal** in Chapter 7.5 and in a list of **final design requirements** in Chapter 7.6*

7


Ajax
kleurwielen
COVID
IKEA
Veel afval = slecht milieu
BIOHAZARD
Laboratorium vibes blauwezak
associations
Roode letters Agressief
Precies Ongemakkelijk
Rustige kleur
Kleurdoos = pasen
Veel dingen onoverzichtelijk veel tekst weinig info kinderachtig
medisch doosje Corona serieus Fijne kleur
oranje = gevaar
Verwarring (zo veel zakjes met generieke
plastic bestek in vliegtuig
Vuilnis (plastic/empty)
Friends that test help you to go test
Eenzaam
What is it like for a woman to do a self-sample test
feelings, attitudes and
they have
De self-sample test van de toekomst
in bioles
badkamer
thuis
privé
positief ervaring
beloning
gratis
makkelijk
abbonement
niet nodig
niet digitaal
duidelijk
verkrijgbaar bij supermarkt
Verweven met dagelijks leven
Relaxed
Whenever I want
Stall all things on table
Read manual more carefully
Hoi
@home
Waiting for result
anxious
@Hospital
Veilig/onveilig
Spannend
Taboe
Ongemakkelijk/onhygiënisch
Kwetsbaar
Afwachten
GGD Amsterdam
Streeklaboratorium
1. CNT SWAB
Fabrique
post ID
bruynzeel
graphite pencils

8.

The final design



After multiple rounds of iterations, the previous aspects of initial concepts, as presented in Chapter 7, that showed potential converged into a final concept that meets the requirements to align with the project's design goal. This chapter presents the final concept and elaborates on how the redesign addresses its requirements.

8.1 The Stepwise kit

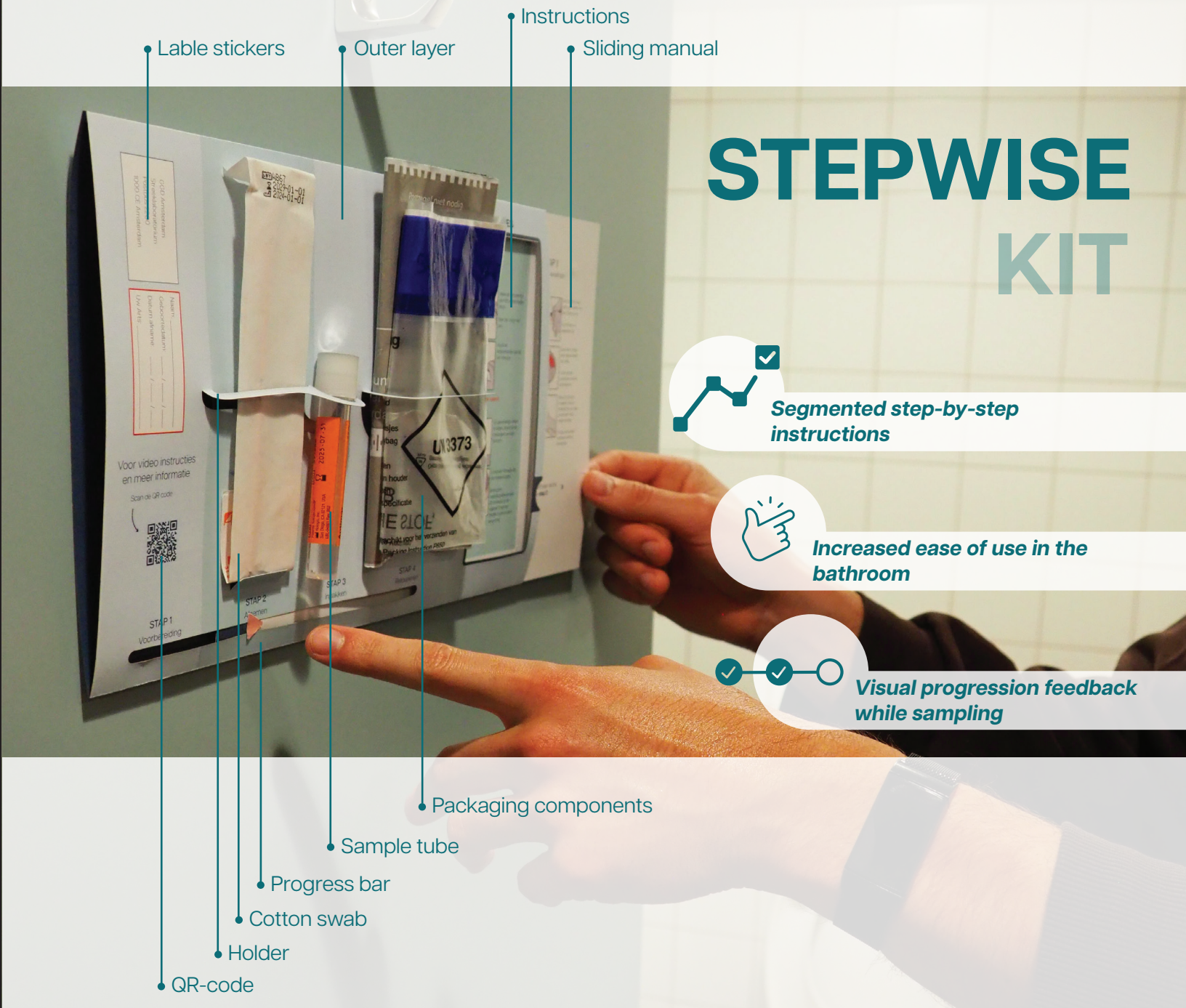


Figure 32 - Visual representation of the Stepwise kit

IMPLEMENTED BENEFITS

The Stepwise kit introduces a new, guided way of taking your sample at home. It breaks down the sampling procedure into clear, approachable steps, providing users with a sense of order, simplicity, and progression when self-sampling. Furthermore, the Stepwise kit facilitates ease of use in private settings such as the bathroom, by allowing the user to hang the kit on a wall or mirror using suction caps integrated on the back.

The instruction sheet can be slid incrementally out of the envelope, revealing information step-by-step to the user in bite-sized segments. This guided interaction should minimize cognitive load and helps the user guide their attention.

A progress bar located at the bottom of the instruction sheet provides visual feedback on the user's progress through the procedure. It also indicates which components are needed at each stage, reinforcing clarity and orientation.

The Stepwise kit has been designed to align with the manufacturing capabilities of GGD Amsterdam. It can be easily produced and assembled in-house without requiring large-scale modifications or involvement from external parties.

USER SCENARIO - STEPWISE KIT

This paragraph sketches an overview of how the Stepwise kit, containing the swab test, is used by the client at home.

The Stepwise kit is received in an A4 package in the mail (1 and 2). When the user is ready to start the sampling process, the envelope is opened and the stepwise kit is slid out (3). Upon first inspection, the user finds a QR-code that guides the user to video instructions (4 and 5). When the user knows what to expect, they sign their information on the label (6) and take the Stepwise kit to the bathroom (7). There the kit can be mounted on the wall (8) using the suction cups on the back. After washing their hands (9), the user slides the instructions to reveal the next steps (10). The progress bar points out what component to use as the user takes out the swab (11) and opens it (12 and 13). The cotton swab is inserted into the vagina to take the sample (14). The user slides the instructions to the next steps and takes out the indicated tube (15). The cotton swab is placed inside the tube and is snapped off (16 to 18). The lid is screwed on (19) and the label is placed on the tube (20). As the user slides the instructions to the next step, they notice that they have reached the last step (21). The packaging materials are taken out of the Stepwise kit (22) and the tube is put into the safety bag (23 and 24). The safety bag is put into the envelope (25 to 28). For proper disposal, the suction caps can be removed (29) and the rest of the kit can be recycled with paper waste (30). Then the sample is ready to be sent to the lab (31).

