Adapting care robot Tessa for early-stage dementia
with implementation through general practitioners

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Master Thesis

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List of abbreviations and recurring stakeholders

CIZ	Centrum Indicatie Zorg
GP	General practitioner
POH	Praktijk ondersteuner huisarts (nurse assistant of general practitioner)
POH-O	POH Ouderen (Elderly)
POH-S	POH Somatics
PwD	Person with dementia
PhD	Doctor of Philosophy
MDC	Multidisciplinary consultation
ROS	Regionale Ondersteuningsstructuur
RSO	Regionale Samenwerkingsorganisatie
Wmo	Wet maatschappelijke ondersteuning (social support act)
Wlz	Wet langdurige zorg (law for long-term care)
Zvw	Zorgverzeringswet (care insurance act)
TaaS	Tessa as a service

General practitioner   Praktijk ondersteuner huisarts   Person with dementia   Casemanager   Informal caregiver   Home care

Abstract

Tessa is a social, assistive robot from the company Tinybots, designed to support people with early- to moderate-stage dementia and other mild cognitive impairments.

By giving verbal reminders and instructions, programmed by their formal and informal caregivers, Tessa gives people back their self-management and autonomy, enabling them to live independently for a longer period of time. Next to this, Tessa can be used by home care organisations to save physical minutes of care, up to 132 minutes per week (Onderzoek En Ervaringen, n.d.). With the staff shortages in the health care sector and the expected rise of people with dementia from 290,000 in 2021 to 620,000 people in 2050 (Alzheimer Nederland, 2021), use of e-health solutions like Tessa will become increasingly important.

This master thesis consists of two parts. In the first part, a distribution scenario is designed to implement Tessa through GPs, a potential market for Tinybots to target. Currently, Tessa is implemented through home care organisations with the support of their health insurance. From interviews with GPs and their supporting caregivers like POHs and casemanagers, the appropriate scenario was chosen, see figure 1. In this scenario, the general practitioner gives Tessa as an option to their patient and refers them to a home care organisation that implements Tessa. This scenario gives GPs the opportunity to support their dementia patients while maintaining their current role in which they assess the situation and then refer. Due to a limited time per patient, more involvement than that is not feasible. With dementia especially, most care is immediately taken over by the casemanager. Another important factor is the lack of financial support the GP receives. Without this support, affording Tessa is impossible. In home care, there is a higher chance of financial support and is therefore incorporated in the scenario.

Through the GP, people with starting memory problems and early-stage dementia can be reached. In this stage of the disease, minimisation and denial of problems is very common. Acceptance of help and therefore, acceptance of Tessa is hard. To increase acceptance by this group of people, the perceived usefulness of the product needs to be increased, which is what the second part of this thesis focuses on.

To do this, multiple solutions were proposed surrounding themes like increasing autonomy, independence, compatibility, social connectedness, and trialability.

Adding the functions of listening to audiobooks and receiving personal voice messages will give Tessa a relative advantage over the current products elderly use and increase perceived usefulness and social connectedness.

In addition, a light version of Tessa in the form of an app to be used on people's own device is proposed as a solution to lower the barrier to accept Tessa. An app is more subtle, is better compatible with elderly who use their phone or tablet and who are still living an active life. When the dementia progresses and home care is needed, the app evolves into an app which can be used by home care to provide care.

Since material and logistical costs are saved with an app, a free trial can be offered to potential users. With this the attribute of trialability is used, which can lead to easier adoption of a new product.

In preparation for the launch of the Tessa app version and the new functions, Tinybots needs to prepare a website and information aimed at people with dementia and their informal caregivers instead of care organisations.

By implementing these design changes, Tinybots can implement Tessa through the GP with the proposed distribution scenario. This means they can use Tessa to support people with dementia and their informal caregivers from very early on and for a longer period of time.
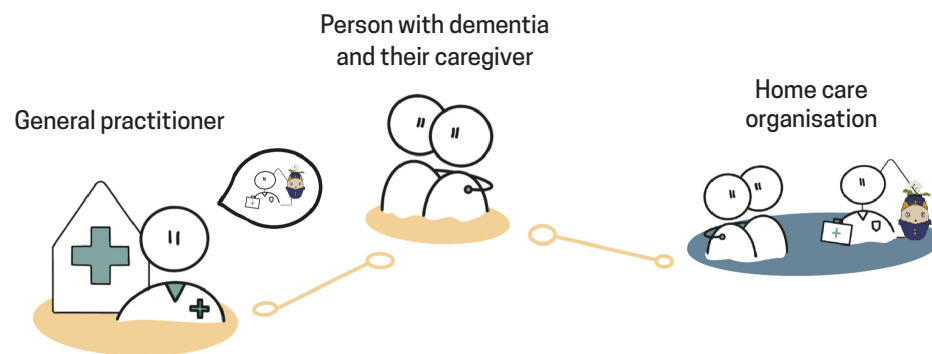
Figure 1: Distribution scenario in which the general practitioner gives Tessa as an option and refers their patient to a home care organisation

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Assignment

Part 1

How can Tessa be implemented through general practitioners?

Currently, Tessa is sold to home care organisations that then implement Tessa with their clients. They are able to declare the expenses with the health insurance that will cover the costs for them. In 2020, Tinybots was approached by a general practitioner in Zevenaar to do a subsidised pilot to implement Tessa in their general practice. This led Tinybots to wonder whether expanding to the market of GPs would be possible. In the first part of the project, I will analyse the market of GPs and design a distribution scenario that shows how Tessa can be implemented through GPs. The target group that is reached through the GP will be restricted to people with dementia.

Part 2

How can acceptance of Tessa be increased for people with early-stage dementia?

Through the GP, people that are at the very beginning of their dementia process are reached. In this phase of dementia, denial and minimising problems is common. People are hesitant to accept help, because they do not feel like they need it. This means accepting Tessa in that stage can be a challenge. Therefore, the second part of the project will focus on ways to increase the acceptance of Tessa by people with early-stage dementia.

Part 1

Design challenge

How can Tessa be implemented through general practitioners?

Subquestions

What does the market of general practitioners look like?

What is the role of the general practitioner and POH in the dementia process compared to other stakeholders?

What would be the most optimal distribution scenario with the GP as a starting point?

Part 2

Design challenge

How can acceptance of Tessa be increased for people with early-stage dementia?

Subquestions

What are the characteristics of early-stage dementia?

What influences acceptance of technology and social or assistive robots?

What increases perceived usefulness, interest or need?

Approach

To give structure to the 20-week project, the double diamond approach (British Design Council, 2005) was used to provide a base. See figure 2 for the full approach. With the use of this creative methodology, multiple cycles of divergence and convergence were made. By diverging, you increase the problem and solution space. To decrease this space and make choices, convergence is necessary.

As stated in the previous chapter, the project can be separated into two different parts. The starting point of the project and the start of the first part was the following question: '*How can Tessa be implemented through general practitioners?*'. Using this question, research was conducted to learn about dementia and the role of the GP and other caregivers. The outcome of this research was a list of challenges and opportunities that were used to develop different ways to distribute Tessa with the GP as a starting point. Criteria based on the insights of the research were used to choose one distribution scenario. From this choice a new challenge arose: looking at how Tessa can be more easily accepted by people with early-stage dementia who are reached through the GP.

In part two of the project, the challenge from part one was reframed into the question '*How can you lower the*
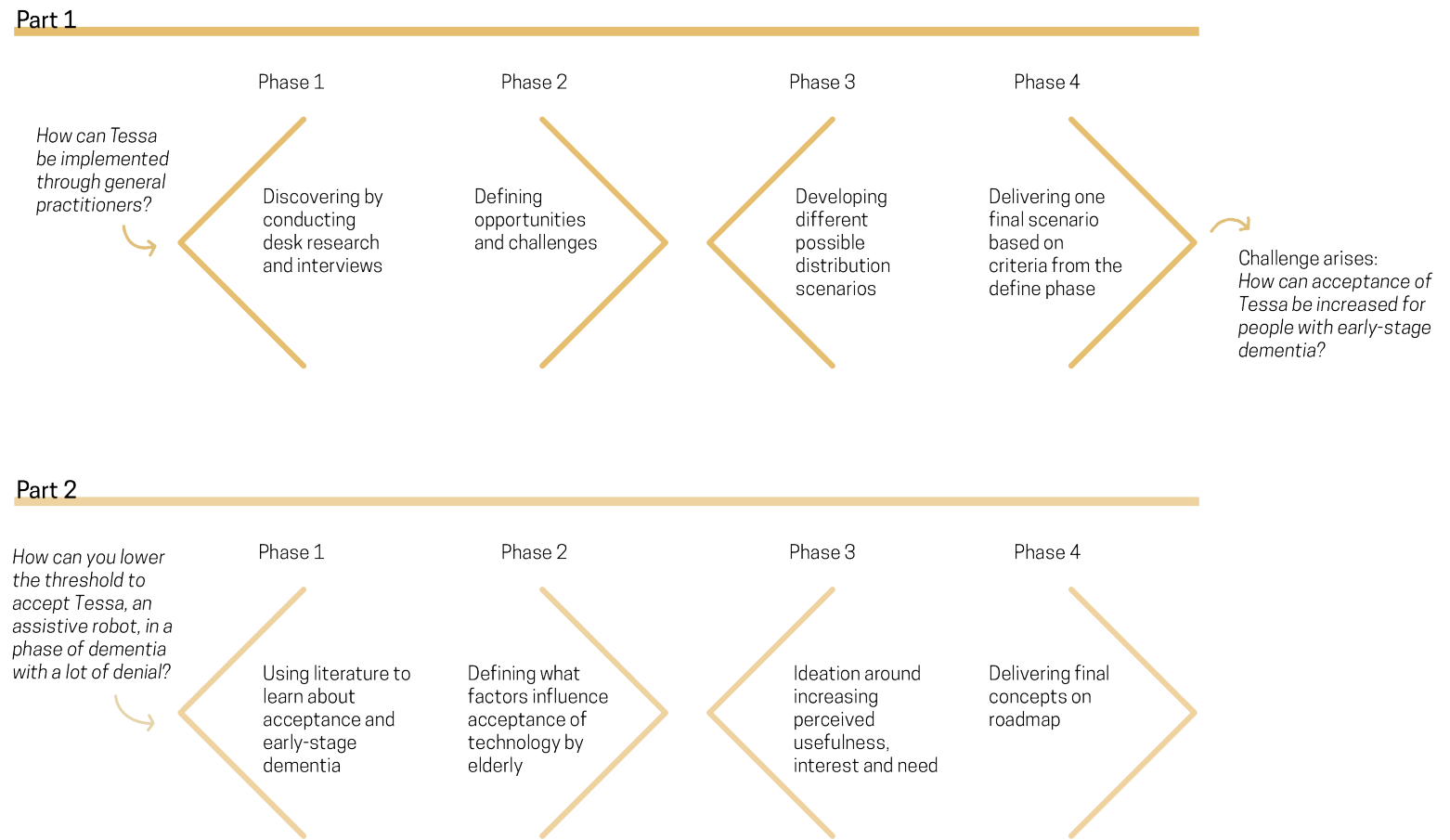

Part 1

How can Tessa be implemented through general practitioners?

Phase 1 — Discovering by conducting desk research and interviews

Phase 2 — Defining opportunities and challenges

Phase 3 — Developing different possible distribution scenarios

Phase 4 — Delivering one final scenario based on criteria from the define phase

Challenge arises: *How can acceptance of Tessa be increased for people with early-stage dementia?*

Part 2

How can you lower the threshold to accept Tessa, an assistive robot, in a phase of dementia with a lot of denial?

Phase 1 — Using literature to learn about acceptance and early-stage dementia

Phase 2 — Defining what factors influence acceptance of technology by elderly

Phase 3 — Ideation around increasing perceived usefulness, interest and need

Phase 4 — Delivering final concepts on roadmap

Figure 2: The approach of the project

threshold to accept Tessa, an assistive robot, in a phase of dementia with a lot of denial? '. With this question as a starting point, literature was consulted to learn more about the characteristics of technology acceptance and early-stage dementia. As an output, an overview of factors influencing acceptance of technology was made. These were kept in mind when creating ideas surrounding the increase of perceived usefulness, interest, and need in the product of Tessa. Based on the C-box method and consultations with elderly four ideas were developed into concepts. The final delivery was a roadmap that explains what Tinybots needs to offer per dementia stage.

1. Introduction   To Tinybots and care robot Tessa

Dementia is a collective term for a group of progressive diseases that decreases cognitive functioning. It affects memory, the ability to reason and communicate. The disease has a high impact on a person's daily life and the people around them and is one of the main causes of dependency among older people (Prince et al. 2013). Technology is being used to support people with dementia. Examples are the Tovertafel, Animal 'cuddle' robots and robots that help with reminding and structuring the day like Tessa, by Tinybots.

1.1 Tessa, by Tinybots

Overall, the self-management and autonomy of a person with dementia decreases (Steeman et al., 2006). This is where Tinybots wants to make a difference with social robot Tessa, see figure 3. Tessa is a voice assistant created to help people with mild cognitive impairments, like dementia, to increase their self-management and be able to live at home, independently for a longer period of time.

In short, Tessa is operated by an app usually by the caregiver and someone from home care and gives verbal care. In the app, reminders, closed questions, step-by-step instructions and music can be planned in a calendar. At the planned moment, Tessa will

voice the prompts written in the app, ask a question or play music. In the near future, the custom command function will be released which enables the user to ask Tessa pre-programmed questions. In return, Tessa will give a set response that is manually written in the app by the app user.

To be able to use Tessa, a person still needs to be able to remember what Tessa said and perform the tasks by themselves. It is a product for people who can still perform activities of daily living (ADL), but do not take the initiative to do them anymore. The loss of initiative can be caused by memory

loss or apathy. Tessa was designed together with people with dementia. For elderly, having a physical object that speaks, is easier to grasp dan a virtual voice assistant, like the Google Nest. Also the predictability of Tessa is comfortable for people with dementia or other mild cognitive impairments.

Next to supporting the PwD, Tessa also supports the informal caregiver. People with dementia can get annoyed or frustrated if they are constantly reminded by their partner or family member. Tessa taking over the reminders can unburden the informal caregiver and makes it feel less

stigmatising for the PwD. Informal caregivers also use Tessa to feel safe when they are apart. With Tessa, informal caregivers can safely leave the house, knowing that the person will, for example, not forget to eat or drink. In addition, they can use the closed question function to check up on them.

Tessa was not designed as a robot against loneliness. However, over time, clients do get attached to Tessa and start to view her as a friend or buddy (Wang, personal interview, 2021). That is also what distinguishes Tessa from other regular electronics like phones, tablets or other virtual assistants. Tessa's appearance makes it more personal and human-like.

Tessa is not sold in the private sector. Instead, it is sold to care organisations, intramural and extramural. The care organisations then proceed to implement Tessa with clients they assessed to potentially benefit from it. To ensure the organisations are able to select clients and introduce Tessa successfully, they can receive a training from Tinybots.

Tessa is on average used for 9 months. After this period, Tessa is relocated to a different client or is send back to Tinybots. In return, Tinybots donates 25 euros to Alzheimer Nederland. Sometimes, used Tessa's are refurbished and sold again.

Tessa and its functions

Tessa speaks with her own voice

Gives **messages** and **instructions**, that can be written and planned in the app. Pre-made scripts are available, but custom scripts can also be made.

Tessa can play the **music** you upload on the app.

Tessa can understand yes or no, so you can plan a closed **question** in the app.
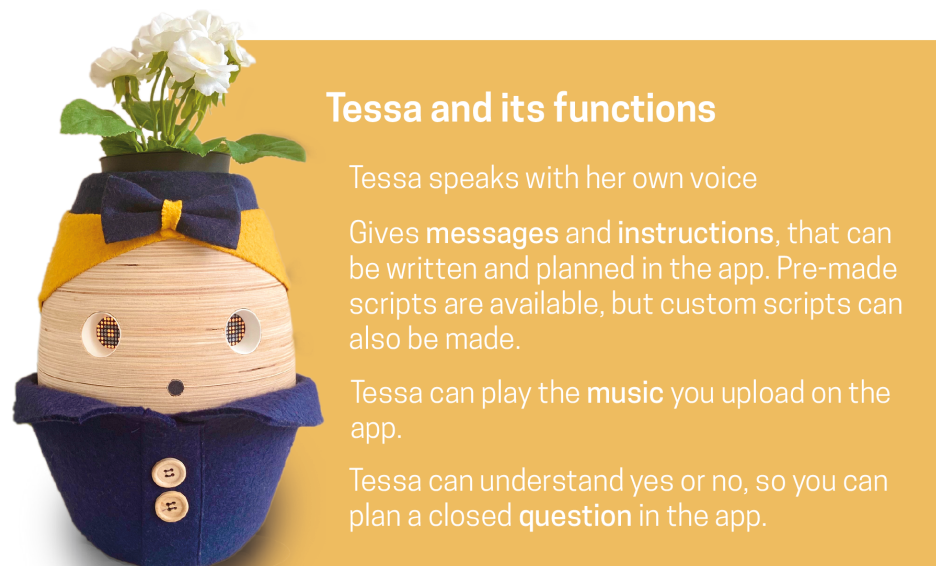
Figure 3: Tessa's functions

1.2 The app

Tessa is operated with a web application, see figure 4. Every Tessa user links their Tessa to a personal account and can control Tessa and set up the calendar from anywhere. Usually, the informal caretaker together with the district nurse determine what should be added to the calendar. The district nurse adds serious reminders, like reminders for medication and the informal caregiver fun reminders, like birthdays.

1.3 Price and business case

A care organisation pays a one-time amount of €275 for Tessa, after which they become the owner of that Tessa.

In addition, €365 per year per Tessa is paid for the software license, app use, manual and helpdesk.

Recently a new businessmodel was introduced, called TaaS (Tessa as a Service). This model is currently available from 50 Tessa's and it allows organisations to offer their clients plug & play Tessa's and only pay for the time Tessa is actually used.

In order to be able to afford Tessa, care organisations need support from their health insurance. Tinybots has successfully made deals with several health insurances that are willing to cover the costs of Tessa. The reason

health insurances are willing to cover the costs for Tessa is that it saves time that would otherwise be spent on physical care given by nurses from the care organisation.

Instead of a nurse coming by to offer a client verbal care, such as reminding them that they need to eat or drink, Tessa gives the message.
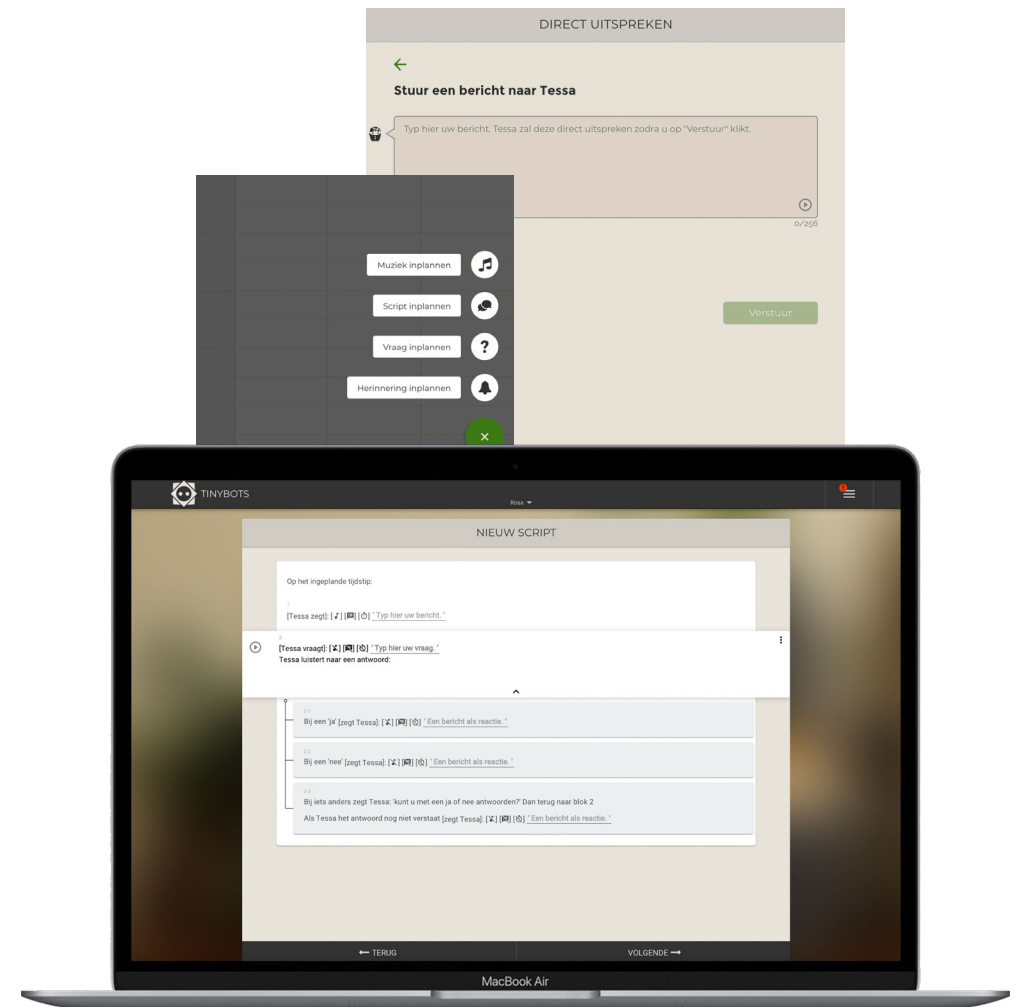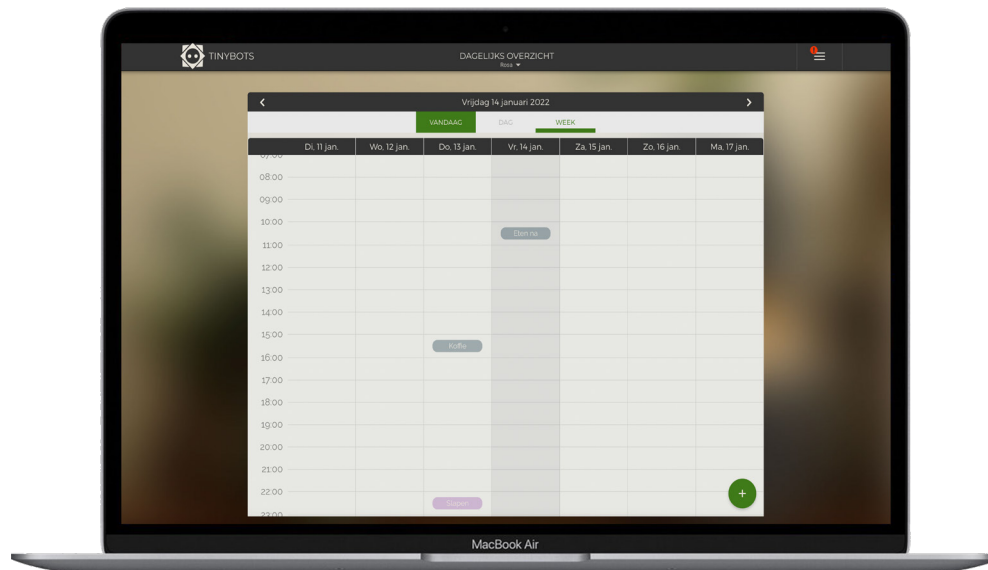

Figure 4: The web app from which Tessa is operated

According to research by care organisations Thebe, ZZG Zorggroep and De Zorggroep, using Tessa can save up to 132 care minutes per week per client, while it costs only 30 care minutes per week (Onderzoek En Ervaringen, n.d.). The time Tessa saves in actual care minutes makes it an interesting business case for health insurances, especially considering the expected increase in people with dementia in the near future and the staffing shortages in the care sector.

1.4 About Tinybots

Tinybots was founded in October 2015, by Wang Long Li, a TU Delft Industrial Design Engineering alumni (About Us, n.d.). Before founding Tinybots, Wang was doing a PhD in how to implement social robots in healthcare. During his PhD he was often asked if the things they researched and designed would become available for the general public. This inspired him to work on a product that could be launched on the market. From personal experience as a caregiver of his father, Wang knows how hard it can be to be a caregiver for a family member.

Since then, he has tried out different shapes and versions of Tessa before landing at the current product, see figure 5.

Figure 5: The evolution of Tessa

Team & vision
The team of Tinybots is growing rapidly. Currently, the team consists of ten regular employees. There are people with a healthcare background, logistics background, business background, programmers and designers (About Us, n.d.). They are all working together to fulfill the vision of the company: a world where social technology enables everyone to live an independent and happy life. They view technology as a means to increase the autonomy, independence and well-being of people.

The market and competitors
An onion framework (Hultink, 2020) was used to create an overview of competitors of care robot Tessa, see figure 5. The inner ring shows products with similar features, forms and values. The middle ring shows products from the same product category. The outer ring are products that fulfill the same need.

Within the category of 'day structure robots', there are two similar products on the market, BillyBilly and Maatje. However, Tinybots has more arrangements with health insurance. Since BilliyBilly is also available on the market for private individuals, it is very hard to get coverage by insurance.

Whether or not the costs are for the client or care organisation makes a big difference in the successfulness of it on the market. The majority of private clients and care organisations are not able to afford such a product without financial support from health insurances.

