

Appendix

Appendix A - Notes Meeting Asthma Patients 11/02

LUMC | 11:00

It is important to always have some trouble-shoot present so the patient never feels lost. Knowledge is important in terms of technique, effect, complications and the reason why Energy management is a major part of self management. Also there needs to be a dynamic plan as the asthma condition can change over time.

Large text and very visual communication is important. It should always function and should be integrated inside a portal. It should be clear whether it is chareable or not. Also very portable in terms of weight and size.

Counting of med usage and icons is preferred. You do not want to be alone.

We should watch out for privacy and also loss of data that takes a lot of effort to collect.

It is important to adress the care provider also as a stakeholder as they frequently do not want to use the intervention because it adds extra workload or they are not convenient with technology.

It would be interesting to not use the med-

ication to see what kind of effect it has on yourself. Performing your own research. This is however not ethical.

Jullie weten hoe het werkt, wij weten hoe het voelt.

Appendix B - Notes Meeting GP 13/02

LUMC | 12:30

/ Niox Verdo = measuring amount of inflammation in lungs product.
/ There is difference between objective and subjective perception of asthma control.
/ People tend to easily neglect what they feel
/ Major problems are adherence and proper technique

/ Patients reported liking to see an overview of their asthma control based on the ACQ questionnaire shown over time. It shows some evidence to show the GP how you are doing.

What can we measure?

Clinical:

Monthly Assessment

Nitrogen

Daily Assessment:

Spirometer

Questionnaire: Snot and ACQ

Activity (to measure activity or emergency)

Heartbeat

Distance

Steps

Environment

Indoor and Outdoor

Temperature

Humidity

No₂

So₂

fine dust

Appendix C - Notes Meeting GP 18/02

Den Haag | 12:00

Normally a patient has to come every year for a checkup.

GP only has 10 minutes. POH has 20/30 minutes to explain

Usually, the POH explains but also the pharmacy.

Cause of unwitting

In the beginning, the person has to go through the fact that they have asthma, but also learn about the inhalation technique, medicines etc. This can be a bit overwhelming resulting in the patient not remembering everything. Flyers and online information can help to keep up but if the patient has low literacy, this can not help that much.

Cause of intelligent

GP tries his best to pursue the patient to use proper medicine, but this is frequently not possible.

Appendix D - Notes meeting adherence expert 20/02

Skype | 8:00

Determining persona's only is useful if the distinction you make is based on difference in solution approach. For example, if for a non-patient and a skeptical denier the solution is to mediate and provide understanding about the disease, then the persona's do not need to be segmented.

SIMPLES could be used as a way to determine medication adherence pattern, but better to use is the TAI questionnaire. This helps you identify which of the subgroups the patients is from.

How to be cost effective? Increased adherence = increased medication usage = increased national and personal costs.

The development of a design should really be trial and error.

It is important to first determine the phenotypes in your target population and to know why they are non-adherent.

Younger people tend to look up more towards iconic figures instead of their clinical experts.

It takes a few weeks for the maintenance medication before it takes effect.

Possible solution strategies:

Motivational messaging

Visualise different inhalers with use of QR or barcode scanning

Short term engagement : social support or motivational interviewing

Shared goals -> doing things together

Movies of proper technique

for intelligent:

Daily habits

Goals

Personal messages

Appendix E - Notes Meeting LHL expert 20/02

TU Delft | 13:15

Specific methods for user research for LL

Make strict deadlines, if the users haven't been recruited in time, just continue and do not let the design direction be guided by user interviews. Use probes and/or ideas as conversation facilitators.

Expectations about adherence

Costs can be a determining factor, LL have a short term vision. Most have the idea that the careprovider has all the authority and they should listen to them.

Practicalities

Do not look like a higher educated person. This might be intimidating

Examples of strategies and interventions

Storytelling, Gamification, rewards (money or discount coupons). Also show what the person has been able to beat. Make the invisible visible. Make a relation between good behaviour and positive outcome. Also social support in teams and insight into medication usage. Comparative strategy. We can make them afraid but it's better to reward and to show good things. Ambassador can be used as person in between. Translate between high

and low ses.

Specific personas

Read papers to discover certain attributes and typical characteristics

Other remarks

There seems to be a large difference in treatment regimens between high and low ses. Especially in the USA it seems that doctors take a different and sometimes worse approach based on the persons SES. It could for example be that the doctor expects the person is not able to pay the treatment that initially should be best.

Doctor reverses pamphlet in order to test secretly if the patients flips it around to read it.

Appendix F - Notes Meeting LHL expert 21/02

Longfonds | 10:00

Main barriers regarding self-management, adherence, and eHealth

They are afraid to use new apps that are difficult to comprehend such as DigiD. New apps as well. There is a certain barrier. Also logging in and creating accounts is difficult. There seems to be no link to the disease when there are no complaints.

The intelligent way of non-adherence seems to be mostly present in higher educated. Such as parents that read something about vaccinations and therefore choose to not vaccinate their kids. The lower educated most of the time feel that they are not able to take these decisions and are very keen to listen to their care providers.

Current strategies for communication

Most of the people use facebook, phones, and tablets. Interaction and performing along seems to really help. Provide a safe feeling of control. If values are checked and warnings are given when something goes wrong, the patient feels less afraid and more in charge of the life. Provide them with more awareness and knowledge. Provide them with extra information before meetings so they can prepare questions and get the most out of it. Connect-

edness also seems to be an important part.

How to approach people with low literacy?

Most of the people like to be rewarded with easy to grasp things such as money. Do not call it an interview or do not use terms like research or something. It is essential in an interview to keep asking. Most of the time they will only say yes or no.

To measure the severity of complaints: Questionnaire, heartbeat, and spirometry.

Appendix E - Quotes “kunt u me dat even uitleggen?”

Anita Ossewaarde

Dan zeiden ze: tweemaal daags een tablet, ik begreep het niet goed en voor ik de deur uit was, was ik het al vergeten. Thuis werd het dan door mijn moeder wel uitgelegd.

Ik kreeg allerelei medicijnen maar wist echt niet wat dat allemaal was. Ik was nog niet mondig genoeg om daarnaar te vragen. De communicatie met het verplegend personeel was ook niet zo best. Vroeger waren de etiketten handgeschreven, dan had je nog een excuus.

Ik kreeg onverwacht een formulier over mijn medicatie om in te vullen. Daar schrok ik behoorlijk van.

Bij de apotheek krijg ik tegenwoordig een uitdraai met een eenvoudige versie van de bijsluiter. Ook die vind ik soms nog aan de moeilijke kant.

Ik kreeg problemen met gegevens invoeren in de computer. Mijn zus hielp me daar eerst bij totdat ze zwanger was en weg ging. Mensen dachten dat ik dom was, het kwam niet in ze op dat ik slecht kon lezen.

Henk van Iersel

Ik heb onderhand een hele stapel medicijnen, maar voor mij zijn al die doosjes hetzelfde. Ik kan ze niet uit elkaar houden.

Voor lezen en schrijven ben ik helemaal afhankelijk van mijn vrouw. Ook voor het samenstellen van mijn dagelijkse pillenrantsoen. Als zij er niet was geweest, was ik nu al drie keer dood geweest.

Mensen zijn gewoon om voor dit of dat een roze pilletje te nemen, of een blauw, en als dat verandert is het gevaarlijk. Het ene pilleke is het ander niet.

Als ik bij de apotheek kom, krijg ik mijn doosje mee en als er uitleg bij is, begrijp ik er weinig van. Gelukkig zoekt mijn vrouw dat dus uit.

Van de verzekering kreeg ik een nieuwe suikermeter opgestuurd. Van dat ding snappen we helemaal niks! Het is een complete computer die van alles kan, maar hij zit nog steeds in de verpakking. Er zit een usb-snoertje bij, maar we hebben het eens en computer. Ook geen smartphone. Als je die aanzet moet je meteen al een regel tekst lezen. Ik gebruik gewoon de oude suikermeter nog.

Theo Duijmelings

We hadden voor iedere pil aan rare bijnaam verzonnen waardoor we de volgorde konden onthouden. Het harttabletje was bijvoorbeeld een briketje, dan wist ik wat hij bedoelde. Met trucjes moesten we ons redden.

Ik slik zo weinig mogelijk, maar wat moet, dat moet.

In de apotheek vertellen ze wel over de dosering en het gebruik. Ze verwijzen ook naar de bijsluiter die leest mijn vrouw dan voor me. Zij is goed op de hoogte want ze heeft zelf veel medicijnen nodig.

Maar soms leggen ze het aan mij uit in de apotheek. Maar dat is voor mij toch lastig om te onthouden.

Als er in de fabriek iets ingevuld moest worden, verzon ik allerlei foefjes. Gelukkig kwam mijn broer daar ook werken. Alleen hij en een ploegmaat wisten het, zij hielpen me.

Piet van Horrik

De bijsluiters lees ik meestal wel, maar oppervlakkig. Het interesseert me niet zo wat erop staat. Zo veel moeilijke dingen, die begrijpen we toch niet. Er stond een lijst van bijwerkingen om bang van te worden.

Tegenwoordig ben ik nergens meer bang voor. Veel mondiger ben ik geworden. Doorvragen als ik iets niet snap bij de dokter of bij de apotheek. Nog een keer en nog een keer. Tot ik het snap. Vroeger durfde ik dat niet. Maar ik weet toevallig dat er ook hoogopgeleide mensen zijn die niet om de uitleg of advies durven vragen en met te weinig informatie de deur uitstappen.

Ik maakte bijna al mijn afspraken mondeling. Offertes liet ik door mijn vrouw of de secretaresses van mijn klanten opstellen. Toen de fax kwam, werden schriftelijke afspraken snel belangrijker. Ik heb wel soms nog moeite met het oppikken van informatie. Het ligt eraan op welke manier het verteld wordt. Laatst heb ik het boek: Alleen op de wereld van Hector Malot gekocht. Prachtig. Ik heb me zo vaak net als Remy gevoeld. Maar dat is nu voorbij!

Overig

Marokkaanse en turkse nederlanders. Hebben nooit leren lezen en schrijven. Nederlanders uit achterstandswijken als de jordaen. Vooral 65 plussers die misschien alleen lagere school hebben gehad. Het probleem is dat laaggeletterden er natuurlijk niet mee te koop lopen.

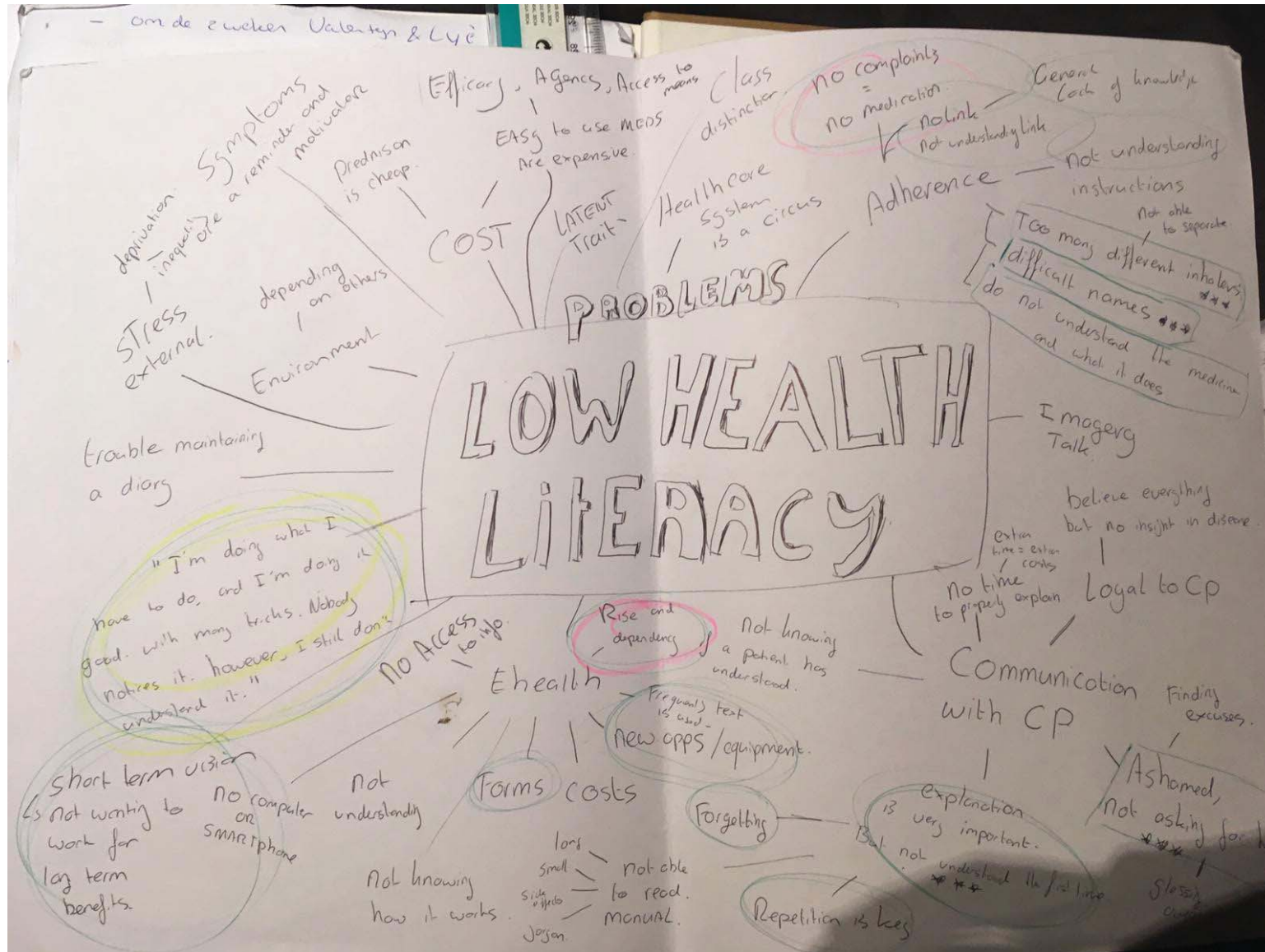
Het probleem is dat laaggeletterden zich vaak schamen. Ze weten het heel goed te verbloemen. Je kunt in plaats van driemaal daags ook zeggen: smorgens smiddags en savonds. Als we merken dat iemand moeite heeft met lezen, dan markeren we de doosjes met kleuren: rood voor smorgens, groen voor smiddags en blauw voor savonds.

Er zijn ook patienten die cijfers beter herkennen. Dan geven we de doosjes een getal.

Ze moest 5 medicijnen slikken en toen hebben we 5 grote zakken gemaakt met cijfers. Zak 1 was voor smorgens, zak 2 was voor smiddags en zovoort.

Er bestaat geen pasklare oplossing, soms moet je met kleuren werken, soms met icoontjes.

Appendix F - Non-adherence insights mindmap



Appendix H - Persona characterisation

Rita | Unwitting

Knowledge and Skills

Not understanding the details, when to take what medication

Not understanding the underlying reasoning

Self-efficacy

Doesn't think she can and doesn't want to communicate with experts

Doesn't think she can and doesn't want to actively address resources to increase her knowledge

Instrumental Attitude

She doesn't see the effect of maintenance medication but wants to do everything that she can to feel better.

Theo | Unwitting & Erratic

Knowledge and skills

Understands the details, but doesn't understand the underlying reasoning

Instrumental Attitude

Doesn't like to take medication but does it because he is told to.

Understands that he has to take his maintenance

medication but doesn't get why. Also, the lack of visible effect doesn't contribute.

Self-efficacy

Doesn't think he can and doesn't want to communicate with experts

Doesn't think he can and doesn't want to actively address resources to increase his knowledge.

Ayse | Intelligent & Unwitting

Knowledge and skills

Because of limited literacy and aversion against the healthcare system, she does not have the proper information that is needed in terms of details. Although she knows that officially maintenance would improve her asthma condition, she is not able to properly adhere since the details aren't clear for her.

Environmental Constraints

Costs let her make the decision to not use the 'not so effective' medication.

Injunctive Norm

Her family is against medication and encourages her to only take the absolutely necessary.

Descriptive Norm

From her home country and the neighborhood she is living in, she has learned that medicines are overly expensive and made by big corporations to make people poor.

Experiential Attitude

Taking medicines is very visual and shameful. Every time she does it, she feels like a patient and doesn't want to be judged by others.

Boris | Erratic & Unwitting

Perceived Control

Getting his life on track currently has the highest priority. Because of this, he perceives to have little control over the management of his medication adherence.