USE SCENARIO STEPWISE

Figure 33 - User scenario of the Stepwise kit at home

MANUFACTURING

The Stepwise kit is designed so it can be manufactured by the GGD's current boxes manufacturer, called Koninklijke Van der Most. The product consists of two carton sheets that need to be printed and cut. The templates for this print are shown in Figure 34. The envelope sheet needs to be cut, folded, and a glue strip needs to be applied. The instruction manual is only cut to size. These manufacturing steps can be done at low cost and are very similar to manufacturing steps that are currently being taken.

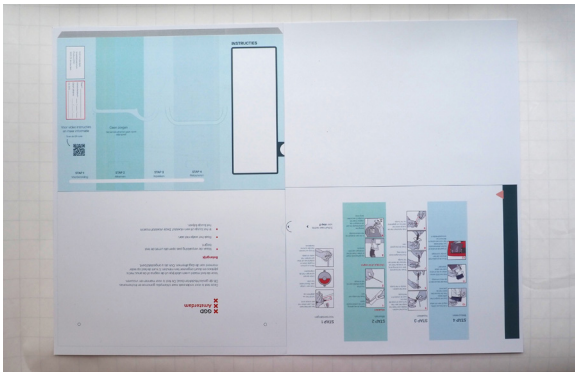


Figure 34 - Templates for production - Stepwise kit

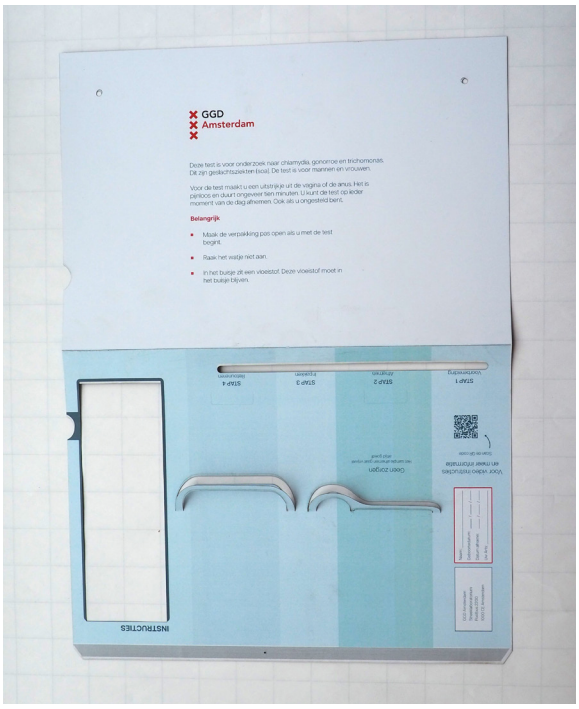


Figure 35 - Cut out templates - Stepwise kit

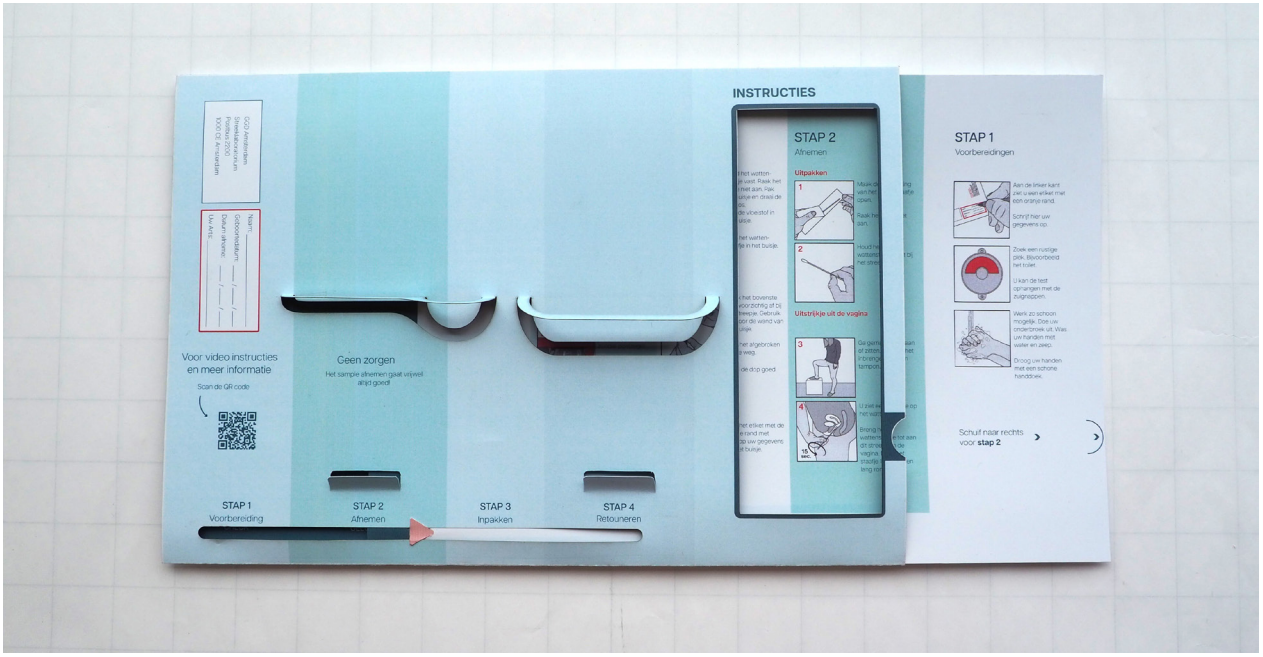


Figure 36 - Folded Stepwise kit

ASSEMBLY

The components need to be slid into the holders (Figure 37), the suction caps are fastened through the precut holes on the back (Figure 38). The assembled kit is designed to fit within an A4-sized mail package, making it suitable for postal distribution to clients. In cases where the kit is not sent by mail, it can be placed in an alternative type of envelope. Regardless of the distribution method, the kit must be packaged in a way that secures and protects the components during handling and transport.