Sometimes, people that receive a product from a care organisation have the choice between Tessa and Compaan. The Compaan is a tablet, specially designed for elderly. It can give reminders, like Tessa, but can also be used for things like video calling and looking at pictures (personal interviews
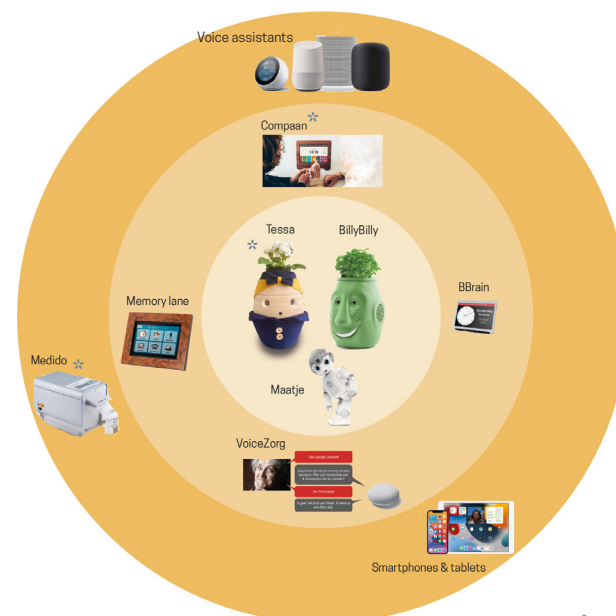

Figure 5: Overview of competitors

✳ Fully or partially covered by (some) health insurances

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with caregivers and district nurse, 2021). The costs of Compaan are sometimes covered by some insurances if it is used in care.

Some other versions of such a tablet exist, but Compaan is most well-known. VoiceZorg is an application for the Google Home, also able to give reminders but is more interactive than Tessa, since it can be talked to and used to relay messages from the PwD to their relatives. Tessa distinguishes itself from VoiceZorg with its looks. As mentioned earlier, the concept of a virtual assistant can be confusing for elderly. Next to this, the Google Home was considered impersonal, especially saying 'Hey Google' was considered as such (Senioren Blijven Langer Zelfstandig Dankzij Slimme Spraakassistent, 2020).

In the final shell are products that could fulfill one or the same functions as Tessa. Regular smartphones and tablets and voice assistants are used by people that can work with such technology, despite their age and dementia (especially, in the very early stage).

The Medido, an automatic medicine dispenser, is also taken into account since Tessa can also remind people to take in their medicine. In practice, some people live with the combination of a Tessa and a Medido. This was also the case in one of my interviews with a Tessa user. The Medido has become a well-known product for care organisations and can be covered by the health insurance. Around 6900 Medido's are in use right now. It's hard for Tessa to compete with this, but they could ride along with its success, if the combination of the Tessa and Medido becomes widely accepted.

Consumer
In the long run, Tinybots wants to help as many people as possible regardless of what their condition is. Currently, most users of Tessa have dementia, acquired brain damage or other mild cognitive impairments. Requirements for the client in order to use Tessa are:

- Sufficient hearing abilities
- Working short-term memory
- Dutch speaking

In figure 6, you can see in which stage of dementia Tessa is used compared to the other products. Tessa is used by people living alone as well as with a partner.

Since setting up and maintaining the agenda can be a large time investment, some organisations require the presence of an informal caregiver (like a son or daughter), to take this over.

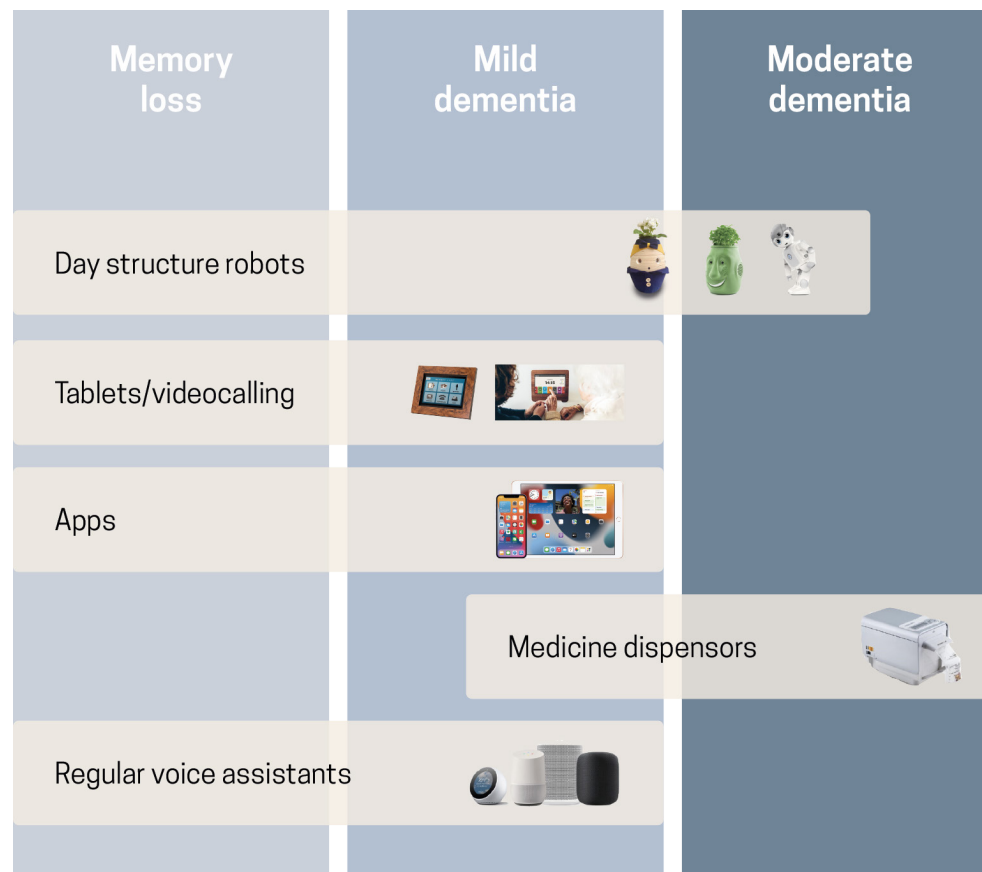| Memory loss	Mild dementia	Moderate dementia
Day structure robots		
Tablets/videocalling		
Apps		
Medicine dispensors		
Regular voice assistants		

Figure 6: Technology from memory loss to moderate dementia, based on Technologie bij dementie thuis, 2019

Extended research was done in the discovering phase of the project. Desk research was conducted to learn about dementia and the world around it, interviews were held with GPs, informal caregivers and other healthcare professionals to discover their role in the process. Finally, visits were made to Alzheimer Nederland gatherings and people with dementia to empathize with their situation.

2.1 Desk research on dementia prevalence, living with dementia, demographics of the market of GPs and trends and forecasts

Prevalence
In the Netherlands, the current amount of people with dementia is estimated at 290,000 (Alzheimer Nederland, 2021). Women have a higher chance of getting dementia than men since they have a higher life expectancy. In the age group 90+, 40% of people have some form of dementia. At the general practitioner, 114,300 people with dementia are registered. An estimated amount of 100,000 people are yet to be diagnosed. The rest resides in a nursing home.

Dementia is the most expensive disease in the Netherlands (Nivel, 2017). In 2017, 10.3% of the national care budget and 36% of the mental health care budget was spent on dementia patients. This comes down to the amount of 9.7 billion euros. The number of people with dementia and the cost attached to it are only expected to increase.

In 2050, the amount of people with dementia is estimated at 620,000 (Alzheimer Nederland, 2017). This expectancy is correlated with the ageing of the population. In the coming years 'grey pressure' (the ratio of a 65+ person to people within working age) will grow to 50% (Centraal Bureau voor de Statistiek, 2021). This means for every 65+ person there will only be two people of working age, see figure 7.
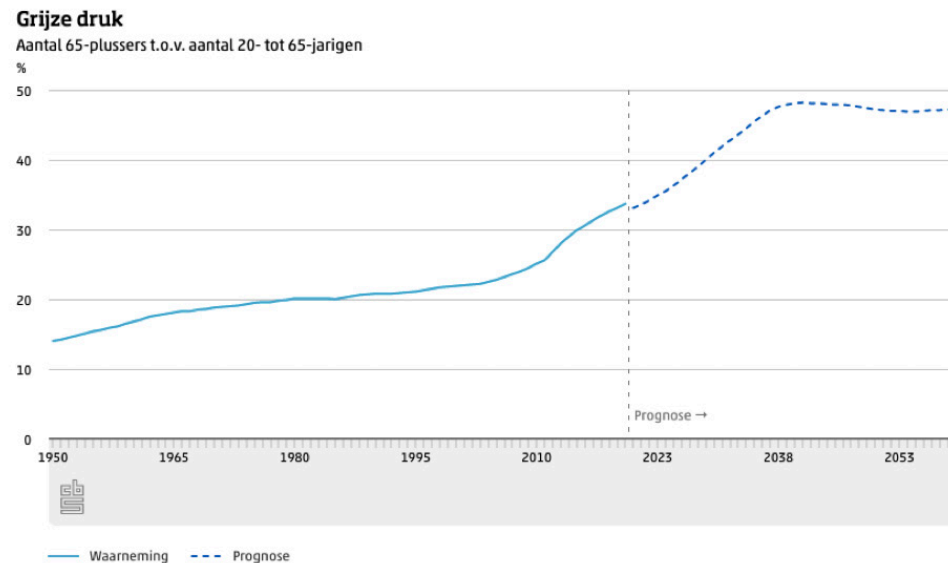
Living with dementia
There are different types of dementia with different characteristics and life expectancies. In total, there are over 100 types of diseases that can cause dementia (Types of Dementia, n.d.). The most well-known type is Alzheimer's disease, affecting around 70% of people with dementia. Other types of dementia are vascular dementia, Lewy Body Disease, frontotemporal dementia and alcohol-related dementia.

For people with dementia the process can be very confronting and confusing. Feeling yourself lose track of reality and the person you used to be can be very hard. It gives a sense of frustration, uncertainty and fear (Steeman et al., 2006). At the beginning of the process, people can even be unaware or in denial of their problems, making it hard for their relatives and caregivers to provide help. But also when people do acknowledge their problems, they can feel so ashamed that they choose to isolate themselves, causing them to suffer in silence.

In figure 8 on the next page, a short overview of the diagnosis process and the stakeholders involved is shown. Often the first thing a person with dementia or their relative notices is getting memory problems (Steeman et al., 2006). Forgetting names, appointments or where you stored a certain object is common. On average, people are diagnosed after 14 months (Kennisplein Zorg voor Beter, 2021).

The first person the family or the PwD turns to when suspicion arises of something being wrong is the general practitioner. The GP will talk to them and decide whether a dementia test, like the MMSE, is necessary or the symptoms can be explained by a different cause, like depression. If dementia is suspected, a test is organised and a diagnosis is made after which a care network is set up (de Boer, 2019).The casemanager is now the main person of contact.
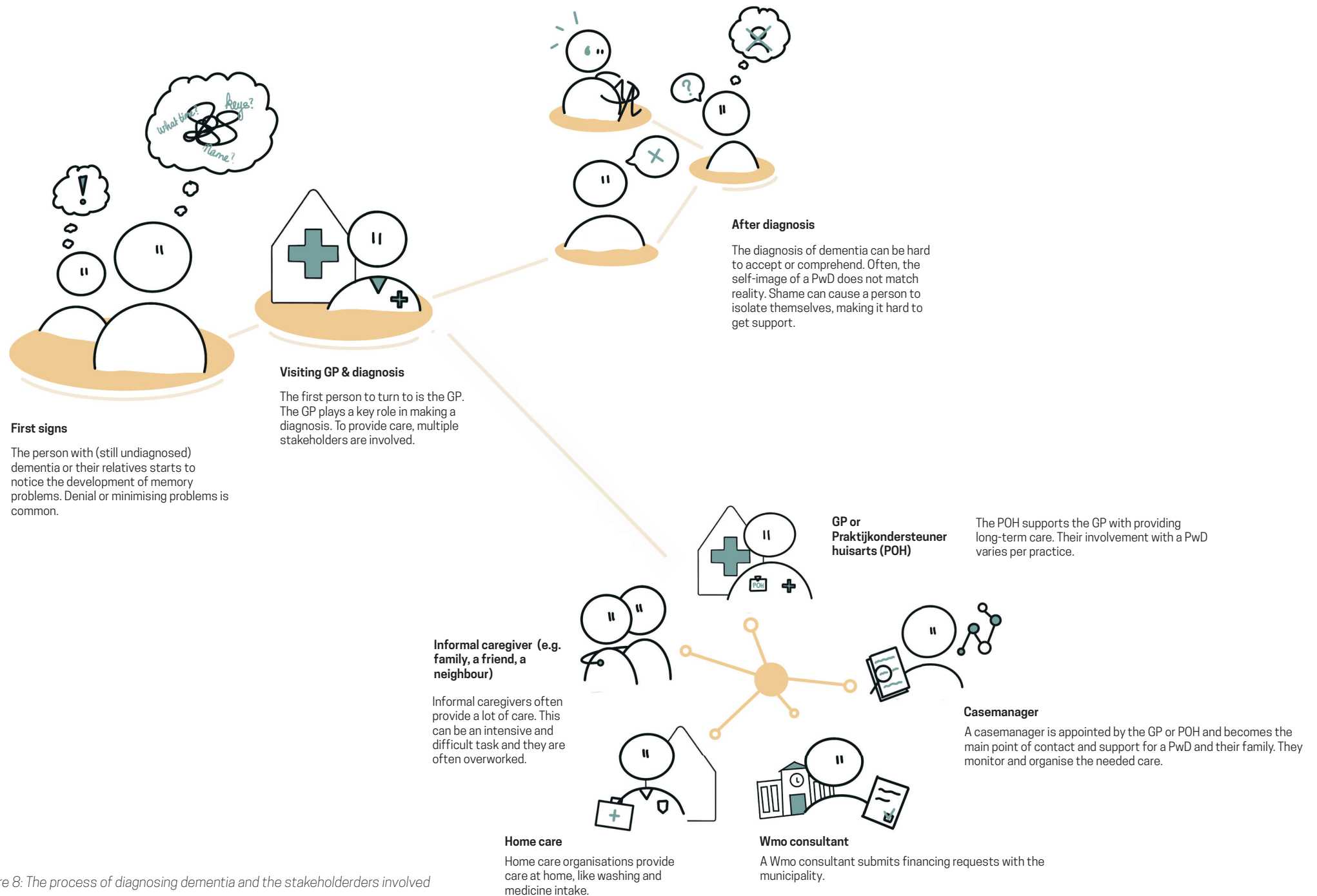

Grijze druk
Aantal 65-plussers t.o.v. aantal 20- tot 65-jarigen

Figure 7: Gray pressure over the years

First signs

The person with (still undiagnosed) dementia or their relatives starts to notice the development of memory problems. Denial or minimising problems is common.

Visiting GP & diagnosis

The first person to turn to is the GP. The GP plays a key role in making a diagnosis. To provide care, multiple stakeholders are involved.

After diagnosis

The diagnosis of dementia can be hard to accept or comprehend. Often, the self-image of a PwD does not match reality. Shame can cause a person to isolate themselves, making it hard to get support.

GP or Praktijkondersteuner huisarts (POH)

The POH supports the GP with providing long-term care. Their involvement with a PwD varies per practice.

Informal caregiver (e.g. family, a friend, a neighbour)

Informal caregivers often provide a lot of care. This can be an intensive and difficult task and they are often overworked.

Casemanager

A casemanager is appointed by the GP or POH and becomes the main point of contact and support for a PwD and their family. They monitor and organise the needed care.

Home care

Home care organisations provide care at home, like washing and medicine intake.

Wmo consultant

A Wmo consultant submits financing requests with the municipality.

Figure 8: The process of diagnosing dementia and the stakeholderders involved

In figure 9, some situations that occur with early-stage dementia are visualised. An extended overview of what it's like to live with early-stage dementia can be found in Appendix 1.
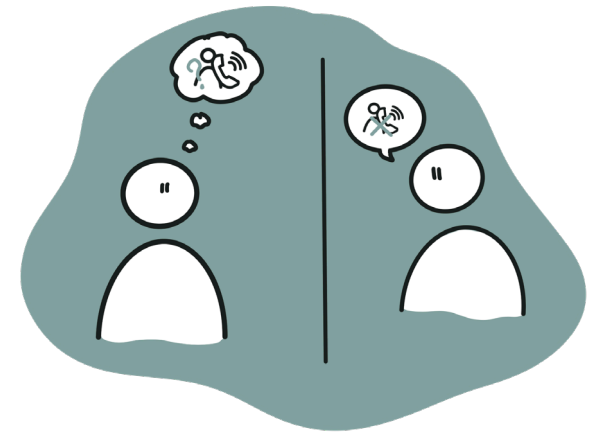
Figure 9: Examples of situations people in the early-stage of dementia ecounter
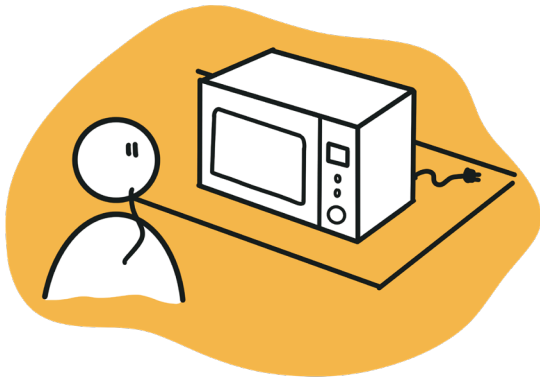
Suddenly not knowing how to use an appliance you had been using for a long time.

Not remembering what you came to do in a certain place. For example not being able to remember what you were going to buy in the store, even if it's only two or three things.

One example to explain the difference between 'natural' forgetfulness with elderly and dementia is the nuance between forgetting who called (forgetfulness) and forgetting the entire event that some called (dementia).

Financing of care

A large part of launching a product in the care business is sorting out the financing. Therefore, an overview of the different financing paths was made, see Appendix 2. Currently, Tessa is covered by insurance from the 'zorgverzekeringswet', abbreviated the 'Zvw'. Home care companies can bill hours of care for using Tessa.

From the interviews further in the project with informal caregivers, a son and daughter of a person with dementia, it became clear that the financial system is very hard to understand and get a grip on when organising care for their relative.

Forcast and trends

With the ageing population and increasing number of people with dementia, preparing the general practice for this has become an important order of business. GP organisations are developing programmes to improve elderly care (ROHA, 2021). This entails actions such as ensuring every practice has at least one POH-elderly.

Next to this, the collaboration between GP, POH, casemanager and home care needs to be better organised to keep up with the amount of care needed (Verenso, 2021 & Ministering VWS, 2020). This is important because the number of people with a casemanger increased with 6% to 41% of people, in 2020 and this number is only expected to grow (Alzheimer Nederland, 2020).

In 2020, most general practices worked on educating extra personnel and learning about e-health (Nivel, 2020). However, GPs are hesitant that technology costs a time investment that does not outweigh the benefits.

According to KPMG, care robots can replace 30% of repetitive tasks in home care (Elsen, 2017). In 2020, McKinsey would go as far as to say that if proven to be effective healthcare technologies are implemented in The Netherlands from now until 2030, it could lower yearly costs by billions (Rutten et al., 2020a).

The market of general practitioners

Another goal of the desk research was to get a better understanding of the size and composition of the market of GPs. Data from Nivel (2016 & 2020), Landelijke Huisartsen Vereniging (2021) and Eerstelijnszorg | Volksgezondheid en Zorg (2021) was comined to determine the amount of GPs, practices and the average number of dementia patients per GP. The result is shown in figure 10. It shows how many potential GPs there are to implement Tessa and with how many clients.

The number of patients with dementia at a general practice was estimated at 1%. This amount was confirmed by the interviews. In some areas with relatively more elderly the percentage rises to around 1.5% and in areas with fewer elderly the percentage drops just below 1%. Some GPs were working as locum GP so they could not provide data and some GPs did not have insight into this. The numbers mentioned in the interviews were estimated at:

- 50 of 5000
- 20-30 of 2600
- 100 of 12000
- 40/50 of 3180
- 30 of 2900
- 70 of 5600

114,300

people with dementia are registered at the general practitioner **70,000** live in a nursing home.

There are **9,955** working general practitioners in **5,020** general practices.

On average there are **2,095** patients per full time working general practitioner.

On average GPs work **0.75 fte**. This comes down to **1,571** patients per GP.

This means that,

1% of the patients have the diagnosis dementia.

[(114,300/(9,955*1,571))*100%=0,7%=157.1 person]

Figure 10: Number of GPs, practices and dementia patients in The Netherlands

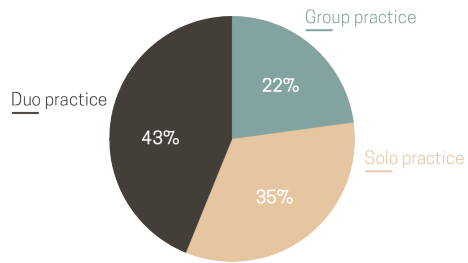Looking at the composition of the practices, it is visible in figure 11 that most practices are duo practices.

Figure 11: Composition of general practices

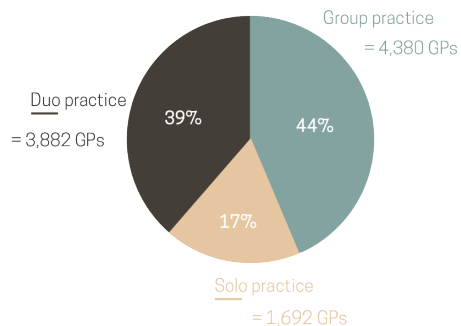However, the largest part of GPs work at a group practice, as can be seen in figure 12.

Figure 12: Where GPs work

In addition, stakeholders within the practice were explored to know who can be encountered when targeting a general practice. In figure 13 the different people at a general practice are shown. The most important in terms of medical caregiving are the GP and POH. The practice manager should also be kept in mind, since they are the ones running the business. They could play an important role in the implementation of a new product like Tessa.

Lastly, the structure of the networks above general practices were explored, see Appendix 3. Tinybots could use these networks to implement Tessa or spread information about Tessa.

GP
The GP can treat patients, prescribe medicine and refer to other caregivers or hospitals.

POH
The POH supports the GP. There are four types: Somatic, Mental health, Elderly and Youth.
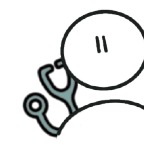
Doctor's assistant
Takes calls, schedules and does simple medical procedures.

Nurse practitioner
The nurse practitioner can take over tasks from the GP. They can treat patients, prescribe medicine or refer you.

Physician assistant
The physician assistant is almost the same as the nurse practitioner, except that they do not have a nursing background.

Practice manager
The practice manager runs the business side of a general practices. Tasks consist of protecting quality of care, managing funds and setting goals.

Figure 13: Staff at a general practice

2.2 Interviews

Interviews were conducted with GPs POHs, casemanagers, informal caregivers, people with dementia and other experts within the care sector throughout The Netherlands. See figure 9 for an overview. Of the interviews, 14 were held online due to COVID-19 and to save travel time. For the interviews with GPs and POHs the Mural.co template from Appendix 4 was used. If the interviews were in real life, the visuals from Mural were printed and taken with.

Quotes were extracted from the interviews and clustered per topic. Insights were then gathered from the clusters, see figure 14.

The goal of the interviews with the healthcare professionals was to discover their role during the dementia care process and their view on technology and Tessa. Next to this, I wanted to find out how products are given out now and if they see a place for Tessa in their practice. Lastly, their view on what the future will look like within the context of elderly and dementia care was asked.

The interviews with the informal caregivers were done to get a feeling for what it's like on the other end of the process and live with someone with dementia.

Outcomes

From the interviews, a clear overview could be created of the steps in the care process with dementia from the early beginning to the end and where the general practitioner comes in, see figure 15. The process was overall quite similar for all GPs, but some minor differences can be found in the level of involvement, the use of casemanagers, the referring to a specialist and task division between GP, POH, casemanager and home care. These differences can be explained by the size of the general practice, the demographics of an area (e.g. relatively more elderly) and the size of the area the practice is located in (e.g. small village in Zeeland compared to a big city like Rotterdam).

The role of the GP

The GP is part of the primary care (eerstelijnszorg). This means that they are the first point of contact that people go to when something seems wrong and are expected to provide as much care as possible to prevent patients from progressing to the secondary line of care. With dementia, the GPs described their role as signaling and setting up care network. Additional roles can be monitoring the patient and the wellbeing of their informal caregiver(s), helping with administrative tasks, but only if there are resources and

time to do this. In some cases, usually in smaller villages or towns, the GP does home visits which really helps to understand the patient's personal situation and get to know them well. However, in general, the GP likes to restrict their role to handling medical matters as much as possible.

"I consider myself the project leader, I organise and monitor, also if I don't see the patients often."

The GP usually combines the monitoring of dementia with 'normal' consultations, where the patient comes in for a physical check-up. The GP uses this time with the patient to inconspicuously check how it is going mentally, but also whether everything is still going well at home. To see if they are eating and drinking well and taking care of themselves. But it's often the case that the GP doesn't see the patient in a long time.

They do not offer care proactively and the patients do not quickly ask for help. This leads to situations where GPs are only involved when there is a crisis because a patient's condition worsened so greatly without anybody noticing it.
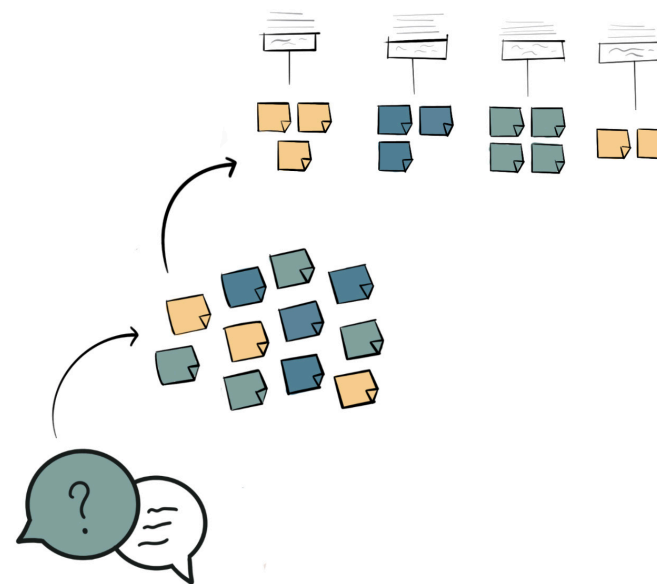

Figure 14: Analysis process

"Every few months I meet with all the caretakers in an MDC and discuss patients that require attention. "

Sometimes, the GPs notice someone could have dementia by chance. For example, one GP told a story about a woman who suddenly called three times a day to ask when her appointment was again.