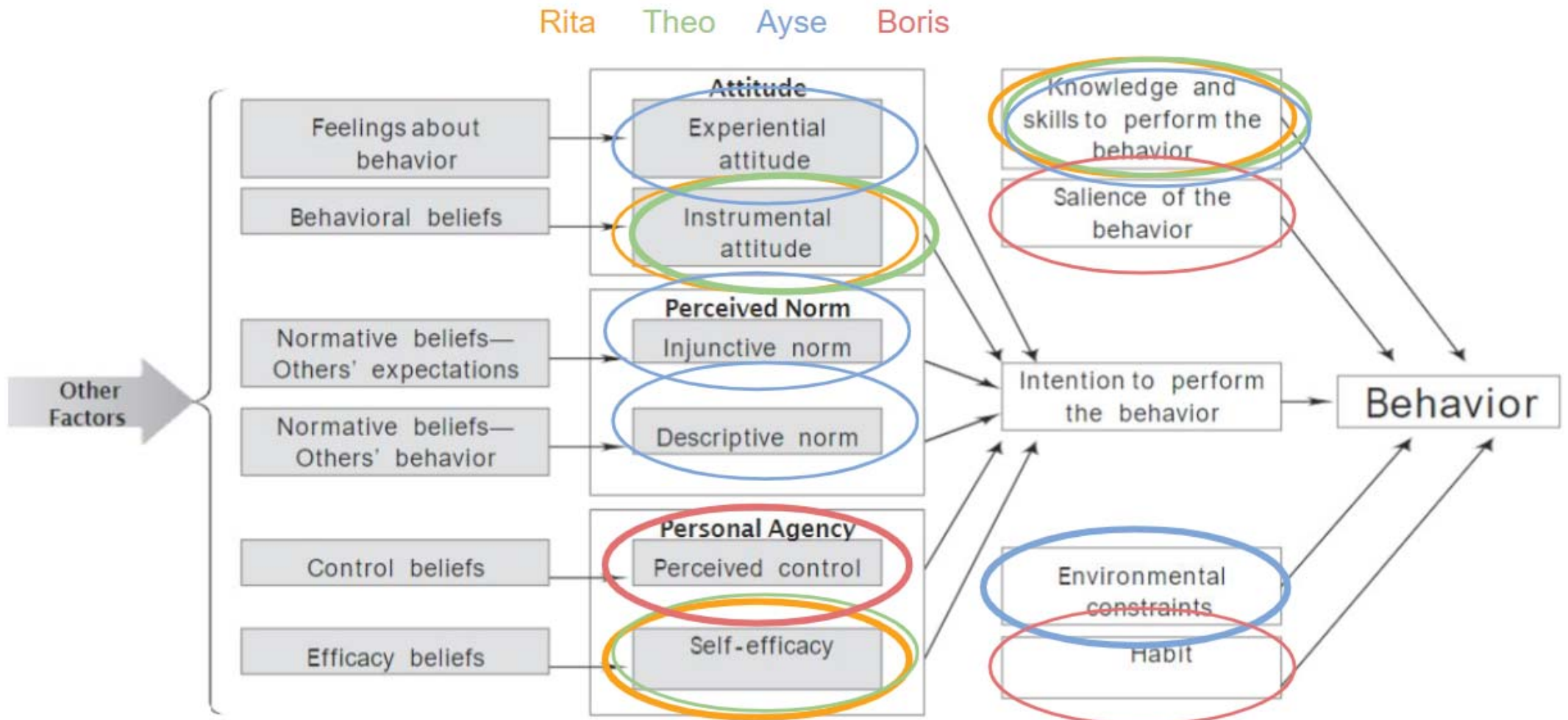
Habit

His life is very dynamic, with a lot of switching between different jobs. Because of this, he didn't manage to build the medication into his life as a habit.

Salience

When asthma symptoms are less, the really wants to forget about asthma. This also has as a result that the treatment is pushed to the very back of his mind.

Mapping the persona characters across the IBM model



Communication/Perceiving

Ashamed to ask if not understanding -> Rita
Forgetting instructions -> Rita
Not being able to read written material -> Rita
Not understanding instructions -> Theo
Hiding the fact that it isn't understood -> Rita
Overload of information during consult -> Theo
Info is broken into small bits -> Theo
Being clear and visual really helps to understand -> Rita

Understanding/knowledge

Short term vision, not wanting to work for long term benefits -> Boris
Not seeing the link -> Theo
No complaints = no medication -> Boris
Not understanding what the medication is and what it does -> Theo
Only after 5 weeks the effects of maintenance start to appear, with a peak in 3 months of full adherence. Symptoms are reminder and motivator -> Ayse

Beliefs

Costs - Medicines are expensive and do not add anything -> Ayse
Doctors are always right, you should listen to them -> Boris
Only the GP is right, the POHs do not know what they are talking about -> Ayse
Side effects - Many side effects are not worth it -> Ayse
Influenced by neighbourhood -> Ayse

System

Healthcare system is complex, causes confusion -> Ayse
Many different medicines with difficult names -> Rita
Costs- Medicines are expensive, not seeing the benefit -> Ayse

Personal

Trouble with organising in general -> Boris
Stress from other factors -> Boris

Resources

No time available by POH to properly explain -> Theo
Additional explanatory materials are not tailored towards LHL -> Rita
Doesn't want to address extra resources (online) -> Rita

Social environment

Relatives are able to help, but not always there -> Rita
Neighbourhood and relatives can have strong influence -> Ayse

Appendix I - Notes Practice Nurse 08/03

De Blauwe Tulp | 16:00

Main insights

Including family could work but do not burden them too much

Cut information into small parts with only the essentials

Very visual, metaphors, simple language, own language

Digital skills are not common in the elderly (only smartphone and calling)

Repetition is key (technique but also info)

You have to present (voordoen)

Contacting patients

Ask permission of manager first

Think about how to approach them

What do I need: Non-adherent, Dutch-speaking, could benefit from an application that provides insight into the why.

The problem for most patients is that they either have not understood what they have to do or that they just forget everything.

When you feel bad you want to take medication, but when you feel fine you just do not want to do it. The maintenance has side effects. Some people make an intentional decision, others let them lead through their underbelly. And when that happens they are

not enough aware of the consequences that come when you do not or irregularly use it. This information should come in their own language and not with text but spoken and with images.

Also, feedback is really important. That a person can see that one has inhaled.

This feedback and the why is really important -> knowledge and insight.

So someone has to make a choice based on good information (not the neighbor)

Because of cultural aspects, people really like antibiotics. Because it has a direct effect. But it has a lot of adverse effects.

Practice nurse sees the patients, in the beginning, every 6 weeks. When things are getting better it moves to 2x a year.

Low health literacy

Attitude is also a problem. People are not used to managing their health like this. How beautiful the thing is you make, there is a big chance that people do not want to put the effort into it. It can be that the person is definitely adherent, but just doesn't want to know all the ins and outs of their health

Low digital literacy

When designing an app you need to think about people that do not have a lot of digital skills. But also do not have access to it. Especially old patients are dependant on their children.

Lack of trust in the technology and what happens with the data is not so common. Most of the time they do not know what you are talking about or what privacy exactly means. This kind of thinking is more common in the youth.

Older people have low digital literacy and also a low literacy in general. They do have a smartphone, but probably only use it for calling.

When you want to improve medication adherence, it is important to mainly focus on young patients.

1st generation

Have worked a lot and didn't do anything about their language problem

2nd and third generation

Better Dutch and Turkish proficiency, and also help their parents a lot. But they have a full-time job and kids and can not always help their parents out.

Example of the man

He forgot to come to his appointment. This is not because he doesn't want to, but it just points out the lack of organization in their life. In his document, we can see that he is using less than the prescribed maintenance medication. And we can also see that he is using a lot of quick-relief medicine. Apparently, this patient is not adherent.

According to Janneke, this could be because he hasn't understood the instruction properly. He doesn't feel the effect of the maintenance medication and therefore he doesn't use it that often.

How to explain

Use very clear language and be very visual. Ask if they understood. Ask to repeat what they understood. Do not use beeldspraak but use analogies/metaphors. Also, build a connection. Do not give all the information for the first time. During the first visit, nothing much happens but is mostly attributed to building a connection. The information will be cut into different parts and slowly feed them the information.

Including the family

Not a burden too much. But that they can see from a distance how the person is doing. and

give compliments or reminders.

Taking maintenance can be seen as an umbrella. When you only use it sometimes there will be holes in your umbrella and you will still be wet. You are dependent on the time that the medication needs to work. When you keep your umbrella in bad shape all the time, there will be little inflammations. Right now you are not feeling it but in 20-30 years, your whole treat is very rigid and it will be harder for you to breathe. When you feel the effects, it is too late. In the time when there was no maintenance medication, the lungs of people look like the lungs of COPD people, the people that have smoked their whole life. And a risk on exacerbations, which is very damaging

your asthma is severe if you have a lot of complaints and your spirometer is not good as well.

Appendix J - Notes Practice Nurse 15/03

Gezondheidscentrum Haagse Hout | 15:00

General Notes

It takes approximately 5 weeks before there is an effect that can be noticed. It is explained that, if the person doesn't believe that it works, they just have to try for 5 weeks. If they still do not want to use it, then it is their own choice. Most of the time this technique works for people that are from other cultures/countries, come here to the Netherlands and do not believe that the medicine is working for them. The Ayse's. These people are also strongly influenced by their families and neighbours. The neighbours have a very big influence for example by telling them about probable side effects.

In terms of shame, most of the doctors are able to see whether a person is lying. This could be by asking them to explain what they are doing or just by seeing body language. It then becomes important to slowly explain the patient what he/she needs to do. And only the essentials. They do not have to be an expert in the field. Written information is actually never given as it is suspected that the patients do not read it.

There is a difference between a patient start-

ing fresh, The practice nurse has not really an example of how this goes over time. But he believes that if you start with a fresh patient, it is way easier to set their medication taking. It just has to become a habit. But once a patient has done it wrong for quite some time it becomes harder.

You always have to try out a bit what medicine works best for the patients.

How do you explain?

Repeat things, use placebo's to perform along, movies do work a bit but it should be in their language. The dutch language is frequently a barrier. It should also be marrokan, Turkish, English and Arabic.

How do you judge how a patient is doing?

- ACQ (but this is sometimes fakely answered)
- Spirometer (but this sometimes does not have a relation with complaints)
- Hearing the lungs (hear if there is wheezing)
- Based on complaints

Old males are most of the time stubborn and proud. They do not want to take advice from (young) doctors. It is quite hard to convince them.

Personas

Rita

Shame is something that is frequently detected and solved by the POH

Giving trust to the patient, they don't have to be ashamed

You can notice when a patient doesn't know
Let the patient explain to check whether they have understood

Not giving flyers

Many times to explain

piece by piece transfer the information

Not the details, only what is important on that moment

don't make them an expert

Creating a bond

a lot of different CP's

Different opinions can result in a break in trust

Ayse

Very accurate, beliefs from previous country have a strong influence, and keep on having it after a long period of time. Not only family but also neighbourhood has a strong influence on their medication beliefs. Even native dutch that live in that neighbourhood. Costs and adverse effects are common subjects. The practice nurse tackles this by let them try out the medicine.

Stubborn patients who think they know it themselves
lot of influence by family
Costs of unnecessary meds
influence by neighbourhood
Try it out and see the effects
They need to experience it themselves
cultural differences can result in distrust (different country)
There are some really stubborn people (males from the older generation) (3/50)
Low literacy results in accepting things easily

Theo

If it is new, it is hard, it needs to get into your schedule
If you can explain it well, then they are doing it good.

Boris

Accurate, but not in low literates. This mostly is the case in young adults that have a very dynamic life.

Appendix K - Personas



Theo

Invisible & Tricky

Age 35 years
Nationality Dutch
Occupation Factory Worker
Education Lower education
Family status Married

Bio

On lower school they thought I was stupid, I didn't get a lot of attention and I spent four years in the first class. After a while I learned how to plan and used this to start learning for a test weeks in advance. Actually, I didn't know what I was learning, but it worked and I managed to get nines and tens. After school I directly started to work in the factory, where reading, writing and other stuff you learn at school are not necessary. I told nobody and when, once in a while, I had to fill in a form, I came up with all sorts of tricks to not do it. When I heard I had asthma, the doctor provided me with medicines to help reducing the symptoms. I do not like to take medicines, but if my doctor tells me I have to take them, I listen to him. Unfortunately it is still not clear to me. The inhalers have difficult names and I don't understand when to take what. In the beginning I asked my wife to help me interpret the manuals, so I could follow my treatment properly. Still, I do not know what medicine does what. The blue one really helps me through the day in bad times. But the red one I sometimes forget to use as I do not feel that it does anything. I know I have to use it twice a day so when I forget to use it I sometimes do some fake dosages to not make the doctor suspicious.

"I'm doing what I have to do, and I'm doing it right. With many tricks in life I manage to go through everything without anyone noticing that actually I have no clue"

Barriers

- Limited understanding of his medication and the effect of it
- Hard to stay motivated
- Avoids social support
- Invisible and hard to discover/ understand by care provider

Facilitators

- Want to be loyal to treatment
- Supported by family



Ayse

Resistant & Outsider

Age 58 years
Nationality Turkish
Occupation Volunteer
Education None
Family status Married, 5 kids

Bio

I am originally from a little village in Turkey. I've never been to a school during my youth. 50 years ago it was uncommon for girls to go to school. We moved to the Netherlands as refugees on my 35th. It was also here, in the Netherlands, that my asthma has been officially diagnosed. I have had a few attacks and hospital visits back in Turkey. There they provided me with an emergency inhaler that I could use in such events. Here the Netherlands, things are more complicated. The healthcare system is like a circus: many different doctors, forms to fill in and different kinds of inhalers and medicines which I all have to use. I don't want all that. Sometimes I'm not even experiencing symptoms, so why should I use all those expensive medicines? I'd like to stick to my emergency medicine, and only use it when it is needed. I would like to feel better and I think asthma is has an unneccisarily high impact on the things I can do in life. I'm just not sure what I can do to improve. There is nobody I can ask. Also my family at home has trouble understanding what is going on. Everytime I feel stuffy and have to use my inhaler, my kids ask me if I have to go the hospital again.

"I do not like to interact with the dutch healthcare system. It's like a circus. An expensive one. Let me just use my emergency medication, that is good enough"

Barriers

- Money is a big issue
- Does not like to interact with the Dutch healthcare system
- Sticks to her (wrong) beliefs
- Strongly influenced by others
- Lack of social support

Facilitators

- Motivated to decrease impact of asthma on her life
- Driven by fear from previous events
- Capable of self-educating



Boris

Chaotic & Alone

Age 28 years
Nationality Dutch/Polish
Occupation Warehouse employee
Education Lower school
Family status Single

Bio

My parents moved in here some time ago because they were looking for work that paid better. I'm born here and have finished by lower education. I speak three languages: Dutch, Polish and a little bit of English. I have had a rough youth. My parents got divorced some time ago and are not really looking out for me. I had to do a lot of things myself. Back in the days I have hang around with the wrong people. This had as a result that I've been in a lot of contact with drugs and the police. Now I'm trying to get my life back on track. I have found myself a place to live and I have a job. The only thing that is still holding me back, is my asthma. Sometimes I feel quite good and I can manage to work on my development. But other times the asthma is really bad and I am not able to leave the house anymore. That is when I feel useless. I wish I could reduce the impact of asthma on my life. The doctor told me that it is possible for me to achieve this if I follow the treatment plan. However, sometimes I just feel fine and I do not want to think about my asthma. I want to put my attention into more important things. When I'm feeling bad I have my quick reliever to help me out. Asthma is not my highest priority at the moment.

"Sometimes I just feel fine and I do not want to think about my asthma at all. I want to put my attention into more important things."

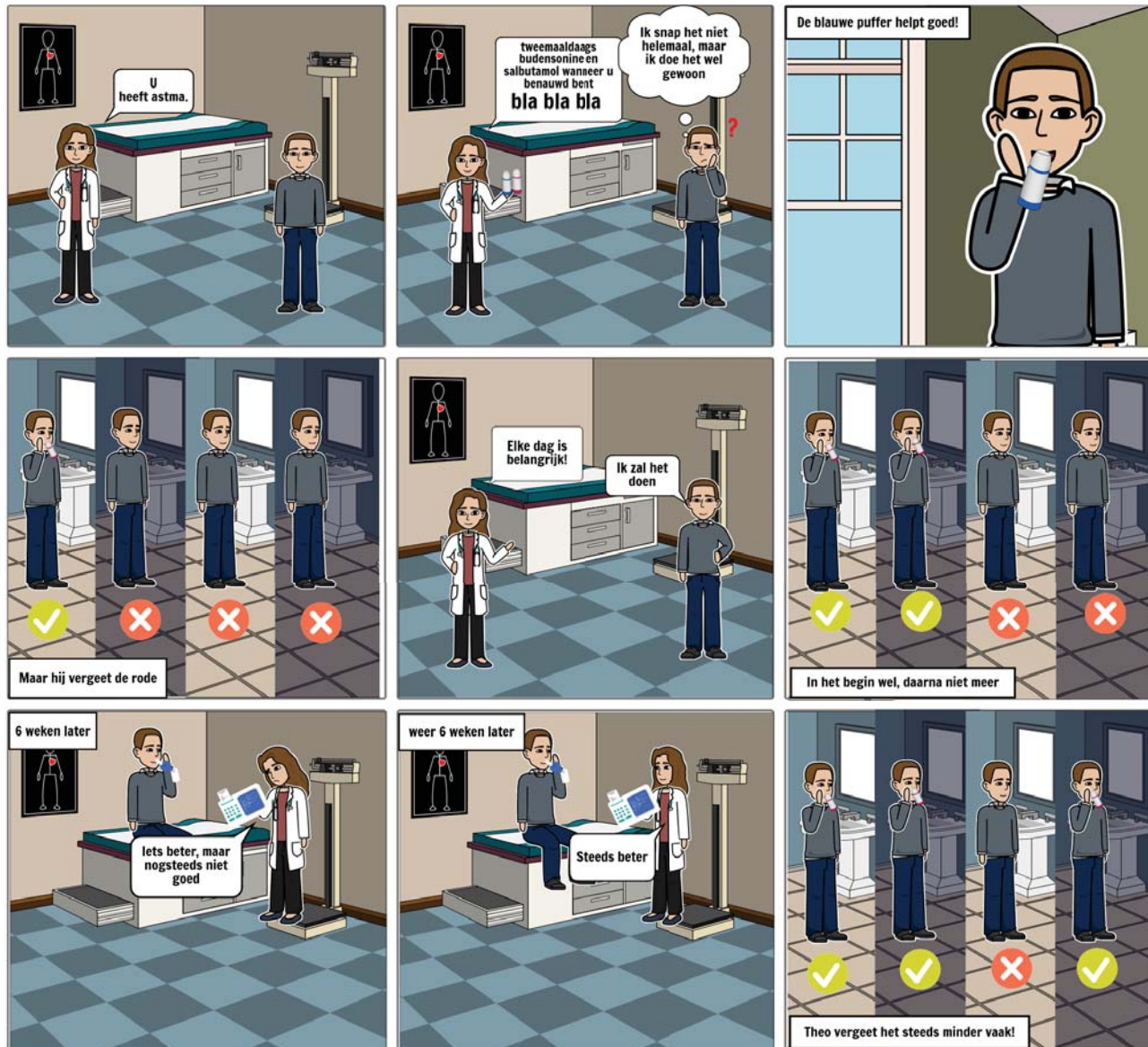
Barriers

- Too many other concerns
- Does not want to think about asthma when it's not there
- Doesn't want to put effort in managing and organising
- Lack of social support