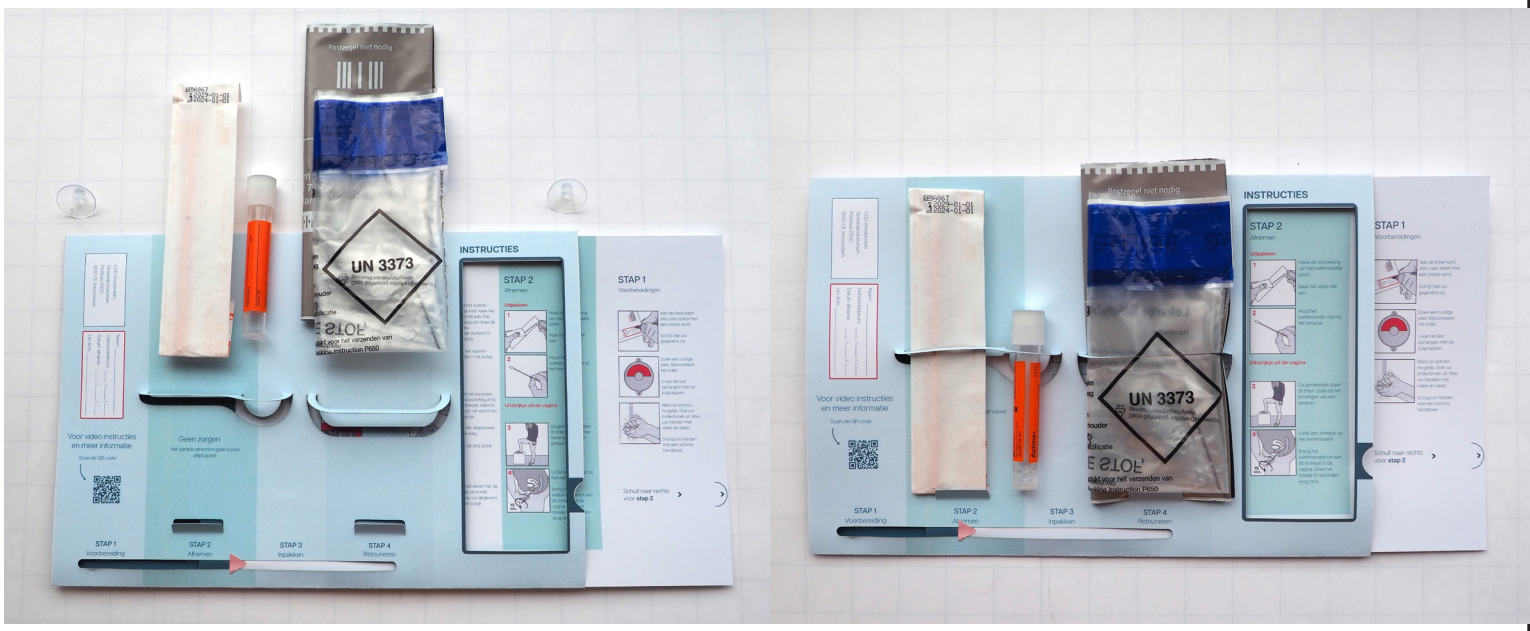


Figure 37 - Assembling the components into the Stepwise kit

Figure 38 - Attaching the suction caps on the back

8.2 Requirement implementations

The following section elaborates on how specific aspects of the redesign correspond to the established design requirements. Each paragraph addresses a particular subdivision as outlined in Chapter 7.6 and visualized in Figure 39.

Figure 39 - Visualization of the devision of requirements

USER EXPERIENCE IMPLEMENTATIONS

Progression feedback

When sliding the instruction card to the right, the progress bar on the bottom of the Stepwise kit indicates where you are in the process and what steps are completed (Figure 40). Indicating the user's progress through visual and interactional feedback. Highlighting the progress the user makes towards achieving their goal (taking a sample correctly) is believed to promote a sense of self-efficacy (Chapter 3.2) and corresponds to the requirement as explained in Chapter 7.6.

Figure 40 - Photo of the progress bar

USABILITY IMPLEMENTATIONS

Simplicity in use

In line with the simplicity requirement outlined in Chapter 7.6, the number of steps required to complete the self-sampling process has been reduced from 17 in the original kit to 12 in the Stepwise kit. This reduction is primarily the result of a streamlined packing procedure.

In the original design, the packaging process consisted of four distinct steps, as illustrated in Figure 41. The white bag was redesigned to provide a hard cover to protect the tube, the box therefore became redundant. Eliminating the box saved material, but more importantly, saved multiple use-steps when packing the sample.

Two new designs for hard covers are introduced in Figure 42.

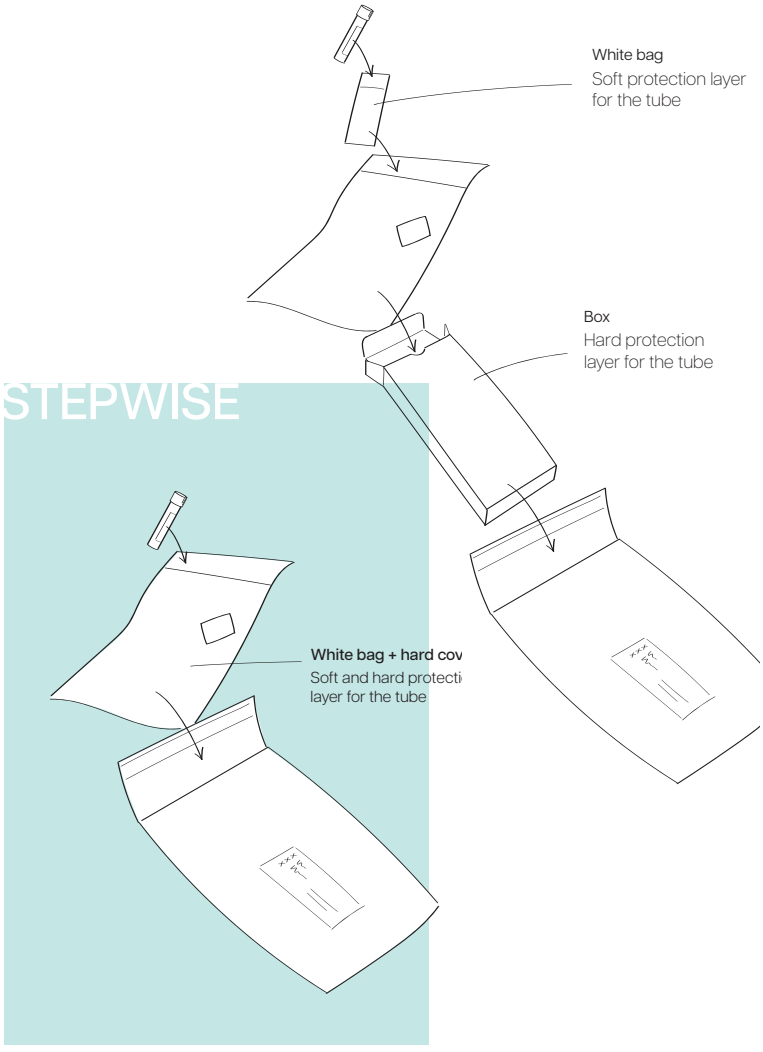


Figure 41 - Streamlined packaging procedure on simpicity

Design 1 is a pre-manufactured PP component that is produced using injection molding. Design 2 involves folding a cover from a rigid, bendable sheet of polypropylene or PET. While the manufactured version offers a more refined and consistent appearance, it would require mass production, which may be challenging for the GGD to implement. The folded design can be produced in-house but must be folded manually, which would increase the labor involved in assembling the self-sample kits.

The white bag and the hard cover are fastened to the inside of the blue safety bag. Doing this allows the user to put the sample directly into the blue safety bag, takes out another use-step and reduces the number of loose components.