The GP has a well-respected status. If the GP says something, the patient is very eager to believe and accept it. Therefore, when a family member or caregiver wants to offer help, but the PwD does not accept it or deem it necessary, the GP is in the position to help the family to convince the PwD to accept the help. If the informal caregiver is registered at the same GP, the GP views it as their job to check in on their health and whether they are able to handle the amount of care they are giving. If they go to a different GP, there is a chance the GP does not see or check in with them that often. This is then considered the task of the casemanager.

"I sometimes help my dementia patients with administrative work, like filling in a form. I like to show them that I'm involved and here to help them."

"If the care network is set up, I send them home and it's bluntly said waiting for something to go wrong"

Reactions to Tessa

Reactions from GPs to Tessa varied from being very sceptical to being very positive and being convinced it would have a positive effect. One GP in particular was very sceptical and simply did not believe people would listen and comply with what Tessa says. Around four GPs liked the idea of Tessa, but had some questions about the effect and needed some evidence in the form of numbers or experiences from users or other GPs or care organisations that implemented Tessa. The other five were very positive from the start and believed Tessa can have a positive effect on the patients. Six of the GPs commented on the appearance of Tessa. Three of them thought Tessa looked 'tuttig' and the other three described Tessa as cute and friendly. Two GPs asked whether PwD experienced Tessa to be scary.

"I wish it would have legs."
"Tessa is so cute!"

Multiple times it was mentioned that they would also see Tessa being used by vulnerable elderly. This is a large and also rapidly growing group of people that need care in The Netherlands. A small analysis of this group can be seen in Appendix 5. It was conducted to see whether there are similarities between people with dementia and vulnerable elderly. One similarity is the decreasing cognitive functioning. However, the biggest problem area of vulnerable people is their physiological state.

Another group that was mentioned were people that are starting to get light dementia-like symptoms. One GP suggested that this group would be even more open to welcoming Tessa.

Summary

- The GP is most involved at the start of the care process.

- They refer to a geriatrician or diagnose by themselves.

- Their role is to make contact with organisations and set up the care network.

- After that they take a step back and in most cases only see the patients for other medical consultations.

- They find it frustrating that they cannot offer help pro-actively. Mostly because of a lack of time, monitoring is not possible.

- They saw themselves giving Tessa as an option to their patients.

Challenges

1. Selection of patients

The selection of patients that would qualify for using Tessa was considered hard or a big-time investment. They said that a good overview of their home situation and people around them is necessary to make the selection. GPs in large practices or less involved GPs do not have the time to visit their patients at home or have elaborate meetings where they are able to map their situation.

"I feel like you really have to know your patients and there home situation to be able to determine if they qualify for using Tessa."

2. Financing

Home care can declare costs with the insurance if they saved time. GP can only declare costs after care is provided (interview practice manager, 2021). In order to create an arrangement with the insurance, the GP needs to contact them and try to convince them to cover the costs of Tessa. From the interviews, it became clear that GPs are very hesitant about doing this. First of all because it costs a lot of time, which they don't have, and secondly because of the negative experiences GPs have had with insurances in the past. They don't want to deal with the financial side and only focus on the medical side. If they only have to sign something or help with filling in a form, it's fine.

"The last thing I want to do is have meetings with insurance."

"They [the insurance] have become very powerful and don't have the patient as a priorty like I do."

3. Home care

Some GPs said that the tasks Tessa can take over, are tasks currently done by home care. Therefore, it seemed more logical to them that Tessa is distributed via the home care organisations. Also because it would save them time and would because of that be valuable for them. For the GP it would not necessarily save them a lot of time or add tangible value. GPs who after the diagnosis and setting up the care network is not very involved anymore said that home care would be better qualified to offer Tessa than them. According to them, the home care knows the patient and their living environment better.

"I think the home care knows more about what to use Tessa for than I do."

4. Time investment

It was very evident that GPs have very little time and are always on a super tight schedule. Most of the GPs said they work overtime almost every day. Making a time investment for Tessa scared them. They would at least need help from their assistants or POHs.

GP's with a pharmacy also have to spend additional time on maintaining and organising that part of the practice.

"I barely have time to attend to all my patients and I also have to do all that administrative work."

Role of the POH and casemanger

The POH is there to support the GP. With dementia could mean that the POH conducts the memory test, like the MMSE and sets up the care network. Sometimes, a POH is asked to make a home visit. In practices with a POH Eldery, they are in charge of checking on the vulnerable elderly that are registered at that practice. This means that the POH calls those elderly a few times per year or occasionally invites them to the practice.

The casemanager has a bigger role in the dementia process than the GP and POH. After the diagnosis is made or even shortly before, the casemanager becomes the main point of contact. The casemanager has extended knowledge of the disease and the different care organisations.

Double roles

During the interviews I noticed that often a POH or casemanager combines this function with the one of (distrcict) nurse at a home care organisation. I talked to someone who worked as a district nurse four days a week and one day a week as a POH elderly in service of multiple general practices. Upon request of a GP, she would make a home visit to a PwD and access the situation. She would then report back to the GP and organise the care she deemed to fit the situation. Sometimes she would visit the same people again, but then as a district nurse, because she is then allowed to perform different tasks and falls under different financing rules.

Caregivers like this, could be used by Tinybots as the connection between the general practice and home care.
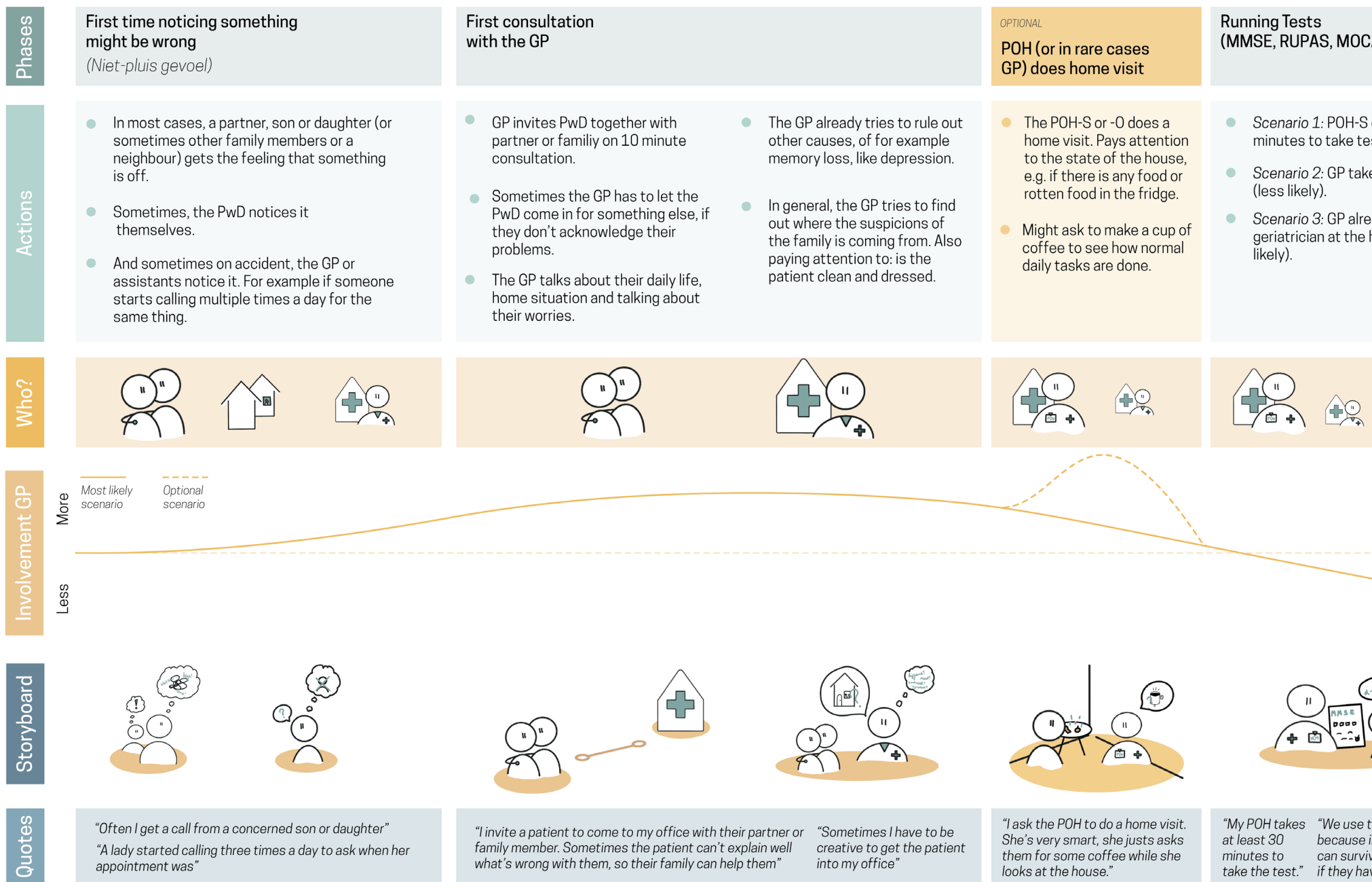
Phases	First time noticing something might be wrong *(Niet-pluis gevoel)*	First consultation with the GP	*OPTIONAL* POH (or in rare cases GP) does home visit	Running Tests (MMSE, RUPAS, MOC...
Actions	• In most cases, a partner, son or daughter (or sometimes other family members or a neighbour) gets the feeling that something is off. • Sometimes, the PwD notices it themselves. • And sometimes on accident, the GP or assistants notice it. For example if someone starts calling multiple times a day for the same thing.	• GP invites PwD together with partner or familiy on 10 minute consultation. • Sometimes the GP has to let the PwD come in for something else, if they don't acknowledge their problems. • The GP talks about their daily life, home situation and talking about their worries. • The GP already tries to rule out other causes, of for example memory loss, like depression. • In general, the GP tries to find out where the suspicions of the family is coming from. Also paying attention to: is the patient clean and dressed.	• The POH-S or -O does a home visit. Pays attention to the state of the house, e.g. if there is any food or rotten food in the fridge. • Might ask to make a cup of coffee to see how normal daily tasks are done.	• *Scenario 1:* POH-S ... minutes to take te... • *Scenario 2:* GP take... (less likely). • *Scenario 3:* GP alre... geriatrician at the h... likely).

Who?

Involvement GP

Most likely scenario / Optional scenario — More / Less

Storyboard

Quotes

"Often I get a call from a concerned son or daughter"

"A lady started calling three times a day to ask when her appointment was"

"I invite a patient to come to my office with their partner or family member. Sometimes the patient can't explain well what's wrong with them, so their family can help them"

"Sometimes I have to be creative to get the patient into my office"

"I ask the POH to do a home visit. She's very smart, she justs asks them for some coffee while she looks at the house."

"My POH takes at least 30 minutes to take the test."

"We use t... because i... can surviv... if they hav...

Figure 15: Care process with dementia and role of the GP

22

GP makes diagnosis

If person is immobile or if already in further stage of dementia

GP/POH stays involved

GP or POH still does home visits to check on patient

Casemanager, family or home care consults GP outside of MDC

This could be about an emergency, or a question or help with filing a form (e.g. for insurance). Depending on the level of involvement of the GP, they might fill out a form or order a product or talk to the informal caregiver. In most cases, the GP only has to sign something, to get it approved by the insurance.

Patient stays home until the end

A)

Referral to geriatrician

If results from tests indicate dementia

Back at the GP, organising next steps

Letting go

Waiting for illness to worsen or something to go wrong. Sometimes they don't see patient for months.

Multidisciplinary consultation

Every 2 or 4 months

In the mean time:
Providing medial care and low-key monitoring

As dementia progresses

Arrange admission into nursing home

---

or -O takes 30 st.

es the test,

ady refers to ospital (least

- Runs more tests, also blood test and brain scan.
- Rules out other things, like a tumor.
- Makes diagnosis and determines type of dementia.
- Gives official diagnosis letter, useful for health insurance.

- Discussing outcomes from geriatrician.
- Mapping personal situation, who can provide care?
- Linking to home care organisation and casemanager through Zordomein. Casemanager can also be organised through the home care organisation.
- Discussing all the options.

- Supporting and providing information is taken over by casemanager
- Home care looks after a patient's home situation
- GP only sees patient for physical problems

- Meetings with all professional caregivers are organised.
- Patients that need that more care, have a complex problem or need a check up are registered by GP, home care or casemanager.
- During the meeting the GP might be asked to approve something, like up scaling of care or give medical advice.

- Some general practices keep an eye on their elderly patients and call every 6 months.
- GP subtlely checks on status of dementia during consultations for other problems.
- Trying to predict worsening, to be able to provide care in time (also taking into account the waiting lists).

- In the end, the GP arranges admission in to a nursing home if this is necessary.
- Other legal matters also go by the GP. For example admission against people's will or helping with curatorship.

he RUPAS, ntelligent people ve the MMSE even ve dementia."

"I always refer them to the hospital. They have more time for a patient and are better qualified to make diagnosis and give an official letter."

"Together with the patient and caregiver I think of solutions and organize help."

"I have one central database from which I can organize home care and a casemanager."

"My role also becomes convincing the patient to accept help"

"To be blunt, it's waiting for something to go wrong."

"I only see them when they need medical help."

"I still consider myself to be the one in charge, "the project leader'."

"I register patients I want discuss. During the meeting we get input from all sides."

"Together we discuss the situation and think of what can do for the patient."

"The POH checks the status of the dementia of the patient when she's there to measure his blood pressure."

"When my patient moves into a nursing home, they don't fall under my care anymore."

2.3 Pilot with GP as Tessa owner

Two additional interviews were held with a practice manager who successfully participated in a subsidised pilot with around 17 Tessa's and someone from their GP organisation 'Onze Huisartsen'. In the interviews the worries of the other GPs and ingredients that led to the success of their pilot were discussed. Three clear ingredients for success were identified, see figure 16.

First of all the availability of financing is key. Otherwise, it is simply too expensive for a general practice to afford. Usually, it is also too expensive for a patient to take on all the costs by themselves. In the pilot, a subsidy was provide by the RVO (Rijksdienst voor Ondernemend Nederland).

A manager from the organisation 'Onze Huisartsen' explained the current position of their health insurance towards Tessa. The insurance recognizes the positive effect of Tessa, but considers the care provided for these patients as 'second-line' care. This means the insurance thinks the GP should refer these patients to 'second-line' care. However, in the current state of our health care system, this is often not possible. This is because a lot of cutbacks were made by the government leading to less staff and longer waiting lists. However, since the insurance only covers 'first-line' care, care provided

by the GP, they say the costs of Tessa are not their responsibility. This means that if the insurance stays with this point of view, the GP cannot continue working with Tessa.

"No GP can afford Tessa without financial support"

Secondly, a large time investment is needed, fueled by sufficient enthusiasm and trust. In the pilot, staff made extra hours after work hours to drive around and install Tessa's. GPs and their staff are already very busy, meaning such a time investment can be hard to realise. If there is enough trust in and enthusiasm for the results Tessa brings, it could convince the staff to make time for it.

"We were alle very enthusiastic about Tessa and were very curious how it would work out. We decided that we would put the effort in as a team to make it work."

Lastly, support from an external organisation is preferred, for example from a supporting umbrella organisation a general practice can be a member of. The administrative and logistical work, like ordering and setting up Tessa's and functioning as a helpdesk can be done by this external organisation. This saves the GPs a lot of time. The only time investment needed then is selecting the patients that could use Tessa and scheduling the agenda for Tessa.

"We involved our GP organisation 'Onze Huisartsen', we hope they can take over administrative tasks en things like handling errors."

A final, additional factor to consider is the selection of patients participating in the pilot. Only three of the participants had memory problems. The other participants suffered from mood swings, autism or acquired brain injury. If you combine this with the finding that the involvement of the GP with dementia is quite low, one could conclude that Tinybots should target a different target group than dementia when Tessa is being implemented by a GP.

Financing by insurance or other external party (e.g. subsidy)

Time investment fueled by enthusiasm and trust

Support from external organisation to take over **logistics** and **administrative** work

Figure 16: Ingredients for the succesful pilot with GP as Tessa owner

2.4 Alzheimer café

Alzheimer café is an informal gathering where people with dementia, informal and professional caregivers or anybody else who is interested can go to. At every gathering, a different topic is discussed. I visited the gathering about the role of the GP. The gathering about technology use with dementia was unfortunately canceled due to covid-19.

Summary

- The people with dementia and relatives showed strong feelings of worry and fear.

- There is no cure for dementia, but relatives at the gathering were willing to try anything that might help.

- It's hard to lose your loved one during the process of dementia. This is also hard for the GP, who likes to take action and help their patient.

- The GP expressed his workload is very high, but he still tries to visit his elderly patients every 2-3 months and also be there for the informal caregiver.

See Appendix 6 for all observations and learnings and figure 17 for an impression of the gathering.
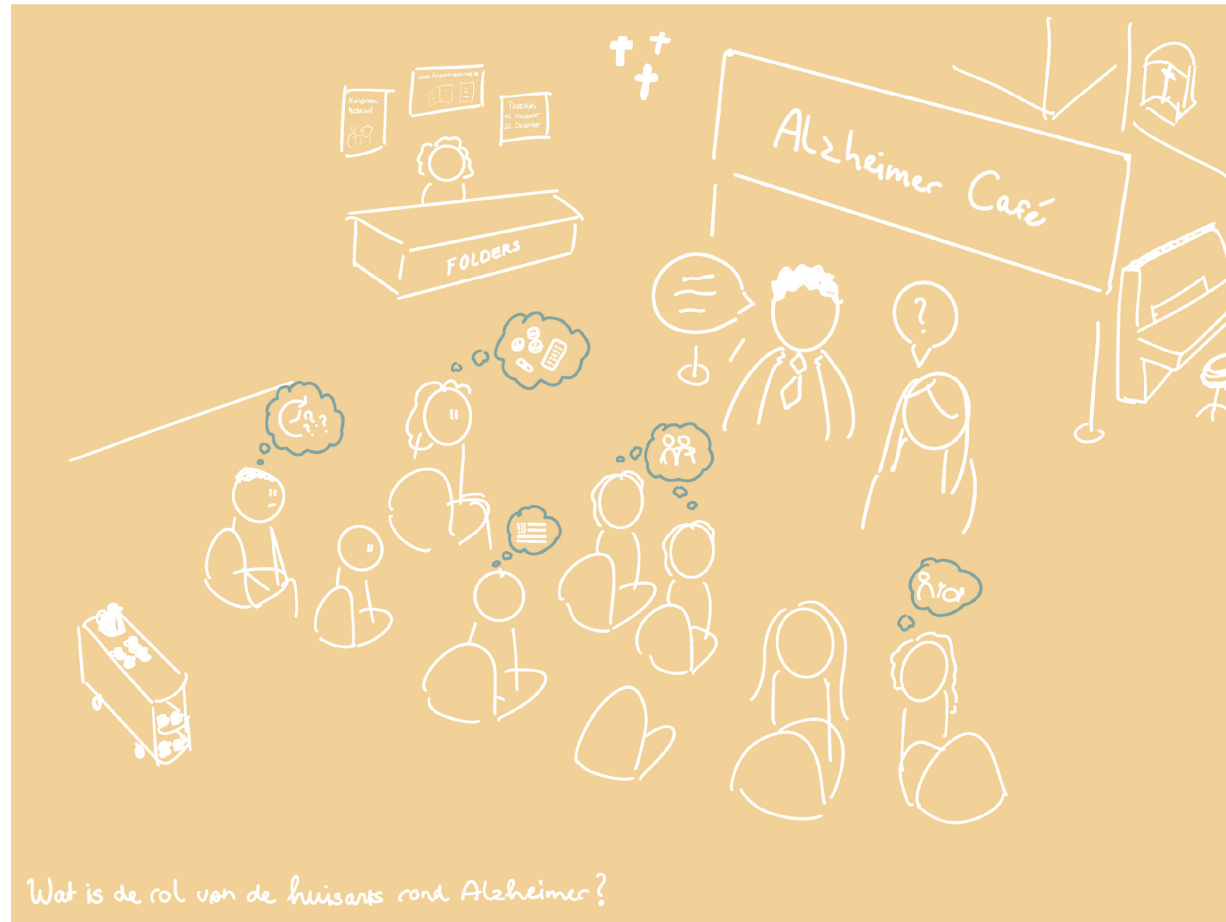
Figure 17: Impression of Alzheimer Café

Key insights to read before continuing
Chapter 2: Research

- Around **114,300** people with dementia are registered at the GP, which is around **1%** of a GP's patients

- GPs are mostly involved at the **beginning** of the dementia process, to support the **diagnosis**. This is done together with the POH.

- After that the **casemanager** is most involved and the GP takes a step back.

Dementia and the GP

- GPs do not see their dementia patients often and do not know enough about a patient's **personal situation**.

- GPs and POHs have very **little time** and want everything to be as simple as possible. They are not used to giving out products.

- Getting financial support from health insurances for Tessa is hard and GPs are hesistant to approach insurances. Without **financial support** GPs cannot afford Tessa.

Challenges

- The GP likes to **offer** their patients a wide range of **options**, which are currently very limited with dementia.

- Most GPs **see potential** in Tessa, also because they view it as their task to provide a save living situation at home.

- **Home care** organisations have **agreements** with **insurances** for Tessa. Caregivers like casemanagers and POH's who also work as a district nurse can funtion as a bridge between the GP and home care organisations.

Opportunities

Chapter 3
What do these insights mean for potential distribution scenarios?

3. Distribution scenarios

During the interviews, the professional caregivers expressed that in a perfect scenario an external company can be consulted to implement technology like Tessa. When the GP or casemanager thinks a product would benefit the patient, they can refer to that company and they will arrange everything. In this perfect scenario, the costs of consulting this external company and the product would be covered by health insurance.

Unfortunately, this is not feasible in the current care system. Therefore, four possible distribution paths were considered for Tessa with the GP as a starting point. The scenarios will each be briefly explained after which they will be evaluated.

3.1 Possible distribution scenarios

Scenario 1: GP as a Tessa owner
In the first scenario, the GP buys, owns and distributes Tessa themselves. This was also the case in the pilot Tinybots executed with GPs.
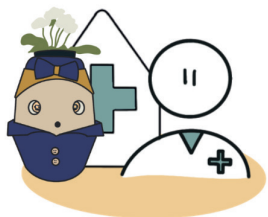
Scenario 2: GP refers patient to home care organisation that can implement Tessa In this scenario, the role of the GP is to refer patients to a home care organisation that already works with Tessa. The patient will receive a Tessa from this home care organisation and make use of the financing system in home care.

Scenario 3: GP recommends Tessa to a patient and they buy Tessa themselves In scenario three, the GP also has to role of referer. The GP does not own the Tessa's, but redirects a patient to buy and arrange the financing for Tessa themselves.

Scenario 4: GP gives out trial Tessa and then refers patient to Tinybots or home care organisation In the final scenario, the GP shortly loans out Tessa to their patient to try her out. If the result is satisfactory, the GP will refer them to buy Tessa themselves from Tinybots or to a home care organisation.
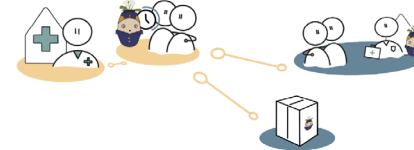
3.2 Evaluation set-up of the distribution scenarios

To determine which scenario has the most potential to be successful, criteria were set up to evaluate the four scenarios. The criteria are:

- Time investment

- Availability of financial support

- Fit with current role

- Simple as just signing something

- Level of involvement with patient needed

The scenarios will be given a score of one to five for every criteria. A higher score means it suits the needs of the GP better. What it means to have a perfect score of five will shortly be discussed for every criteria.

Time investment
Using Tessa costs the GP and other staff in the general practice little to no extra time. GPs are convinced that it does not take too much time.

Availability of financial support
Costs of Tessa are covered by their health insurance and GPs do not have to be involved in negotiating with health insurances.

Fit with current role
GPs are more willing to try Tessa if it fits within their current tasks. If they do not view it as their responsibility, it is harder to involve them. Their current role next to offering medical care is referring, discussing options and ensuring their patients can still live safely at home. Sometimes they also lend out products for a short period of time.

Simple as just signing something
Numerous times GPs said that they would be open to using Tessa, if they only have to sign something and that's it. The process of getting a Tessa should be as simple as possible.

Level of involvement with patient needed
Little knowledge of their dementia patient's personal and home situation is required, since GPs feel like . They were afraid that mapping out their personal and home situation would cost too much time.

3.3 Evaluation of scenario 1: GP as a Tessa owner
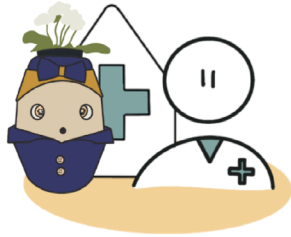
Tinybots is the supplier of the Tessa and the GP the owner and distributor. GPs would be more interested in Tessa if Tinybots can offer a service to install and implement Tessa with their patient.

Pro's & cons

+ Maybe in the future, if there is a bigger focus on specialised eldery care at GP with more POHs-O

+ If they are really enthousiastic about Tessa and are willing to put in the time and get subsidy it could work

+ No waiting list, quick acting is possible

− No coverage by insurance, GPs are not eager to talk to insurance

− GPs do not view it as their task to own and give out products

− GP is too distanced from dementia patients to decide whether they would benefit from a Tessa and to determine what should be put in Tessa's agenda in the app. There is no continuous care and long-term monitoring from the GP with dementia

− This also means the GP is not in the position to follow-up on the effectivity of Tessa

− GPs feel like it costs too much time, to set up logistically. POH does not seem to have enough time to take this over

Criteria *(A higher score means it suits the needs of the GPs better)*

Criteria	Score
Time investment	●○○○○
Availability of financial support	●○○○○
Fits with current role	●●○○○
Simple as just signing something	●○○○○
Level of involvement with patient needed	●○○○○

Role caregivers

Role	Description
GP	Tessa owner, selects patients
POH	Selects patients, setting up agenda, follow-up, long-term monitoring
Casemanager	Not involved or helps with the agenda and monitoring

More likely if...