Facilitators

- Wants to get better
-

Appendix L - Scenarios



Maak je eigen bij Storyboard That

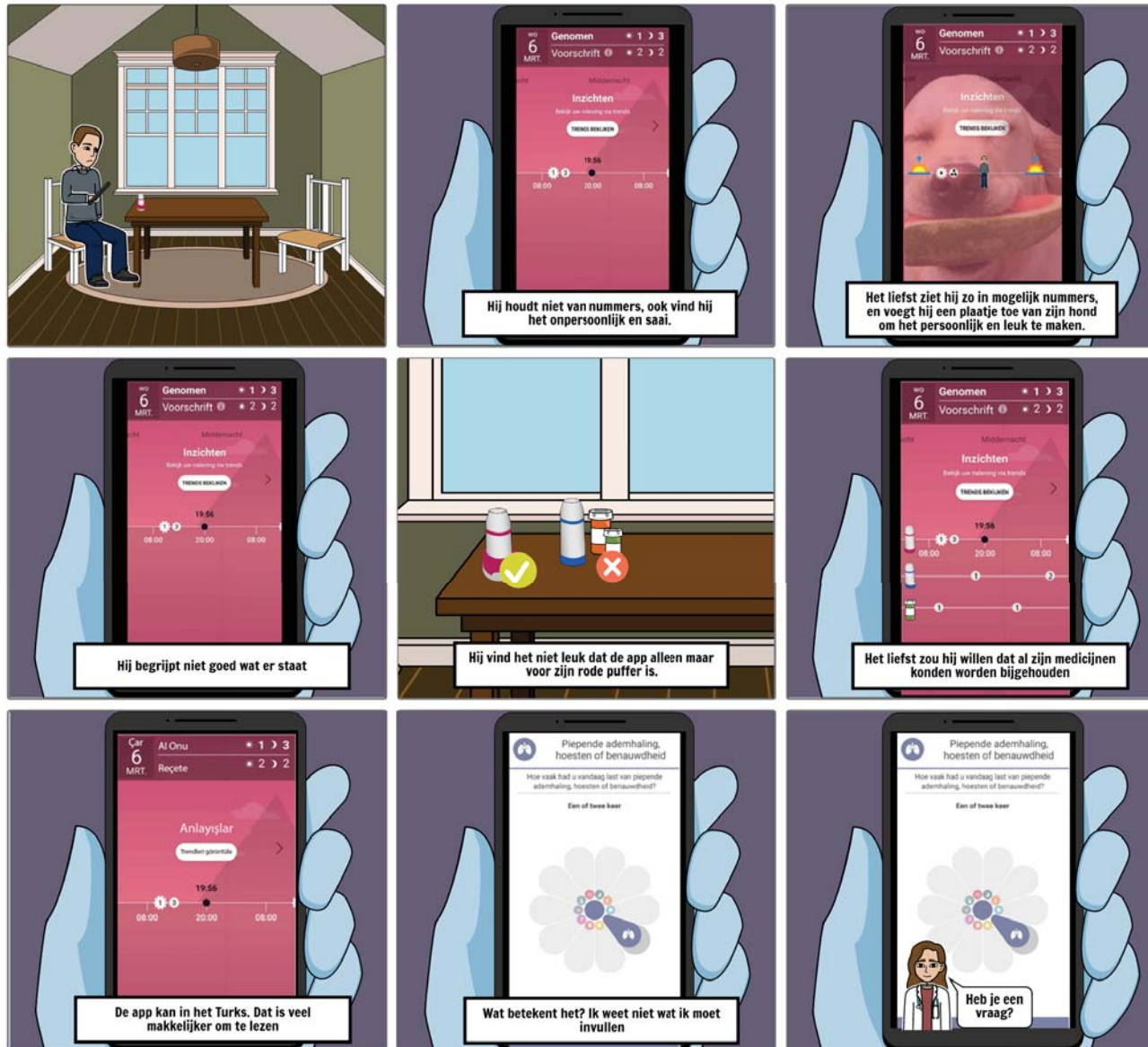


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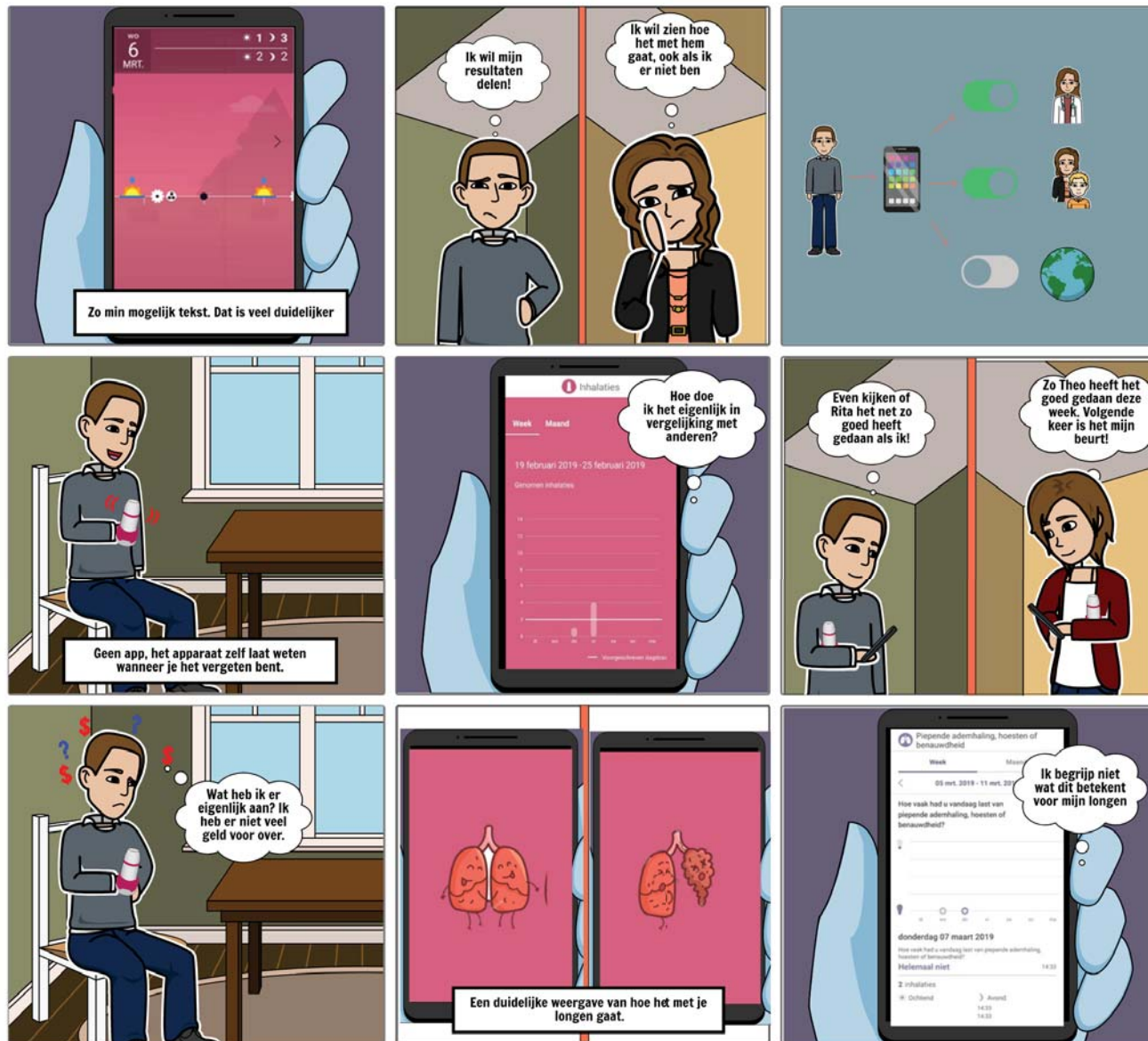


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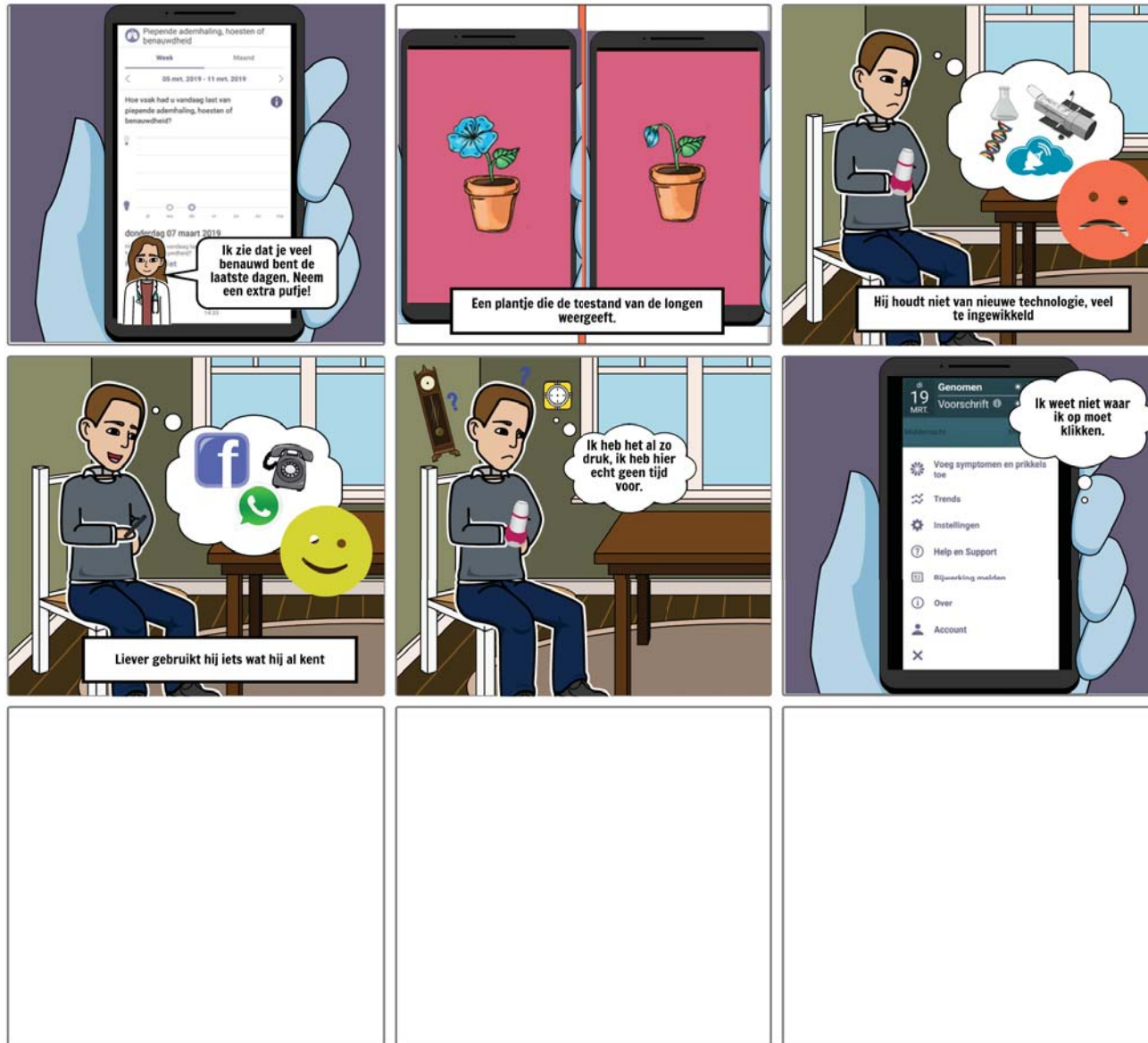
Appendix M - Story Elements



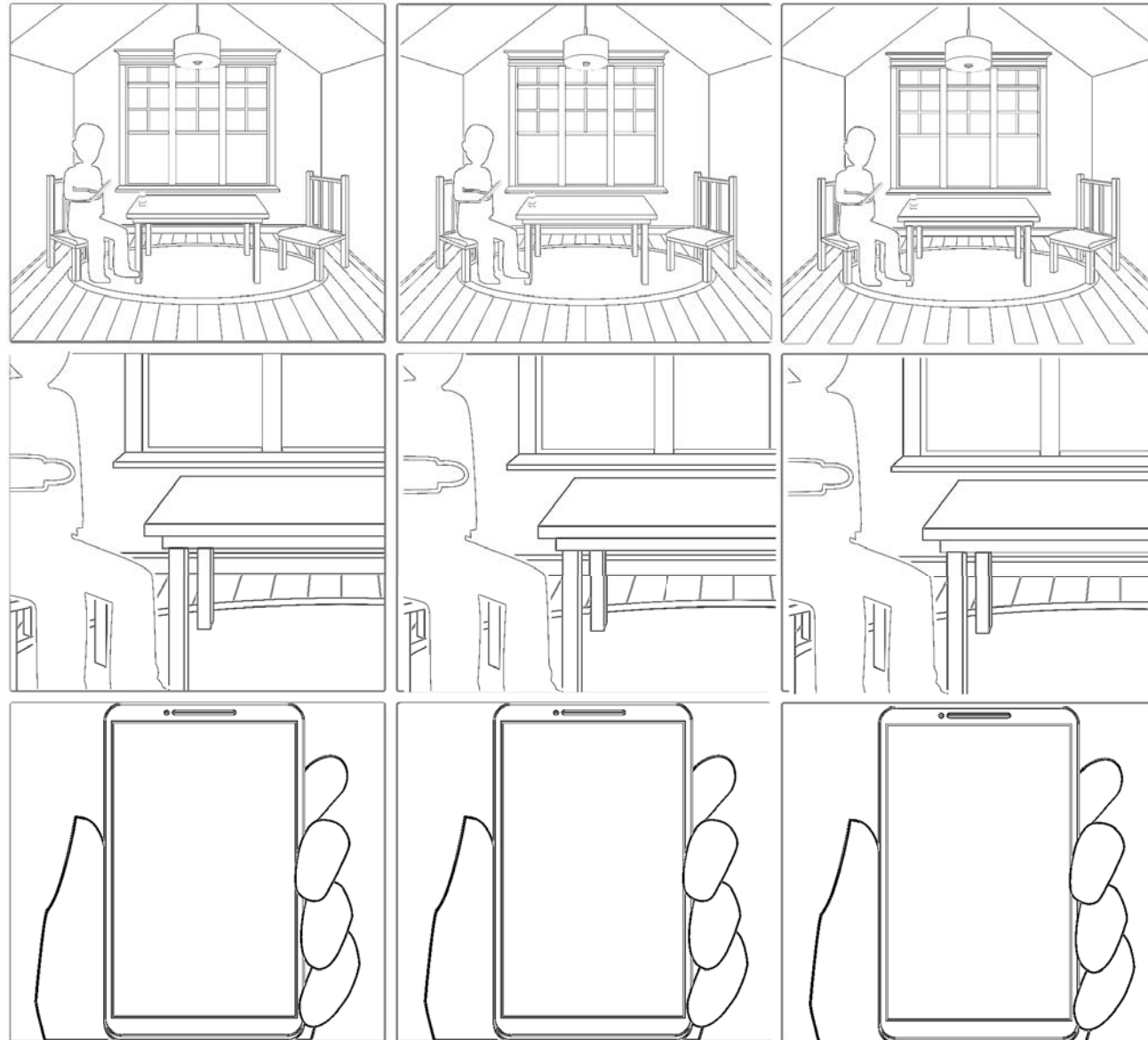
Maak je eigen bij Storyboard That



Maak je eigen bij Storyboard That



Maak je eigen bij Storyboard That



Maak je eigen bij Storyboard That

Appendix N - Turbu+ Analysis

Functions

Log medication usage

The Turbu+ recognizes when a person has used his or her medicine, this is then logged into the app. The automatic tracking of this medication use can really provide a benefit in terms of insight. It is easy to forget when you used or when you didn't use your medication. Viewing back your adherence can provide major insight and therefore contribute a change in behavior.

In addition, medication usage is also provided to the care provider. The care provider can use this information to objectively judge the adherence of the patient and also use the information as an argument to help convince patients that it is important to use maintenance medication.

Reminder

When a patient forgets to use the medicine, the app can send a gentle reminder that reminds the person that he or she has to take the medication. If taking the medication is not yet integrated into someone's life, this can help to keep the salience high and eventually a habit.

Log symptoms and feelings

Being able to log symptoms and feelings also helps to create an overview for someone to see how well they are doing. It can be easy to forget how you have felt the past 6 months when your care provider asks for it. Therefore it could help to have a history with you to show to your care provider to allow him to make better decisions.

Critical Points

The app could really be a benefit to someone who shows a lot of erratic non-adherence behavior. This because of the ability to remind, create salience and build a habit. However, the mechanisms that are present to tackle unwitting or intelligent non-adherence behavior, are less strong.

Interface

A confusing dashboard that shows the beginning and end of a day as (8:00 and 20:00) which can be hard to interpret by people with low literacy. In the beginning, you have to enter your prescription (morning, evening, how many times). This is displayed as a sun and a moon with numbers. Since this is a part where most people have trouble with, it's visualization could significantly be improved.

Not holistic

The app is only focussed on the maintenance medication. It can be very confusing for someone who has a lot of different inhalers, that the app is only for maintenance. Although the logging functionality could be only available for the maintenance, there could be better integration of the other medication and facets of asthma management as well. If the app isn't holistic, it can quickly be seen as extra and unnecessary.

Not educating

Although you are able to see trends in the app (graph of separate symptoms and medication usage over time). It is not possible to see them next to each other in order to draw conclusions and to learn from it. In addition, there are some elements in the app that provide instruction or give tips about asthma (About, Help and support, notify adverse effects). However, these pages are very textual and hidden in the interface.

Costs

It is self-evident that using the device during the treatment brings up extra costs. In addition, getting to learn the device and integrate it into your life also costs time. The perceived benefit the device can offer in return might

not weigh up to these costs it brings. The biggest hurdle is the initial decision where the patient has to decide to spend an extra bit of money to make use of this technology. The patient has to be convinced that it is worth the extra money.

Privacy beliefs

Patients with low health literacy are very skeptical about providing their data to instances that they can not oversee. Especially high instances like the government. The patient might be reluctant to use the device when they have the feeling that they are being followed and tracked everywhere. Also, they might not like the feeling that their medication usage is always visible to the care provider.

Appendix O - Research Setup (Empathize)

Participants

2/3 participants that can be considered to have low health literacy and have (had) lung complaints. Preferably Dutch-speaking.

Research Materials

Personas

4 persona's that have been created to carry hypothetical insights from the background literature study. These personas will not be used during the interviews but will serve as a background framework for the researcher to structure the thoughts and help to ask relevant questions regarding adherence.