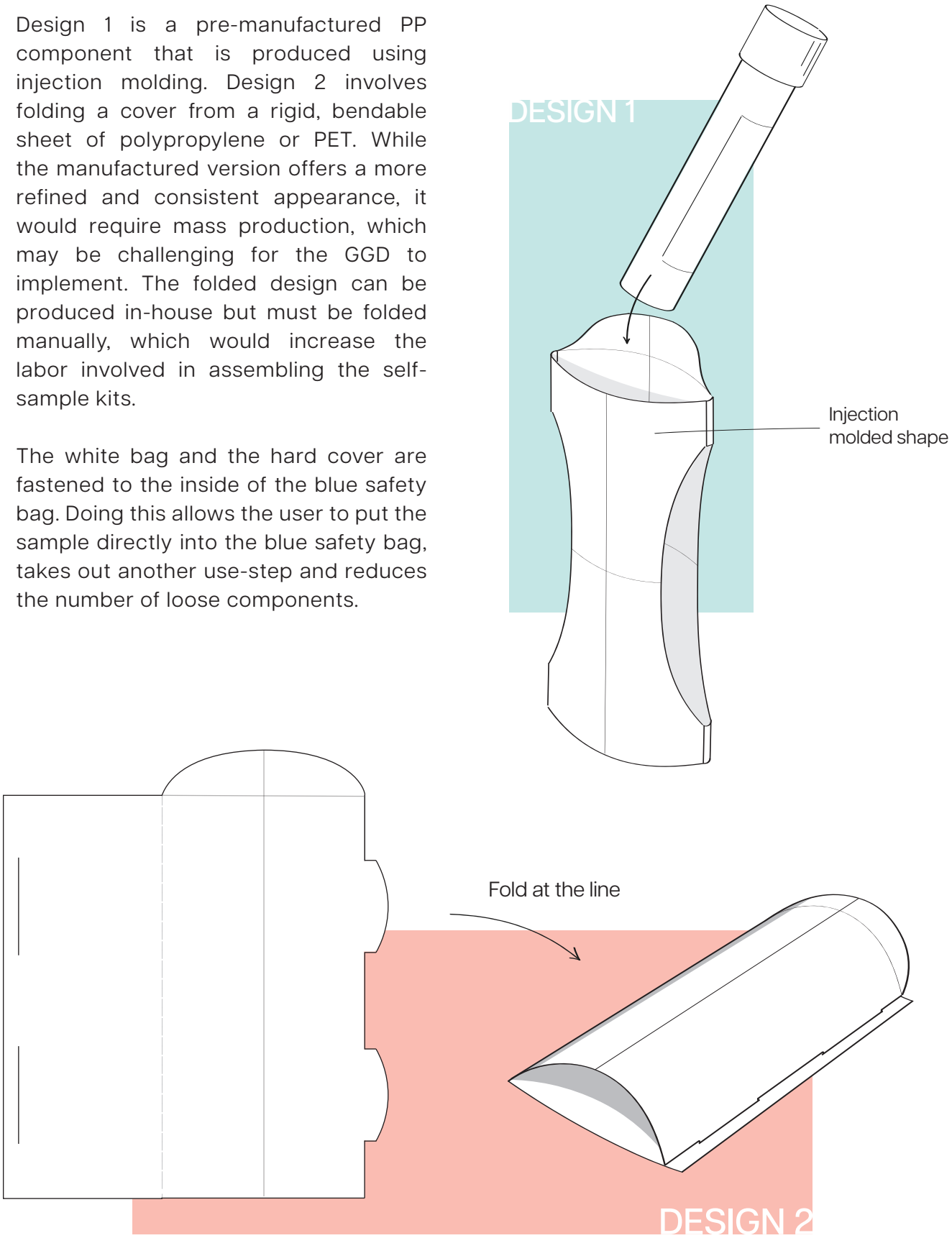


Figure 42 - Sketch of design 1 and 2 of the hard cover

Information design of the manual

Participants from both the generative session (Chapter 7.4.1) and the MES (Chapter 6.2) expressed a shared need for clearer, more reassuring guidance on how to correctly collect a sample. According to the participants, the current instructions are vague and suggest that the sampling process must be executed with high precision, while in reality, it is quite forgiving.

Participants were unsure whether the swab should be rotated in a circular motion or spun along its own axis. Although both actions are thought to be equally effective by experts, as long as the swab remains in contact for over 10 seconds. This ambiguity contributes to user's uncertainty.

The illustration and accompanying instructions in question appear as step 5 in Figure 43. The results of the study point out (Chapter 6.2) that not all users are confident in estimating a depth of 5 to 6 cm, and counting the rotations of the swab proves difficult due to its cylindrical shape. (see generative session 7.4.1) In the redesigned instructions, the text has been revised to: ***"Breng het wattenstaafje tot het streepje in de vagina. Draai het staafje 15 seconden lang rond."***

This revised wording eliminates reliance on measurements that may cause doubt during sampling. The target depth can be confirmed by feel, and users are generally more capable of estimating time than tracking specific movement patterns. As a result, the updated instruction likely enhances clarity and confidence in correct test execution.

Figure 43 - Visualization of changes in instructions

Video-based instructions

Interviews with users (Chapter 7.5) pointed out that there is a need for more visual information in the form of instruction videos as extra explanation on top of the illustrated instructions. Users think seeing instruction videos before or during sampling will decrease their feelings of doubt when sampling. Research done on the effectiveness of visual-based interventions in health care supports this assumption. Video-based instructions particularly, are effective for improving the comprehension of health-related material (Galmarini et al., 2024). This provides reason to assume that the inclusion of video-based instructions may support the design requirement for clarity of instructions, as outlined in Chapter 7.6.

The instruction videos are already made by GGD Amsterdam and can be found on their website. However, users hardly ever find these instructions when self-sampling. Access to the video instructions is integrated in the product through a QR-code on the envelope that is introduced to the user when preparing for the test. The user can prepare for the test by seeing the video of the process according to their own desire.

Step-by-step instructions

The current manual presents all instructions at once, which can overwhelm users as they familiarize themselves with the sampling process. This issue is evident in the micro-emotion scan timeline (see Chapter 6.2), where confusion and reluctance occur early in the process. Ideally, users should receive context-specific information at the appropriate moment in the process, aligned with each stage of the test kit's use.

Implementing a structured, step-by-step instructional format can improve user comprehension and reduce errors. Segmenting instructions and revealing them progressively is consistent with principles from cognitive load theory (Sweller, 1988) and helps prevent information overload and supports better task performance (Shang, Li, & Li, 2023).

To address this, the instructions have been redesigned to appear in separate rows, one row signifying one step in the process. Step 1 is the preparation prior to sampling, step 2 focusses on taking the sample, step 3 is packing the sample tube and step 4 is preparing the return package. While going through the steps, the user's attention is guided to the step at hand by revealing it to them when they slide the instruction card. The progression through the steps is visualized in Figure 44.

Figure 44 - Visualization of sliding manual

EMBODIMENT IMPLEMENTATIONS

Creating unity

The Stepwise kit contains all the needed components and instructions in one place on the wall (Figure 45). This provides a better overview than working with multiple components scattered through the bathroom. This lines up the product with the design requirements for context suitability and creates overview (Chapter 7.6) Guiding the users attention enhances the likelihood that users remain in their flow and addresses the motivational dilemma identified in Chapter 6.3.

Figure 45 - The Stepwise kit mounted on the wall

Revising the look and feel

In Chapter 7.4, important aspects of the self-sample kit's visual and perceptual design were identified as areas for improvement. To reduce user's associations with "trash" or "cheap disposable products" (see Interview with experienced users, appendix...), unnecessary and visually inconsistent packaging elements were removed. Instead, all components were integrated into a uniform and structured presentation.

Where possible, technical jargon and unclear medical indications were removed from individual components, where possible, to avoid confusion. Additionally, harsh warning colors such as orange and yellow were replaced with calming hues commonly associated with medical environments, such as light blue, mint green, and other soft pastel tones. These colors are known to evoke feelings of calm and reassurance in healthcare contexts (Walsh & Philbin, 2011; Spence, Velasco, & Knoeferle, 2014). By applying principles of color psychology, the redesign fosters a more approachable appearance for users, minimizing the perception of the kit as "aggressive" or overly clinical. Attributing to the requirement of attaining a clinical look and feel (Chapter 7.6)

The envelope is designed to be sturdy so that it feels like a high-quality product (Chapter 7.6) , within the margins of what is reasonable for a disposable product.

Feasibility considerations

In order to produce a product that is adoptable for the GGD Amsterdam as a standalone organization, the redesign is restricted to low-cost materials and production methods. This leads to a renewal of only in-home produced components and a low-effort and low-tech manufacturing process.

Versatility of concept application

The division of instructions into four distinct steps can be applied across all self-sampling tests offered by GGD Amsterdam, as these tests share a consistent procedural structure:

preparation, sample collection, packaging, and return shipment. While the specific instructions and compartment dimensions may vary depending on the type of test, these are considered minor adaptations in the template.

The holder designs shown in Figure 46 are a more versatile design, as it can stretch around differently sized components. The number of and the length of the incisions made in the cardboard define the stretchability of the holds. Smaller incisions, like in Figure 46, cause the hold to be more rigid and wraps more tightly around the components it holds. Longer cuts, like in Figure 47, result in a looser but more stretchable holder. As such, the Stepwise concept is transferable and can be implemented for other self-sampling kits within the GGD's range.