Tinybots can take over the tasks of installing, implementing and monitoring the Tessa's.

Tinybots can prove Tessa increases overall health of a patient or that it saves a GP time.

There is a POH, for dementia patients preferably POH-O, available to spend time on selecting patients for Tessa and help with setting up the agenda and monitoring. Another option would be that the POH or GP instructs the casemanager.

The costs of Tessa can be covered by insurance. GP does not have to invest time in talking to the insurance (at least not before seeing the effect of Tessa, afterwards they might change their mind).

TaaS (Tessa as a Service) is possible for less than 50 Tessa's (Only around 1% of a GP's patients have dementia and GPs in general expect a small share of their patients would apply for Tessa). Or Tessa is sold through regional GP organisations (to reach 50).

The GPs and other staff at general practice are less constrained in the time they have.

Target group

Would not work to target dementia patients

Care and monitoring is provided by casemanager and home care organisations. GP is too little involved, while the casemanager and home care have a good view on the personal and home situation of a patient and are the ones providing continuous care.

Best to target this way

Patients that receive continuous care from the general practice, like GGZ patients, people with MCI or elderly. If they could benefit from a Tessa, it would save time for a general practice, because they don't contact the GP or POH as often as before.

Another benefit could be to prevent home care, by implementing Tessa. For example, because their condition does not worsen since they are reminded to take their medication. This could also be an option if home care is full.

3.4 Evaluation of scenario 2: GP refers patient to home care organisation that can implement Tessa
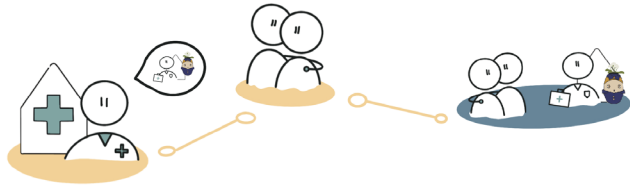
Tinybots sells Tessa to the home care organisations. Tinybots helps with installing Tessa with the patient or the home care organisation does this. Tinybots also has the role of informing and educating GPs and POHs on Tessa, so they feel like they can give it as an option to their patients.

Pro's & cons

+ Fits with their role to set-up care, give options and refer

+ Costs covered through the agreement between home care organisations and insurance

+ Costs little time

+ Home care is better at mapping out the home situation of a patient

+ Fits with TaaS in home care companies, quick access to more Tessa's that are ready to go

+ The pathway from Tinybots to home care already exists

+ Makes use of the double roles POH-Os and casemanagers have. They are often also working at home care organisations.

– GPs find it hard to know how to select patients

– Still need to invest time to learn about the product

– Unsure if home care organisations are open to this and if making an official 'referral indiaction' of Tessa is possible

Criteria *(A higher score means it suits the needs of the GPs better)*

Time investment — ●●●●○

Availability of financial support — ●●●○○

Fits with current role — ●●●●●

Simple as just signing something — ●●●●○

Level of involvement with patient needed — ●●●●○

Role caregivers

GP	Selecting and referring patients, or asking the casemanager to be involved with implementing Tessa
POH	Selecting and referring patients or asking the casemanager to be involved with implementing Tessa (in consultation with GP)
Casemanager	Being the connection between GP and home care, assist with implementation, provide input on home situation
Home care	Take in patient to provide them with a Tessa. Implement Tessa, optionally with help from Tinybots.

More likely if...

Tinybots can make deals with more home care organisations.

The number of home care organisations with agreements with insurance to cover the costs of Tessa keeps increasing.

Home care is open to accept patients that only apply for help through Tessa (already done with Medido).

ZorgDomein

A referral for Tessa from a home care organisation is available in ZorgDomein. The programme all GPs use to refer.

Target group

Best way to target dementia patients

With dementia patients the GP and POH are there until referral. Organisation, monitoring and providing care is taken over by the casemanager and home care organisations.

Who else?

People in the 'gray area' between getting the diagnosis dementia and needing care can be targeted this way. These are people that would need home care in the near future, but could already be helped with a Tessa, delaying their decline and need for home care.

In some areas, people with dementia symptoms are not yet diagnosed, but are already linked to a casemanager. This is a different 'gray area' that could be helped with Tessa through this way, since a casemanager is often connected to home care.

3.5 Evaluation of scenario 3: GP recommends Tessa to a patient and they buy Tessa themselves
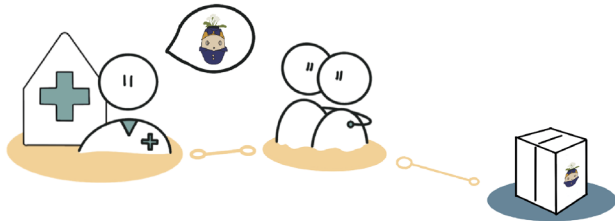
Tinybots receives orders from individual clients. The clients can lease or buy Tessa. If they have the recourses, they help the client with installation and implementation. Tinybots also has the role of informing and educating GPs and POHs on Tessa, so they feel like they can give it as an option to their patients.

Pro's & cons

+ Fits with their role to set-up care, give options and refer

+ Could cost little time for the GP. In some cases helping with filling the form would be done by the GP or POH

− No coverage by insurance: Tessa can be too expensive to pay for by patients

− Tinybots is moving away from selling to individuals. From experience they know the share of individual clients is not very large

− No guidance for implementation and adoption, patients could turn to GP for questions

− GP may need to assist with what to put into the agenda of the Tessa, costs time

− Implementation of Tessa can fail if not assisted well

Criteria *(A higher score means it suits the needs of the GPs better)*

Criteria	Score
Time investment	●●●●○
Availability of financial support	●●○○○
Fits with current role	●●●●○
Simple as just signing something	●●●○○
Level of involvement with patient needed	●●○○○

Role caregivers

GP	Selecting, informing and referring patients
POH	Selecting, informing and referring patients, optionally helping with implementation
Casemanager	Not involved or informing and referring patients, optionally helping with implementation

More likely if...

Tinybots can assist with installing, implementing and monitoring the Tessa's. Guiding the family and other caretakers on how to use Tessa.

There is a POH, preferably POH-O, available to spend time on selecting patients for Tessa .

Individual clients can get the costs of the Tessa covered by the 'zorgverzekeringswet' or 'wmo' if it's too expensive to pay for it themselves.

TaaS (Tessa as a Service) is also available for individual clients.

The share of individual clients increases.

Target group

Could work to target dementia patients

If the patient is supported well and finances are sorted out, the GP (or POH) can use this pathway to guide patients with dementia to Tinybots.
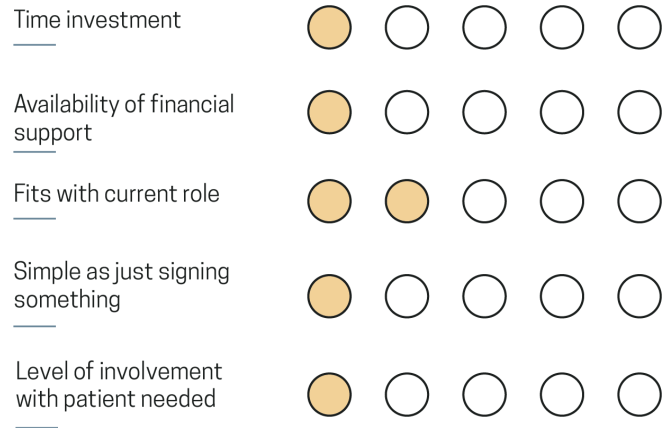
Who else?

Anybody who be helped with a Tessa to such an extend that it could improve overall health, delay the need for home care or delay any other referal to secondary care, so it's attractive for insurance to cover the costs. Or anybody who can be helped with a Tessa and can afford it by themselves.

3.6 Evaluation of scenario 4: GP gives out trial Tessa and then refer patient to Tinybots or home care organisation
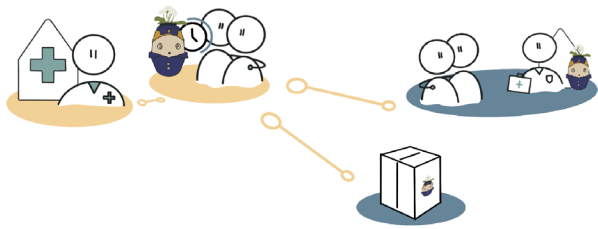
Tinybots sells Tessa's to home care companies and individual clients. Optionally Tinybots helps with installation, implementation and monitoring.

Tinybots delivers GPs 'trial' Tessa's. GPs offer the trial Tessa's and then refers to home care organisation or patient orders Tessa individually.

Pro's & cons

+ Fits with their role to set-up care, give options and refer

+ GPs are used to lending out products for a short period of time

+ Costs are covered through home care

− Organising the logistics of the trial is complicated for GP & Tinybots

− Costs more time, not as simple as 'just signing something'

− No coverage by insurance: Tessa can be too expensive to pay for by patients

− Implementation of Tessa can fail if not assisted well

− The POH and assistant need to help with the trial Tessa's. So the concept depends on availability and occupation of POH & assistants

Criteria
(A higher score means it suits the needs of the GPs better)

Criteria	Score
Time investment	●●○○○
Availability of financial support	●●○○○
Fits with current role	●●●○○
Simple as just signing something	●●○○○
Level of involvement with patient needed	●●○○○

Role caregivers

GP	Selecting, informing and referring patients
POH	Selecting, informing and referring patients, optionally helping with implementation
Casemanager	Not involved or being the connection between GP and home care, assist with implementation, provide input on home situation
Home care	Take in patient to provide them with a Tessa. Implement Tessa, optionally with help from Tinybots.

More likely if...

Tinybots can take over the tasks of installing, implementing and monitoring the Tessa's.

Tinybots can make it easy to give ouy trial Tessa's and it doesn't cost much money.

There is a POH, assistant or casemanager available to help with the trial Tessa's.

For individual clients there is a POH, preferably POH-O, available to spend time on selecting patients for Tessa. If support from Tinybots is not feasible, the POH or assistant needs to help with setting up the agenda and monitoring.

For individual clients the costs of Tessa can be covered by insurance.

Target group

Could work to target dementia patients

If the patient is supported well and finances are sorted out, the GP (or POH) can use this pathway to guide patients with dementia to Tinybots.

Who else?

Anybody who be helped with a Tessa to such an extend that it could improve overall health, delay the need for home care or delay any other referal to secondary care, so it's attractive for insurance to cover the costs. Or anybody who can be helped with a Tessa and can afford it by themselves.
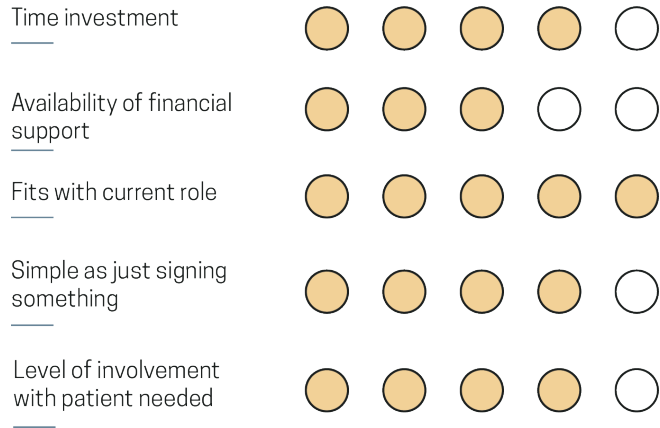
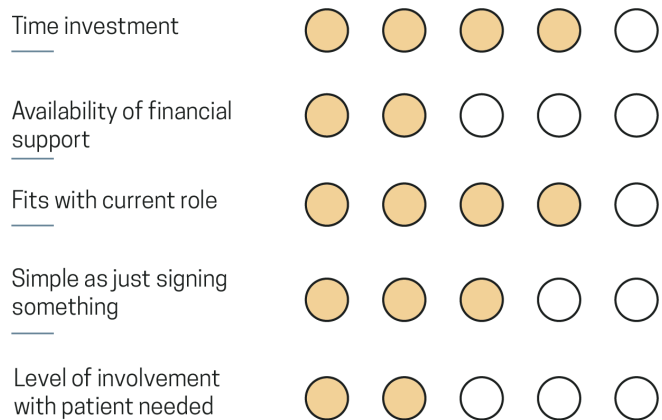# 3.7 Final overview evaluation

Scenario 1
GP as a Tessa owner

Criterion	Rating
Time investment	●○○○○
Availability of financial support	●○○○○
Fits with current role	●●○○○
Simple as just signing something	●○○○○
Level of involvement with patient needed	●○○○○

Scenario 2
GP refers patient to home care organisation that can implement Tessa

Criterion	Rating
Time investment	●●●●○
Availability of financial support	●●●○○
Fits with current role	●●●●●
Simple as just signing something	●●●●○
Level of involvement with patient needed	●●●●○

Scenario 3
GP recommends Tessa to a patient and they buy Tessa themselves

Criterion	Rating
Time investment	●●●●○
Availability of financial support	●●○○○
Fits with current role	●●●●○
Simple as just signing something	●●●○○
Level of involvement with patient needed	●●○○○

Scenario 4
GP gives out trial Tessa and then refer patient to Tinybots or home care organisation

Criterion	Rating
Time investment	●●○○○
Availability of financial support	●●○○○
Fits with current role	●●●○○
Simple as just signing something	●●○○○
Level of involvement with patient needed	●●○○○

3.8 Conclusion   Scenario 2 has the most potential

On short-term, scenario two comes out as most likely to be successful, see figure 18. One crucial part of scenario two is the highest chance of financial support from health insurances. This is because home care organisations can save time by using Tessa, where GP currently does not for their dementia patients.

Next to this, Tessa would be used to postpone the need for home care and enabling the person with dementia to live at home independently for as long as possible. This will become even more important with the increasing shortages in home care, the long waiting lists and massive expected rise in dementia patients.

In practice, this would mean elderly live at home independently without care with Tessa and possibly other technology. As an example, in one of my interviews I visited a woman, age 84, with aphasia and early-stage dementia. She lives with a Tessa and a Medido medicine dispensor, provided by a home care organisation in her neighbourhood. Besides those two products, she does not receive any additional care. The district nurse who implemented Tessa told me: "Without Tessa and the Medido we would have had to provide care for her a long time ago".

Such a situation is one scenario two should provide and is what makes it an interesting one for GPs, since they will not always be able to refer someone to home care because of the shortages, but still want to provide a safe living environment. For home care organisations it means they can postpone the need for home care with Tessa and start with this from a very early stage of dementia.

Recommendations

This scenario raises some questions that need to be addressed out before it can be implemented. Some points of attention are:

- How can home care organisations be motivated to take in clients only for use of Tessa?

- Do the health insurances support this model? It is already possible with Medido, the medicine dispenser

- Can the GP create a care indication under which Tessa can be written (e.g. medicine handover)

- How can GPs learn that Tessa is an option to give to patients?

Next to these questions, another important point of attention is the group of people that is reached through the GP. From chapter two it became evident that the GP is involved at the very beginning of the dementia process. Through the GP, you can reach people with beginning memory problems and very early-stage dementia. In this phase, there are some factors at play which influence the acceptance of

Tessa. People in this phase still function quite well and often do not like feel like they need support. This is a challenge that should be resolved, since one of the strengths of this scenario is that Tessa can be implemented earlier. Tessa is more effective on long-term, can support the informal caregiver from early on to prevent overburdening and postpone the need for physical home care as long as possible. This leads to the following design challenge:

How can the product-service of Tessa be adapted to people with beginning dementia reached throug the GP?

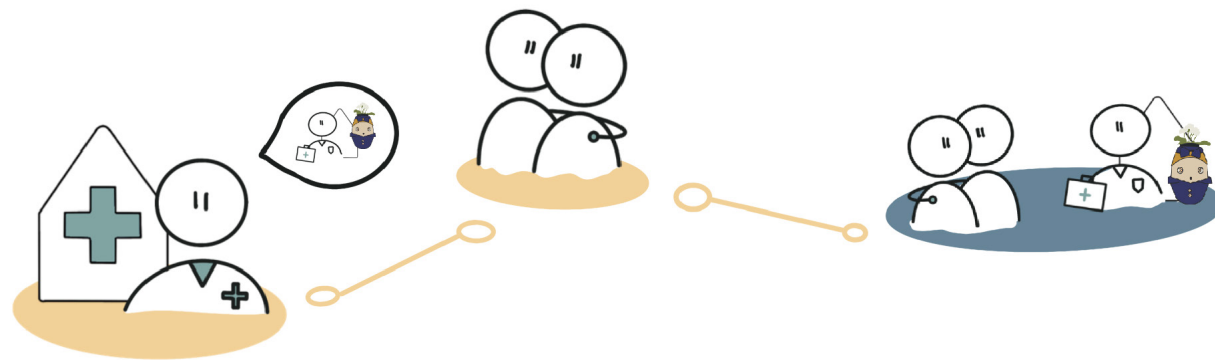On the next the page, the argumentation for this design challenge will be further explained.

Figure 18: Chosen scenario: GP refers patients to home care organisation that can implement Tessa

Key insights to read before continuing
Part 1: From research to distribution scenario to design challenge

In the chosen distribution scenario, the **GP** is the **starting point**.

From the interviews we know that the GP can reach people at the **beginning** stage of their **dementia** process

Early-stage dementia is characterised by **minimising problems** and **denial** that something is wrong (Steeman et al., 2006)

People are already **losing** autonomy, independence and are being viewed as a **patient**, which does not match their self-image.

Therefore, admitting you need **help** is **hard**. This complicates **acceptance** of Tessa.

People find themselves still '**too good**' for Tessa, find her **childish** or just '**not for them**' (Interviews, 2022). Sometimes the Compaan is therefore chosen over Tessa. (Interviews, 2022).

This means that the product of Tessa does not **fit** the people that are reached through the GP, leading to the initial design challenge:

How can the product-service of **Tessa** *be* **adapted** *to people with* **beginning dementia** *reached through the GP?*

Initial design challenge

Since the importance of maintaining personhood and the reluctance against **acceptance** of help through Tessa is very defining for the early-stage of dementia, the design challenge was **reframed** to:

How can you **lower** *the* **threshold** *to* **accept Tessa***, an assistive robot, in a phase of dementia with a lot of* **denial***?*

Reframed design challenge

Part 2: How can you lower the threshold to accept Tessa, an assistive robot, in a phase of dementia with a lot of denial?

4. Design challenge How can you lower the threshold to accept Tessa, an assistive robot, in a phase of dementia with a lot of denial?

As stated in the previous chapter, the GP sees people at the very beginning of their dementia process. This means Tinybots can reach people in a very early stage of their disease. That is an opportunity, but it also brings new challenges. To prepare for the ideation stage, characteristics of early-stage dementia and the acceptance of technology, such as assistive robots among elderly was researched. Next to this, other products that are made for people with dementia were looked at to get a feel for what they focus on.

4.1 The new target group of Tessa

A new target group comes with both opportunities and challenges. The opportunity lies in the fact that Tinybots has found that the earlier Tessa is implemented, the more successful it is. Next to this, the informal caregiver can be supported from earlier on. Research from Boots et al. (2015), states that preparing in an early stage can prevent high levels of burdens in the future. A different research by Gaugler et al. (2005) showed that intervention and support at an early stage can reduce strain on caregivers. The health and condition of the informal caregiver is extremely important. If the informal caregiver would become overworked or too strained to provide care, the home care organisations are the ones who need

to take over these tasks. Therefore, an early on supported informal caregiver is also in their interest.

Another reason why home care organisations want to implement Tessa sooner, is in order for their clients to get used to Tessa. This enables them to act quickly when a care need arises. This could be a person forgetting to eat regularly. Without Tessa, verbal care would be provided by home care organisations to provide reminders. If the person has a Tessa and is used to it, the home care can simply add the reminder to the calendar of Tessa and the care need is fulfilled. This approach was also described by a district nurse from Zorgcirkel I talked to.

For the GP, Tessa is a means to be able to offer their patients something where currently they stand quite empty-handed. As said in the interviews, GPs like to offer care pro-actively and their main objective with dementia, next to offering medical aid, is to ensure a safe and comfortable living environment.

4.2 Characteristics of early-stage dementia

Recognizing your health is deteriorating can be hard for everyone. With early-stage dementia, acceptance of the diagnosis, let alone acceptance of help is especially challenging (Steeman et al., 2006). Denial and minimising

what is going on is very common. This increases the threshold to accept an assistive product like Tessa. A common reaction from people is that it's a nice product, but not for them (H. R. Lee et al., 2016).

Other experiences are the loss of control and increasing insecurity, loss of personhood due to people focusing on the diagnosis instead of the person that is going through it and practical problems, such as forgetting where you put your belongings or having low concentration. A person with early-stage dementia is confronted with not being the same person as before, while still trying to live your life as normal as possible.

4.3 Acceptance of technology

To understand more about acceptance of technology, three acceptance models were used, see Appendix 8. The most important thing to remember from the models is that for seniors, social influences and user context together with perceived usefulness determine the intention of use (Davis, 1989), see figure 19. Next to this, interest and need for the product is key for acceptance (Peek, 2016), see figure 20. In my business model, the GP can add social pressure to use Tessa from their position of authority. Taking into account the fact that denial and minimising problems play a large
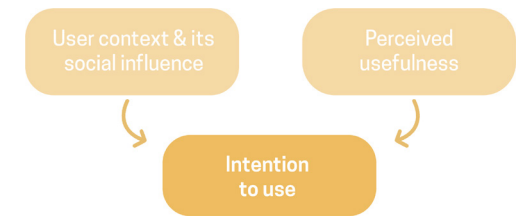

Figure 19: A part of the Senior Technology Acceptance Model (Davis, 1989)

role in early-stage dementia, perceived usefulness will be likely to form a barrier in moving to intention to use.
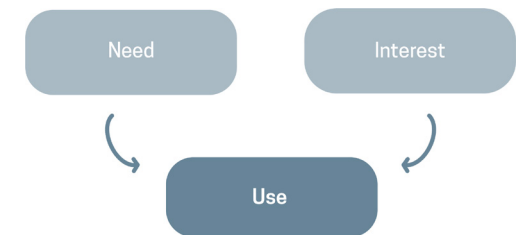

Figure 20: A part of the the technology acceptance model for elderly by Sebastiaan Peek (Peek, 2016)

4.4 Keypoints surrounding elderly acceptance of assistive and social robots

From literature, important insights and themes were identified to take into account with acceptance of assistive and social robots.

- Designers of assistive and social robots are inclined to see aging only as the process of detoriation

(Deutsch et al., 2019). Elderly view aging as much more than this, the health decline is only one part of it. The focus on the disability aspect of aging leads to rejection by elderly who do not want to be associated with this. The stereoptypes are also caused by the fact that elderly are often treated as one homogeneous group, instead of a diverse group of people (Frennert & Östlund, 2014)

- The representation of older adults in assistive robots is often stereotypical and stigmatizing, not matching the self-perception of elderly (Lee & Riek, 2018). This can form a major barrier for acceptance.

- Elderly value their independence. So much that this should also be reflected in the appearance of the robot (Broadbent et al., 2009). If a device implies disability, they would be too emberrased to use it (Hirsch et al., 2000).

- A customisable experience can add to the feeling of autonomy and one design is unlikely to suit everyone (Broadbent et al., 2009).

4.5 Roger's five attributes of adoption

Roger's five attributes influencing adoption with innovation (Rogers, 1995) also offer an interesting perspective on adoption of new products that are in line with the theories on technology acceptance. The five attributes are:

- Relative advantage, the innovation offers something current products cannot

- Compatibility, how does the innovation fit with existing values, experiences and needs

- Complexity, how easy is the use and understanding of the innovation

- Trialability, can they experiment with the innovation for some time

- Observability, observable positive outcomes of the innovation makes is more adoptable

Relative advantage and observability are important when determining perceived usefulness. The elderly that were interviewed were quick to compare Tessa to their own devices and try to find what they were able to do with Tessa which they were not able to do already. They were trying to see what advantage Tessa offers and what the outcomes would be for them. Outcomes like not forgetting things are not recognised if you do not acknowledge the problems that come with early-stage dementia. A different relative advantage with observable positive outcomes is needed which is compatible with how they view themselves and their life.

The attribute of complexity and trialability connects to the part of the senior technology acceptance model (Davis, 1989), where intention to use leads to experimentation which is influenced by ease of use, see figure 21.
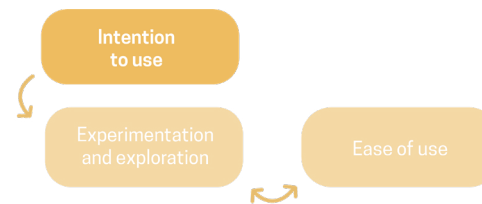
Figure 21: Extract from the Senior Technology Acceptance Model (Davis, 1989)

Being able to experiment with the product can improve adoptability, but only if the ease of use is sufficient. A new user can be deterred by a hard interface or confusing set-up process during the phase of trialability.

4.6 Values for meaningful aging

There are three values within meaningful aging that are commonly agreed on (Bruggencate, 2018), that will be kept in mind when going into ideation.

- Feeling socially connected, to family, friends, the neighbourhood and society.

- Being independent.

- Being meaningful for others or society.

4.7 Characteristics of other products around dementia

Other products aimed at elderly or people with dementia were viewed, see Appendix 9 for the overview. The most important takeaways were:

- The senior tablet is mostly used for video communication with family or caregivers and looking at pictures.

- Monitoring is a characteristic of products for the later stage of dementia.