Scenarios - Adherence

Based on the personas, several scenarios have been created that narrate from the perspective of the abovementioned personas. In the scenarios, a specific type of hypothetical non-adherence has been addressed and will serve as a probe in order to provoke responses and verify the hypothetical determinants.

Scenarios - Turbu+ & Future solutions

From background research, several themes of possible problematics regarding the use of the Turbu+ by the target group have been captured in scenarios. These scenarios will be

used as follow-ups of the previous scenarios. Again, these scenarios will serve as probes during the interviews, in order to find out the deficits of the current Turbu+ device and (eHealth) applications in general. According to Buskermolen & Terken, a co-constructing stories session has to exist in the form of two phases. A sensitization phase, where the participant is asked to think back of past experiences regarding the topic. But also an elaboration phase, in which the participant is asked to use these past experiences to think of future scenarios. Therefore the second part of the interview will be a session in which future some preliminary solution strategies will be presented in the form of drawings/cards. These are used together with suggested Turbu+ deficits in order to shed light the biggest problem areas and what the connected solution strategies that have potential within the target group.

The participant is asked to fill in two brief questionnaires in order to collect their level of asthma control and to identify their level of health literacy.

Asthma Control:

ACQ

[\[dia/748485/acq-_scorelijst.pdf\]\(https://www.hagaziekenhuis.nl/me-dia/748485/acq-_scorelijst.pdf\)](https://www.hagaziekenhuis.nl/me-</p></div><div data-bbox=)

Health literacy

Questions based on Ylitalo et al. (2018)

Hoe vaak laat je je helpen bij het lezen van medische documenten?

Hoe vaak heb je moeite met medische formulieren invullen en begrijpen?

Hoe vaak heb je moeite met het begrijpen van je asthma door het moeite hebben met lezen? (het berijpen van informatie)

The researcher will end the interview by expressing gratitude and asking if there are still questions left.

Appendix P - Interview Questions (Empathize)

Scenarios

Rita

Hoe zou jij reageren tijdens een bezoek aan de huisarts en je begrijpt niet wat ze zeggen?

Wat zou je doen als je geschreven informatie niet begrijpt?

Wat vind u ervan om informatie van het internet te halen?

Op wat voor manier helpen vrienden en familie om informatie te begrijpen?

Heb jij ook veel verschillende medicatie? Wat vind je daarvan?

Wat doet de dokter bij jou om het je beter te laten begrijpen?

Theo

Lukt het bij jou om te begrijpen wat de dokter zegt?

Wat betekent de rode puffer voor jou? Wanneer gebruik je hem?

Vergeet jij ook wel eens te inhaleren?

Hoe komt het dat je het soms vergeet?

Zegt de dokter daar wel eens iets over? Wat doe je met dat advies?

Hoe gaat het met jouw puffer gebruik over een langere periode?

Ayse

Wat vind jij van het nederlandse zorgsysteem?

Trek jij soms ook je eigen plannetje? Hoe doe je dat dan?

Wat vind je van de prijs van de medicijnen?

Welke invloed heeft de prijs van medicijnen op jouw medicatiegebruik?

Hoe denken de mensen thuis of in de buurt van medicijnen?

Heb je de rode wel eens voor een langere tijd geprobeerd? Merk je dat het dan beter gaat?

Veranderd er dan iets van wat je van de rode vind?

Boris

Wat vind jij van medicijnen? Denk je dat ze goed voor je zijn? Gebruik je ze graag?

Wat doe je anders als je je goed voelt ten opzichte van als je je niet goed voelt?

Wat vind je van de mening van de dokter? Heeft deze altijd gelijk?

Op wat voor manier heeft je levensstijl invloed op het gebruiken van je medicijnen?

Vergeet je wel eens je medicijnen door een te druk leven? Vind je het moeitelijk om het in te bouwen in je dagelijks leven?

Story Elements

Personalisation

Wat vind je van het beginscherm? Kun je het begrijpen? Wat zou je willen doen om het per-

soonlijker te maken?

Literacy barriers

Kun je lezen wat er staat? Wat zou je willen doen om het leesbaarder te maken?

Interpretation

Begrijp je wat er bedoeld wordt op dit scherm? Snap je wat je moet doen en wat het betekent? Hoe zou je het anders willen zodat het makkelijker te begrijpen is?

Social Environment

Zou je de resultaten willen delen?

Met wie wil je je resultaten delen?

Waarom zou je je resultaten willen delen?

Zou je je resultaten willen vergelijken met anderen? Waarom wel/niet?

Usefulness

Wat zou volgens jou het grootste nut van dit apparaat zijn?

Wat zou er anders kunnen zodat het nuttiger voor jou lijkt?

Digital literacy

Welke apparaten gebruik je zelf nu al vaak?

Zou je een nieuw apparaat willen leren gebruiken?

Appendix Q - Written Scenarios

Theo

First consult

Theo experiences a lot of symptoms and one time it was bad. An exacerbation occurred and he has to go to the hospital. After his recovery, he is asked to go to the general practitioner, where he is examined. It is there that they find out that he has asthma. He is told that he has asthma and all the things that he has to do to take care of himself. A lot of difficult medical terms, a lot of different medication. Theo just wants to go home. The doctor gives him some flyers to read at home.

First day

At home, Theo's wife helps him to read and understand the flyers. He learns that there are two kinds of medication. One that he has to take every day (red) and one that he only needs to take when he feels stuffy (blue).

First 6 weeks

The first 6 weeks, Theo tries to take the red medication every morning and evening, but sometimes forgets it. The blue one he really likes, as it gives him a lot of relief.

Second consult

At the consult, the care provider hears that Theo is doing better and that the blue medi-

cation really helps him sometimes. When she asks about the red one he tells that he sometimes forgets it. When she tests his spirometry, she sees that the lungs aren't really improving. Based on this she tries to convince Theo that the red is really important and that it has to be taken every day. She notices, however, that Theo has a lot of trouble understanding it all and really takes the time to explain to him what happens when he doesn't use the red medication.

The conversation is quite exhausting and the time is over. The care provider would love to give Theo extra written information so that he can figure it out himself at home but knows that this is of little use.

Further in the treatment

After several consults, the care provider has been able to fully explain to Theo what happens when he doesn't use the red medication. Although Theo understands now that it is very important to take every day, his underbelly still tells him that when he is feeling fine, he doesn't need to take the medication. After a consult, he briefly feels motivated again to take the medicine. But this insight fades away over time and he falls back into his original use.

His family wants the best for him and they do

better understand the importance of the red medication and sometimes they are able to push/motivate him to take it. However, these people also have jobs and kids and are not able to always bother with helping Theo.

Ayse

Ayse is from Turkey, where she has always used the blue medication to help her through tough situations. Now that she moved to the Netherlands, she needs a new dose. But unfortunately you need a referral from the GP. Ayse goes to the GP to ask for a prescription. But the GP tells her loads of other stuff, extra medication etc etc. She doesn't want to know about all this and just wants her blue medication.

In the pharmacy she sees the price of the medications, she thinks to herself: I'm only going to use my meds when it is really necessary. Some days the weather is good and Ayse can go without medication. But other days are really bad and she uses the blue one.

The doctor explains her that if she uses the red medication, she doesn't need to use the blue one that often. Ayse did have a lot of complaints and wants to do what is best so she buys another set of meds

Back home her husband gets frustrated. why did you buy that medication again that isn't working? The doctors here do not understand what they are doing. They just want to earn money.

Boris

The consult

Boris heard that he has asthma, the doctor tells him what he has to do. He doesn't like it and just wants to go on with his life without taking too much medicines because they make him feel like a patient.

At home Boris notices that his blue medication helps him a lot. He is able to not be bothered too much by his asthma if he takes the blue medication. The red one he forgets often, his life is very busy and when he feels good he wants to not think about asthma at all and when life is bad he can use the blue one the most.

Consult 2

Boris wakes up in the morning and sees that he is almost too late for his appointment with the doctor. He hurries and manages to be there in time. The doctor does some testing and sees that his asthma could be better under control. She explains that it is really important to use the red medication. Boris knows that it is important but he just forgets it somehow. His life is too busy. Although he would really like to do it.

At home Boris tries to take his red medication more often, but when he is late for work, or sleeps at a friend's place, he still forgets to use it. Although Boris really would like to use it, it remains very hard for him to do it every day.

Rita

The consult

During the first consult, Rita is told that she has asthma. The doctor tells her a lot of difficult stuff and gives her a flyer to take home. Rita is ashamed to tell that the doctor should speak a bit more slowly and that giving her the flyer doesn't really contribute as she has a lot of trouble reading. Therefore she just tells the doctor that she understands and wants to read the flyer on her own at home.

At home

At home, Rita throws the flyer in the bin as she is not able to read it. She didn't quite remember everything the doctor said, but she knows that there are two medicines that she has to take. Everytime when she doesn't feel good, she takes one of the medicines. After a while she notices that the blue one really helps. The red one doesn't do a lot. Maybe it is not the right medicine for me she thinks.

Consult 2

The doctor hears that Rita still has a lot of complaints. If the doctor asks if she uses both medications she says yes (just to make the doctor happy and to hide that she didn't understand)

The doctor knows that Rita is probably not totally understanding what she has to do. She explains it more clearly this time but Rita just needs a lot of time to understand everything. She doesn't want to ask something if she didn't understand because she is ashamed that she might be stupid.

Appendix R - Notes Participant #2 (Empathize)

General Part

Living situation

Lives not on his own, with many other friends. From there he goes with the taxi towards his work at the farm. Works from 9 to 15:00 Feeds the chickens and the goats

Asthma

Since a few years no complaints anymore. Before there were more complaints when he was walking, running or laughing.

Medication

Using a purple disc every day 1x in the morning. Does not forget to use it. He wants to see if he doesn't have to use it at the weekends In the past, he used to have rescue medication which the carrier the full day (salbutamol) In combination with an orange one. But he doesn't have to take it anymore. But doesn't need it because he uses the purple disc every day.

If I feel I need it, I will definitely do it. Others around me also notice it when I didn't use it. They hear that my airways are wheezing. Then they tell me that my airways are wheezing and that is a sign for me that I have to take it.

When providing an explanation of the difference between the two:

That has not been told, or maybe very far in the past.

Are you doing it yourself or is someone helping you? The helpers give it to me and ask me to do it.

Do you think you would be able to do it yourself? Hmm, I'm not sure yet.

Doesn't like to use the 'voorzetskamer' 'gedoe' he calls it. The discus he thinks is nice to use.

Do you know what it does?

I think that it has been mentioned once, but I forget it every time. Why is that?

I just have to do it, tells the doctor, that is what I know.

How often do you go to the doctors?

Previously quite often but now not so often.

Other medication

At the farm, he is also told to take his medication for ADHD. But quite often he helps to remember them that he has to take it. She suspects that it is the same with the inhaler.

One time yes, one time not.

Adherence Scenarios

I do not remember how it went in the past. The medication means that he doesn't have asthma, this means that he can freely walk around. What happens when you do experience symptoms? No breath. Not being able to properly breathe. Never needed to go to the hospital for an exacerbation. He is able to read and write. But not too much. He likes to read strips. Long words are difficult. Mother or care support is able to help them with the reading of flyers from the doctors and tell hem when he has to take something. *I can read strips if I want. But mom helps me to read more difficult things. I'm not really a doctor-kind of guy.* Doesn't like doctors. For example because of vaccinations. Experience no negative effects from an inhaler. When it is empty, there is a new one ready. This is brought by the pharmacy. *You notice it when nothing comes out.* He doesn't search for things on the Internet. He doesn't think it is interesting to look for information. He does play games on the internet and knows how to get there and navigate. Online banking is done by the mother. *The doctor just explains it with words, when he doesn't get it he just says it.*

When there is no support, do you think you will forget it?

Yes

Why do you think this would happen?

If I feel something I take the quick-relief medication.

Do you have apps on your cellphone?

Games and youtube. I look at games and how to play it.

Looking at a certain streamer. Whatsapp en Facebook.

Do you use new apps?

Yes, games sometimes.

Can you read what it says?

Yes, a little.

This one is hard, moving, if I walk a lot, I feel a pain in my stomach.

And moving makes me tired. My feet are going to hurt.

eHealth Stories

Doesn't like new technologies

No, if someone can explain to me how it works I think its fun to try something new.

Only for one med

Doesn't really matter for me.

Wants to share data

Yes, Then mom doesn't have to ask for it, but she can see if I forget something.

If I forget it, others can see it. They can use the app and I use the medication.

Doesn't understand what it says.

Yes, definitely

sharing with peers

I do not know a lot of people with asthma.

What about others, through phone?

you could see how others are doing.

Menu

Not really clear, probably this will cause not liking the system.

Money

Do not know who pays it.

Time

If I have nothing else to do. Or before going to sleep take a look at how the day was.

Time is no issue.

Symptoms

I know that I have some wheezing now and then.

How would you put it today? Not at all

And how about an extreme moment? Then it never stops. Do you have it 1-2 times a day? No that not. Do you think it is clear for you? Yes, I think so.

What would you like to change?

The sharing option. I would like to share it with my mother when she isn't there.

He would like to share it with mother and care support. And maybe with the doctor as well. So you don't have to go there a lot of times. Only the care support may know. Wants to be able to

choose what to see.

Would you like more symbols?

Yes, for me that is quite important.

Image of how it is going.

Yes, would be cool.

Personalization

I would like to show my girlfriend

How more fun, the more interesting it is.

Adding photos would be nice.

Game

I would think it is fun. I like the games.

Shows a website where you can buy games for on your computer. I can speak English but I follow videos and learn from someone who explains how it works. First I look other people play and then I buy it myself. Then I know that it is fun.

Plant or lungs doesn't matter, as long as it is nice and visual.

I do not bring it with me, my care support has it.

So if the feedback is shown on the thing itself I can not see it. It is at home. The phone I always bring with me.

Help by a doctor.

It would be good to hear a voice explaining the matter to you. And it would be even better if you could set the language. Talking to the doctor is not preferred as they are quite busy. It would be good to talk to the doctor.

Appendix S - Coding RQ1 (Non-adherence)

	Dependant on social support B4	Complexity B4	Not understanding information B3	Forgetting information B4	Not feeling the effect (subjective) E6	Attitude: No complaints = no Meds, gut feeling, different perception of health D7	Reduced Social Support/Social Influence F2/F5	Cultural influence D2	Not interested in 'health' health is not priority D5
Expert Talks									
POH3	1	1	1	1	1	1	1	1	1
GP1			1	1					
LHLE1									
AE									
GP2					1				
POH2	1		1	1	1	1	1	1	1
LHLE2									1
POH1	1	1	1		1				
GP3			1	1	1	1			
Literature									
Kunt dat even uitleggen?		1	1	1					
Teuscher et al. 2015						1			1
Hiscock et al. 2012							1		1
Arpey et al. 2017									
Pampel et al. 2010			1				1	1	1
Interviews									
P1				2			2	2	2
P2	2			2					2
Total	5	3	11	5	5	6	6	5	10

POH = Practice Nurse
 GP = General Practitioner
 AE = Adherence Expert
 LHLE = Low Health Literacy Expert

Younger people and old males not loyal/stubborn D2/F7	Short Term Vision - Long term has less benefits D4	No strong relation with CP F7	Ashamed to ask for info C3	External stress - Cognitive Tax C4	Taking meds is not fun D5	Limited Personal Resources B 3/4	limited Material Resources B2	Healthcare system is a circus B2	Reduced self-efficacy C4	Deprivation/inequality	Latent Trait
1		1	1			1					
			1			1				1	
1											
1		1	1		1	1					
	1				1			1		1	
			1					1			
				1	1	1					
			1						1		
		1						1			
	1				1	1	1			1	1
		2			2						
		2				2	2		2		
3	2	7	5	6	5	9	5	3	4	2	1

Appendix S - Coding RQ2 (eHealth Acceptance)

	Young has more skills than old	Depening on Children	Technology Anxiety	Limited digital efficacy	small texts are difficult	Afraid of something going wrong	Costs	Difficult to judge trustworthiness	Perceived value/beneficial
Expert Talks									
POH1					1		1		
POH2	1	1		1	1				
POH3		1							
LHLE2				1	1	1	1		1
Literature									
Stichting lezen en schrijver				1				1	
Rahimi (2018)			1	1					1
Kayser et al (2015)			1	1					1
Interviews									
P1		2		2					
P2	2			2	2				
Total	3	4	3	9	5	1	1	2	2

Lack of engagement	Not innovative enough	No customized info	No social norm integrated	Not involving PP relationship	Privacy Concerns	Trustworthiness	No relation with own health	Troubleshooting/it should always work or help if it doesnt
		1						1
1	1	1	1	1	1	1	1	
1		1					1	1
2		2	2	2			2	
4	1	5	3	1	1	1	3	2

Appendix T - Coding Insights

	Performing Along	Loyal to GP/ accepting things easily	Wanting to be looked over	Support self-efficacy	Prepare for consult to ask better questions	Be visual	Short term engagement	Show consequences	Subjective vs objective make the invisible visible
Expert Talks									
LHLE1		1		1		1	1		1
LHLE2	1	1	1	1	1	1	1		
POH2	1	1				1			1
POH3	1	1				1		1	
AE1						1	1		
GP2									1
GP3	1					1			
Interviews									
P1		2							
P2		2	2			2	2		
Total	4	8	3	2	1	8	5	1	3

Looking back on progress	Story Telling	Gamification	Rewards	Only focus on the essentials	Step by Step	Creating a bond	Multiple languages	Reminders	Movies	Phone you carry with you, device is always at home
	1	1	1			1				
			1			1			1	
1				1	1	1	1	1	1	
				1	1		1		1	
1										
				1	1				1	
2		2				2	2		2	2
4	1	3	2	3	3	5	4	1	6	2

Appendix U - Preliminary matrix of change

	Capabilities	Self efficacy	Attitude	Awareness	Social Influence
Fill	Able navigate the healthcare system and know where and how to fill, has money to buy		Sees that the benefits are higher than the costs, accepts the medication		Family accepts the acquirement of medication
Understand	Able to understand and interpret information (verbally, written or digitally)	Expresses confidence in asking for clarification		Is aware of the importance and health benefits of maintenance medication	Is aware of other asthma patients doing the same
Organise	Able to organise medication schedule and integrate it in daily regime. Able to understand difference between medications, remember medication information	Expresses confidence in being able to manage asthma despite cognitive tax	Sees that taking care of yourself in the future is as important as taking care of yourself now		
Take			Enjoying the taking of medication		The social environment accepts the taking of medication
Monitor	Able to interpret effect of medication on symptoms			Sees the link between medication usage and symptom relief Sees that being healthy is more than feeling healthy	
Sustain			Sees that taking medication is also important when there are no complaints		Has a trustworthy relationship with the care provider

Appendix V - Collages

Consciousness-Raising

Definition

Providing information, feedback, or confrontation about the causes, consequences, and alternatives for a problem or a problem behavior.