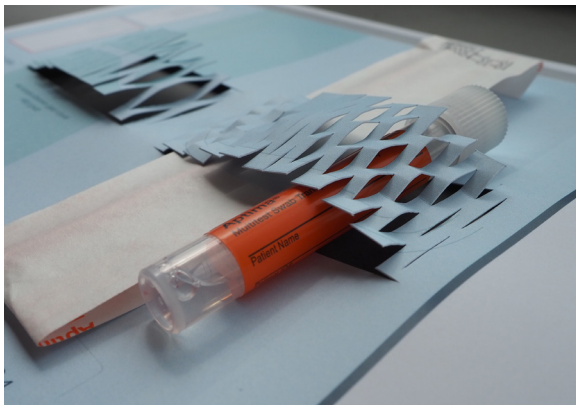


Figure 46 - New holder design (more rigid)

Figure 47 - New holder design (more flexible)

9.

Evaluation

In this chapter, the final design of the Stepwise kit is evaluated through a micro-emotion scan followed by a qualitative interview in which the requirements were discussed. The micro-emotion scan was done identically to the one described in Chapter 5, only this time, the Stepwise kit is used. The results are analyzed and formulated in recommendations for continuation of future development of the Stepwise kit.

9.1 Performance expectations

The final design has been prototyped into a fully usable version, allowing participants to interact with it as they would in a real-world scenario. The hypothesis is that the improved instructional guidance and progress affirmation will strengthen participants' sense of self-efficacy during sampling and increase their trust in the results afterward. Additionally, the self-sampling process is designed to be more comfortable to perform in a bathroom setting, aiming to reduce the likelihood of negative emotional responses.

However, since the prototype includes several new implementations (Chapter 8.2), it is expected that some unforeseen issues may emerge in the user experience. These potential challenges are addressed in the chapter's conclusion and reflection.

9.2 Method

Three participants were recruited for this evaluation of the concept, consisting of all female users N=3, out of which two participants that are familiar with the existing sample kit, so that a comparison can be made between the old and the proposed redesign. It is acknowledged that participants with previous experiences might be biased due to knowledge of components and usability. Therefore, one participant without previous testing experience is asked to participate in the evaluation. This is important to obtain insights in how this test is perceived by first time users. Participants were selected based on identical demographic criteria to the previous tests (see Chapter 5.1) to ensure a homogeneous sample within the target age group of 25 to 30 years old.

DATA COLLECTION AND ANALYSIS

For similar reasons to the ones named in Chapter 5.2, participants recorded voice memos during self-sampling to document their experiences. The real-time emotional responses were collected using micro-emotion scan (MES) techniques (Desmet, 2023).

The responses from the qualitative interview were recorded and transcribed. These responses were

analyzed on the basis of the design requirements presented in Chapter 7.6 and insights that can be meaningful for further development of the design were presented in the results. The interview questions were composed to be open ended and non-leading, according to guidelines for qualitative evaluation methods presented by Patton (2002). The questions were aimed to touch upon pragmatic usability, but also to understand the user's feelings of control, accomplishment, and positive emotions in a holistic way. Hassenzahl (2010) composed a set of guidelines to ensure holistic questioning, that were taken into account.

Follow-up questions were asked to help participants elaborate on their findings and to provide more clarity on the underlying reasons behind their answers in relation to the product. All questions and follow-up questions can be found in Appendix 11.2.1.

PROCEDURE

The procedure of this evaluation test consists of three steps

- **Intake conversation**
- **Micro-emotion scan (MES)**
- **Qualitative interview**.

Intake conversation

The participants with previous knowledge about the existing product (PE1 and PE2) did an intake conversation to refresh their memories with sampling, because these are reflected on and compared to the redesign. Throughout this conversation I asked them questions about what they remember from self-sampling, and they are able to interact with the test kit they used before to help bring back memories.

Micro-emotion scan

The way the MES is conducted is identical to the procedure presented in Chapter 5.1. However, this time based on the user-experience with the Stepwise kit. The Stepwise kit was packaged in an A4-envelope, as shown in Figure 48 and put into the mailbox of the participant, so they received the Stepwise per mail and included these use steps in the evaluation test.

Figure 48 - How the Stepwise kit is found in the mail box

Qualitative Interviews

The qualitative interviews were conducted consecutive to the MES. The questions were asked in a way that ensured that all the design requirements were touched upon at least once. During the interview the participant was able to interact with the prototype to help recollect findings more easily.

9.3 Results

The results from the interviews and MES were analyzed to find overarching themes among each requirement that was tested for (Chapter 7.6). In this paragraph, insightful results that inspire further development for the redesign are presented.