- Some products focus on entertainment and reliving memories, but are therefore usually not covered by insurance because of their classification as well-being.

Key insights to read before continuing
From design direction to ideation

For the **acceptance** of Tessa by people with early-stage dementia the perceived **usefulness**, **need** or **interest** needs to **increase**, since these are te main factors inluenceing intention to use.

Themes that can be used to **increase** this are:

- **Social** connectedness
- Adding independence and **autonomy**

- Feeling **meaningful**
- A focus on the **positive** side of ageing

- Looking at **compatibility** and **relative advantage**

Some factors that could work **against** the increasing of acceptance are:

- Being **stereotpyical**, not matching self-image of elderly

- Vieweing ageing as a process of **detoriation**

- Taking away feeling of **independence**

Next chapter: How can you increase perceived usefulness, need or interest in the product-service of Tessa?

5. Ideation How can you increase perceived usefulness, need or interest in the product-service of Tessa?

In the ideation phase brainstorm sessions were done using brainwriting and braindrawing together with "How can you" statements to explore a wide range of ideas. They were done alone, with other IDE students and with informal caregivers. Next to this, a Mural board was made to collect input for the brainstorm from the Tinybots team, see appendix 10. Afterwards several small ideas were combined into larger ideas. Later on, a few ideas were selected and turned into concepts. The themes and topics from literature that were previously discussed and experiences from interviews and observations with people with dementia and their caregivers were kept in mind and used as a starting point. To evaluate the ideas, they were discussed with three healthy elderly and shortly with several elderly with early-stage dementia or memory problems from other causes at a daycare facility.

> **Starting point of ideation**
>
> • How can you increase perceived usefulness, need or interest in the product-service of Tessa?

This question was chosen as a starting point, because it is evident from the acceptance models that without perceived usefulness, interest or need, technology acceptance will not be achieved. Different ideas were visualised touching upon various topics and themes, around early-stage dementia and technology acceptance. The ideas will be discussed shortly per category. The topics and themes the ideas play into will be shown with the following labels:

 Adds to social connectedness

 Offers positivity and spontaneity

 Adding to the feeling of independence

 Improves overall autonomy of the product

 Increases autonomy by customisation

 Focus on elderly as individuals and ageing as a positive process

5.1 Social connectedness

"Tessa, send a message to my son"

"Hi Lydia, Hans has a message for you. I will play it"

"Hi Lydia, Hans has a message for you."

In this idea, relatives can record personal messages and send it to Tessa. Hearing messages from familiar voices can light up a moment. The spontaneous nature of the messages also makes the product more interesting.

"Tessa, call my son"
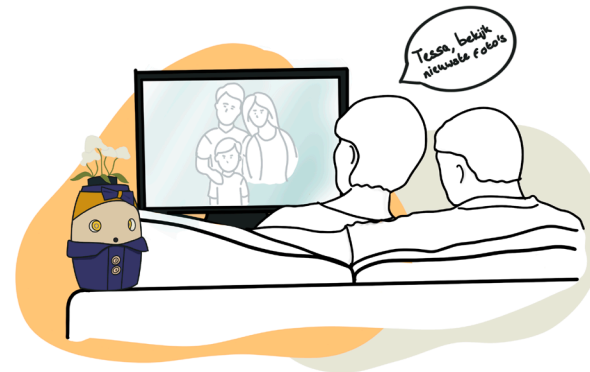
"Tessa, show most recent pictures"

Being involved in other people's life through pictures can make elderly feel more socially connected. Tessa cannot show pictures, but could be connected to a TV and relatives can upload pictures in the app. On voice command Tessa will show the pictures on the TV.

To increase connectedness with family through Tessa a messaging system or a calling system operated by voice could be included. However, most elderly use their phone for this and this works very well. Adding a similar function would not increase perceived usefulness.

"Tessa, tomorrow remind me of..."   *"At what time?"*
          "At 3 o'clock"

Currently, Tessa is operated by a relative or care taker through the app. The product is very one-sided. This makes it a simple yet effective concept. However, the feeling of autonomy can be affected if the Tessa user is not able to add things to the agenda. What you put in your agenda differs from what other people would put in your agenda. Adding a voice function to enable adding your own reminders could make the product more two-sided.

From an interview with a discrict nurse and an informal caregiver I learned that the Compaan is chosen as an assistive product because of the ability to watch pictures and videocall. These are functions that cannot be added to Tessa, but they could be incorporated in the app. In this idea the app is expanded and functions like looking at pictures, video calling and manually starting and stopping the music would be possible.

Instead of adding a lot of functions to the app, only the interface of the web-app with which Tessa is operated can be simplified. This way, Tessa users that are still able to operate the app can use Tessa for their own calendar, reminders and music.

5.3 Incrasing autonomy by integration in current context: Tessa on your own device

Accepting a physical form of aid can be very confronting and hard, especially if you don't understand why you need it. Tessa can be quite invasive and maybe even unnecessary if someone can still work their way around a device like a smart phone or tablet. Getting used to a vritual assistant can also be done through an app version of Tessa.

5.4 Increasing perceived usefulness by adding other products

"Tessa, where are my keys?"

"I will let them make a sound so you can find them"

People with dementia often forget where they put their stuff. A caregiver expressed this was very annoying for the person with dementia, but also for her. Maybe Tessa can help solve this problem by providing gps-trackers which can make a sound when Tessa is asked about them. This idea does focus a lot on the negative aspects and the elderly expressed they did not like this idea.

5.5 Increasing perceived usefulness by addition of entertainment

The function of an audiobook was mentioned several times during interviews. Adding this could increase perceived usefulness. One positive aspect of aging is all the free time one has. Reading or listening to audiobooks would play into this.

5.6 Personalisation to adapt Tessa to user context and prevent a clash with self-image

Some people find the appearance of Tessa childish, stereotypical or just not a fit to their taste. This could cause them to reject the product. Personalising the product might prevent this and is also mentioned in literature as a factor influencing acceptance of assistive robots. If the appearance of the product does not express the way the elderly view themselves, it can influence the acceptance of it in a negative way. Next to this, I observed that the longer people spend looking at Tessa, the more they started to like it. However, if someone does not see use in the product, the appearance will not be able to change this. This idea will be more useful in the stage after someone is willing to give Tessa a chance.

5.7 Safety at home

Safety in your own home is an important topic for all elderly. The risk of falling is a something elderly and their relatives worry about, but also a risk they are able to acknowledge. This idea proposes that the user can call for help from Tessa with the custom commands function and Tessa will send a notification to the app users.

5.8 Information aimed at Tessa users

The current website is aimed at care organisations and care professionals. It will be necessary to create a channel where future Tessa users and their caretakers can look for information about the product and ordering and financing options.

5.9 Adding spontaneaous positivity

To make the product more spontaneous and put the focus on positivity, Tessa can be made to initiate a fun message at certain times of the day. Tessa could tell a joke, give a compliment or tell an interesting fact.

5.10 Integrations with other platforms in user context

To increase the compatibility of Tessa in someones current life, making it easier to adapt to it, integrations with other apps or services can be used. Important dates like doctor's appointments could be put in automatically, just as the date when your books need to be returned to the library. If this can be developed, any type of integration would be possible on various topics, like safety or entertainment. This gives the option of customisation and tailoring Tessa to a person's needs and interests.

5.11 Idea selection

To help choose the most promising ideas to develop into concepts, three healthy elderly were approached to discuss the ideas, their view on technology and observe their reactions to their own technology, for example when they received a message on their phone. Next to this, a visit to day care centre Humanitas for people with early-stage dementia was made with the same goal. Insights gathered from dementia co-design expert, Gubin Wang, were kept in mind. See A7 for these insights.

The outcomes of this in combination with the conclusions about acceptance from literature, four criteria were setup. The criteria will be used to create a c-box, see figure 22, to choose the most promising ideas to develop into concepts. The criteria are:

- It supports independence and autonomy or increases social connectedness

- Offers something their current devices do not, or something they do not know how to use on their device, which is consistent with Roger's attribute of relative advantage

- The opnion of the elderly that were expressed during the session

- The extend to which it focuses on what they can do instead of what they cannot

C-box legend

1. Calling with Tessa
2. Texting with Tessa
3. Setting appointment with voice command
4. Tessa shows pictures
5. Sending personal messages
6. Audiobooks
7. Safety notification
8. Integration with other platforms
9. Tessa on your own device
10. Expansion of Tessa app
11. Simple calendar interface
12. Spontaneous messaging
13. Location tracker

The ideas 'Personalisation to adapt Tessa to user context and prevent a clash with self-image' and 'Information aimed at Tessa users' were left out of the C-box, since these are ideas that will not increase perceived usefulness at the beginning of the buying processs. The information aimed at Tessa users will be incorporated in the roadmap in chapter seven, since it is a key part in reaching the new target group.

The chosen ideas are the safety notification, personal messages, audiobook and virtual Tessa.
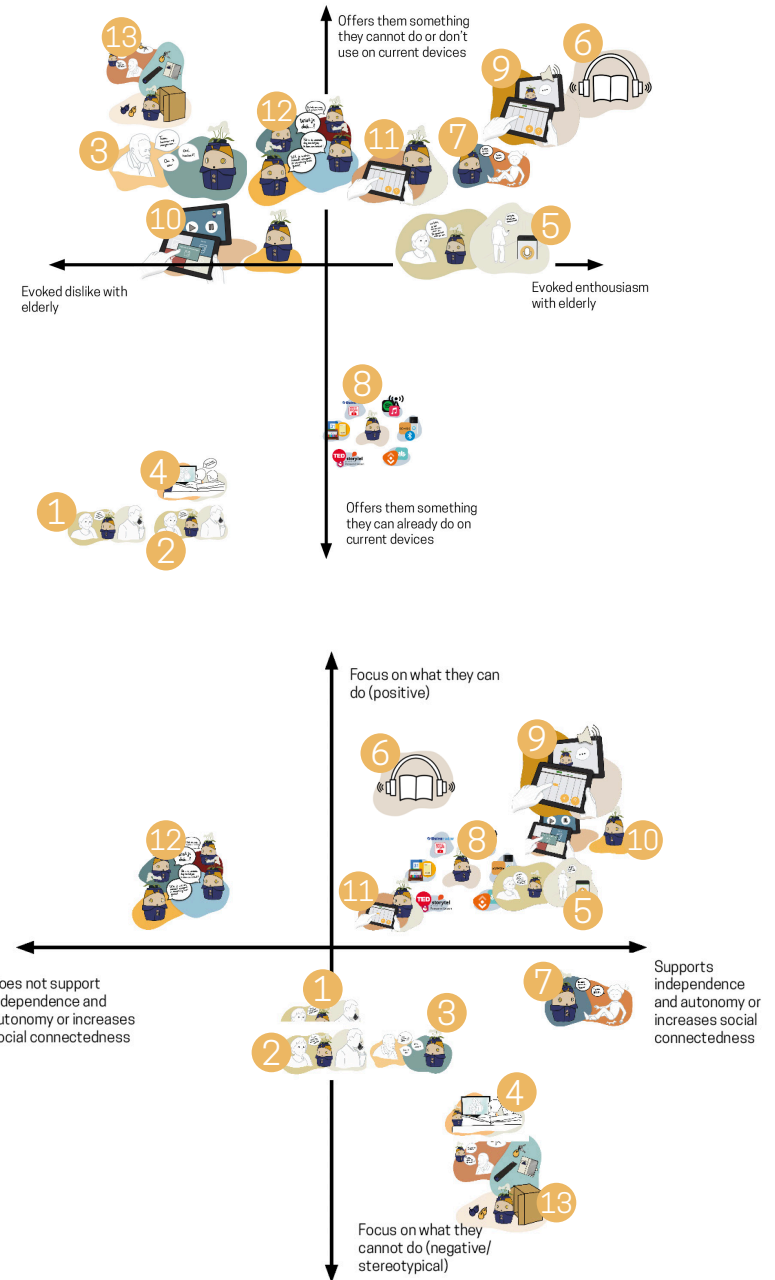
Figure 22: C-box plot of the ideas

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6. Concepts Developing the safety notification, personal messages, audio book and virtual Tessa into concepts

In this chapter, the chosen ideas (the safety notification, personal messages, audiobook and virtual Tessa) will be developed into concepts, see figure 23. Over the next four pages the concepts will be explained and analysed on advantages, drawbacks, technical requirements and possible other opportunities the concept offers.
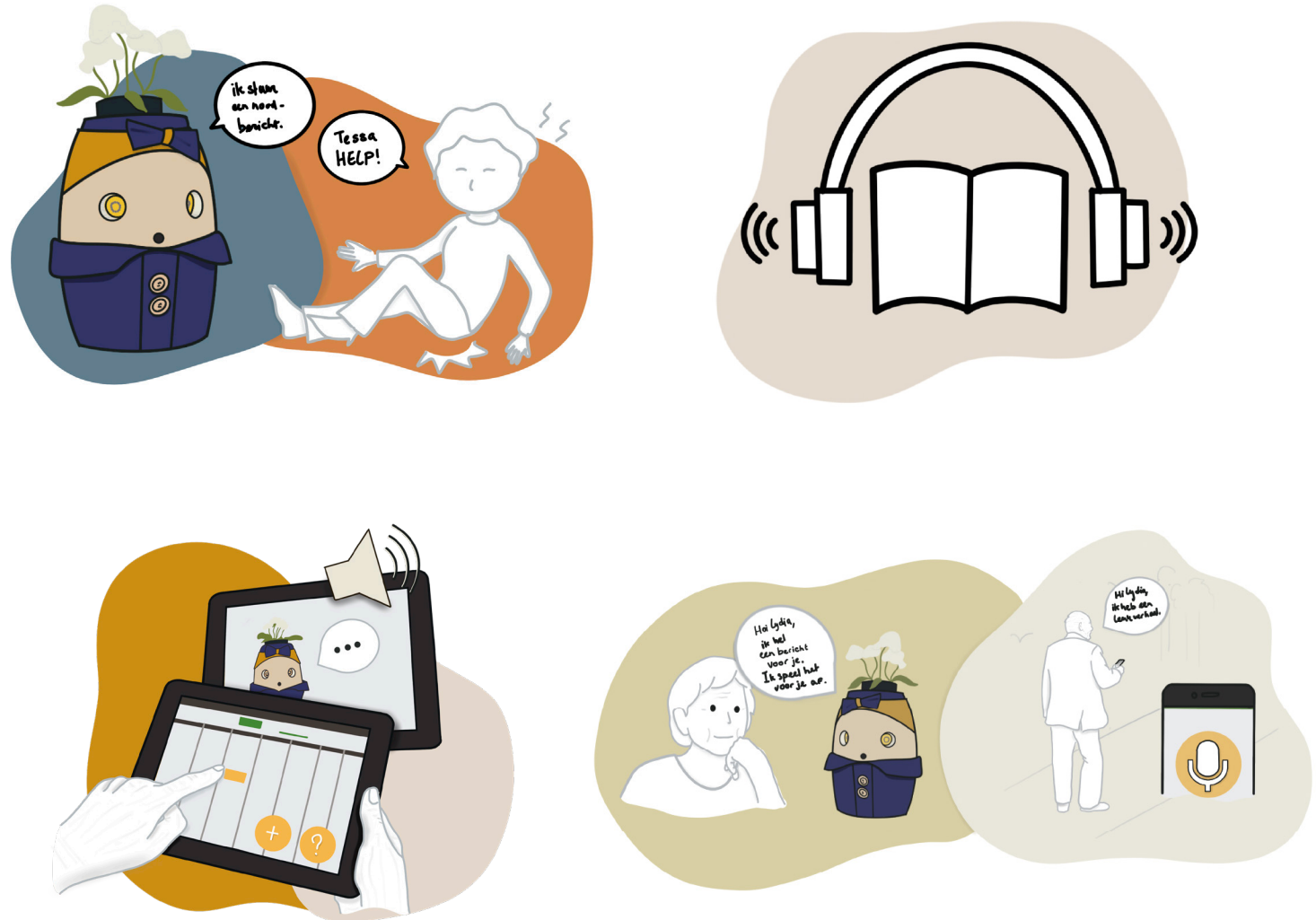
Figure 23: The four ideas that will be developed into concepts

Elderly consider their decline in health as only one part of aging. There are many other positive things in their life that they would rather focus on. However, they do value their safety and security. The elderly I have spoken to are very realistic about the chance of them falling or slipping in their home. Many elderly have additional options to call for help next to their phone, for when they are not holding it. A voice-based emergency option in Tessa would provide a subtle way to be able to call for help, in case this turns out to be necessary.

This does not only add value for vulnerable elderly, but also for healthy elderly. A need to be able to contact relatives when they cannot get to their phone was also expressed by healthy elderly.

1 Linked app-users can turn on emergency notifications, so up to three people can receive the notifications

2 Tessa can recognize "Help", "Tessa I need help" and "Tessa, emergency"

2a Tessa asks a closed check question and waits for yes, no or nothing

3 If the Tessa registers yes or nothing, a push notification and e-mail is send to the registered app-users
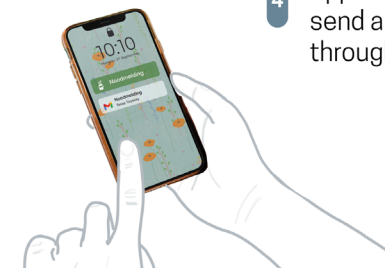
4 App user is stimulated send a direct message through Tessa.

Addition of a safety notification system

Why?

To increase perceived usefulness through the feeling of safety at home for the Tessa user and the family. Providing a way to call for help without needing to accept or wear a system with a big red button.

Technical requirements

Notifications

- Ability to register app-users for emergency notification, potentially also register emails from outside app-users.

- Automatically send a notification to registered users when Tessa registers an emergency.

- Enable notification on phone next to email, possibly through browser. Harder to manage on a web-application.

Voice recognition

- Tessa needs to recognize prompts like "help", and initiate the auto response the check question and notification. For custom commands, hey Tessa is recognised. Maybe someone forgets to say hey Tessa, and "help" needs to be added as well.

Drawbacks

This function might increase usefulness for one group of elderly, but elderly could still be encountered that are in denial and don't see why they would need it.

In case of emergency, a quickly read notification is necessary. The question is whether push messages can be send from a web application. This can potentially be done using notifications from the used browser. IOS currently only allows notifications from apps from the app store, but the programmer from Tinybots says this might change in the near future. Building in notifications also requires some work done from the server side.

Another complication arises when someone uses the app on their laptop. Then they will not receive a notification.

Impact on stakeholders

Person with early stage or suspicion of dementia
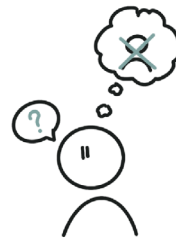
Getting security in a elegant and subtle way. They do not have to accept a system with a big red button, but know that if a fall would occur, even though they think the likelyhood of it is small, they have some sort of back-up.

Caregiver

Knowing there is a safety net build in the product can be a soothing thought. Next to this, they don't have to try and convince their relative to take in an alarm system, when they are not ready for it.

Tinybots

Expanding to the category of safety is an investment, but meets an important topic in the life of elderly. It's a new selling point, but requires the company to provide something that is very reliable and waterproof.

Casemanager

The function could attract casemanagers more to the product, since they also feel responsible for creating a safe living environment for elderly.

GP and POH

The function could attract GP en POH more to the product, since they feel responsible for creating a safe living environment for elderly.

Home care

Home care could also make use of the function, but it is the question whether they want this. They could also use the function to convince the client and their family to support acceptance of Tessa.

Being able to record and send voice messages as an app-user to Tessa would cause an increase in the level of social connectedness and spontaneity in the product.

From the focus group it became clear that healthy elderly viewed Tessa more as a companion than as a tool. They liked Tessa's voice in the quietness. The voice message when you tickle Tessa made everybody laugh.

The elderly are for a big part able to communicate through calling or texting on their phone, but do not use voice messaging. Making this easier to use, could offer a relative advantage to their phone As said earlier, elderly people like to be socially connected. Hearing a familiar voice can be very soothing. One woman had a recording of her granddaughter set as her ringtone, which would play every time she would get a message.

In this concept relatives can send a personal message to Tessa to positively suprise someone, tell a story or let them hear their voice.

1 In the app, users have the option to plan or directly send a voice message.
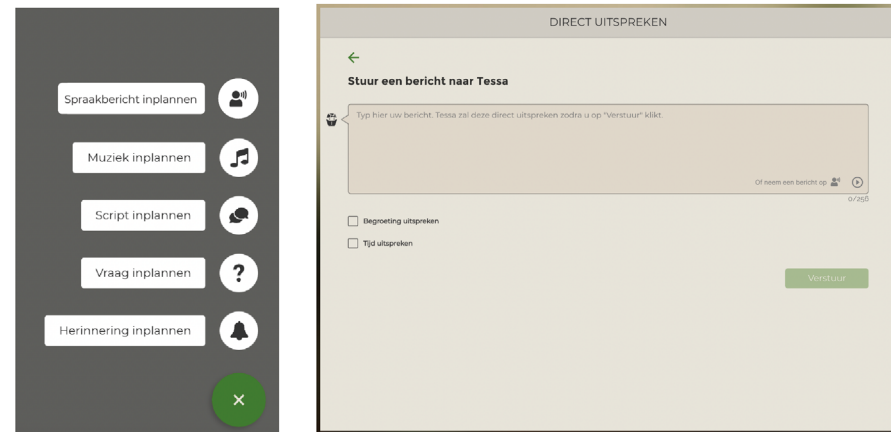
2 The app is able to use the microphone in the device to record a message, store it, send it and play it. Another option would be to choose from recordings on their device and send the file to Tessa.

or

3 Tessa plays the recording.

"Hi lydia, I have a message for you. I will play it now"

In the future, this function can be extended to support Tessa to become more interactive and adaptive to the life of the user. With the custom command function, personal messages can be replayed. This can be done on command by the user or Tessa can play them on her own initiative. The custom commands for playing these messages could also be linked to more emotional words, like 'memory' and 'loneliness', see figure 24 for some examples.

"Jos, do you remember when..."

Figure 24: Ways in which personal messages could be played

Send personal voice recordings

Why?

To increase the personal, social and spontaneous aspect of Tessa. Elderly like hearing messages from their loved ones. They mostly use their phone for texting and calling, but not for voice messaging.

Technical requirements

Recording or accessing recordings

- Voice recording and saving needs to be built in. This is a big function to build in.

- The app needs to be able to access voice recording files from the phone, upload them as MP3 file and send them.

Saving recording

- If a recording is planned in and not directly send, the recording also needs to be saved.

Drawbacks

Building the voice recording function requires a big investment, uploading existing recordings would costs less.

The effectivity of the function relies on the input of the app-users. The intensity in which messages are send could highly influence the effect of the function on the Tessa user.

Someone can easily miss a message when their in the other room. There is also the possibility that it startles people.

Additions

To extend this function, it would be nice if the Tessa user or app-user can save some recordings and play them again or let Tessa play them again automatically.

App-users could receive a notification every now and then, motivating them to send a message.

Impact on stakeholders

Person with early stage or suspicion of dementia

Elderly like to be socially connected and like hearing from their loved ones. Next to this, it was oftend mentioned that Tessa could be used to provide some sound in the quiet of their home. This function supports that. Also, spontaneous messages can positively influence how assistive robot is experienced.

Caregiver

It offers family members or other relatives the opportunity to use Tessa for so much more than just reminders. They can send personal messags, share stories or tell a joke that could light up a person's day. There already exists one use case of daughter that recorded a summary of all the things that happened during the week and send it to her mother with dementia through Tessa. She quit doing this after a while, because it was too much work. Things like this would be made easier with this function.

Tinybots

Recording voice and saving and sending it is not very new, or advanced technology. It should be doable to implement this. The challenge also lies in the fact that some messages can be worth saving to be played again later.

Elderly have a wide range of ways to entertain themselve with technology. They watch TV, listen to music on their radio or stereo, read on their e-reader and some even watch clips on youtube.

However, one type of entertainment is not as easy to access for elderly, but was mentioned several times as an interesting function: audiobooks.

For people with dementia, but also for elderly, the concentration to read a book can be lacking. This forms a complication next to the small letters that become increasingly hard to read.

With the audiobook function, Tessa becomes more of a storyteller. It's an attractive function for elderly in both the very early stage as the more progressed stage.

1 Uploading the audiobook can be done as an mp3 file, the same way music is uploaded. One audiobook should be uploaded at the same time to make it easier to operate.
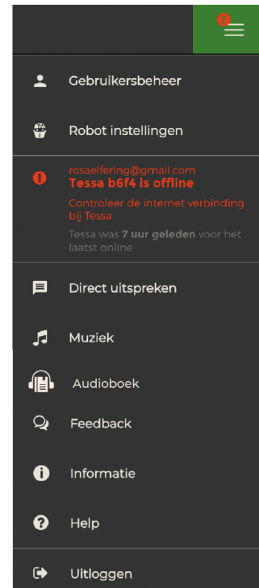
Since an integration with the library app or Storytel app will be hard to manage, the (app-)user can buy an audiobook as an mp3 and then upload it.

In the app, a link to an audiobook shop can be included, for example www.luisterrijk.nl.

3 Pausing or or quitting the audiobook when it is manually started can be done with custom command. Tessa could react to the command: "Hey Tessa, stop audiobook". The technical team told me that custom command will be possible for starting and stopping music, so it seems likely that this is also possible for audiobooks. If this is is not working, Tinybots could choose to make the button in the back a play and pause button.

Next to this, Tessa can pro-actively ask after 20-30 minutes if the person is still listening and react to that answer.