Must be followed by an increase in problem-solving ability

Based on facts

Showing ACQ over time

Show other parameters over time

What parameter can be used to provide feedback?

How can this feedback be presented?



Scenario-Based Risk information

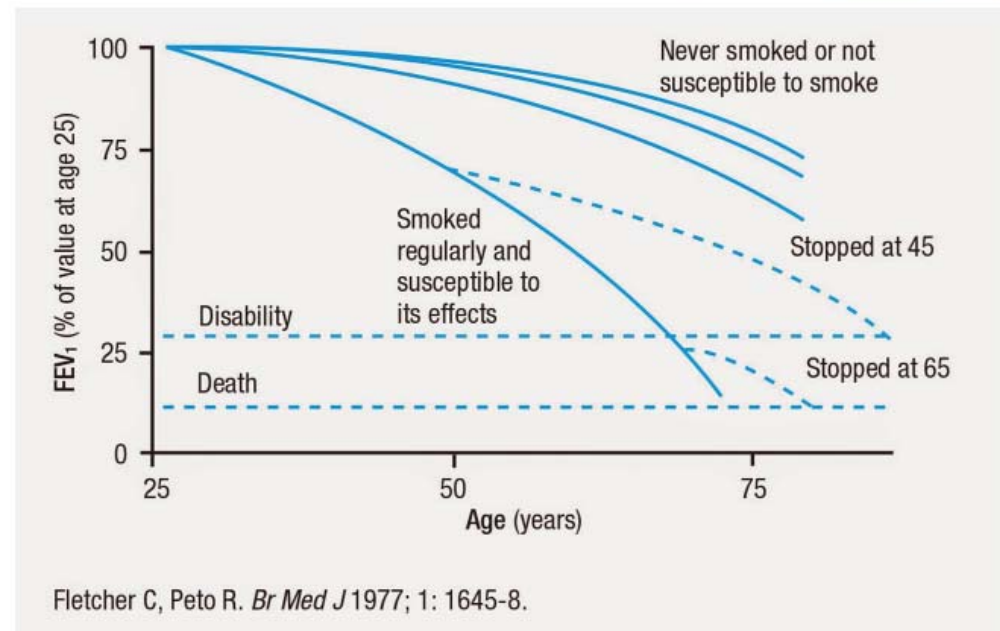
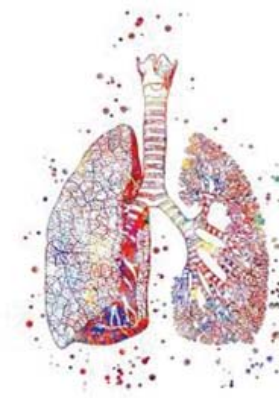
Visualise future prediction
Show degradation over time

Definition

Providing information that may aid the construction of an image of the ways in which a future loss or accident might occur.

The body is degrading, but you want to reduce the steepness of this

How to visualise a future impact?
How to visualise state of lungs?



DIRECT EXPERIENCE

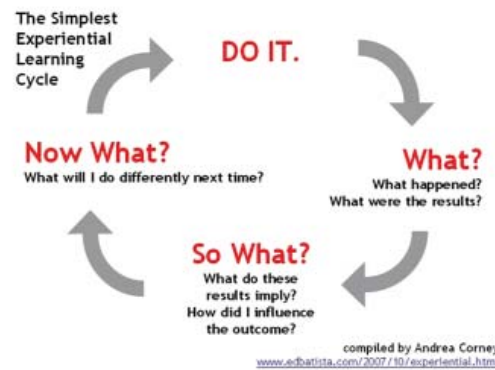
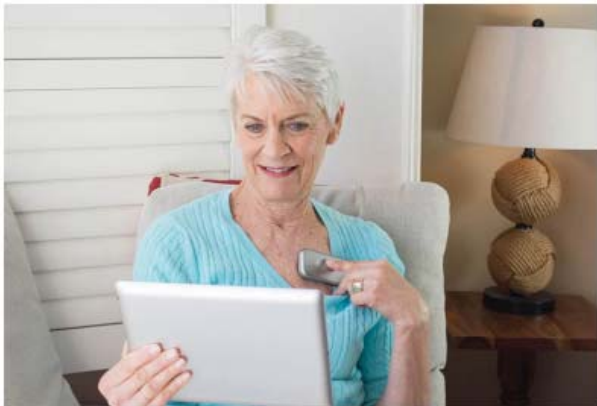
Definition

Encouraging a process whereby knowledge is created through the interpretation of experience. Experiential learning results in personal theories about effective behaviour and continuously recurs as these theories are tested out and confirmed or modified.

Active process
Including a reflection on the meaning of the experience
Making visible the invisible
Experience asthma in more obvious and direct way
Discovering knowledge yourself

How to experience something that is invisible?

How to reflect and learn from this experience?



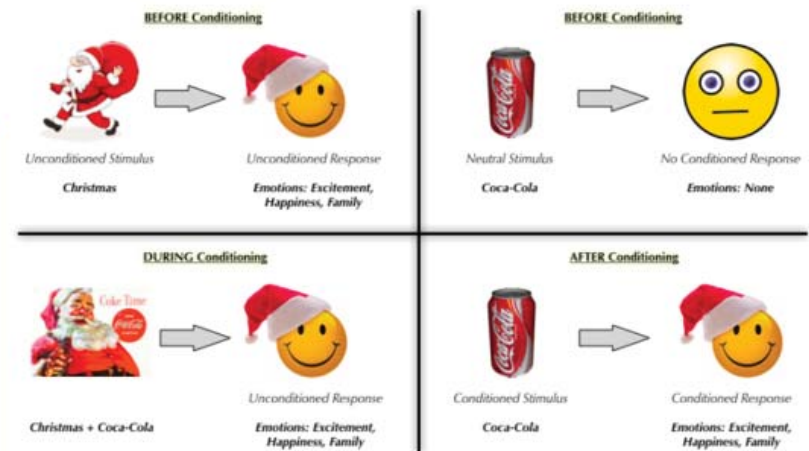
Conditioning

Definition

Stimulating the learning of an association between an unconditioned stimulus (UCS) and a conditioned stimulus (CS).

- Pair the inhalation moment to something positive
- Receiving a piece of candy/toy at the dentist
- Receive social support upon taking medication (Compliments)
- Gamification (Receiving points)
- Certificates
- Prizes
- Bonusses
- Discount

What can be positive aspects to provide?



Guided Practice

Definition

Prompting individuals to rehearse and repeat the behavior various times, discuss the experience, and provide feedback.

Enhance contact between patient and caregiver

Add more moments of interaction

Not adding extra work for the caregiver

Digital coaching

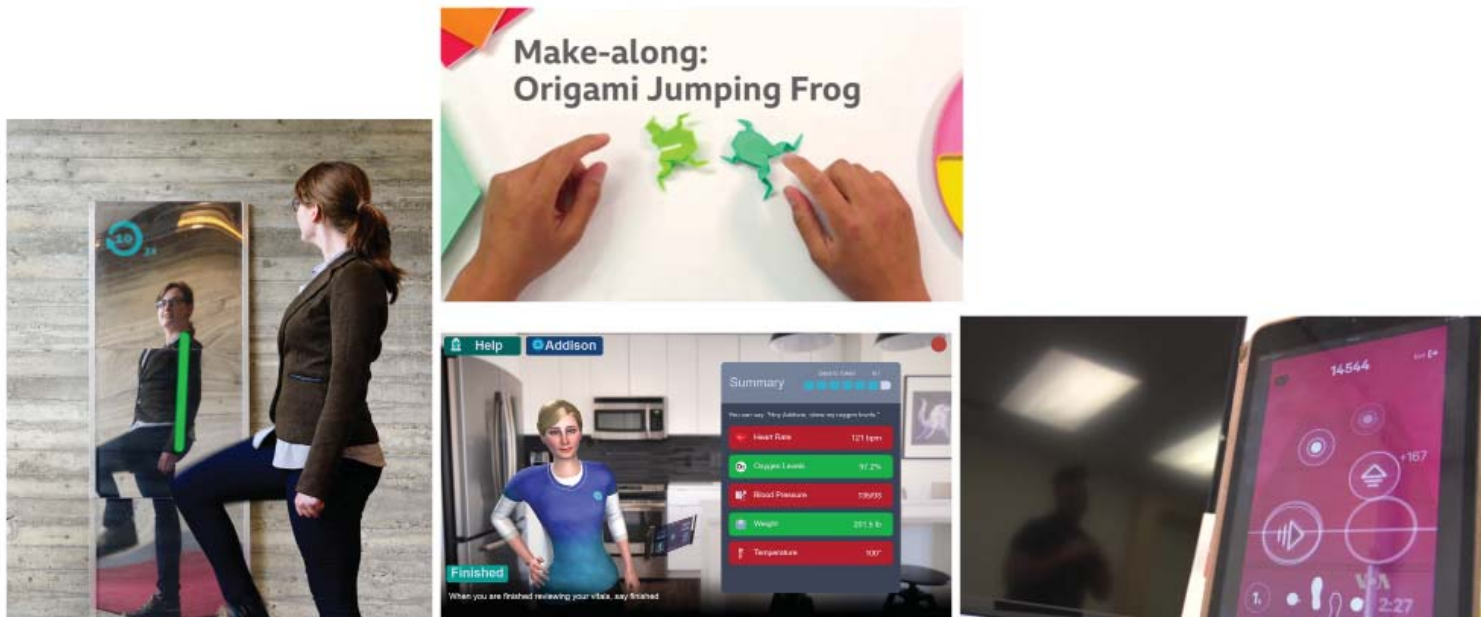
Rehearsing

Tutorial

Make-along

How to involve the caregiver?

What could be used as communication channel?



Self-monitoring of behavior

Definition

Prompting the person to keep a record of specified behavior(s). The monitoring must be of the specific behavior (that is, not of a physiological state or health outcome). The data must be interpreted and used. The reward must be reinforcing to the individual

How to present feedback?

How to acquire self-rating?

Enhance and empower look back at adherence
 Make timeline engaging
 self-rating



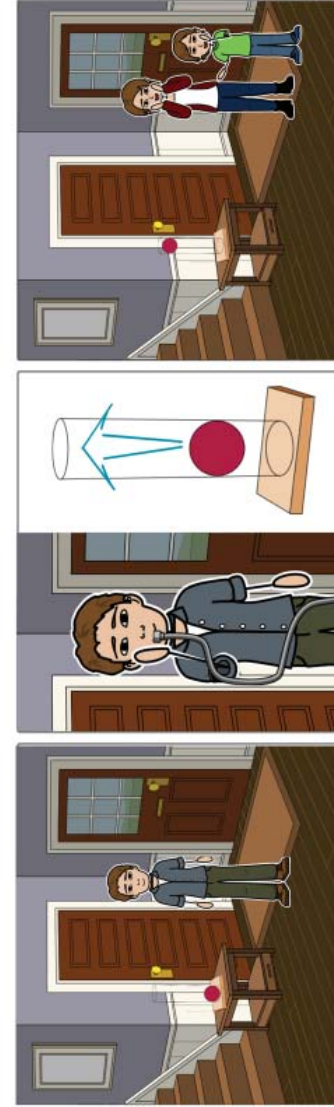
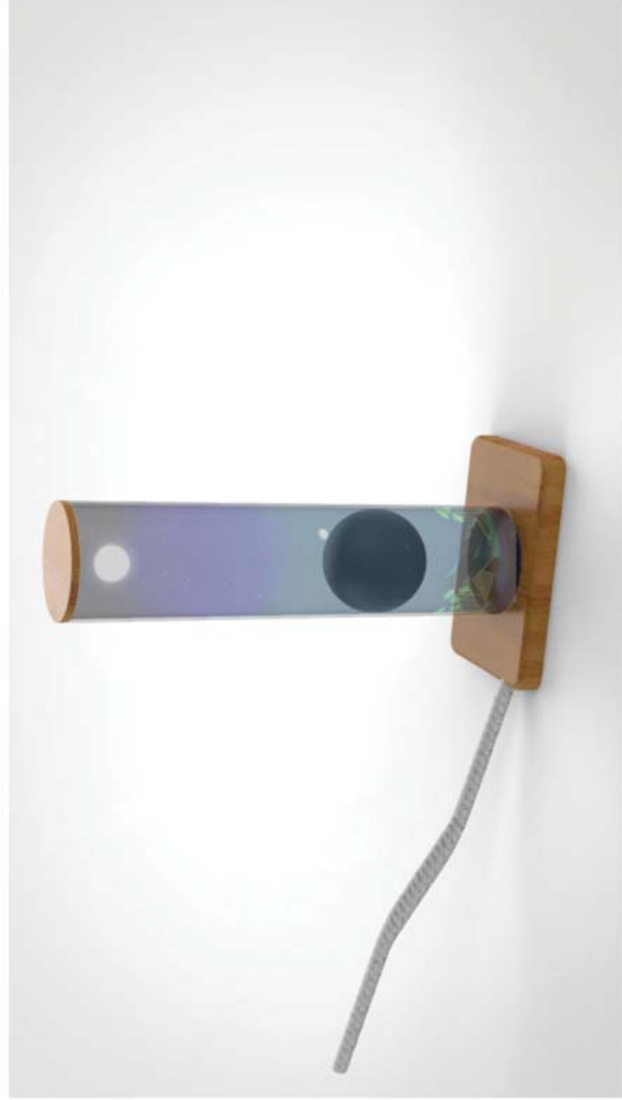
Bathroom Checklist

	Pull down my pants. Sit on the toilet. Go pee or poop in the water.	
	Wipe with toilet paper. Throw toilet paper in water.	
	Pull up my pants. Flush the toilet.	
	Wash my hands with soap and water. Good job!	

✓ ✓ ✓ ✓

Appendix W - Visual Presenters

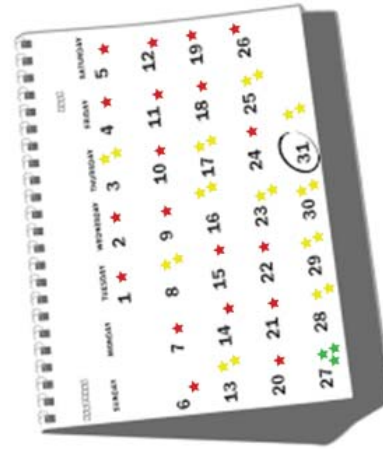
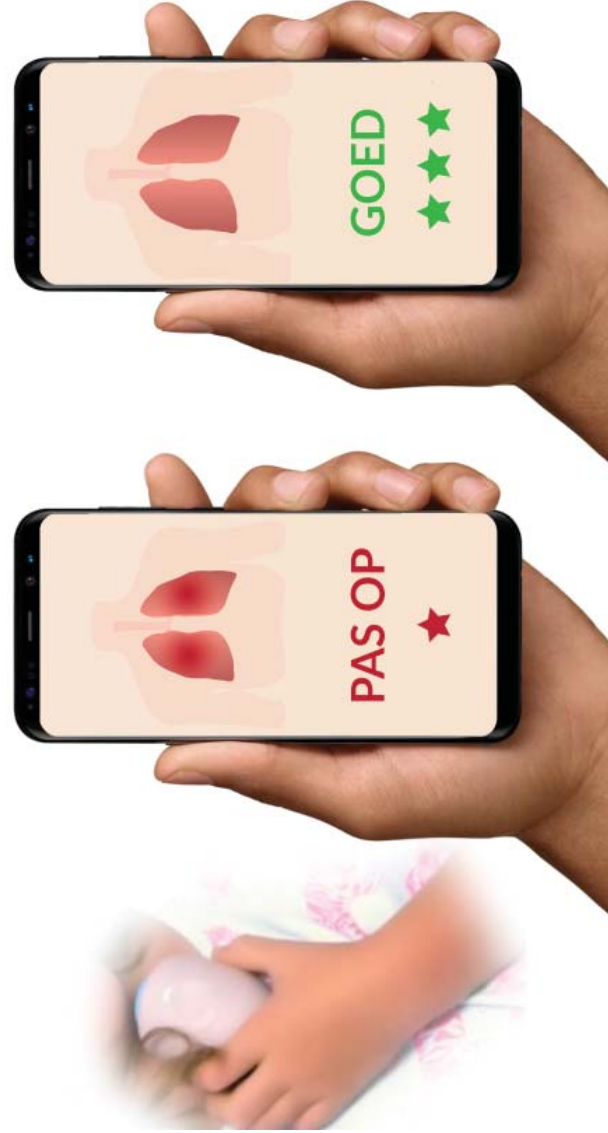
1. BALLENBLAAS