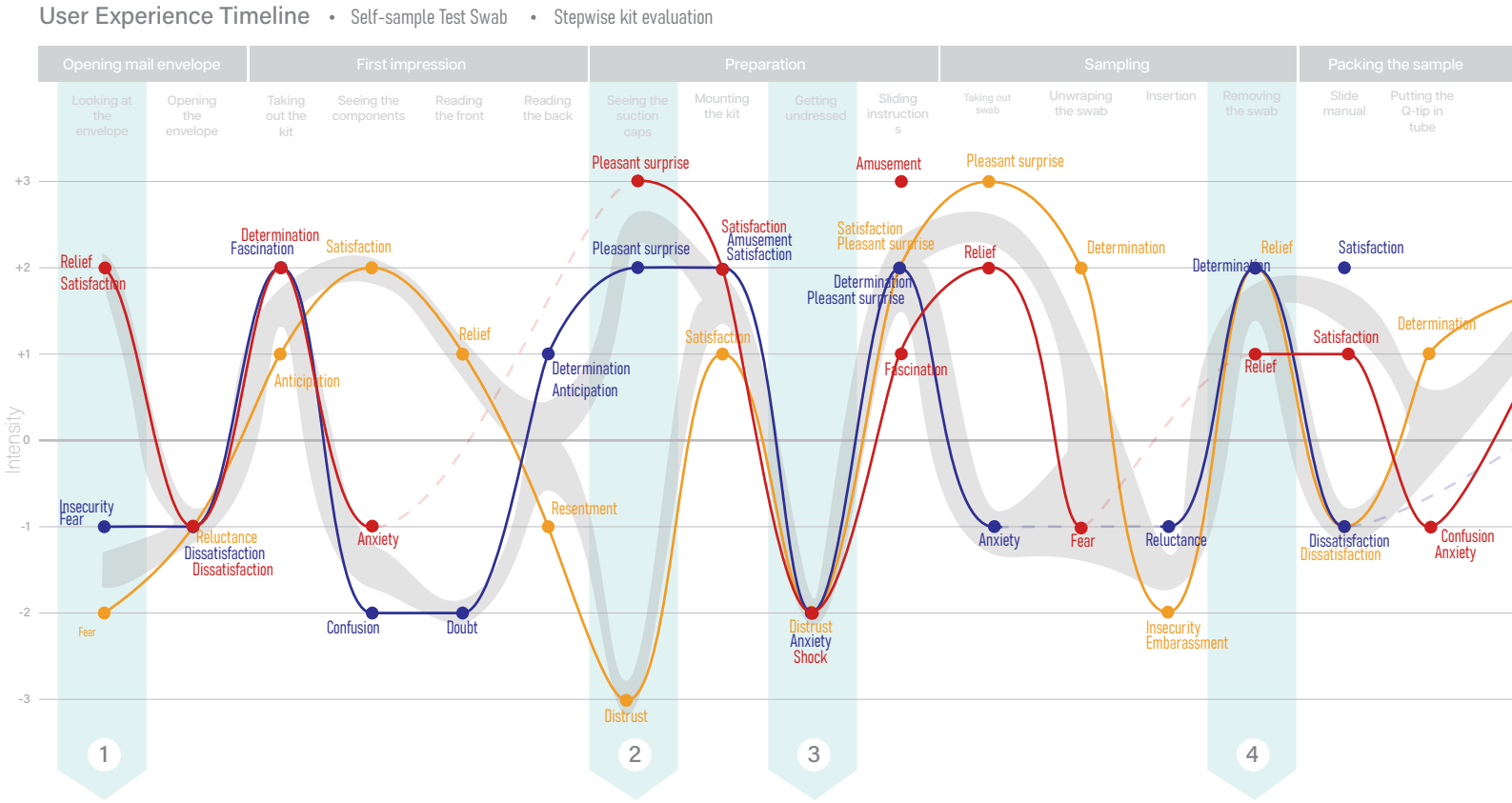
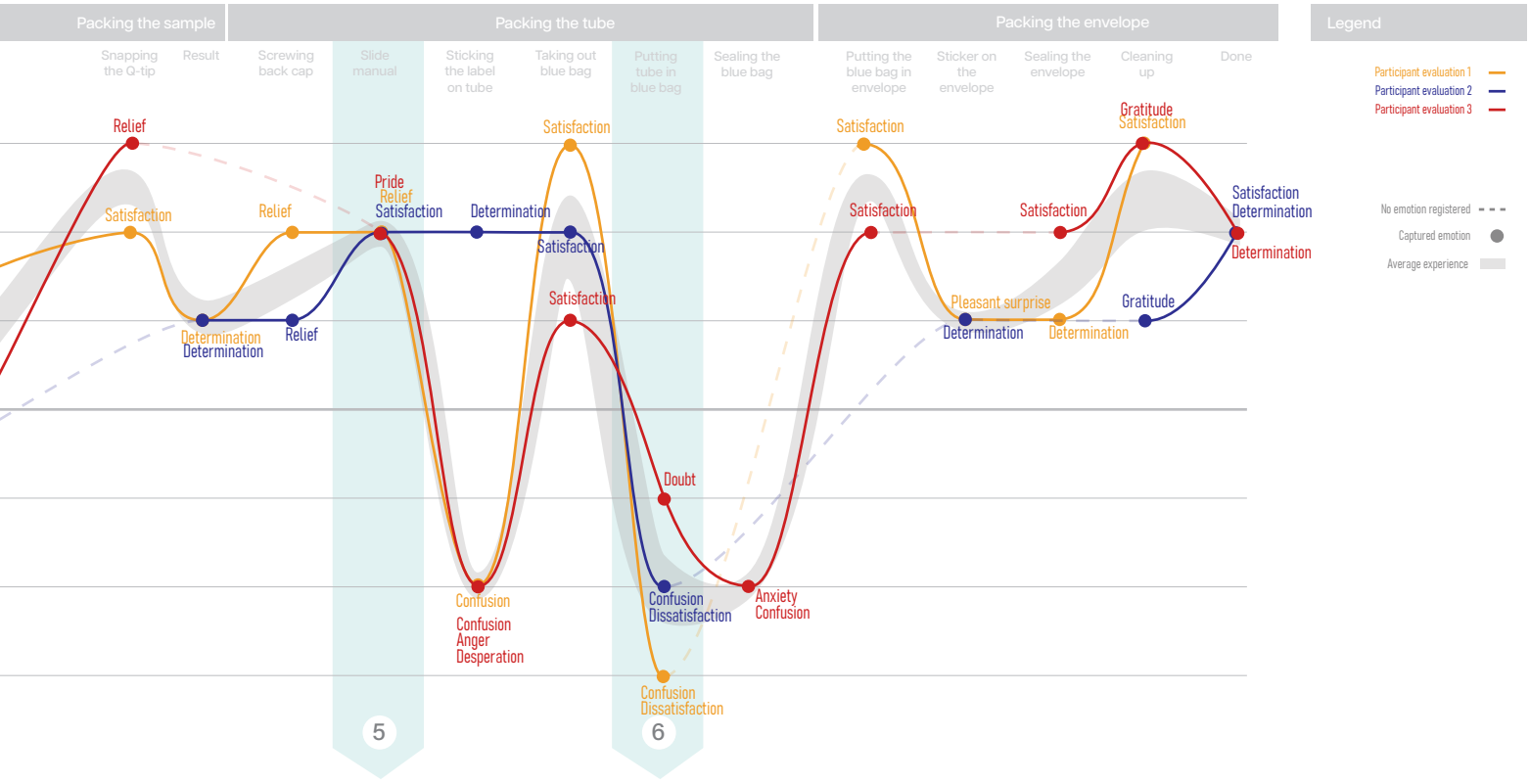


Figure 49 - Micro-emotion scan timeline of the Stepwise kit test



All three participants said to be confident that they took the sample correctly, whereas with the original test kit only 2 out of 6 felt that way. Looking at the MES timeline in Figure 49 the overall emotional experience of the participants seems to be more positive than the MES results with the original product (Figure 21).

More frequently, instances of determination and relief are measured. Though the step-by-step dosage of information was said to be perceived positively by the participants, not fully knowing what the next step would be, caused negative emotions like anxiety and insecurity at times.

MICRO-EMOTION SCAN RESULTS

1

Emotion:
Fear

Stimulus event:
Seeing the large size of the envelope

Motive:
I want the test to be easy and quick

Upon receiving the envelope, the participants felt fear. Which was mainly due to the size and anonymity of the package. There was no indication that the package was sent by the GGD, which was on the one hand frightening and on the other convenient for privacy reasons. **The large size of the envelope was intimidating** to the participants and created the assumption that the sample test inside would be big and complex too.

2

Emotion:
Pleasant surprise & distrust

Stimulus event:
Seeing the suction caps on the back

Motive:
I want the test to be comfortable & I want to be able to trust that it does not fall

When the participants saw the suction caps on the back of the sample kit, some were pleasantly surprised, and others felt distrust. The feeling of distrust came from past experiences with suction caps and an established disbelief that they would stay stuck on the mirror. **Even though the Stepwise kit did not fall during sampling, the participant felt a constant fear that it might fall.**

3

Emotion:
Distrust

Stimulus event:
Taking off the underwear before seeing the next steps

Motive:
I want to know what I take my underwear off for and for how long.

In step 1, the participants were instructed to take off their underwear, while the steps for taking the sample were still hidden under step 2. This caused distrust due to **not knowing what is going to happen in the next steps** and how long they have to keep their underwear off for. Although segmentation of the steps was appreciated by all participants, having to blindly follow instructions without knowing what comes next, understandably, causes negative emotions.

4

Emotion:
Relief & Determination

Stimulus event:
Removing the swab after sampling

Motive:
I want to be sure that the sample is taken correctly

When making the decision that the sample is taken well enough, they remove the swab from the vagina and feel relief and determination. During reflection on the process participants explained that they counted in their head and **were sure the sample was taken correctly after 15 seconds.**

5

Emotion:
Relief & Pride

Stimulus event:
Sliding the manual to the last step

Motive:
I want to be done with the test

Upon seeing the progress bar slide all the way to the last step, the participants feel relief and pride that they have come so far. This seems to create a moment of closure of the previous steps.

6

Emotion:
Confusion & dissatisfaction

Stimulus event:
Trying to put the tube in the cover

Motive:
I need to know whether I put the tube in the right way

The design of the hard cover is experienced as dissatisfying by the participants. This is mainly because of the tight fit of the cover around the tube. The participants miss a form of product feedback, like a click, that tells them they put the tube in the cover correctly. The slight struggle to insert the tube caused confusion.

INTERVIEW RESULTS

The main insights regarding the requirements the participants are interviewed on, are presented separately for each requirement. All findings can be found in Appendix 11.2.

R1 Promoted self-efficacy

Participants expressed that the guidance they experienced in the step-by-step instructions helped them feel more confident about their actions.