2 Playing the audiobook can be planned in the calendar or started with custom command.

"Hey Tessa, play audiobook"
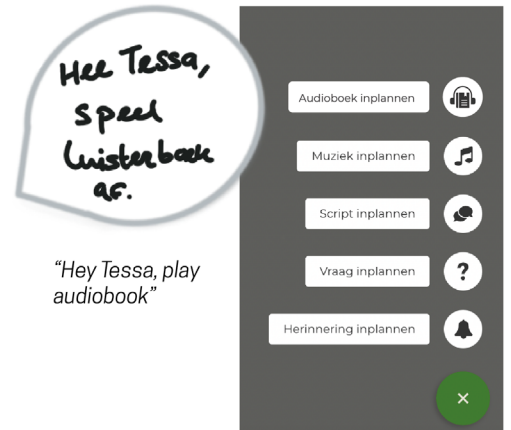
2a With an audiobook it is more important that someone is in the room and listening than with music. When a session with the audiobook is planned, Tessa could first ask whether they want to listen to their book.

Similar to personal voice messaging, audiobooks offer many interactions that will add to the interactivity and adaptability of Tessa to a person's life. For example, playing stories or news at certain times of the day or when certain people are over. Figure 25 shows some examples.
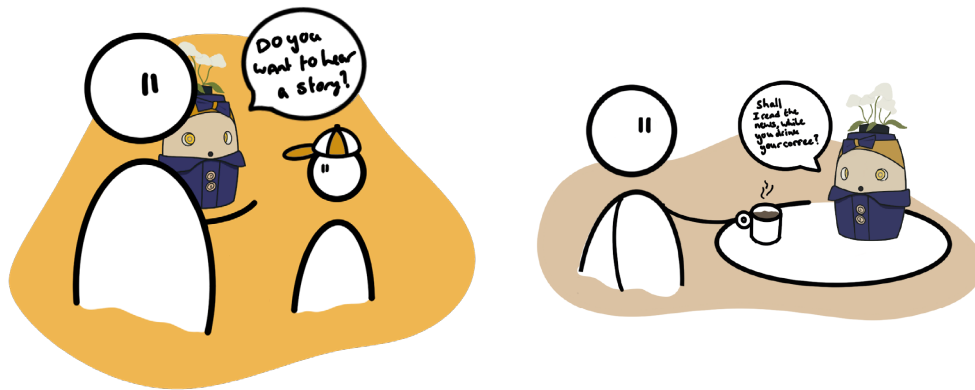
Figure 25: Possible scenarios with audiobooks

Audiobooks: Tessa as a storyteller

Why?

Increasing perceived used by adding an intellectual entertainment function to Tessa which is attractive for elderly, but do not yet use often on their current devices and therefore creates a relative advantage.

Technical requirements

Seperating audiobooks from music

- Audiobooks and music have the same file type but should be treated differently and stored seperately.
- Tessa has to remember where in the file you left off, and continue from that point when the book is played again.

Custom commands

- A custom command to start and stop an audio book should be made. The button could also be used to stop playing.
- Tessa should ask after a certain amount of time whether the person is still listening and react to that.

Drawbacks

Correct operation of the audiobook can be sensitive to errors, making it plausible that the user will miss some parts.

The user probably needs help with buying, downloading and uploading an ebook. This makes it less accessible for people without support or who are reluctant in asking for help.

Additions

Audible newspapers, magazines, lectures or short stories could also be added.

For technologically skilled elderly, the starting and stopping of the audiobook could be operated through the app.

If Tinybots does not want to make audiobooks a new function, they could make it more clear for users that audiobooks can also be uploaded at the music section, since it is an mp3 file.

Impact on stakeholders

Person with early stage or suspicion of dementia

Someone will be able to enjoy books without being confronted with too low concentration to read or problems with vision. They can enjoy the comfort of sound filling their home and experience entertainment. Especially, if next to audiobooks other forms, like podcasts or the news will be integrated, so Tessa is able offer much more to the user.

Tinybots

The function is of an audiobook is quite similar to listening to the music function. It will be an easy adjustment and therefore a small investment. Also the costs of the audiobook lies with the user.

GP and POH

The GP promotes active stimulation of the brain as a means to slow down the process of deterioration. Listening to books can provide these stimuli and put the mind to work. Therefore, GPs will support the addition of this activating function.

Home care

If the function is used and it can contribute to slowing down the deterioration process, it can also contribute to slowing down the need for physical home care.

Caregiver

The informal caregiver will probably have to assist with uploading the audiobook. But it will also be a way to provide activity remotely. Especially for people who used to really enjoy reading, but for some reason cannot anymore, it's way to make them happy again and focus on the positive side of aging: having a lot of free time to listen to audiobooks. For partners of a Tessa user the function can be usable and enjoyable too.

The acceptance of a physical tool can be very hard for elderly and especially for people with early stage dementia. To address this group of people, a non-physical version of Tessa can be the solution.

These are people that consider themselves healthy elderly and are cognitively still doing quite well. By offering them Tessa, e.g. through the GP, on their own device, it is less invasive and it still enables them to get used to a virtual assistent.

Even in the early stage of dementia, operating devices becomes harder. A simple and easily operated app would fit their situation. The elderly I spoke to expressed that they found the calendars on their phone and tablet very confusing.

A virtual Tessa also prepares Tinybots for a future where more elderly are in possession of a smart phone and tablet. There may be more demand for digital assistants as opposed to a physical tool, until operating the device becomes impossible.
The light version of Tessa also fits better with the target group, who are still quite flexibel and active. The physical Tessa is fixated at one place in one room, while the people I spoke to emphasized that they like to move around and are not yet bound to their home or sofa. It increases the compatability with their current life.

Since most of the data with which Tessa is operated is stored in the cloud and not in the Tessa itself, the app could still collect data without the use of a physical Tessa. When the transfer is made to a physical Tessa, the data can easily move with.

The movement to a physical Tessa can be made if operating the app can not be operated anymore or more clearly, when a person receives an indication for care. The indication could be for taking medication, eating and drinking or other activities of daily living. Moving to a physical Tessa is not always necessary. The indiciation can also mean the app will be used by caregivers to provide care.

This concept is also useful for promotional purposes. An app is easy and quick to download and try out, for example when people are debating whether they will accept such a thing as Tessa. It is also cheaper to try out, than having to give people physical Tessa's to try out. This is consistent with the attribute of triability that increase adoptability (Rogers, 1995).

1 The app will have the same basic functions, consisting of a calendar, reminders, scripts, questions and music. Tessa will be visible and audible as the one giving the messages. The messages will also be audible when the device is locked.

2 By making the app simple, it can be operated by the Tessa user, giving them more autonomy. For example, when clicking on Tessa, a simple menu will appear to add their own reminder or play music.

3 The app adds to the flexibility of the tool. When their in the other room or outside, Tessa can be taken with them if the app is on their phone. There will be a lower chance of them missing messages due to their activity.

4 Personalisation can add to the acceptance of assistive robots. In the app, personalisation of the character of Tessa can be done more easily than with the physical version.

When connected to a device as a tablet and smartphone it could be easier to integrate other apps or calendars. It would add value if a calendar can be imported from an Apple or Google account.

Transition of Tessa
Over time, Tessa can transition along with the needs of the person with dementia. Initially, the Tessa app is meant to provide support, used by the person with dementia themselves. There will come a time however, when home care is necessary. Tessa is able to transition along with this change in need for care, see figure 26.

There are two options. The first option is a switch to the physical Tessa, given out by the home care organisation. The second option is the switch to the care version of the app. In this case, home care organisations get access to the app and will be able to provide care through it, just as is done now with the physical Tessa. Eventually, someone can still switch to a physical Tessa, for example because operating of the app is not possible anymore.

Transition of functions
The transition of Tessa comes with a shift in functions. The app version for consumers consists of different functions than the app that is used for care. This is in the first place necessary to enable home care organisations to provide care with the app. Secondly, a shift in functions will show the health insurance that there is a clear distinction between the consumer and care app. This distinction shows insurance an indicated need for care is in place when financial support is asked for the app and it does not belong to the category of well-being.

The overview of the different functions can be found in figure 27. In short, the light version of the app, is meant to provide support from the beginning of the dementia stage, while maintaining the feeling of autonomy and independence for the users. With the app, users have a simple way of keeping a calendar, notes and set reminders. Integration with other calendars is possible, increasing connectedness. The users will be able to operate the app by themselves, because of the ease of use, increasing the feeling of independence and autonomy and moving away from the stereotypical image of elderly who cannot operate devices. The character of Tessa will recur in the app, so it will make the concept of a virtual assistant more tangible. The character can be

customised, because this can improve the feeling of autonomy (Broadbent et al., 2009).

In the care version of the app, the main change is the fact that caregivers from home care organisations have access to the app. The app can be added to their Tessa dashboard, see figure 28, and operated from there. Next to this, check-in questions can be asked. By inviting home care to use these functions, verbal care can be given through the app and physical care minutes can be saved.

Finally, the app will function as a link between other e-health applications and exchange information. Medido users can for example ask Tessa when it's time for their medicine or people can ask Tessa to start a video call with their caregivers through NAAST.

The physical Tessa will have the current functions as well as the addition of the personal voice messaging, audiobooks and other verbal forms of entertainment.
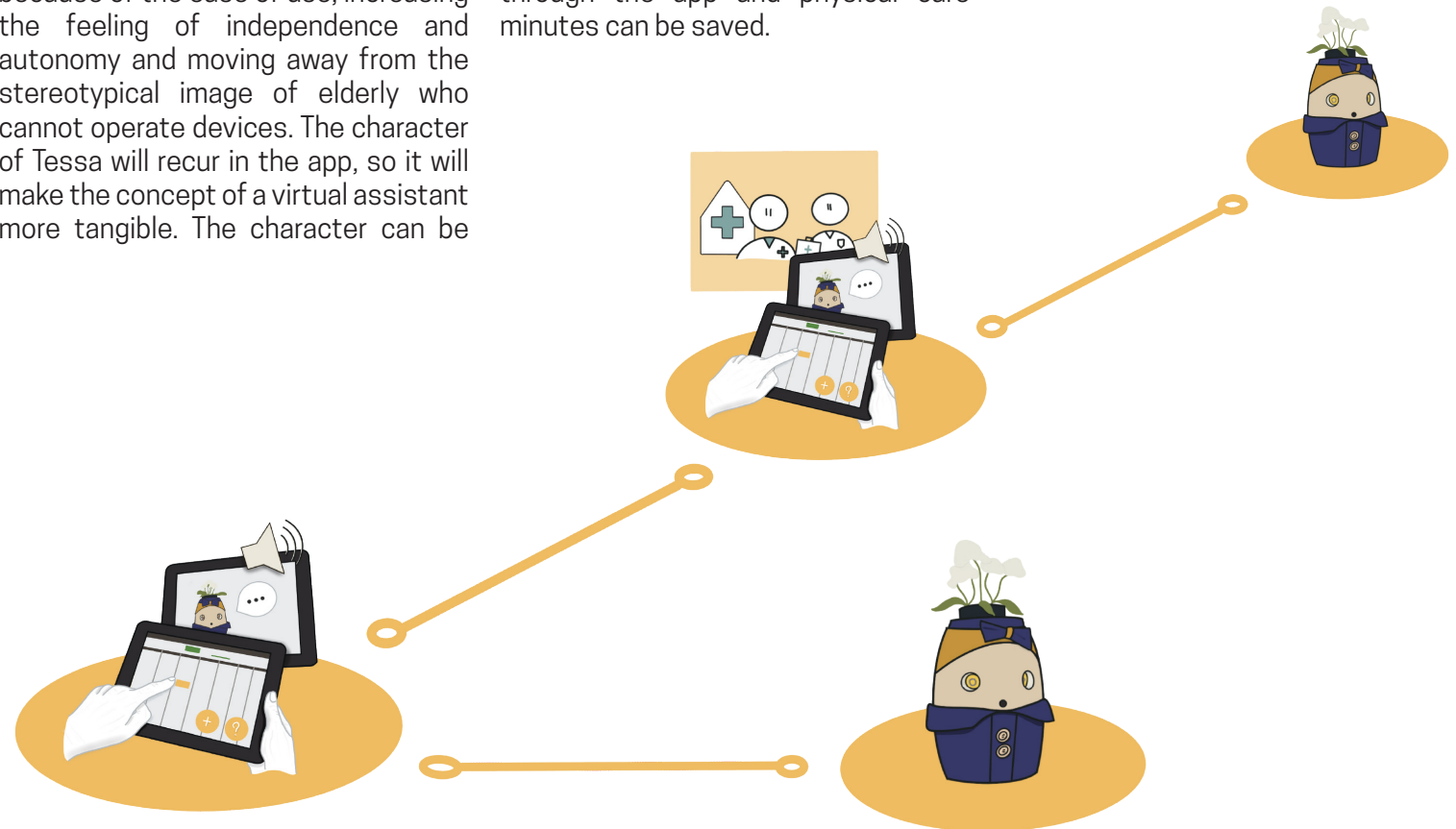

Figure 26: Transition of Tessa

The app, light version

Focus on supporting autonomy, independence and well-being

Costs for consumer

- Shared calendar with family or caregivers

- Give reminders and custom commands

- See time and date

- Receive personal voice messages

- Get memories in the shape of pictures and messages

- Plays music, audiobooks, short stories and news

- Customizing looks of Tessa

The app, care version

Can be used by care provider to save physical care time, on your own device

Costs (partially) covered by health insurance

- The functions of Tessa light

- Care organisation can get access to calendar and send reminders for care related activities such as medicine

- Ask check-in questions

- Being the link between other e-health applications, such as NAAST, which offers remote care. They will be operable through the Tessa app.

The robot

The original form of the product to support self-management and provide care

Costs (partially) covered by health insurance

- Give reminders and custom commands

- Give step-by-step instructions

- Ask a closed question and add custom commands

- Plays music, audiobooks, short stories and news.

- Plays personal messages and 'memories'

Figure 27: Transition of functions of Tessa

Operation of Tessa app by home care
When the transition is made to the care version of the app, the home care organisation needs access to it. Just as with the current physical Tessa, home care will use the product to provide verbal care, such as reminders for medicine. With the app version, the same Tessa Owner dashboard can be used to operate the app. In figure 28 you can see an example of how a digital Tessa can be added.

Tinybots only needs to make sure every app user can be individually registered to the dashboard, for example by granting each user their own serial, as is done with the physical Tessa's.
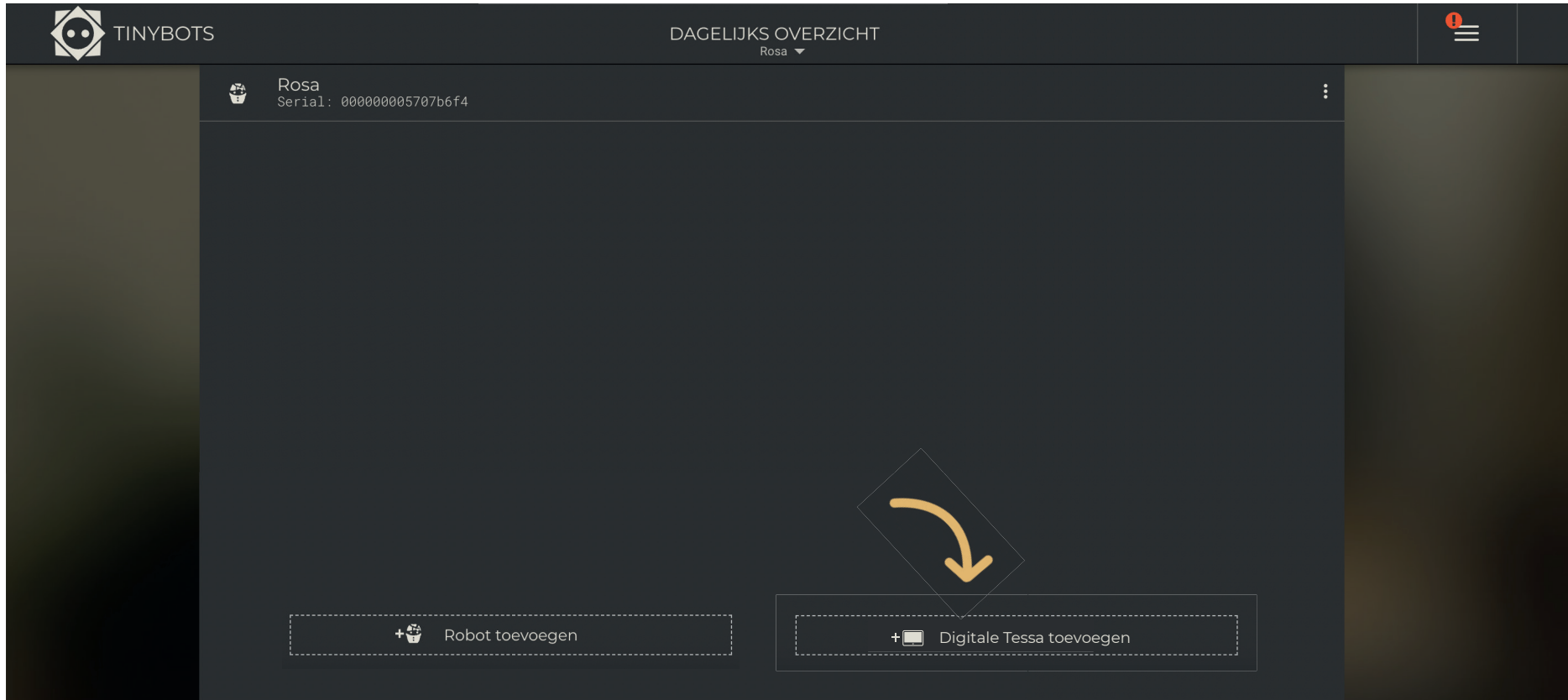
Figure 28: Adding the Tessa app to the Tessa Owner dashboard

Cost estimation

To determine whether an app version of Tessa is a good investment, a cost estimation was made, see figure 29. It was estimated, by a developer from 3PO (2022), that the costs of developing a native app will be around 50,000 euros. The figure shows three different scenarios with a varying number of app users and the cost of the app. As a result the amount of customers needed to get a return on the investment in three, four and five years is shown.

Considering that in The Netherlands there are 3 million elderly, of which 600,000 are vulnerable and 290,000 have dementia, the needed number of customers appears to be feasible.

Keeping in mind that the elderly of the future will have more affinity with technology and a higher percentage of that group will own a smartphone or tablet, the number of potential customers to target will only grow.

With all of this in mind, the Tessa app version appears to be financially feasible.

Estimated cost of app is 50.000 euros (3PO // Websites, Apps En Online Tools | 3PO.Nl, 2022)

There are 3 million elderly, 600k vulnerable elderly, and 290k people with dementia.

Around 50% of elderly has a smartphone or tablet (UnitedConsumers, 2020)

App users	Costs user per month	Customer lifetime value	Total profit	*If return of investment is after 3 years* Customers needed per year	*If return of investment is after 4 years* Customers needed per year	*If return of investment is after 5 years* Customers needed per year
1000	5	25	25000	667	500	400
1000	10	50	50000	334	250	200
2000	5	25	25000	667	500	400

Figure 29: Cost price estimation Tessa app

First impression of the app
To get a first impression of what the
app could look like, some sketches
were made.

Figure 30: App tile

Figure 31: Example of a Tessa notification

Figure 32: Loading screen

Figure 33: The home screen

Figure 34: The page with memories and voice messages
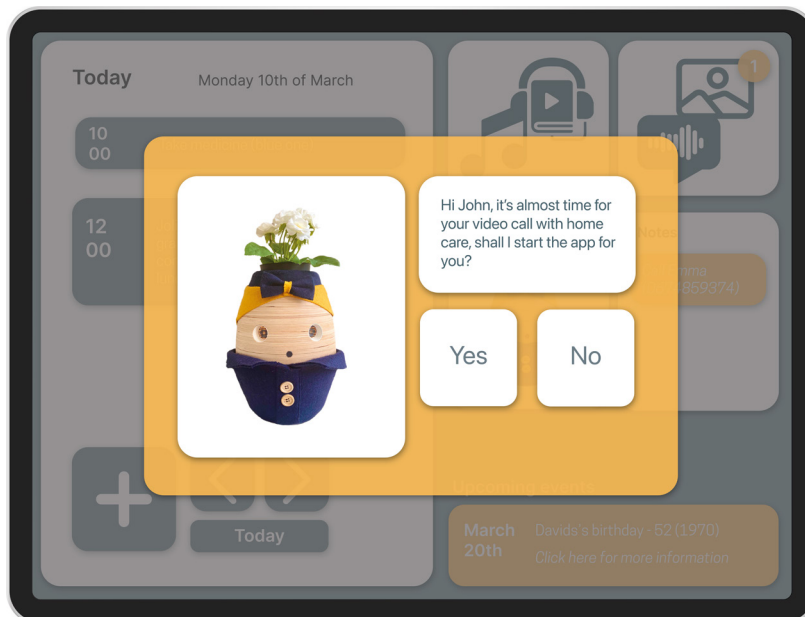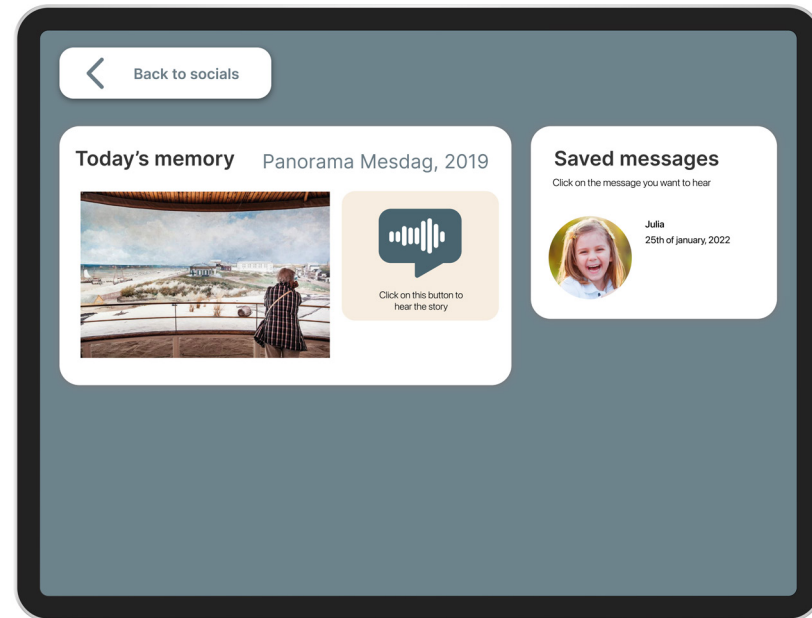
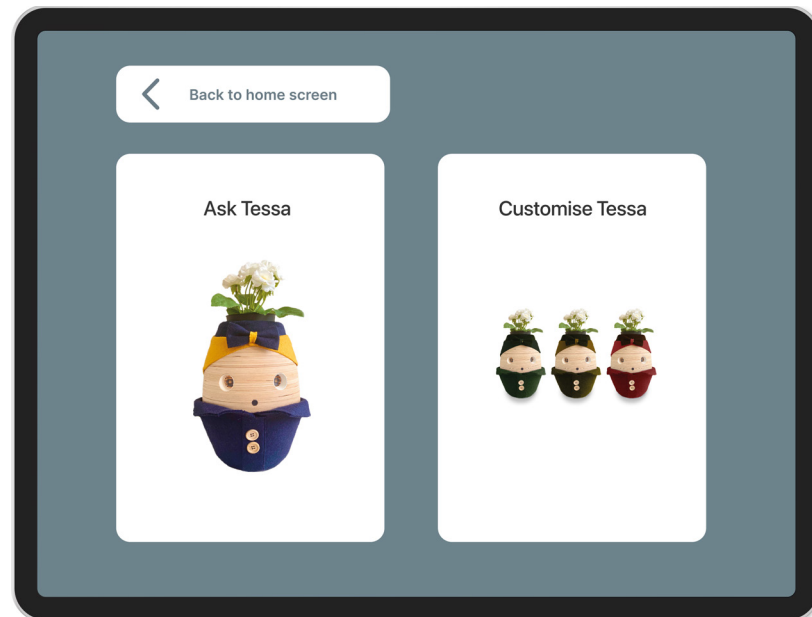*Figure 35: Example of an integration with other e-health applications*

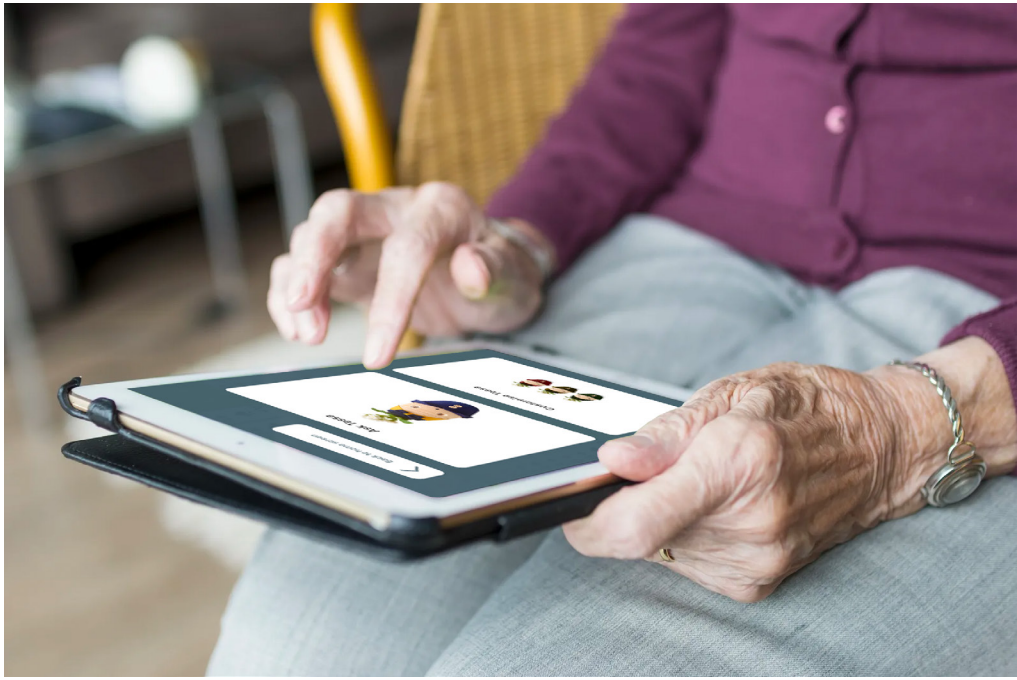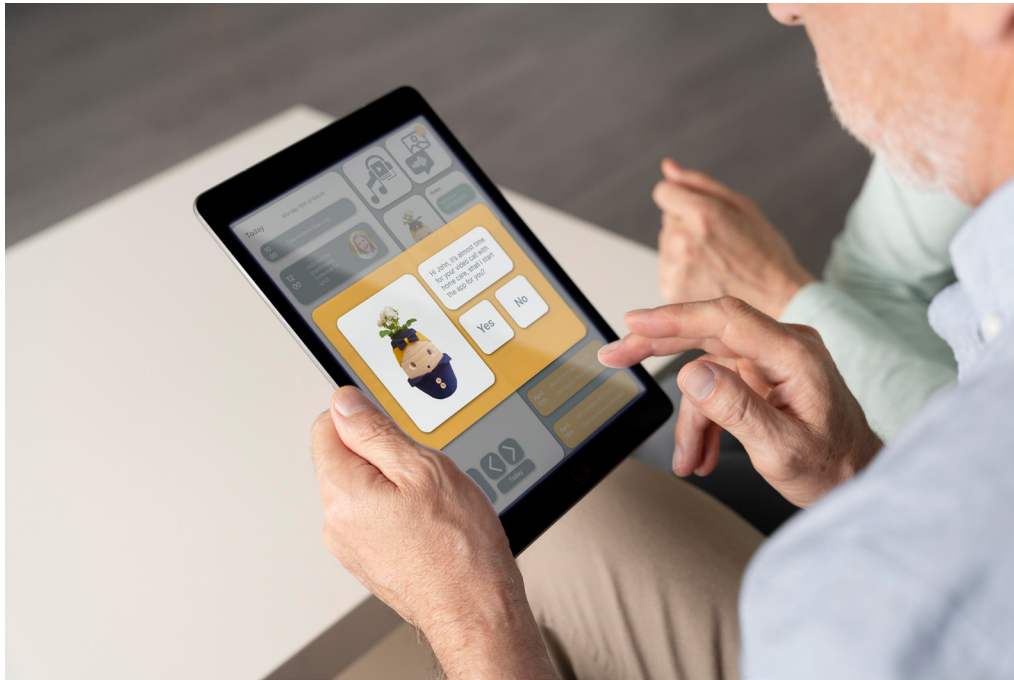*Figure 36: The Tessa page, where custom commands and customising of Tessa is possible*

Figure 37: The app in context

A virtual Tessa, the light version

Why?