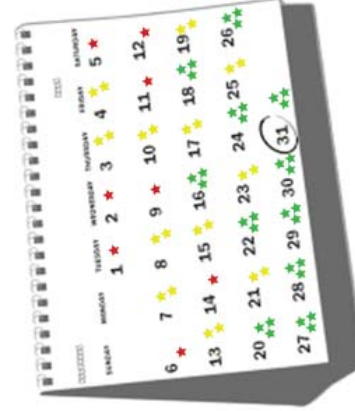
2. GELUIDENVANGER



3. LUISTEREND OOR



★ 30

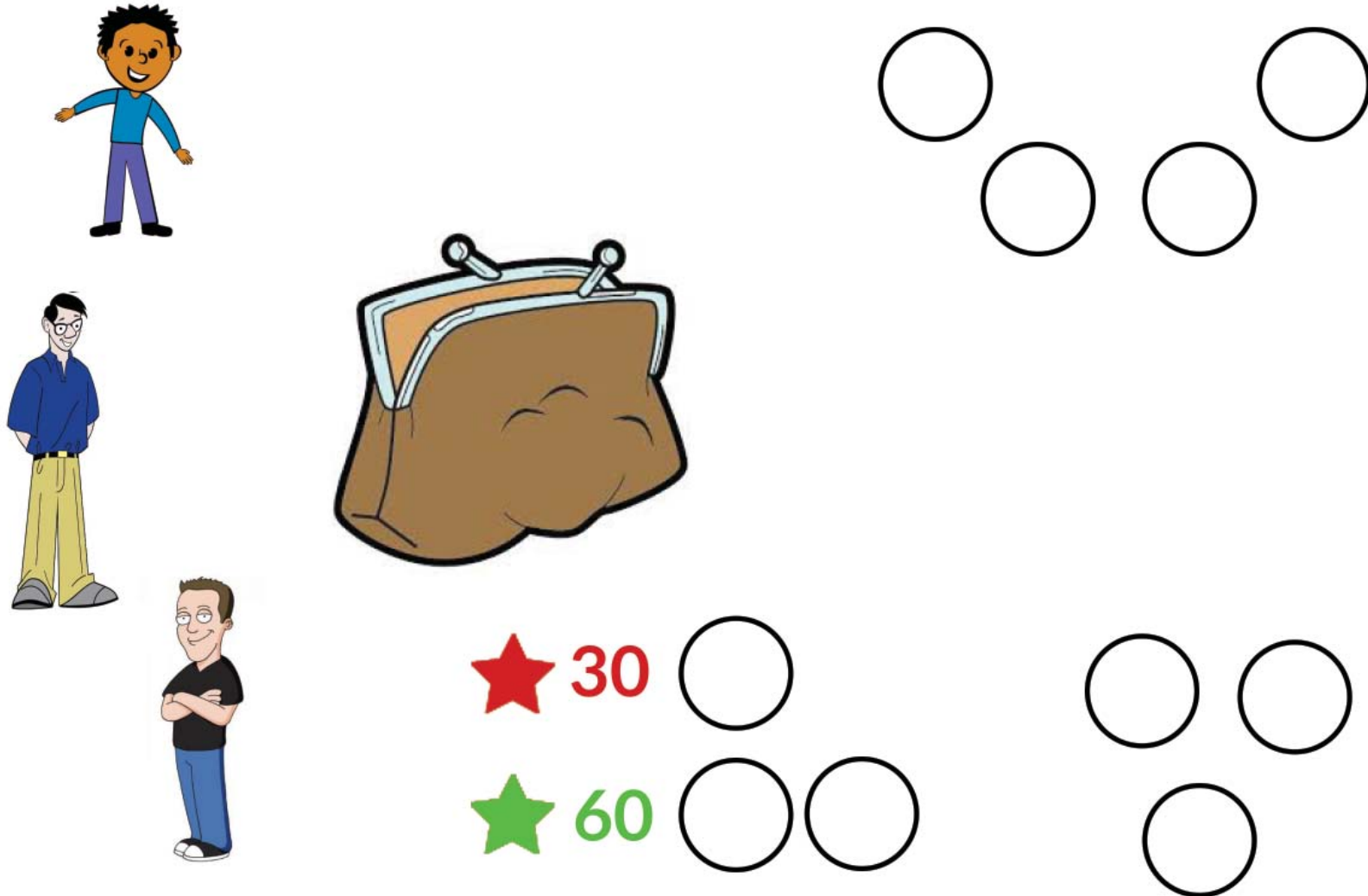


★ 60

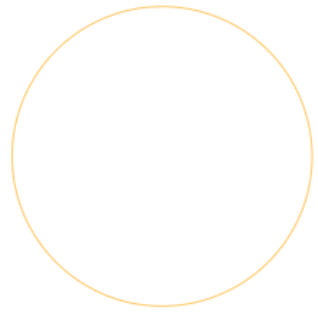
4. DE ERVARING



Appendix X - Explaining sponsorship sheet



Appendix Y - Geluidenvanger Prototype



PLAATS STICKER

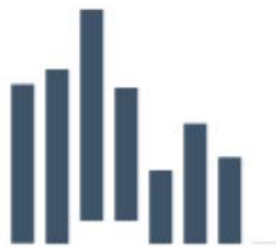
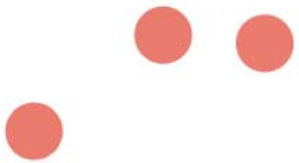
Placement of sensor



Analysing Data



Visualising Coughs



Visualising Wheeze



Final output screen

Appendix Z - Peakflow Measurement Benchmark

Peak Flow Meters

Normal peak flow for home use

Pros

/ Cheap (15 euro)

Cons

- / Values are not easy to interpret
- / No triggers
- / Only peakflow (no FEV1)
- / Values need to be manually logged
- / Manually logged values can be helpful for the doctor but do not provide insight for the patient.
- / Inaccurate (not suitable for diagnosis)



Medpreventie.nl

Smart Peakflow

Pros

- / Small and portable, able to take everywhere
- / Automatic Logging
- / See results over time

Cons

- / An abstract representation of scores
 - / Triggered with sound and flashlight, no other incentive.
 - / Only peakflow (No FEV1)
- the doctor but do not provide insight for the patient.



Smartpeakflow.com

Smartone Wireless Peakflow

Pros

- / Easy to clean
- / Automatic Logging
- / See results over time
- / Records FEV1 and peakflow
- / Data creates a discussion point to help better reflect

Cons

- / Values are difficult to interpret
- / Large
- / Expensive (100 euros)
- / No trigger



Medischevakhandel.nl

Incentive Spirometer

Pros

- / Fun, engaging to use
- / Visual and easy interpretable feedback
- / Cheap (15 euros)

Cons

- / No specific values can be logged
- / Doesn't record automatically
- / Doesn't provide peak flow or FEV1 values
- / Large



Rizen Healthcare

Medical Spirometer

Pros

- / High accuracy
- / Detailed description of results to be interpreted by the doctor
- / Many different display options
- / Values are automatically logged

Cons

- / Graphs are abstract and difficult to interpret
- / Expensive (1400 euro)
- / Interface not usable by patients



KWIPPED

Appendix AA - Wheeze Measurement Benchmark

Wholter

Pros

/ Detects wheeze during the night

Cons

/ Only usable at night

/ Not developed yet



Wheezo.com

Respiri.co

Pulmotrack

Pros

/ Continuous monitoring

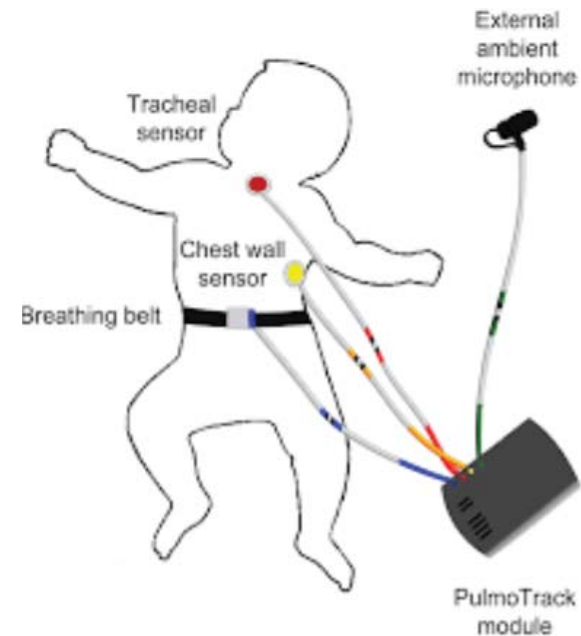
/ Automatic

/ Accurate

Cons

/ Invasive sensor placements

/ Multiple sensors



Puder et al. 2016

Pros

- / Small
- / Aesthetic form
- / Automatic wheeze detection
- / Child-friendly app
- / Provides a simple to interpret 'wheeze score'
- / Learns through frequent use
- / Sends results to GP

Cons

- / Breathing is presented in an abstract way
- / The wheeze score doesn't provide information on what is actually happening within the lungs
- / A parent has to initiate to use the wheezo, there is trigger



Appendix BB - Evaluation Setup Iteration 1

Aim

To evaluate the acceptance of four different product concept directions. The concept directions contain elements that have been taken out of the ideation stage. The concepts and their elements will be tested regarding their level of engagement. Finally, this will yield a concept that is regarded as optimal which is build up out of the elements that have been judged as being the best.

Representations

The product concepts will be evaluated through mock-ups (dummies), three-dimensional tangible representations of the product concepts.

Test Environment

The interviews will be conducted in a private room at the health facility

Means of recording

The interviews will be recorded with a voice recorder

Respondents description:

Three asthmatic males with low health litera-

cy and uncontrolled asthma. They have been selected based on their ability to speak and understand the Dutch language, in order to facilitate the discussion.

Method

Through a personal interview, questions will be asked that will measure user engagement. According to short et al. (2018), there are several methods to assess patient engagement. For this project is has been chosen to focus on a macro level to explore users perceptions of how the intervention could help to engage in the behavior change process. It will be done through semi-structured interviews. During these interviews, questions will be asked based on the elements of the UTAUT questionnaire.

Questions

Algemeen:

Hoe is uw leef situatie, waar woont u en wie is er betrokken bij uw asthma?

Welke mensen in de omgeving buiten uw huis zijn betrokken?

Op wat voor manier heeft u last van uw asthma?

Hoe merkt u wanneer het slecht gaat met uw

asthma?

Welke medicatie gebruikt u?

Hoe vaak gebruikt u deze?

Vragen per concept:

Ballenblaas

Embodiment:

Wat vindt u ervan dat het een echt product is en geen app?

Context:

Waar, wanneer en hoe vaak zou u dit product willen gebruiken?

Engagement:

Hoe denkt u dat uw huisgenoten hierop zullen reageren? Wat vindt u ervan dat ze op de hoogte zijn van uw asthma? Denkt u dat u dit elke dag zou willen proberen?

Luisterend Oor

Embodiment:

Wat vindt u ervan om een apparaat te hebben dat naar uw keel kan luisteren?

Context:

Waar, wanneer en hoe vaak zou u dit product willen gebruiken?

Engagement:

Wat vindt u ervan dat u korting kunt krijgen op uw medicijn?

Hoe denkt u dat anderen om uw heen zullen

reageren als ze u kunnen sponsoren? Wie zou het bij u willen doen?

Denk u dat dit helpt om elke dag de meting te doen, omdat u anders geen sterren krijgt?

Geluiden Vanger

Embodiment:

Wat vind u ervan dat u een sticker kunt plakken die naar u kan luisteren?

Context:

Wat vind u ervan dat het product vanzelf bijhoudt hoe het met u gaat terwijl u slaapt?

Engagement:

Wat vind u ervan dat als u sochtends wakker wordt, u een aangename ervaring meekrijgt?

Zal u hiervoor elke avond de sticker dragen?

Wat vind u ervan dat u eigenlijk zelf geen moeite hoeft te doen?

De Ervaring

Embodiment:

Wat vind u ervan om een Ipad thuis te krijgen die u voor een tijdje mag gebruiken?

Context:

Waar, wanneer en hoe vaak zou u dit product willen gebruiken?

Engagement:

Wat vind u ervan dat u deze innovatieve technologie kan gebruiken? Zou u dit elke dag willen doen? Vind u het leuk om te gebruiken?

Final Concepts:

Welk product spreekt u op het eerste opzicht het meeste aan? Waarom? Welk product lijkt het meeste leuk om te gebruiken? Welk product lijkt u het meest leerzaam (leren over

asthma en het medicijn)? Welk product lijkt u het makkelijkst?

Welk product spreekt u het minste aan?

Waarom? Bent u bang dat het misgaat? Bent u bang dat er iets met uw persoonlijke gegevens gebeurt? Denk u dat het te ingewikkeld is om te gebruiken?

Welk product zouden de mensen in uw omgeving het meeste aanspreken?

Appendix CC - Evaluation Results Analysis

Participant #1

Engagement	Insight	Quote
Sponsorship	No comments	
Presentation in app	No comments	
Effortless	Not interested in knowing about health only if it is effortless. Otherwise unnecessary/doesn't see the use	Ja dat is ook een hele goeie idee. Dan weet je meteen hoe het met jou gaat. Dat je zelf eigenlijk de arts van uw eigen zijn.
Game	Could be fun for one or two times but will not be interesting for a longer period	Ja als een soort spelletje af en toe. Maar na een tijdje zou je zeggen jaa..
Involving others	Others have also other things to do. Also they have a different lifestyle so because of irregularities it becomes difficult	Ja die liggen dan nog in bed. En als de deur uit ga bijvoorbeeld voor mijn werk. Dan ben ik savonds thuis. ja iedereen is bezig met zijn eigen dingetjes. Dan kunnen ze wel 1,2,3 dagen zeggen, maar dan vergeten ze het zelf ook. Omdat men ook met zichzelf bezig is.
Be your own doctor	Check-ups at the health facility are enough he says. It would be nice to know about your day before you start if it doesn't cost any effort	Zelf heb ik, ik heb de medicijnen, ik neem de medicijnen. Ik wordt regelmatig gecontroleerd hier. 1x in het jaar ook longfunctie onderzoek, dus ik denk dat deze minder effectief is voor mij. Maar het is wel een goed idee. Voor de grap kun je wel een kijken hoe het met je gaat.
See progression	Not as important. Its better to put the effort in remembering	Ik denk dat die wel helpt. Maar herrinerungen van medicijn en als je eraan denkt dan neem je het regelmatig in. En dan gaat het wel beter met de persoon die dat regelmatig ook doen.
Immersion	Not discussed	

Embodiment	Insight	Quote
Tablet	Why use a tablet when you can use a phone for the same	Ja tegenwoordig iedereen heeft zijn telefoon en niemand heeft interesse erin. In een tablet. Want wel af en toe een laptop om huiswerk te maken maar voor de rest niet echt. Het is hetzelfde als telefoon. Mijn is zo gewend om met de telefoon gewoon allemaal dingetjes te doen.
Physical object	Could really be beneficial to help to remember and think about things. Also to help the people around to remember	Ja! precies. Als ik het op tafelhoog zie, en vanzelf zie ik het wel dan denk ik eraan
Patch	No problem to wear, as long as it helps	Wat je kan doen is proberen zo goed mogelijk te leven. En dat is medicijnen innemen, dat kan niet anders. Dusja een stikkertje plakken op je lichaam, het is heel gewoon. het is net zoals een plijstertje op een wondje. je voelt niks ervan en de volgende ochtend trek je hem eruit.
Stethoscope	Does not want to use it during work. Also different moments of evaluation can result in different scores. It could be possible to measure at the same moment	Als ik het meenmeen naar werk bijvoorbeeld dan zit ik te eten. En na het eten ga ik altijd opstaan bijvoorbeeld omdat ik alleen werk. Maar dan heb ik geen zin om zo te zitten en te staren naar buiten.
Phone	No comments	

Participant #2

Engagement	Insight	Quote
Sponsorship	Doesn't care about the discount since costs are not a problem. Insurance	
Presentation in app	No comments	
Effortless	Wearing something throughout the day is not preferred. However a few minutes each day is no problem	Ja dat is ook een hele goeie idee. Dan weet je meteen hoe het met jou gaat. Dat je zelf eigenlijk de arts van uw eigen zijn.
Game	Not discussed	Ja als een soort spelletje af en toe. Maar na een tijdje zou je zeggen jaa..
Involving others	Others have lifes of their own. Especially the children shouldn't be included as the parents don't want them to worry	Ja die liggen dan nog in bed. En als de deur uit ga bijvoorbeeld voor mijn werk. Dan ben ik savonds thuis. ja iedereen is bezig met zijn eigen dingetjes. Dan kunnen ze wel 1,2,3 dagen zeggen, maar dan vergeten ze het zelf ook. Omdat men ook met zichzelf bezig is.
Be your own doctor	It is difficult to understand sometimes how you are doing and if you are doing bad. If you can check how you are doing yourself, you will understand why the medication is important.	Zelf heb ik, ik heb de medicijnen, ik neem de medicijnen. Ik wordt regelmatig gecontroleerd hier. 1x in het jaar ook longfunctie onderzoek, dus ik denk dat deze minder effectief is voor mij. Maar het is wel een goed idee. Voor de grap kun je wel een kijken hoe het met je gaat.
See progression	Not discussed	Ik denk dat die wel helpt. Maar herrineren van medicijn en als je eraan denkt dan neem je het regelmatig in. En dan gaat het wel beter met de persoon die dat regelmatig ook doen.
Immersion	Enthusiastic. Innovative technologies are seen as more than technology. They are less exposed to the newest trends and therefore even more amazed by it. Participant achieved a moment of insight while using the technology and told that he already better understood why to use the medication. Learned that lungs are on the same place for everybody. Immersive experience also has a bit of a scary aspect and he thinks that it will work motivating	<p>ooh maar het ziet er zo uit. Ons lichaam, Maar dit is echt jouw longen of? Ja ongeveer, want longen zitten bij alle mensen hetzelfde. Alleen bij astma patienten zit er slijm en. Ja het is echt gaaf, echt ontdekken, Nou het is geen gekke technologie het is hoger dan technologie. Een robot ook</p> <p>Ja dat klopt, want soms heb ik ideeën dat het medicijn niet belangrijk is. Omdat ik gebruik maar af en toe vergeet je het medicijn. Alleen als je echt last hebt, ja dan zoek je naar de medicijn. En als je dan als je gaat in deze (de ervaring) en je ziet dat het niet goed gaat, dan ga je gelijk gebruiken</p> <p>Ja ik krijg nu al het idee dat ik deze (onderhoudsmedicatie) wil. jawel. Ja daar kun je heel veel mensen mee redden. Om om te gaan met de astma. Astma mensen zijn ook mensen, maar met astma vergeten ze dat ze astma hebben. Ja dan gaan zeggen, dan worden ze denk ik bang ofzo. Dat ze hebben gezien wat er binnen gebeurt en met die plijster. Dan zien ze als ik rook dan oeee. Als ik deze gebruik ja ik weet niet of ik slijm heb of slaap ik goed. Ik weet het niet. En sommige mensen gebruiken het dan opeens en ja met deze heb ik. Deze maakt jou wakker. Dan weet je meer. Ja ik wist het niet allemaal dit. Maar nu heb ik het gevoel van ja zo werkt het.</p>

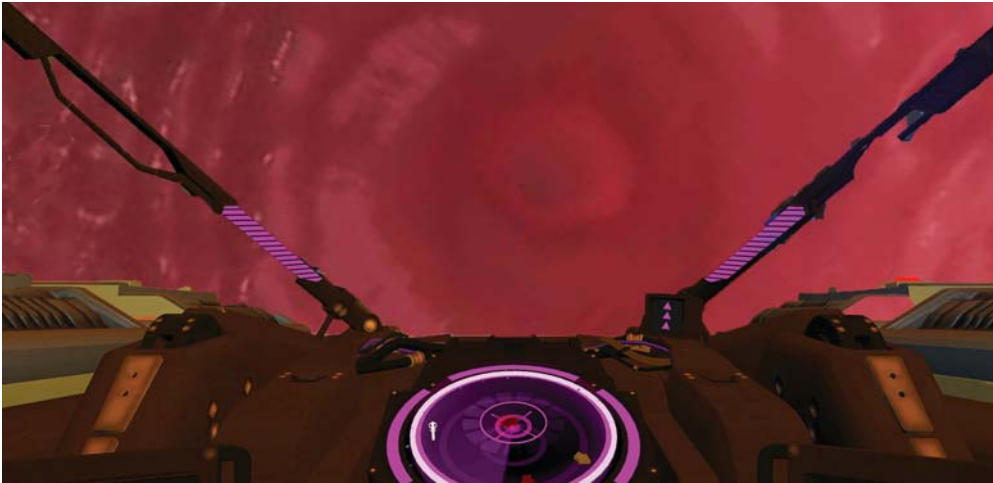
Embodiment	Insight	Quote
Tablet	No comments	
Physical object	No comments	
Patch	No problem to wear, helps to visualise what happens during the night what you do not see when you are sleeping	Ja dat vind ik ook een goed idee want tijdens het slapen zie je niet of je hebt gehoest. Maar met deze dingen weet je het precies. Of het goed met me gaat of niet. Want misschien hoest ik heel veel of heel veel gepiept maar dat weet je niet tijdens het slapen. Dan zit je heel diep in je slaap en dan weet je het niet
Stethoscope	As long as you only have to use it for a few minutes its ok. Would be nice to bring it along so you can test any moment	
Phone	Phone is seen as first step and you can carry it along with you all the time so you can check anywhere	Eerste stap is met telefoon, dat is heel belangrijk want dagelijks heb je je telefoon, dat je ook jezelf buiten kan controleren Ja klopt, meenemen. Maar dan kan je jezelf ook onderzoeken. want nu als ik heb last dan moet ik gelijk naar de huisarts.