"The clear and guiding steps helped me feel confident in the process as well."

(PE1)

"Because I felt like I did all the steps. I didn't really doubt my actions related to the test"

(PE2)

They also indicate that this supported confidence is still quite fragile and small inconveniences, like the tube not fitting in the cover perfectly, can easily throw them off.

"Very small inconveniences can already make me question whether I am doing this right."

PE1

R2 Affirmative feedback

The participants recognized the affirmative feedback they received from the Stepwise kit in the way the instructions were easier to interpret.

"The 15 sec counting helped. I felt determined that I took the sample for long enough this time."

PE2

Also, the acknowledgement of their progress in the bar was perceived as affirmation that they were doing well.

R3 Improved overview

The participants expressed that the reduction of information helped in establishing an overview for them.

"I have more overview for each step, whereas first I was a bit overwhelmed by the amount of information."

(PE1)

However, the overview was also compromised according to the participants. The Stepwise kit does not allow prior inspection of all the steps.

"I also remember from the last test that I did, is that I first read through everything. And then I started doing it. Whereas with this one it's meant to kind of read as you go and for me that is not how I would usually do it."

(PE1)

And the back of the sample kit contained some information, however the participants did not read this information. This is probably caused by hesitation in holding the test upside down, as they were afraid components might fall out when they did so.

"I completely missed the back of the test. I didn't look at it. And I think that is because i don't want to hold it upside down."

(PE2)

R4 Clarity

Some participants said to miss some introduction to the test before starting it. To check if you have all the components and see if it is the right test.

"I lacked information on where to start. And a clear introduction."

(PE2)

R5 Segmentation of information

Participants explained that they liked the amount of information they received per step. However, again, sometimes they wished to know the steps prior to the moment of introduction of new information.

"I did have points where I kind of wished I knew it sooner, in advance. But I didn't, because I was only reading my own step."

(PE3)

R6 Simplicity

Both the first time user (PE3), and the second time users (PE1 and PE2) found the whole procedure simple. The indications and names of the steps helped in conveying simplicity.

"I found it very simple. Actually, it was much simpler than I expected."

(PE3)

"When I was actually doing it felt very doable. Yeah, also being able to see already the names of the steps helped."

(PE1)

R8 Context suitability

The Stepwise kit was found to fit the context better than the previous product. This is also found in the reduction of negative emotions in the MES.

"No discomforts, especially not if I compare it to the previous tests that I've done."

(PE2)

R9 Medical reliability

The look and feel of the test was perceived as medically trustworthy by the participants, due to the color and how the components were orderly placed.

"It looks clean and like something you need to take seriously if that makes sense."

(PE2)

"So in a medical sense, I like the colors for it. I associate these colors with healthcare and calmth"

(PE2)

The reduction of information was perceived as non-medical, because the participants associated medical instructions with large amounts of text.

R11 approachable appearance

The appearance of the Stepwise kit was not perceived as particularly approachable by the participants. This was mainly due to its bulkiness. All components are mounted on the front of the product, this resulted in the participants not being sure where to look first. Due to the appearance of the product, the participants still felt overwhelmed when unpacking the Stepwise kit.

"I didn't really know where to look, and I think I also said something about, the thing being very big, like the stuff from step four."

(PE2)

"It was overwhelming in the beginning when you opened it."

(PE2)

R12 high quality look and feel

The perceived quality of the Stepwise kit met the expectations of the participants.

"I find the structure of it very fascinating, and I like that it's paper and not plastic."

(PE2)

"Feels quite sturdy. It's not like weak paper. I like that."

(PE2)

9.4 Conclusions

The results suggest that the Stepwise kit positively influences users' self-efficacy. All three participants reported feeling confident about the correctness of their self-sample, in contrast to the original self-sample kit, where only two out of six users expressed similar self-confidence. While these findings are promising, further testing, with more participants, is needed to make a stronger comparison.

From the interviews, the change in perceived self-confidence seems to come from the step-by-step guidance the Stepwise kit offers. However, the participants also express that their confidence is frail. So, as long as the process progresses smoothly the user is likely to maintain confidence, but small problems in usability can easily bring back feelings of insecurity and doubt. **This highlights the importance of designing a self-sampling kit with consistently good usability.**

The interviews pointed out that the segmentation by steps was overall experienced positively by participants. However, hiding the next steps clearly caused new problems in the users' experience. This tension can best be defined as a motive dilemma.

- **They want to know what is going to happen next.** *This is important to them because in a moment when you feel vulnerable, such as taking a sample, they want to feel prepared and not be surprised by new information.*
- **They want to only receive the information that is relevant at that time during sampling.** *This helps them to not feel overwhelmed by the amount of information and to not get distracted (stay in their flow) during sampling.*

The progress bar proved valuable in enhancing the user experience. It helped participants recognize their advancement and provided a sense of accomplishment. Sliding the manual to reveal the next step appeared to offer a subtle but meaningful sense of closure, signaling the completion of a task and mentally preparing the user for what's next. This was measured in the MES timeline as several instances of determination while sliding the manual to the next step. This interaction may help users let go of previous uncertainty and transition with greater confidence to the following step.


INSTRUCTIES
STAP 1
Voorbereidingen
Schuif naar rechts voor stap 2
9

RECOMMENDATIONS

The results from the evaluation of the Stepwise kit resulted in 12 recommended areas for improvement of the product. In this paragraph, 3 of these recommendations will be elaborated on. The selection is based on the estimated importance for further development. The other recommendations can be found in Appendix 11

Approachable Look

Despite improvements, participants still found the sample kit visually overwhelming due to the exposed components on the front. When users first encounter the kit, they are immediately faced with unfamiliar elements, which can create confusion or hesitation. To ease this first impression, the design could incorporate containers or covers that partially conceal the components. This would create a cleaner, less intimidating appearance and help users ease into the experience more comfortably.

Figure 50 - The user's first impression of the Stepwise kit

The Hard Cover

Participants experienced confusion and hesitation when placing the tube into the hard cover (Figure 51), largely due to unclear orientation and lack of feedback. This issue could be resolved by redesigning the cover to allow the tube to slide in only one way, and by incorporating a clear confirmation of correct placement, such as an audible click or a more secure fit. The GGD already sources components that offer this type of hard protection Figure 52. One of these existing components could replace both the hard cover and the bag currently used in the Stepwise kit. The Stepwise kit would require minor adjustments to accommodate this change, eliminating the need to develop a new part from scratch.

Figure 51 - Hard cover design with sample tube inside

Figure 52 - Safety bag with hard cover as sourced by GGD

Size Of The Product

Due to the size of the product users felt like taking the sample would be an accordingly big task to do. This is a misconception that should not be created by the size of the product. So new ways to make the test kit and the components more compact should be explored.

Figure 53 - Package experienced as large and unrecognizable

10.

Personal reflection

With the end of the project in sight, I want to reflect on several aspects of the project. I want to start by saying I enjoyed most of the project, mainly the topic and its medical background. It was hard at times, but I enjoyed exploring emotional design methods that suited both the project and me as a designer.

PROJECT MANAGEMENT AND PROCESS

Throughout the project, I was able to complete all the initially planned topics. Although I would have liked to delve deeper into certain aspects, particularly the final product development and user testing with the final prototype, I am satisfied with the overall outcome. That said, it still feels like there's so much more potential yet to be explored.

This project pushed me to think realistically within a new and unfamiliar medical context. Translating research findings into feasible design solutions within the constraints I set for myself was particularly challenging. However, this challenge ultimately helped me grow. It led to a redesign that meets the project's requirements, the needs of the GGD and the needs of the user.

THE DESIGN CHALLENGE

Looking back, I would not have anticipated ending up with this redesign, especially considering I began the project with a fairly narrow scope. I tried to submerge myself into the context as much as possible, although this was not always easy within the medical sector. The first challenge was to navigate, design and introduce change within a medical environment that is under pressure and that, understandably, does not have time, funding or resources to allow for much creative freedom.