Offering a less invasive way and easy to try-out version of Tessa as a first step towards accepting a virtual assistent. The app gives more autonomy, flexibility and personalisation, increasing the perceived use.

Technical requirements

Building the web-app

- Function wise it's almost a copy of the original app. The interface should be adapted to be simple. The usability needs to be tested with the target group. Next to this, the app from the Tessa user and the app from the caregiver need to be linked as Tessa is now linked to the app.

- The big change in function is that the messages need to be played on the device itself.

Integrations & voice command

- If you want to collect and use data from the device, this needs to be built in.

- The voice command works differently, this needs to be researched.

Drawbacks

It requires a large time investment to build an adapted version of the app. A native version would probably work better, but requires a high investment.

A new business model will be have to set-up with costs for the user.

Additions

Functions/integrations/changes can more easily be implemented and tested than with a physical Tessa.

A clear manual with the app would be preferable, but might be irrelevant soon due to fast moving changes to the product. Therefore, Tinybots could also invite elderly users to their coaching sessions that are organised for (informal) caregivers.

To compete with Compaan on price, the app should costs below €12.95 per month.

Impact on stakeholders

Person with early stage or suspicion of dementia

When people are not "stuck to their sofa" yet, as one woman described in our conversation, this concept will fit better in their life. They can live their life and take Tessa with them. Acceptance of an app on a familiar product can be easier than a physical product, like Tessa. If the interface is made very simple, more users will be able to participate in using the app, leading to more compatability, independence and autonomy.

Tinybots

Tinybots will penetrate a new market, the market of apps. It's a high investment but also targets a large group of people. The app could be used by regular elderly, people with emerging memory problems and people with early stage dementia. It can also be an opportunity to compete with Compaan. Next to this, this concept can be promoted through many channels and also consumer channels and not only professional channels such as healthcare organisations.

The logistical and manufacturing costs that are saved with having an app as opposed to a physical product can provide opportunities to offer things like a month of free use.

Caregiver

With this product, support from family or another informal caregiver is needed for installation, when the user finds it hard to do it by themselves. Next to this, the caregivers can still be involved in setting reminders and the calendar as in the current product.

The product will relieve them to an extend that tasks like giving reminders are taken over.

GP and POH

They will have the possibility to add another option to give to their patients with dementia or memory problems. They could be approached for receiving Tessa training and being an information channel for future users and distribution channel for touchpoints.

Casemanager

For casemanagers this app will also provide an addition to the products they could offer. They can also be approached for training and used as information channel for future users and distribution channel for touchpoints.

Home care

They can use the app to provide verbal care and home care could offer the product to clients that don't want the physical Tessa, but could use its functions.

6.2 Concept evaluation

Rejection of the safety notification concept
After looking at the advantages, drawbacks and technical requirements of the concepts that shape the feasibility, desirability and viability of a concept, the concept of the safety notification will be rejected.
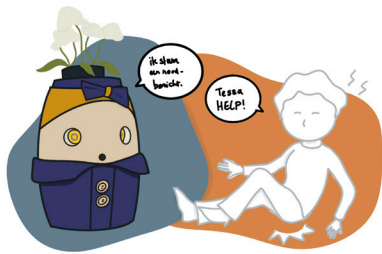

Figure 38: Safety notification concept

The feasibility and viability of this concept are not acceptable. In order to incorporate a function around safety, it needs to be a completely reliable system. This is not the case with this concept. In a web-app, sending a push notification is not possible. This means notifications are send through email, which does not trigger a fast response. Next to that, if a person is far away from Tessa, for example in a different room, speaks softly or forgets what word they should say to Tessa, the safety notification cascade is not triggered.

Evaluation of the remaining concepts
There is not one function that will be able to convince all people with

early-stage dementia to use Tessa. Therefore, a choice will not be made between the concept of personal messages and audiobooks since they can both contribute to increasing acceptance and are both desirable and feasible.

Figure 39: Concepts of personal voice messages and audiobooks

These concepts also offer opportunities for future developments, where Tessa is more adjusted to a person's habits and lifestyle, increasing the viability of the concepts. Tessa could start playing an audiobook, or short story during coffee time or read a fairy tale when the grandkids are over.

To make the concept of a virtual assistant attractive for people with early-stage dementia, the concept of

a light version of Tessa will also need to be embraced. The cost estimation shows that the target group is sufficient enough to make it feasible. By making Tessa available on current devices, Tinybots will not only add to the compatibility with elderly who are still active and consider themselves as healthy elderly, but also be prepared for a future where more elderly are used to smartphones and tablets. This transition adds to the viability and desirability of the product.

*Figure 40: Concept of Tessa on your own device*

In the next chapter, a roadmap to the implementation of the three concepts are shown.

7. Roadmap of implementation of the concepts From support with beginning memory problems to a care providing Tessa

This roadmap shows the different phases of dementia, from getting memory process to the diagnosis and even an indication to receive care. For each stage the fitting product is shown. Next to this, initial steps for Tinybots to take before targeting people with early-stage dementia or elderly with memory problems are described.

Preparation for Tinybots

Information for users and their relatives
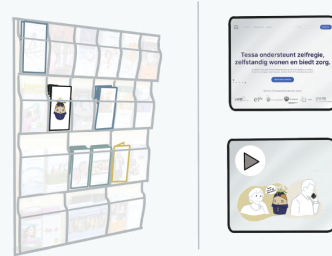
Tinybots should prepare information aimed at the user and their relatives. At least a website, I would also advise a brochure and video. They can use the Grey Ocean strategy by Edgar Keehnen (2018)to learn how to address elderly.

Small changes for more autonomy in the product

There are some quick fixes that already improve the autonomy in the product, making it fit the target group better. Being able to:

- ask Tessa to repeat the last message
- turn music on and off
- ask about the calendar points coming up

	Phase 1: first touchpoint with Tessa app	Phase 2: use of Tes
Stage of dementia	*Pre-dementia stage to early dementia stage.* This phase targets elderly with memory problems, people without official diagnosis or people with the diagnosis of early-stage dementia	
Context	The future users are not in care, but can use support. In this phase they learn about the Tessa app and we try to convince them to use it.	The person has decided support during their pre- their own device.
Channels	Physical: GP, casemanager, day care facility, Alzheimer café Digital: Website, app-store, online advertisement, ads in (news)letters	The app, the app store a monthly newsletters, el
Touchpoints	People see an add or receive a physcial object leading them to the website or app store.	- Tinybots needs to p and manual of the a - User could attend t and informal caregi
Product	No product is in use yet.	
Business model	New user gets 1 month free to make first use more attractive. According to the attribute of triability from Roger's five attributes for innovation adoption, this can ease adoption.	User pays an amount pe membership.
Actions for Tinybots	- Prepare marketing material, online and physical - Approach GPs, and find other locations suitable for targeting possible users.	- The app should be av easy to set-up. Ease - Provide ways for use and keep them enga

Phase 3: getting an indication for care

Phase 4: final transition to physical Tessa

People with the diagnosis of early-stage dementia.
There is an official diagnosis and an indication for care is given by the CIZ.

People with progressed early-stage to moderate dementia.
The early-stage dementia has progressed and people are on the verge of moving to the next stage of dementia.

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t
ntia

If the care can be provided with verbal care, the Tessa app can be used or the switch can be made to a physical Tessa.The new functions can be used to increase acceptance of a physical Tessa at this stage.

As the dementia continues to progress, understanding and operating devices as a smartphone and tablet becomes increasingly difficult. It is inevitable that the switch has to be made to a physical Tessa.

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to use the Tessa app as a way
or early stage of dementia on

The physical Tessa is distributed through home care organisations. If they use TaaS, a plug and play Tessa can be implemented quickly.

The physical Tessa is distributed through home care organisations. If they use TaaS, a plug and play Tessa can be implemented quickly.

---

nd Tinybots could send out
derly often read these.

● A Tessa Coach implements physical Tessa at home or this is done by the home care organisation.

● Home care integrates with Tessa app and offers care through the app or physical Tessa.

● A Tessa Coach implements physical Tessa at home or this is done by the home care organisation.

● Home care continues to offer care through Tessa from the same dashboard as before.

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rovide a clear explanation
pp.

raining session for users
vers to support them.

r month for the app use

If the app can be used for care, there is a chance the costs will be covered by the insurance, because it saves physical care minutes by home care. For the physical Tessa, the home care organisation can use their current agreement with insurance for the costs.

The physical Tessa will continue to save care minutes, so the costs will be covered by health insurances that have an agreement with the home care organisations. With the rising shortages in care, it is expected that the amount of insurances that cover Tessa will increase over time.

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vailable to download and
of use is very important.

rs to learn about the app
ged.

● Tinybots should support the transition to the 'care version' of Tessa.

● Tinybots needs to give care organisations access to the app or physical Tessa of the user.

● Stimulate users to make transition to physical Tessa.

● Support home care organisation with transition to physical Tessa. Transfer data from app to physical Tessa.

Discussion and conclusion

How can Tessa be implemented through general practitioners?

From the research, it became clear that the way Tessa is currently implemented, with the home care organisations as the Tessa owner, is not feasible for GPs.

This is because of a variety or reasons, such as the fact that GPs do not see their dementia patients often, care is mostly taken over by the casemanager and they have difficulty getting support from insurance. Next to this, GPs prefer a role of care network connector and referrer.

Therefore, the best way to implement Tessa through a GP is to let them give Tessa as an option and refer them to a home care organisation that works with Tessa.

For Tinybots this means a number of things. First of all, one advantage of this scenario is the use of the current pathway of implementing and financing Tessa. No changes need to be made here. This pathway also fits the TaaS model, with which plug and play Tessa's can easily be given out, for example upon request of the GP.

Structures between the GP and home care already exist. GP and home care meet during MDCs, but this is not often. In the meantime, POHs and casemanagers form a bridge between the two parties. Especially when they work both as a casemanger or POH and in home care.

As a result of having the GP as a starting point in the distribution scenario, people that stand at the very beginning of the dementia process can be reached. This group of people is characterised by denial and minimising of problems. Acceptance of Tessa in this stage is a challenge, which initiates the second part of the project.

Part 2

How can acceptance of Tessa be increased for people with early-stage dementia?

For elderly with early-stage dementia or suspicion of early-stage dementia, accepting help can be very hard. People in this stage do not acknowledge or recognize their starting memory problems. It is hard to accept help for something you do not think you need help for. Therefore, the acceptance of Tessa should be made easier for this target group.

By looking at literature about the acceptance of technology it was evident that to increase acceptance, perceived usefulness, need or interest needs to increase. This can be done by looking at compatibility, trialability and observable relative advantage to the technology elderly currently use. Next to this, stereotypical portraying of ageing, a focus on the negative side of aging and the feeling of losing independence decrease acceptance.

To increase perceived usefulness, interest and need, the functions of personal voice messaging and listening to audiobooks were added. Next to this, the concept of an app version of Tessa was introduced. Instead of accepting Tessa in a physical form, it can now support someone from their own device. The costs of this will initially have to be paid for by the user. When the dementia progresses and care is indicated, Tessa can transition to a care providing product. This means the costs can also be taken over by the insurance. It is also possible that at some point, someone switches to the physical Tessa.

To prepare for the launch of such a product, Tinybots needs to prepare information, for example on a website, aimed at users instead of care organisations. Next to this, Tinybots should increase overall autonomy in the product with a few simple changes. These changes are: being able to repeat a message from Tessa, turn the music on and off manually and being able to ask about upcoming calendar points.

Final conclusion

This project shows Tinybots how their social, assistive robot Tessa can be implemented with people who stand at the very beginning of the dementia process. By using the GP as a starting point, Tinybots can reach these people and refer them to care organisations where structures to offer and finance Tessa already exist.

To adapt the product to fit the new target group, the functions of personal messages and audiobooks are added to increase perceived usefulness. Next to this, an app version of Tessa should be offered to increase compatibility with the life of the elderly with beginning memory problems which can provide trialability and an observable relative advantage.

With these proposed solutions, Tinybots can support people with dementia and their caregivers from early on and for a longer period of time. As a result, the need for home care can be postponed. If home care becomes necessary, Tessa can continue to provide support as it transitions along from a supporting system into a care providing product.

Recommendations and limitations

A design project is never fully finished, there are always recommendations for further research and limitations surrounding the proposed solutions. In this chapter, these recommendations and limitations are discussed.

Part 1

As became clear from the research in part one, without financial support, GPs will not be able to use Tessa. However, with the increasing shortages in care and the growing burden on first line care, financial support might become available in the future. Especially if Tessa becomes more well-known with health insurances and its positive impact on care is widely acknowledged.

To support the future extension to GPs as Tessa owners, two strategies to reach GPs are recommended. They were made in collaboration with a GP ICT sales expert from the company VZVZ, see figure 41. One strategy is to search GPs with an innovative mindset, invite them to do a pilot and talk to the health insurance with the results. The second strategy starts the other way around, at the health insurance. If Tinybots can find a health insurance that is willing to support the use of Tessa, they can use this a starting point. The next step would be to find GPs attached to this insurance. The barrier of financial support is then taken away, making it easier for GPs to accept Tessa.

From the research was concluded that the GP as a Tessa owner is not the optimal scenario for dementia patients. However, I recommend Tinybots to explore whether this is also the case for other target groups. In the pilots that are already done with GPs, which were considered successful, most participants were not on dementia patients. It could be worthwhile to create an overview of other target groups that can be reached through the GP.

In the project, a distribution scenario is proposed for a context where GPs do not have access to financial support does not explore how GPs learn about Tessa. Tinybots should find ways to educate GPs on the possibility of Tessa, so they will start to give the product as an option. Tinybots could also look at targetting GP organisations or ROSs and RSOs for the spreading of information about Tessa.

Tinybots could also explore how a care indication to use Tessa can be made by the GP which is approved by the health insurance. Patients can use this indication to apply for a Tessa at a home care organisation.

Next to this, Tinybots needs to validate two more things about the distribution scenario. The first thing is whether health insurance supports this model. The second thing is the willingness of home care organisations to accept clients only for use of a Tessa.

Part 2

The ideas that were created in the second part of the project to increase perceived usefulness, interest and need were discussed with the target group, but not extensively tested with, for example, prototypes. Tinybots could do pilots to test the new functions and measure their influence on acceptance.

Next to the functions, the advice is to create channels with information targeting the actual users of Tessa. The way this information is represented should be more extensively looked into by Tinybots. Some factors from this project can be taken into account, for example that the information should not add to a stereotypical image of elderly, as unfortunately many products do.

Considering the further development of the Tessa light app, there are some recommendations. First of all, the app needs to be developed and designed in a way that it is easy to use by elderly, but does not necessarily look like a stereotypical app for elderly. UX research is extra important in this case, since ease of use is an important factor in technology acceptance by elderly. A first impression was made to show what the app could look like, but this is something Tinybots will need to invest more time in after this project.

Secondly, a broad overview of functions was given in the project, but the exact need of functions could be researched or evaluated more extensively. When the app is developed and tested, the channels through elderly can be reached should be explored.

Find innovative GPs

Locate GPs that seem innovative, open to using technology and e-health. For example, look for articles written by GPs about eHealth, technology, innovataion or lifestyle and contact them. Compliment them on their article and ask for a conversation about Tesa.

Convincing

Show the value of Tessa, what can it do for GPs and their patients? Use storytelling, results from the pilots or personas. Find their triggerpoints, like saving time or preventing specialized care. Ask if they might be interested in a pilot. Don't spend too much time on convinding a negative GP, use that time to find a positive GP.

Pilot

Offer the GP a pilot. If possible, pamper the GP a little bit by offering a reduced price or even a free trial period. Money can change their perspective. Make sure everything is plug & play and support them throughout the whole process. Tinybots can use the pilot to produce numbers about the effect of Tessa.

Spread the word

If the pilot showed positive results and the GP is enthousiastic, they can introduce Tessa to GPs or organisations in their network. Their results and experiences can function as a means to convince other GPs in their network.

Use regional organisations

For GPs a regional approach is preferable. With the support from a ROS or RSO, more GPs can be reached but also more support can be build.

Look for GPs from insurance

Locate GPs in the same region that are connected to the same insurance company.

Approach insurance with ROS/RSO

For GPs a regional approach is preferable. With the support from a ROS or RSO, more GPs can be reached but also more support can be build.
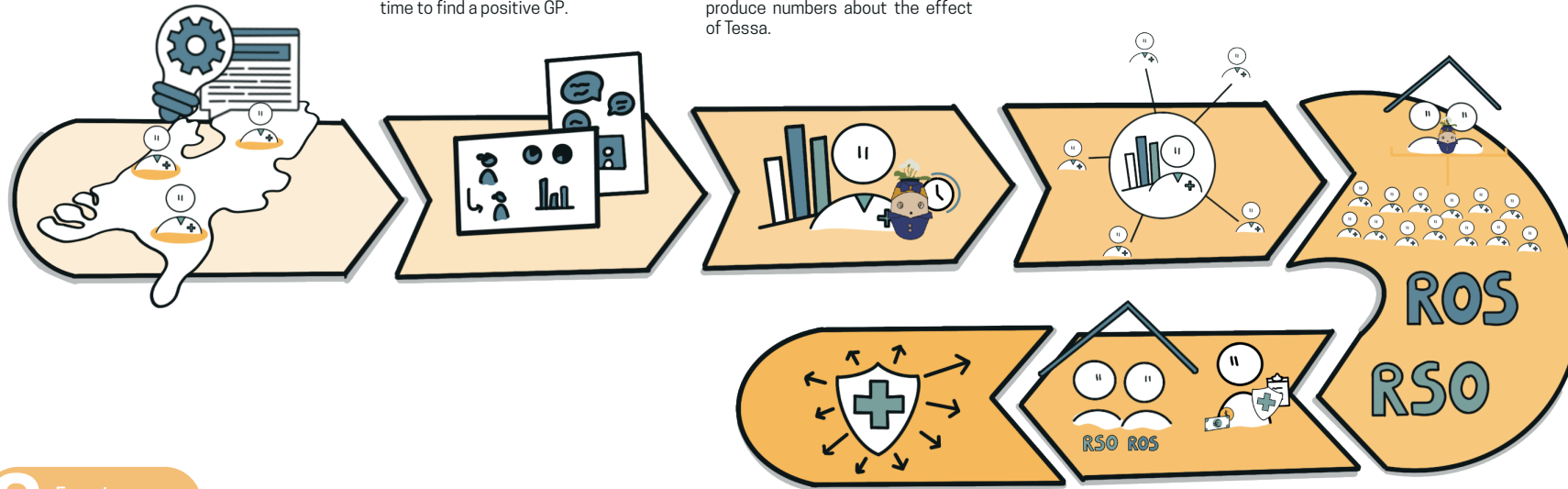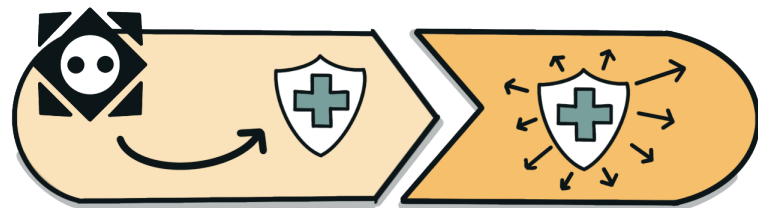
Find the right insurance company

Find an insurance company that are open to prevention, eHealth and technology. Approach them and try to convince them of the effectivity of Tessa.

Locate GPs from that insurance

If the insurance is open to financing Tessa, look for GPs that are connected to the insurance compancy. Again, money can change the perspective of the GP, so offering Tessa from this perspective could be very effective.

Figure 41: Two ways to target GPs

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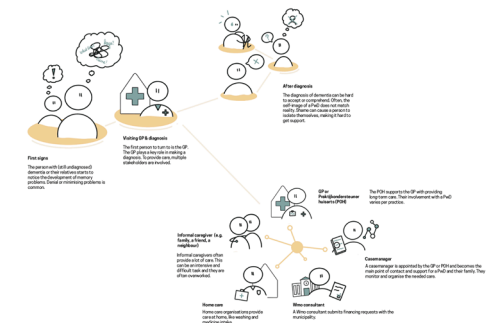We zijn er klaar voor! (n.d.). Alzheimer Nederland. Retrieved October 4, 2021, from https://www.alzheimer-nederland.nl/

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Appendix

A1. Early-stage dementia

Symptoms

- Memory problems
- Lack of taking initiative, finding it hard to make choices and decisions
- Losing interest in other people and activities
- Repeating things often
- Slower understanding of new things

Other things

- Hard to ask for help
- And hard to accept help
- Have a lot of questions
- Important to create a rout[i] and stick to it
- Try to keep the person act[i] both physically and menta[l]

Staying in touch with reality

People in this stage can lose the grip on reality. They forget the date and time and lack structure. It helps them to have a calendar, clock or to look at other reminders like pictures.

Good days and bad days

Living with dementia does not mean you have they same symptoms every day. One day you might forget things that today are easy for you to remember. This makes it hard for the caregiver to help them, especially in an early stage when they might not yet recognize if someone is having a good or bad day.

On a good day, the help from a caregiver might not be received well, putting a strain on their relationship.
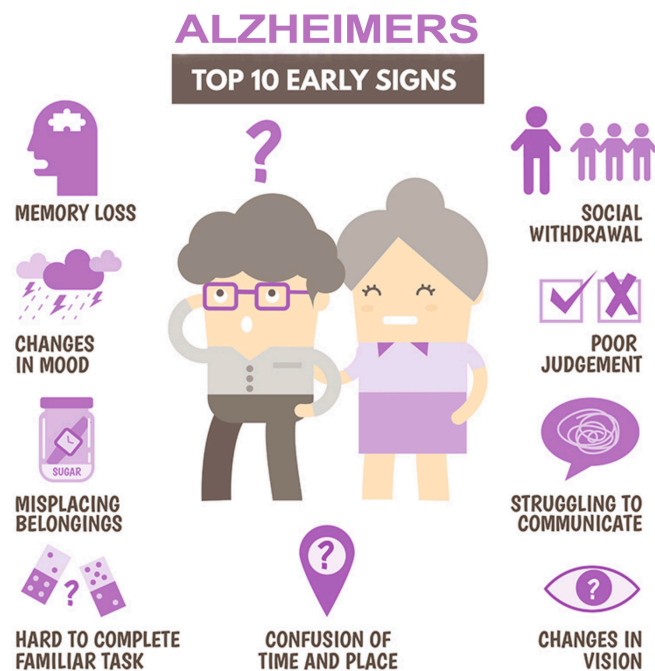
Coping with changes

When you are diagnosed with dementia, it is inevitable that your life will change. Usually PwD have a lot of questions. In early stage dementia, coping with the changes, while not losing your self-identity is a relevant topic (Steeman et al., 2006). Protection of 'personhood' is key. Someone should still feel their actions are meaningful, that they have autonomy and that they feel secure.

Proactive care in this early stage can prevent dependency and therefore, reduce suffering. Tessa can give someone independency and autonomy, by reminding them in a way that they still make their own choices. In an objective and subtle way Tessa gives reminders, which gives the PwD the power to participate in their own care. The messages Tessa gives can be personalised, which can be used to remind someone of their identity. For example Tessa can say "Your favourite soccer team is playing today", with that reminding them of a fun activity that they used to enjoy before diagnosis.