Participant #3

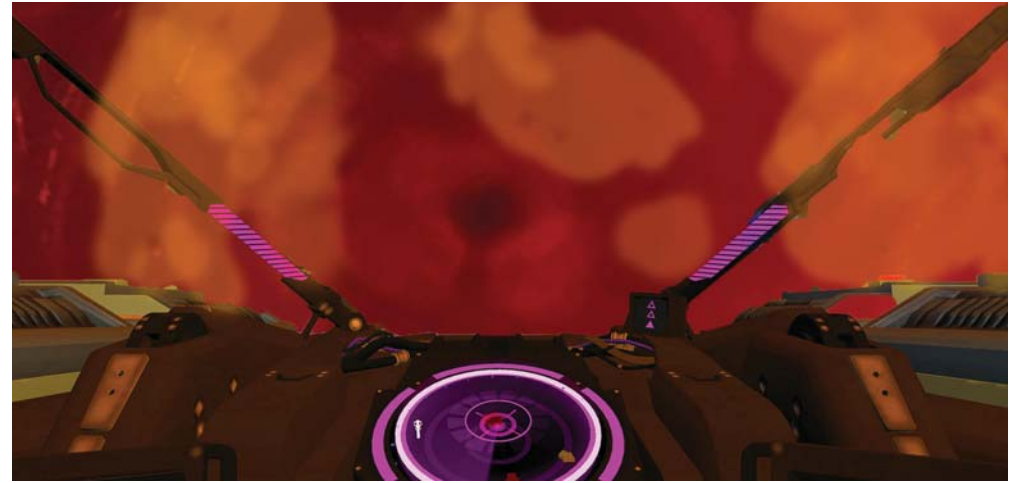
Engagement	Insight	Quote
Sponsorship	Not discussed	
Presentation in app	Better presenting it abstract than as real as possible, real projection is scary and can result in negative thoughts	Dochter: Ik zou dit niet doen. Is denk ik voor hem niet goed om zo naar z'n longen van binnen te kijken. Want hij weet al wat voor effect de medicijnen voor hem hebben. Ik ben gewoon bang dat anders.. vooral niet na alles wat hij heeft meegemaakt ook komt stress bij. Komt een probleem erbij. Ik ben bang dat hij anders dingen gaat zien en daarover gaat piekeren van joh he. Zit er misschien slijm in of heb ik het weetjewel. Dus dat zou ik niet doen App interface: ja dat is goeie en dan meer sterren.
Effortless	Has experienced a lot and therefore trouble managing/forgets a lot. If something is important, effort can be made (taking big amount of pills, setting reminders)	Nog niet van POH nog niet gevraagd. Veel dingen. Ik bijna vergeet te slapen is goed of niet. Veel dingen. Is de laatste tijd echt ellende geweest. Ellende geweest. Ja dus veel vergeten. Veel vergeten
Game	Not discussed	
Involving others	Not discussed	
Be your own doctor	There are enough complaints present that indicate how one is doing. Also people around the person can hear coughing and other sounds and can also notify about the status. Extra products that help to indicate are therefore not wished for.	Vrouw reageert: ja heel erg (doet snurken na) Nee, ik vergeten dan gelijk benauwd. Ik gelijk weet het wel. Ik vandaag veel vergeten. Maar vergeten dat is gelijk weten
See progression	Not discussed	
Immersion	Scared. The participant has experienced many things the last time with surgery and everything and therefore seeing the organs like that doesn't provide him with a nice feeling. Although the technology is of interest, he doesn't seem to like the way how its visualised	

Embodiment	Insight	Quote
Tablet	Not Discussed	
Physical object	Not Discussed	
Patch	Daughter thinks that he would want to use it	dochter reageert: Ik denk dat het voor hem goed is omdat hij vaak ook onrustige nachten heeft
Stethoscope	Not Discussed	
Phone	Not Discussed	

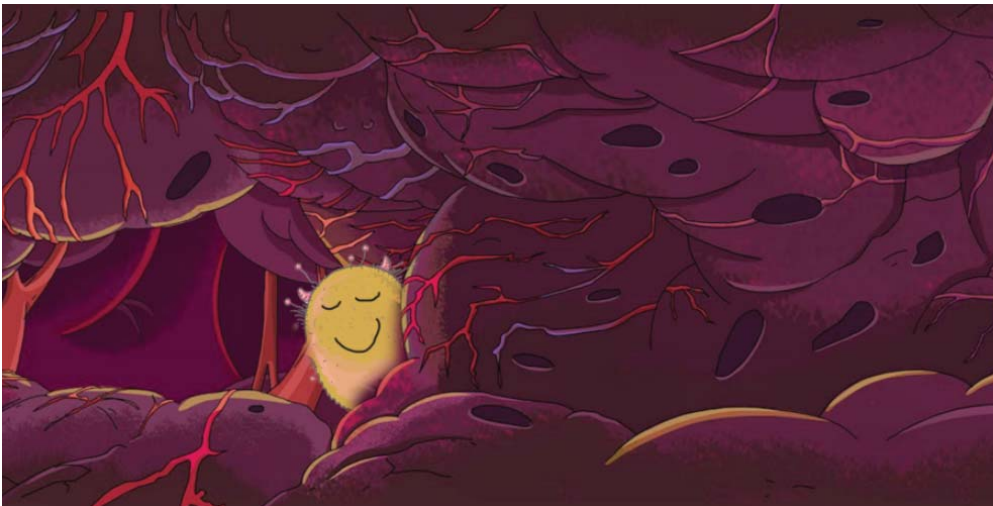
Appendix DD - Interface exploration



Realistic experience (Controlled)



Realistic experience (Uncontrolled)



Use of characters (Controlled)

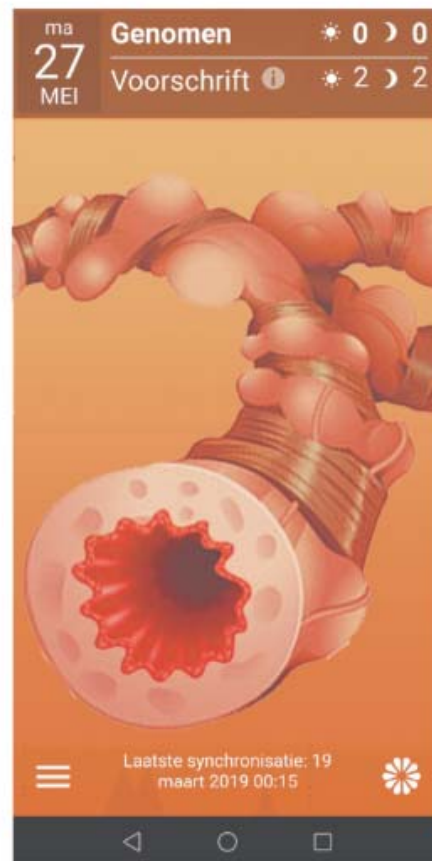


Use of characters (Uncontrolled)

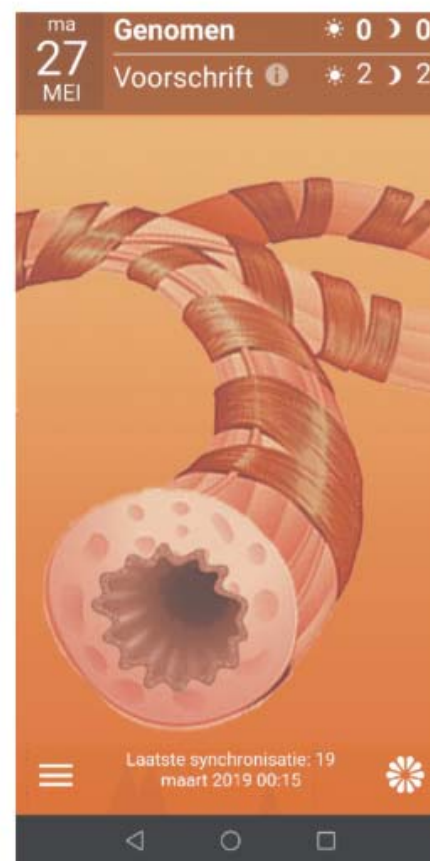
Appendix EE - Second Iteration different states (1)



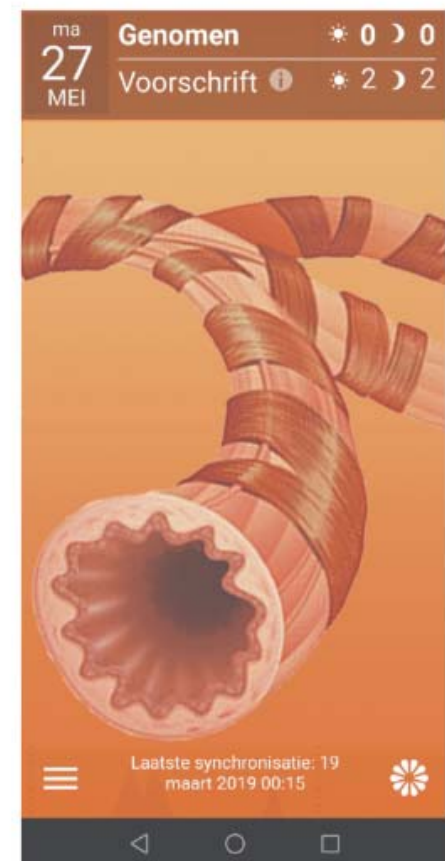
Scenario 1
/ Beginperiode
/ Medicijn vergeten
/ Veel symptomen



Scenario 2
/ Halverwege
/ Medicijn vergeten
/ Veel symptomen

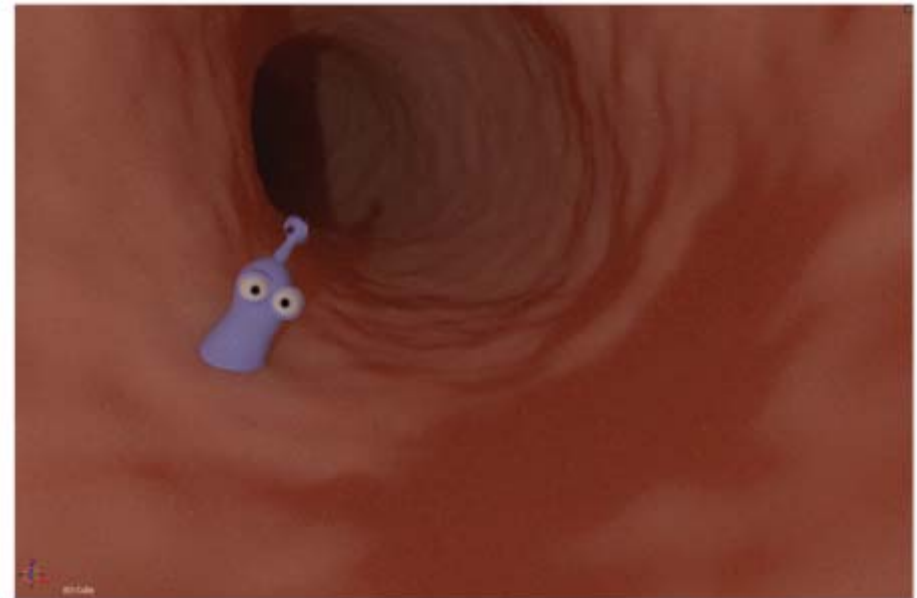
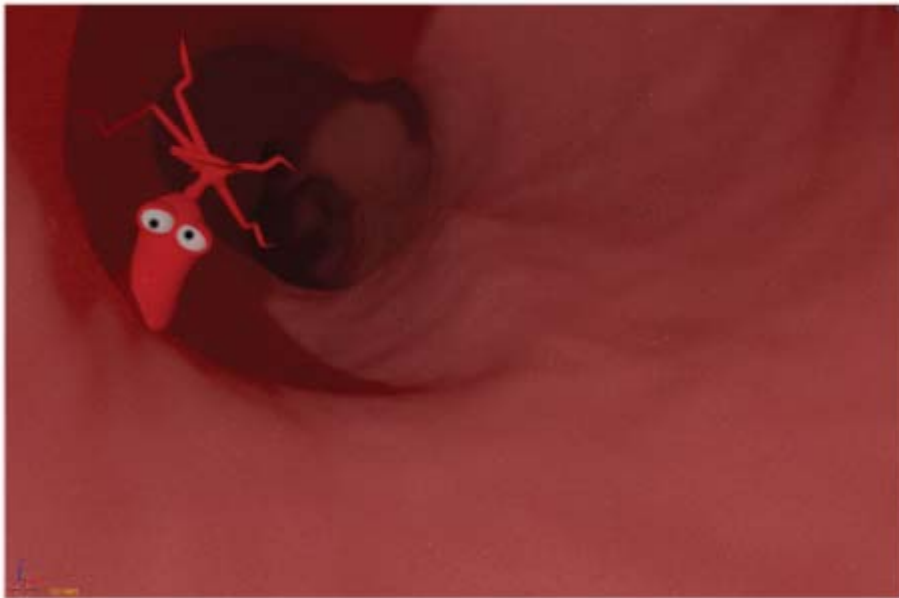


Scenario 3
/ Halverwege
/ Medicijntrouw
/ Weinig Symptomen




Scenario 4
/ Eindperiode
/ Medicijntrouw
/ Weinig Symptomen

Appendix FF - Second Iteration different states (2)



Appendix GG - Pharos Checklist



eHealth4All
EEN BEELTUIT VAN PHAROS

Checklist Toegankelijke informatie

Voor voorlichtingstoepassingen zoals folders, flyers en films
Voor eHealth-toepassingen zoals websites, apps en patiënten informatie systemen

De eerste drie onderdelen van deze checklist gelden voor alle toepassingen. In het laatste onderdeel is er extra aandacht voor eHealth-toepassingen.

BETREKKEN GEBRUIKERS

Behoeftepeiling

- Is er bepaald voor welke gebruikersgroep de toepassing ontwikkeld of aangepast wordt?
- Is aan gebruikers gevraagd naar de behoefte aan deze informatie?
- Is aan gebruikers gevraagd welke vorm of toepassing hun voorkeur heeft?

Ontwikkeling

- Is aan gebruikers gevraagd welke boodschappen zij belangrijk vinden?
- Is de toepassing ontwikkeld met mogelijke vragen van gebruikers in gedachten?
- Zijn de gebruikers betrokken in de uitwerking van de vorm?

Testen

- Is de informatie in conceptversie getest door gebruikers?
- Is de informatie na ontwikkeling getest door gebruikers?
- Is duidelijk hoe de toepassing gebruikt moet worden en wat de meerwaarde is?
- Is het opleidings- en taalniveau van de testgroep bekend?

TEKST

Eenvoudig

- Wordt er gebruik gemaakt van korte zinnen en eenvoudige woorden?
- Wordt er gebruik gemaakt van actieve zinnen (zonder de werkwoorden 'zijn' en 'worden', bijvoorbeeld: de fysiotherapeut doet de oefeningen voor i.p.v.: de oefeningen worden voorgedaan door de fysiotherapeut)
- Worden tangconstructies vermeden? (Bijz. tussen de onderwerp en persoonsvorm)
- Worden dubbele ontkenningen vermeden?
- Worden moeilijke, weinig gebruikte woorden vermeden?
- Worden moeilijke vaktormen en medisch jargon vermeden of waar mogelijk uitgelegd?
- Is het gekozen lettertype en -grootte duidelijk leesbaar?
- Zijn er voldoende witregels tussen de zinnen en kopjes opgenomen?
- Wordt gebruik van percentages, formules etc. vermeden?

Verhaalvorm

- Is de informatie waar mogelijk verhalend?
- Is het verhaal 'spannend'? (wekt het nieuwsgierigheid op)
- Sluit het verhaal aan bij de beleevingswereld van de gebruiker?