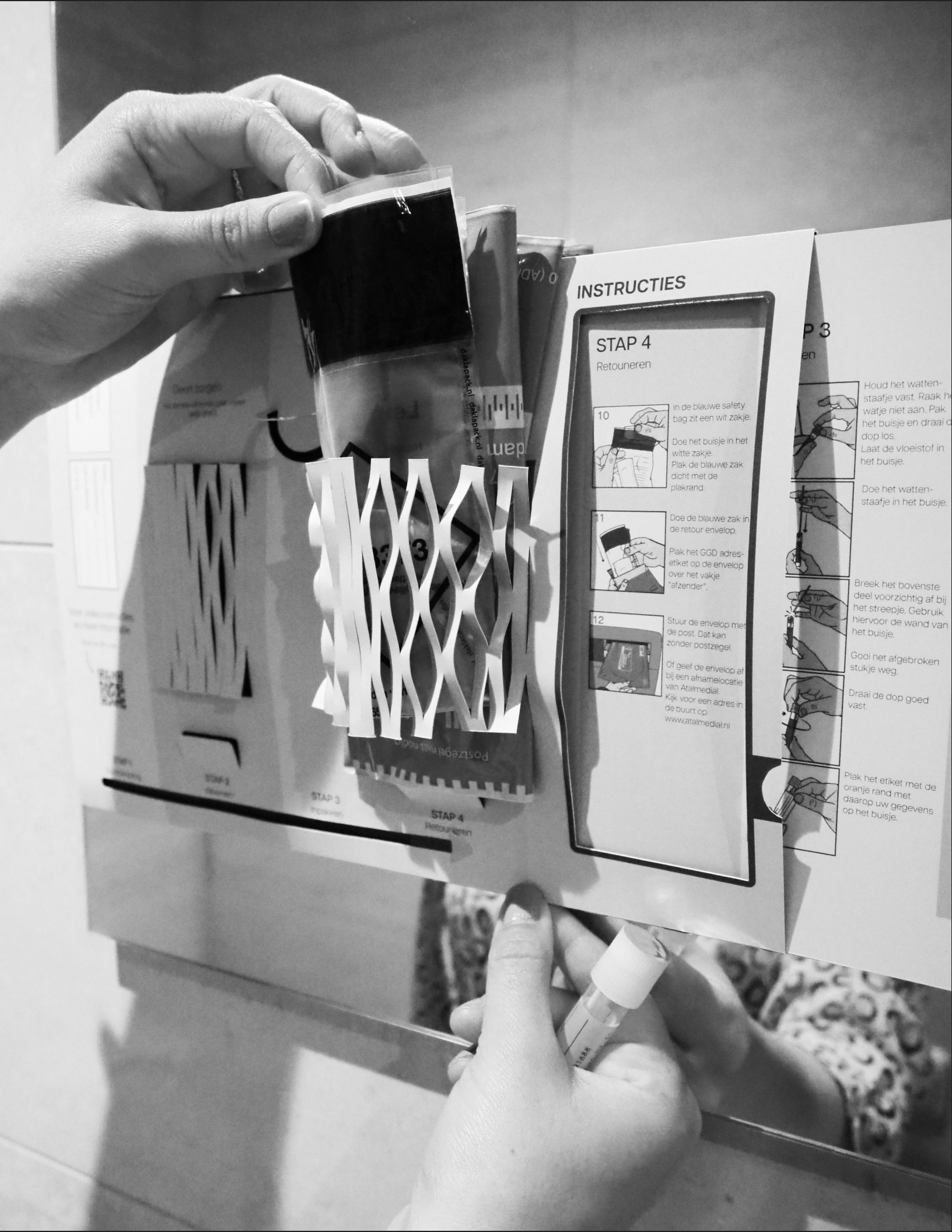
Another critical challenge was understanding and prioritizing user needs. Balancing conflicting values and deciding which requirements to emphasize was not easy. In retrospect, I think I could have been more concise in defining the final design requirements. Perhaps I tried to solve too many problems within a single design, which might delude the project's aim. Nonetheless, I'm proud that the design addresses some key issues, particularly the potential to boost user self-confidence during self-sampling.

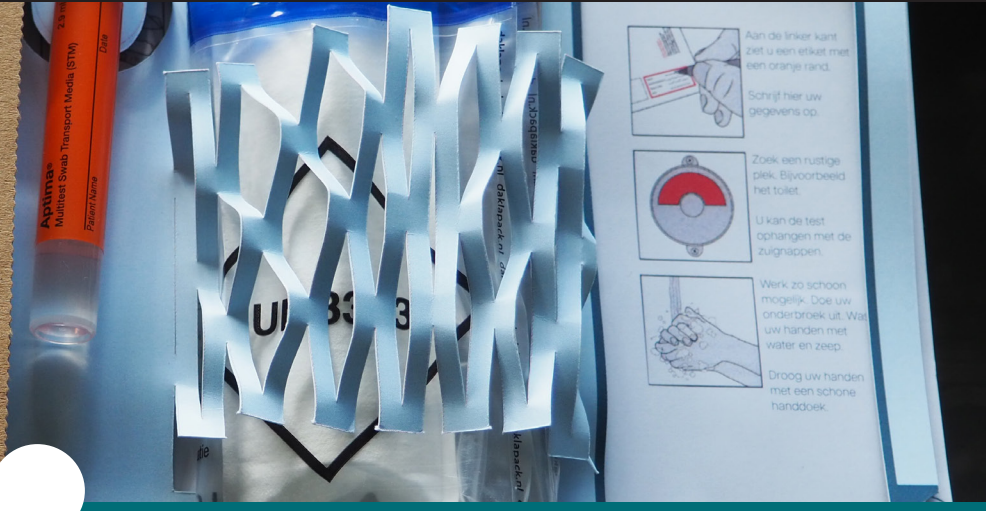
THE SOLUTION AND ITS IMPACT

I am confident that the solution presented in the report fits the needs of the GGD and even more the needs of its clients. The Stepwise kit is mainly designed for the GGD's clients, aimed to improve their user experience and I think it has the potential to do so successfully. With more development, I think the design of the Stepwise kit can grow into a new, more user-friendly self-sample kit.

However, I don't consider the redesign complete. There are still many opportunities for refinement and detailing to take the Stepwise kit from prototype to fully developed product. Future investment in improving self-sampling methods is important, especially given that this approach currently seems best suited to meet the needs of the Dutch healthcare system.

But I learned quality healthcare isn't just about treating illness, it's also about making people feel cared for. That's where self-sampling still falls short. This project attempts to bridge that emotional gap, and I believe that's where its real contribution lies.


INSTRUCTIES
STAP 4
Retouneren
10
In de blauwe safety bag zit een wit zakje.
Doe het buisje in het witte zakje.
Plak de blauwe zak dicht met de plakrand.
11
Doe de blauwe zak in de retour envelop.
Plak het GGD adres-etiket op de envelop over het vakje "afzender".
12
Stuur de envelop met de post. Dat kan zonder postzegel.
Of geef de envelop af bij een afnamelocatie van Atalmedial.
Kijk voor een adres in de buurt op www.atalmedial.nl
Houd het watten-staafje vast. Raak het watje niet aan. Pak het buisje en draai de dop los.
Laat de vloeistof in het buisje.
Doe het watten-staafje in het buisje.
Breek het bovenste deel voorzichtig af bij het streepje. Gebruik hiervoor de wand van het buisje.
Gooi het afgebroken stukje weg.
Draai de dop goed vast.
Plak het etiket met de oranje rand met daarop uw gegevens op het buisje.
STAP 3
STAP 4



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Appendix guide