Concreetheid

- Is de informatie concreet en puntsgewijs?
- Worden beeldspraak, spreekwoorden of gezegden vermeden?

Dosering

- Is de boodschap eenduidig?
- Wordt een beperkt aantal kernboodschappen meegegeven? (max. 3 per toepassing)
- Als er meer boodschappen zijn, worden die dan verspreid over meerdere toepassingen?
- Is alleen het belangrijkste van de boodschap weergegeven?
- Wordt de belangrijkste boodschap (vanuit gebruikersperspectief) in het begin gemeld en herhaald?

Structuur

- Is de informatie stapsgewijs en chronologisch opgebouwd?
- Maakt het verhaal geen uitstapjes?
- Dekken de titels de lading van de tekst?
- Wordt elke stukje/kopie afgesloten met een samenvatting?
- Wordt er in die samenvatting ook puntsgewijs aangegeven wat de gebruiker nu kan doen?

Actiegerichtheid

- Is het voor de gebruiker duidelijk welke actie hij/zij kan ondernemen?
- Is het duidelijk wie hem of haar daarbij kan helpen?
- Is het duidelijk waarom deze actie belangrijk is?

Samenhang tekst/beeld

- Geeft de tekst hetzelfde weer als de beelden?
- Geeft de tekst geen extra informatie ten opzichte van de beelden of vice versa?



BEELD

Eenvoudig

- Is het beeldmateriaal niet multi-interpretabel?
- Bevat het beeldmateriaal heldere lijnen, een helder contrast?
- Zijn afleidende details weggelaten?
- Worden grafieken, tabellen en diagrammen vermeden?
- Wordt er toegelicht hoe deze te gebruiken/lezen?

Leefwereld

- Sluit het beeldmateriaal aan bij de leefwereld van de gebruiker (de beelden weerspiegelen diversiteit in geslacht, etniciteit, leeftijd en sociale status, zonder stereotypen te gebruiken)?
- Kan de gebruiker zich herkennen in de gebruikte personages/illustraties?
- Is het beeldmateriaal niet bevoogdend of kinderlijk?



eHealth-toepassingen zoals websites, apps en patiëntinformatiesystemen

Structuur

- Wordt de informatie verdeeld in korte stukjes?
- Is het keuzemenu eenvoudig?
- Is het makkelijk om terug te keren naar het hoofdmenu?
- Is het makkelijk terug te keren naar eerdere pagina's?
- Worden antwoorden tussendoor opgestegen?

Gebruiksgemak

- Is het duidelijk voor de gebruiker in welke situatie deze toepassing gebruikt kan worden?
- Zijn de knoppen in de toepassing makkelijk te gebruiken?
- Voldoen de pictogrammen of icoontjes aan de gestelde eisen voor beeldmateriaal?
- Heeft de zoekfunctie een centrale plek in de toepassing?
- Worden in het zoekveld automatisch aanvulsuggesties gedaan (zoals bij google)?
- Is het aantal zoekresultaten beperkt tot maximaal 10?
- Wordt vermeden dat de gebruiker zelf berekeningen of interpretaties moet doen?
- Is het ook mogelijk om offline met de eHealth toepassing te werken?

Gesproken tekst

- Wordt in de toepassing gebruik gemaakt van gesproken tekst?
- Is het mogelijk de geschreven teksten hardop te laten voorlezen?
- Is het mogelijk het tempo van de voorleesfunctie aan te passen?

Meertaligheid

- Is het mogelijk verschillende talen te kiezen?
- Zijn er vertaalmogelijkheden via google translate?

Hulp

- Is er een doorverwijsmogelijkheid bij vragen? Kan je een telefoonnummer bellen?
- Is er een introductie/instructie(filmpje) over het gebruik van de toepassing beschikbaar?
- Staat dit filmpje aan het begin van de toepassing?
- Voldoet dit filmpje aan de eerder gestelde eisen?

Deze checklist is mede gebaseerd op een in de VS ontwikkeld instrument om gebruik en nutteloosheid voorlichtingsmateriaal voor patiënten te toetsen op begrijpelijkheid en toegankelijkheid voor alle patiënten: de PEMAT (Patient Education Materials Assessment Tool). Dit instrument is ontwikkeld om te beoordelen of patiënten de informatie kunnen begrijpen en op basis ervan actie kunnen ondernemen. Daarnaast is Pharus expert in het ontwikkelen van toegankelijke & begrijpelijke informatie, waarbij altijd wordt samengewerkt met de professional en laaggeletterden om tot het eindproduct te komen.

Appendix HH - Pharos test research questions

Algemene vragen

/ Is het duidelijk dat de kleuren communiceren hoe ver iemand in het gebruik van het medicijn is? Oftewel hoever de gebruiker is in het kalmeren van de snuffelpaaltjes.

Bijvoorbeeld rood is het begin, geel is in het midden en blauw is aan het einde.

/ Is het duidelijk dat de blauwe pijlen de lucht aangeven en dat hoe meer pijlen er zijn hoe meer lucht er door de luchtwegen gaat en hoe beter het dus gaat?

Hoofdscherm

/ Kan de gebruiker uitleggen of in de huidige interface de persoon wel of niet zijn medicijn is vergeten? Dus of het duidelijk is dat de groene pijl aangeeft dat het medicijn gebruikt is en dat er progressie wordt geboekt?

/ Kan de gebruiker uitleggen of de persoon aan het begin, midden of eind van het medicijngebruik is, door het zien van de progressie balk?

/ Kan de gebruiker uitleggen of de luchtwegen dicht of open zitten door dit af te lezen aan de blauwe pijlen?

Luchtwegen

/ Is het duidelijk dat hier een luchtweg is afgebeeld?

/ Kan de participant uitleggen hoe de nacht van de gebruiker is geweest? In dit geval zou het een redelijke nacht zijn (3 van de 5 pijlen)

/ Hoe zou het eruit zien als de gebruiker een goede nacht of een slechte nacht heeft gehad?

Snuffelpaaltjes

/ Is het duidelijk dat hier de 'snuffelpaaltjes' zijn afgebeeld?

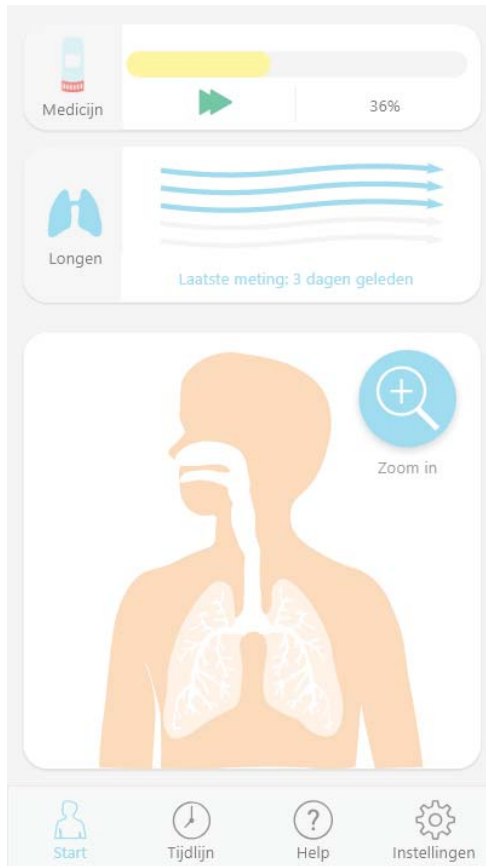
/ Is het duidelijk dat de gebruiker hier aan het einde van zijn medicijngebruik is? (blauwe kleur)

/ Hoe zou het eruit zien als de persoon aan het begin van het medicijngebruik is? (rode kleur)

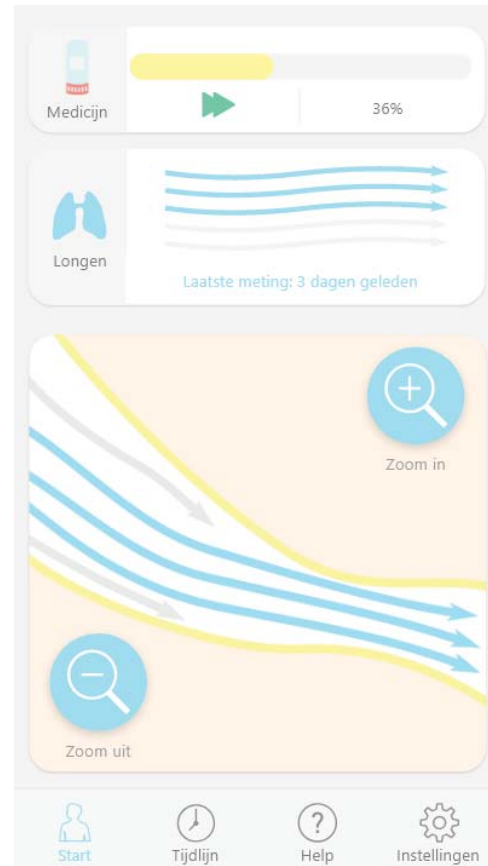
Tijdlijn

/ Kan de gebruiker uitleggen op welke datum het goed ging met de persoon en op welke datum het minder goed ging?

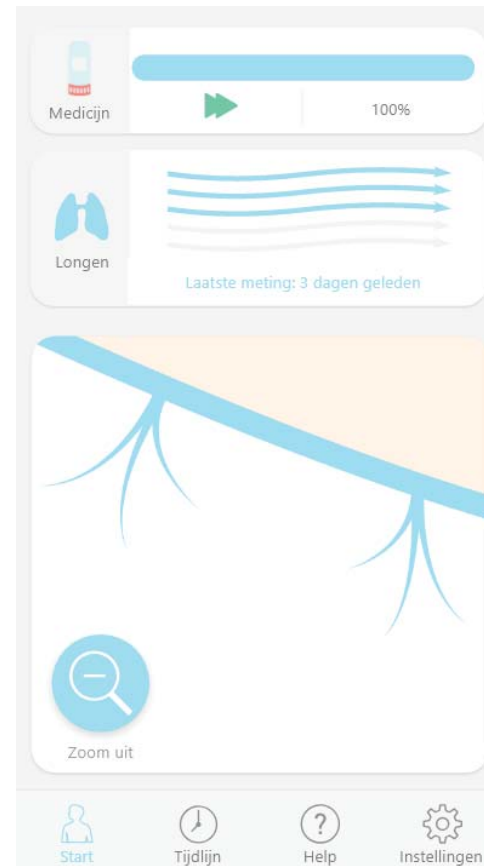
Appendix II - Pharos test screens



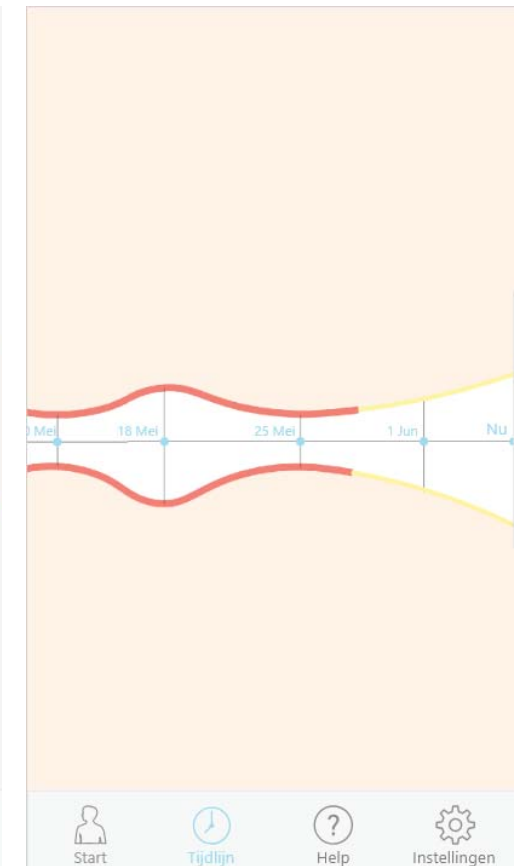
Hoofdscherm



Luchtwegen



Snuffelpaaljes



Tijdljn

Appendix JJ - Test Script

Start Filmpje

- / Kun je in je eigen woorden uitleggen waar het filmpje over gaat?
- / Wat vind je van het filmpje?
- / Wat vind je duidelijk?
- / Wat vind je neit duidelijk?

Scherf 1

- / Wat valt je als eerste op?

Medication bar

- / wat bedoelen ze hiermee?
- / In het geval het niet duidelijk is, uitleg geven
- / Heeft de patient in dit voorbeeld zijn medicijn genomen? Waar zie je dat aan?

Sensor bar

- / Wat bedoelen ze hiermee?
- / in geval het niet duidelijk is, uitleg even
- / krijgt de patient in dit voorbeeld makkelijk lucht?
- / Waar zie je dat aan?
- / Hoe zou het plaatje eruit zien als iemand heel gemakkelijk lucht kan krijgen?
- / Hoe zou het plaatje eruit zien als iemand heel benauwd is?

Holistic view

- / Wat zie je hier?
- / Wat bedoelen ze hiermee?

Zoom in

- / Wat zie je hier?
- / Wat kan je hiermee doen?

Menubar

- / Wat zie je hier?
- / Wat bedoelen ze hiermee?
- / Waarom heeft het plaatje links een andere kleur dan andere plaatjes?

Airways

- / Wat zie je hier?
- / Wat bedoelen ze hiermee?
- / In geval het niet duidelijk is, uitleg geven
- / Denk je dat de patient een goede nacht heeft gehad of dat hij veel last heeft gehad van zijn asthna?
- / Waar zie je dat aan?

Zoom uit

- / Wat zie je hier?

Detectors

- / Wat valt je als eerste op?

Medication bar

- / Wat zie je hier?
- / Wat bedoelen ze hiermee?
- / Heeft de patient al zijn medicijnen ingenomen?
- / Welke kleur zou de balk zijn als de patient zijn medicijnen niet heeft ingenomen?

Detectors

- / Wat zie je hier?
- / Wat bedoelen ze hiermee?

Timeline

- / Wat valt je als eerste op?
- / Wat zie je hier?
- / Wat bedoelen ze hiermee?
- / Wat betekent de rode lijn?
- / Wat betekent de gele lijn?

Ending Questions

- / Wat vind je ervan?
- / Wat vond je duidelijk?
- / Wat vond je niet zo duidelijk?
- / Heb je zo iets al eens eerder gezien of gebruikt?
- / Zou je dit willen gebruiken als je astma patient zou zijn?
- / Wat voor cijfer zou je het nu geven? (1-10)?
- / Wat kunnen we doen om er een hoger cijfer van te maken?

Appendix KK - Costs calculation

Sensor	Item	Price per unit	Units	Price (EUR)	Source
	Diaphragm	4,02	1	4,02	Amazon
	Bluetooth Module	2,39	1	2,39	Aliexpress
	Audio Processing Board	5,95	1	5,95	Vanallesenmeer
	Electret Microphone	0,89	1	0,89	Benselectronics
	LiPo 1000mAh battery	2,81	1	2,81	Aliexpress
	Fabric	1,98	0,5	0,99	Stoffen-hemmers
	3D printed housing	0,019	13	0,247	123-3d
	Total			17,297	
Docking	LED	0,12	8	0,96	Reichelt
	Power Cable	1,43	1	1,43	Aliexpress
	3D printed housing	0,019	82	1,558	123-3d
	Bluetooth Module	2,39	1	2,39	Aliexpress
	micro controller	1,37	1	1,37	Aliexpress
				7,708	

Appendix LL - Sidetracks

One of the objectives that were identified by the practice nurse as important was the capability to use the proper inhalation technique. This could be an interesting direction to focus on to improve unintentional medication non-adherence. However, within the project team, it was decided to not elaborate on it further. For this project, also the social environment objectives were left behind. The acceptance of the medication by family members and the social environment was frequently mentioned as an important determinant for non-adherence. Because the changeability of these factors was quite low regarding the eHealth channel, it was decided to not include them in the final design directions. Nevertheless, other channels such as awareness campaigns or events could be a valuable channel to approach this objective.

The physical aspect of the ball and blowing it up was perceived as interesting and intriguing. Another interesting direction would have been to further investigate this concept. The downside of this concept was that it requires a peak flow measurement, which is often perceived as a burden. Therefore further research would be needed into how to make it engaging to reduce the impact of this burden. Another downside of this concept was the costs it would bring. Developing such a mechanical design would

reduce the scalability of the product according to the client. Although the chosen direction also seemed to have its challenges, eventually it seemed to be more preferable in terms of measurement technique and costs.

The tracking of reliever medication as a way to objectively track asthma progression was not included in any of the concepts. The measurement method has the potential to be integrated, however, because of internal reasons, it was decided to not include it.

Appendix MM - Original Project Brief

Appendix NN - Summary

This project presents the design process of an innovative eHealth solution targeted to improve medication adherence of asthma patients with a low health literacy. The symptoms of asthma, such as shortness of breath, can lead to a severe reduction in the quality of life. To reduce the severity of these symptoms, it is important that a patient is adherent to their medication. However, people with a low health literacy experience certain barriers, such as lack of capabilities to understand and limited awareness about the effects of the medication. These barriers result in poor medication adherence. eHealth technologies provide the possibilities to counteract these barriers, however, the design of these technology interventions needs to be carefully considered with respect to the target group.

In this project, the personal determinants behind the non-adherence behaviour and the acceptance of eHealth technologies of the target group are investigated. This is done through research-through-design methodologies such as the creation and discussion of scenarios and the co-construction of stories.



The insights from this research were analysed and structured according to the intervention mapping approach, a theoretical framework for the creation of interventions aimed at behaviour change. In the final stages of the project, solution elements have been embodied in prototypes and evaluated in practical sessions with the target group. This iterative process has resulted in the design of the final concept: The Turbuscope.

The Turbuscope is an intervention that aims at improving awareness about the effect of the mediation. The awareness is created by providing a reflective self-monitoring experience in which data is interpreted about the adherence and the asthma state. This data is gathered through a non-invasive nocturnal symptom tracking device in combination with the Turbu+ (a smart inhaler for tracking medication usage).

The end product is a finalized concept that embodies design guidelines and recommendations for future designs. They provide suggestions on the area of objective data gathering, providing awareness and providing engagement. These recommendations serve as a vision for eHealth intervention design within the field of improving medication adherence for asthma patients with a low health literacy.