Emotions

Insecurity   Feeling lost   Fear

Early-stage dementia symptons. (n.d.). [Illustration]. https://www.theoldish. com/stages-of-alzheimers-disease/

A2. Financing of care

ZVW
Zorgverzekeringswet
Care Insurance Act

Nursing and care at home is arranged by the Zvw. The Zvw can be used to purchase (some) tools/devices that can provide help in any way.

Zorgverzekeraar
Health insurance

WMO
Wet Maatschappelijke Ondersteuning
Social Support Act

The Wmo offers support to be able to continue to live at home and participate in society. This concerns things like adjustments to a home, a wheel chair, cleaning services or other (some) tools/devices.

The care from the Wmo is for a limited time. After the term has expired, the request for care needs to be renewed. The care is paid for by the munincipality.
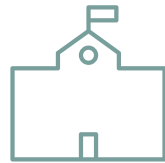
Gemeente
Municipality

WLZ
Wet Langdurige Zorg
Law for long-term Care

Patients use the Wlz when they have a condition which demands long-lasting care or monitoring for 24 hours per day. This means they are admitted to a nursing home or receive a full care package for at home (VTP, volledig pakket thuis). The care from Wlz is lifelong.

An indication for admission to the Wlz is given by the Centraal Indicatieorgaan Zorg (CIZ). The care is requested from and paid by the care-office.

Zorgkantoor
Care-office

Eigen bijdrage

Personal contribution
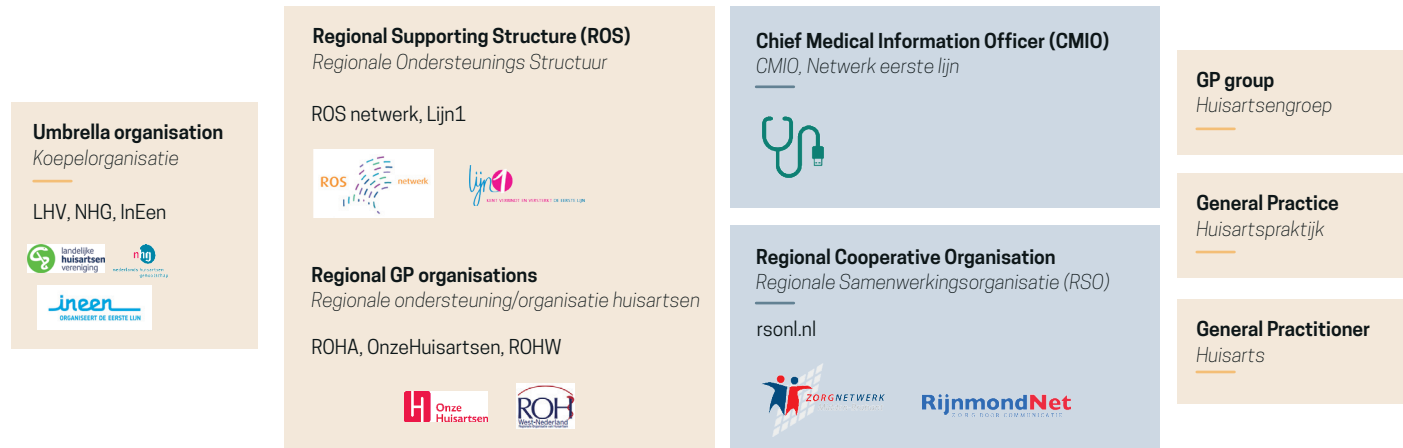
The Zvw requires no personal contribution.

With Wmo, the municipality can ask for a personal contribution. This is not dependent on income. The height of the contribution can differ between municipalities.

For care from the Wlz, an income dependent personal contribution is required.

Patiënt
Patient

A3. Structure of GP network

Umbrella organisation
Koepelorganisatie

LHV, NHG, InEen

Regional Supporting Structure (ROS)
Regionale Ondersteunings Structuur

ROS netwerk, Lijn1

Regional GP organisations
Regionale ondersteuning/organisatie huisartsen

ROHA, OnzeHuisartsen, ROHW

Chief Medical Information Officer (CMIO)
CMIO, Netwerk eerste lijn

Regional Cooperative Organisation
Regionale Samenwerkingsorganisatie (RSO)

rsonl.nl

GP group
Huisartsengroep

General Practice
Huisartspraktijk

General Practitioner
Huisarts

A4. Interview template

0 Welkom!

1 Algemene vragen

Wie bent u?

Hoe ziet de huisartspraktijk eruit?

Wat is uw ervaring met dementie?

Hoeveel patiënten met dementie?   Hoeveel nieuwe diagnoses per jaar?

2 Huisartsenzorg bij dementie

De zorgreis

Aangeboden
hulp(middelen)
vanuit HA

Waren er momenten dat u zorg wilde bieden maar dat het niet kon?
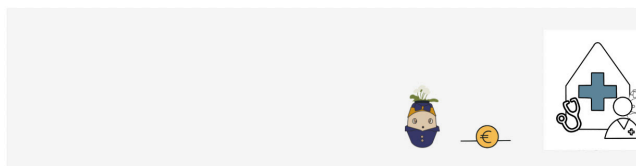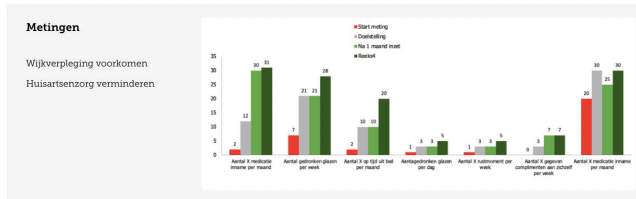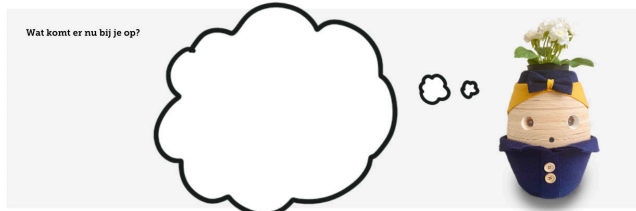
Zorgvragen

?

?

Verleden en toekomst

3 Zorgtechnologie bij dementie

Waar denkt u aan bij zorgtechnologie voor dementie?

Bij welke zorgvragen zou u technologie willen inzetten?

Op de markt

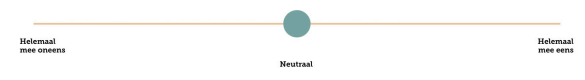**Dwaaldetectie**

Leefstijl monitoring

Geheugenklok

Noodknop

Dagstructuurrobots
Billybilly, Tessa, Maatje

Knuffelrobots
Katten en zeehond

4 Tessa, de dagstructuurrobot

Kan berichten uitspreken
Ja/nee vragen stellen
Stap voor stap instructies geven
Muziek afspelen

Hulp nodig bij:
Eten & drinken
Medicatie inname
Zelfzorg

Dag/nachtritme
Op tijd zijn voor afspraken
Hebben van een gezonde levensstijl

Wat komt er nu bij je op?

Metingen

Wijkverpleging voorkomen

Huisartsenzorg verminderen

Stellingen

Het is de taak van de huisarts om te bedenken wat voor zorg iemand na de diagnose dementie nodig heeft

Helemaal mee oneens — Neutraal — Helemaal mee eens

Ik zou (binnen mijn praktijk) meer technologie willen inzetten in het zorgproces bij dementie

Helemaal mee oneens — Neutraal — Helemaal mee eens

De huisartsenpraktijk is een plek waar Tessa kan worden aangeboden aan mensen met dementie of een lichte cognitieve beperking

Helemaal mee oneens — Neutraal — Helemaal mee eens

Het stellen van de diagnose dementie kan even duren. Ik zou Tessa kunnen inzetten om voor een officiële diagnose hulp te bieden, bijvoorbeeld bij geheugenproblemen.

Helemaal mee oneens — Neutraal — Helemaal mee eens

5 Afsluiting

Maak af:
De rol van de huisarts rond dementie is.....
....

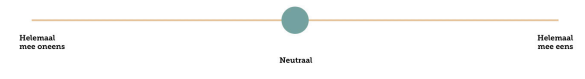Zijn er nog andere dingen die u nog kwijt wilt?
Vragen, ideeën, visies, etc...

Vervolgonderzoek, POH, patiënten

Vulnerable Elderly
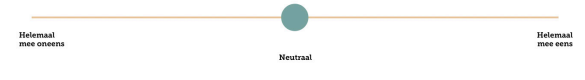
Kwetsbare ouderen zijn oudere mensen met een **complexe** situatie en een **zorgbehoefte**. Ze hebben **verminderde** (of verlies van) **regie** over het eigen leven. Hierdoor vermindert de **functionele autonomie**.

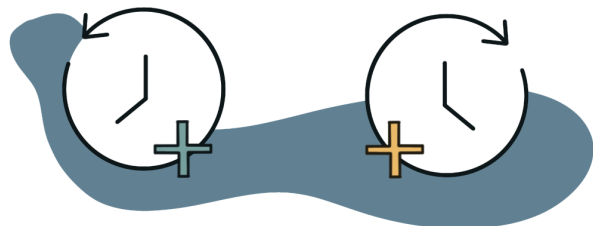**600,000-700,000** vulnerable elderly

80%
lives at home

Care now

Home care, POH does home visits (sometimes also GP, in smaller areas) and care from a specialist at the hospital.

Care future

Geriatrician move more to primary healthcare (eerstelijnszorg). GP won't be able to handle the amount of elderly patients, need for more POH-elderly.
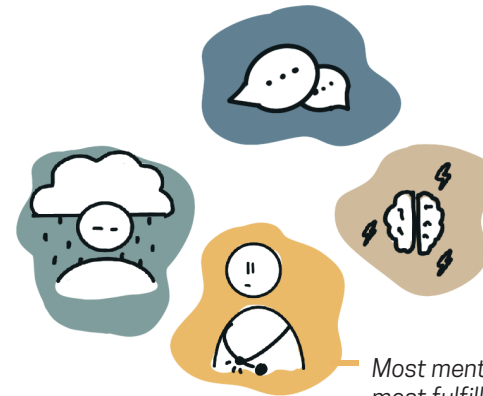
4 Problem areas

Physical

Cognitive

Social

Physiological vulnerability

Most mentioned, but also most fulfilled

Current unfulfilled needs

Activation/physical activity

Getting out of the house

Social interaction (feeling lonely)

Alzheimer café | De huisarts, wat is zijn/haar rol in het proces, door Sietse Crop
12 oktober 2021

Role of the GP

In general the role of the GP is signalling and creating a support system. The GP is the first one to talk to a patient or their relatives about suspicions of dementia and the one who can exclude other causes of the signalled problems, diagnose or refer them to a specialist.

The exclusion of other underlying causes is done with the 'SCEGS' method. It stands for somatics, cognitive, emotional, behaviour (gedrag) and social. All these categories are checked before dementia can be diagnosed. The GP for example does a blood test to check someones somantics or looks at the physical activity of a person.

The emotional state is also a very important factor to take into account when diagnosing dementia. The example that was given during the Alzheimer café was about mourning. When a person is in mourning after, for example, the loss of their life-long partner they can show memory loss and confusion. After mourning this goes back to normal. In this case, the GP follows the situation over a longer period of time. This can take even several months to a year.

After diagnoses, the GP creates a support system consisting of a POH somatics or elderly care (somatiek/ouderenzorg), sometimes casemanager an sometimes nurse practitioner, together with the mantelzorger.

From the wide range of possible care options, he GP tries to narrow it down to the needs of the personal situation of a patient.

The GP also emphasized the importance of checking on the mantelzorger and providing support for them.

Medicine

The GP is hesitant with prescribing medicine. The GP prefers to leave this to a specialist.

Role of GP after diagnosis & setting up network

Since the time a GP has for patients is very limited, most of the monitoring is taken over by the POH or nurse practitioner. The GP is addressed when there are somatic matters or questions about medicine. The GP also ranks the patient as high or low vulnerability.

Casemanager

The GP at the Alzheimers café did not have good experiences with casemanagers so far. The waiting lists are very long. This means that the casemanager comes in when it's already too late and a crisis situation occurs. As a result, when the casemanger is finally appointed they immediately have to arrange admission into a nursing home.

Workload

The workload of the GP is very high. He mentioned that the amount of patients in his practice well exceeds the advised 'normpraktijk'.

He tries to personally visit his elderly (75+) patients every 2-3 months, but often this is done by the POH).

Activation

The GP expressed the importance of activation, both physical and mental. He likes to try and activate his patients to prevent decline.

Characteristics

Pro-active

Science/evidence based

Eager to do something

Sceptical

The audiance

The audiance consisted of early stage dementia patients, caretakers, relatives and anybody else interested in the topic (like me). You could feel that the atmosphere was quite tense. Both the patients and the care taker showed worry and fear.

The questions they asked showed they were very desperate to get help and eager to try anything, such as medicine from the USA or certain plasters. They were all very informed about the different possibilities. The GP however, was quite hesitant about medicine, plasters or other treatments. In his opinion eating healthy and getting enough physical and mental excercise is the only thing that really works.

You could feel that this position from the GP towards treatments called for some resistance from the audiance. They don't want to sit back and see their loved one deteriorate, but take action.

Co-designing with people with dementia

Communication

Co-design is a way of involving the end-users in the design process (Sanders & Stappers, 2008). However, co-design requires a certain level of communication, cognitive and creative skills (Rodgers, 2017).

For people with dementia it can be hard to voice their needs, imagination and creativity. An individual approach is adviced to determine what kind of session you are able to conduct, so that the person with dementia is able to participate in a comfortable and fruitful way. Co-designing should not give a feeling of frustration or failure. It should give a sense of achievement and satisfaction. Self-empowerment is very important.

Guidelines

- **Pre-determine** with the caretaker what works and doesn't work with the participant.

- Give the session a **visual** nature. Use cards, pictures, or anything visual. For example visual cards can provide support, as it can function as a prompt or memory aid (Niedderer et al., 2020).

- Fun, participatory, **creative** sessions are recommended, for example doing arts and crafts. **Touch-based** activities have proven to help with sharing and illustrating ideas (Tsekleves et al., 2018).

- Give the session a clear **structure** and don't make it too demanding. Dementia affects the attention span.

Role of the caregiver

The caregiver is best at interpreting and understanding the PwD. You can use them provide interpretations based on the behaviour of the Pwd, when for example the person is not able to express their thoughts verbally.

Next to this, the caregiver will probably also be using the design intervention you're doing the session for. So by involving them you also get their input.

If the PwD is comfortable and cognitively able enough, you can choose to conduct the session without the caregiver. This could enable the PwD to speak more freely, without limitations.

Wang G., (2021)

Examples

Specific tools and recommendations

Mild dementia stage

- Apply Think Aloud methods
- Create scenarios
- Make storyboards
- Apply visual prompts
- Let PwD build rapport with each other
- Make vignettes
- Use self-observation diary
- Select PwD who know each other for group discussion
- Separate PwD from their caregivers if PwD can express themselves independently so that PwD can give their opinions freely
- Provide a few concepts instead of just one
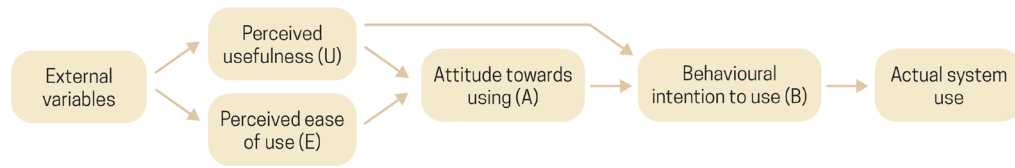- Use a topic guide to make the session structure clear to PwD

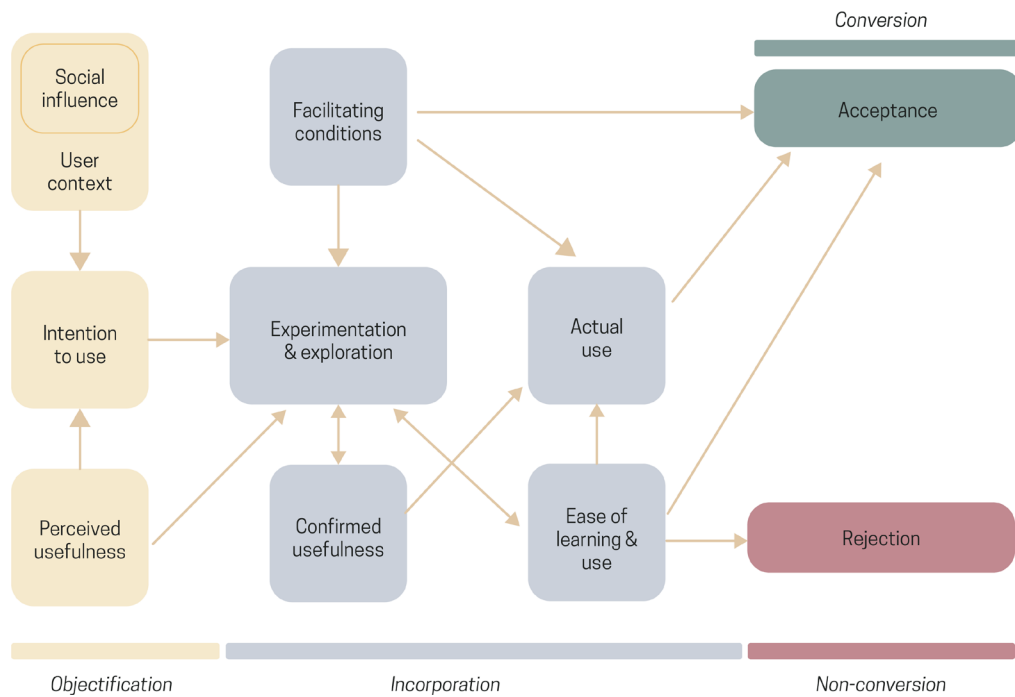Wang G., (2021)

Mild to moderate dementia stage

- Formulate questions in a way that PwD would not feel that they are being tested
- Acknowledge the contribution of PwD
- Use videos
- Recap the last session before every new session
- Ensure questions are not confronting
- Let PwD engage in one activity at a time
- Use external memory aids
- Use environmental cues and triggers
- Use subtle physical prompts
- Compartmentalise a main task into subtasks
- Create a routine for a specific task
- Plan tasks that are suitable for the educational level of PwD
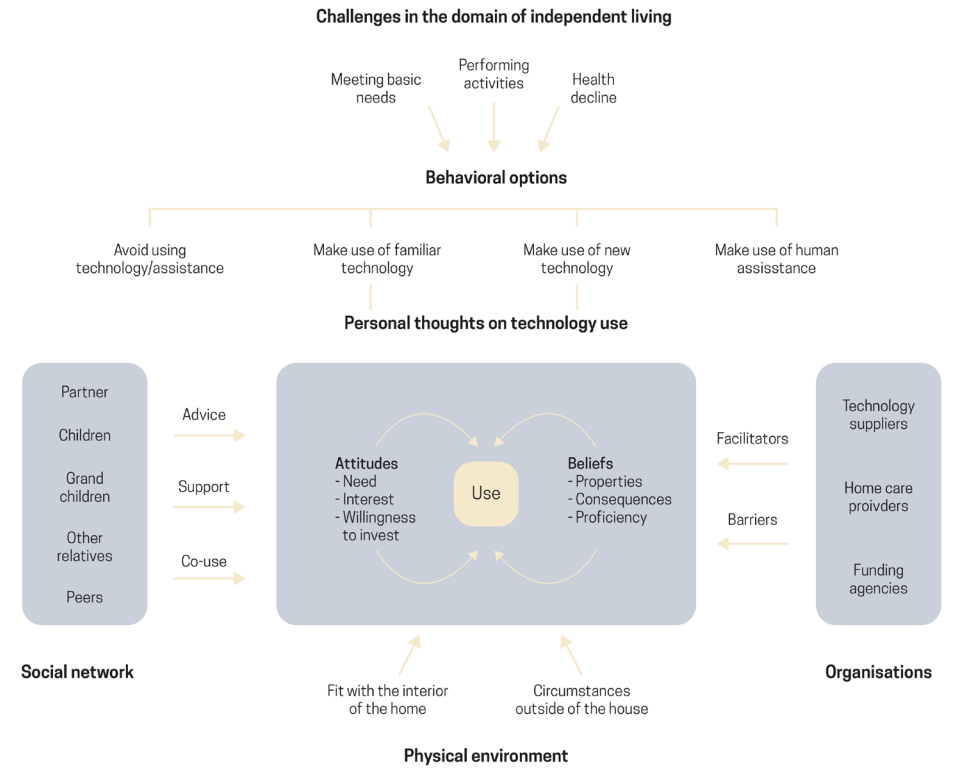- Plan tasks to have a purpose

Wang G., (2021)

Limitations

- Small sample size
- Potentially stressing for PwD
- Hard to create generalised findings
- Short session durations
- Unknowingly influencing of PwD by researcher

Wang G., (2021)

A8. Technology acceptance models

Technology Acceptance Model (TAM), by Fred Davis 1989

External variables → Perceived usefulness (U) / Perceived ease of use (E) → Attitude towards using (A) → Behavioural intention to use (B) → Actual system use

Senior Technology Acceptance Model (STAM), by Fred Davis 1989

Conversion — Acceptance

Rejection

Objectification — Incorporation — Non-conversion

Social influence / User context → Intention to use → Experimentation & exploration → Acceptance

Facilitating conditions

Actual use

Perceived usefulness

Confirmed usefulness

Ease of learning & use → Rejection

Conceptual model of factors influencing the level of technology use by older adults who are aging in place, by Peek S.T.M., et al. (2016)

Challenges in the domain of independent living

Meeting basic needs | Performing activities | Health decline

Behavioral options

Avoid using technology/assistance | Make use of familiar technology | Make use of new technology | Make use of human assisstance

Personal thoughts on technology use

Social network: Partner, Children, Grand children, Other relatives, Peers — Advice, Support, Co-use

Attitudes - Need - Interest - Willingness to invest | Use | Beliefs - Properties - Consequences - Proficiency

Organisations: Technology suppliers, Home care proivders, Funding agencies — Facilitators, Barriers

Physical environment: Fit with the interior of the home | Circumstances outside of the house

A9. Other products used by people with dementia

Other products

Compaan

The Compaan is a tablet designed for elderly. On the tablet you can view photos, see agenda, send text message, videocall, play games and read the news. For caregivers, Compaan offers a way to monitor and consult from a distance. With the Compaan, clients can do measurements of their health at home, with for example an oximeter and send it to caregivers through the compaan.

Price: One time €299 and €12.95 per month.

- Modern look. Wooden frame gives it a feeling of home and sophistication.
- For caregivers, main feature is videocalling and (tele)monitoring from a distance.
- For the client it is a means of communication, reminders and fun.
- The client controls the tablet.
- The reminders are hidden as a feature in the tablet just like the games. It feels like no function is dominant and one cannot say the Compaan is only for reminers or only for pictures. This makes the use of it more attractive.
- Too complicated for progressed dementia.

Maatje

Maatje is a social robot accompanying people throughout their day. Maatje can talk, dance, move, remind, play music and walk. It also scans QR codes and the interactions are quite advanced.

The user is able to customize the interactions in the app, enabling a lot of possibilities for creating conversations, games and reactions.

Price: +- €2000

- Can customize and create interactions, making it more interesting.
- If you get creative, a lot of things are possible with Maatje. The QR codes can be used to make games or make having conversations easier.
- The interactions can be complicated in the beginning and made more simple as the cognitive abilities of a person decline. In the future, the eyes can be used for video calling.

Praatknoppen

Can record up to 80 seconds.

Price: +- €90

- Own voice
- Repetitive

BBrain

Calendar, time, pictures, texts and videocalling.

Price: €229 + €10 per year

VoiceZorg

Price: €12,50 per month

Medicine dispenser

Releases medicine at the right time and gives alarm.

Price: covered by insurance

Lifestyle monitoring with sensors

Price: unclear

Illi tv

Retrieving memories from old days, watching videos, group activities

Price: €1600, no insurance coverage possible

Additional functions next to reminding

More functions in general like:	Customizable interactions	Showing expressions + hearing real voice
- Videocalling		
- Games	Telemonitoring	Moving
- Viewing pictures	More communication possibilities	Having a screen
- Texting		

Needs

Safety	(Tele)Monitoring	Maintaining independence
Preserving your 'personhood'	(Video) Communication with family	Stimulating activity
Keep doing the things you like	Fun: karaoke, Andre Rieu, Bingo	

A10. Brainstorm Mural

Ideeën

1 — Hoe kan je Tessa **veranderen**, bijvoorbeeld met nieuwe **interacties** of **functies**, waardoor ze in een **vroeg stadium** wordt **geaccepteerd** door de persoon met dementie en de mantelzorger?

Start hier!

Waar komt deze vraag vandaan?

Tessa moet iets zijn:

Hiervoor is nodig dat:

Welke **eerste ideeën** komen in je op?

Maak een post-it door te dubbel klikken of deze te kopiëren

Je zou het **uiterlijk** of **functies** rondom de spraakfunctie van Tessa kunnen veranderen. Door de Tessa bijvoorbeeld kleiner te maken of als iets anders te laten functioneren lijkt het iemand misschien een nuttig voorwerp.

Hoe kan je het **uiterlijk** veranderen?

Welke **functies** kan je toevoegen?

Momenteel gaat alles vanuit Tessa naar de persoon met dementie. De gebruiker heeft weinig regie en controle over Tessa. Dit terwijl ze zelf ook een beetje regie en controle verliezen door de dementie.

Hoe kan je iemand meer **controle/regie** geven?

Mensen met beginnende dementie ondervinden al een aantal **praktische problemen**. Denk bijvoorbeeld aan het constant kwijt zijn van je spullen of je pincode vergeten bij de kassa.

Hoe kan Tessa helpen met praktische problemen?

Mentaal & fysiek actief blijven is extra belangrijk bij dementie. Even een wandeling of een puzzel maken is belangrijk om genoeg prikkels te krijgen.

Hoe kan je iemand **activeren**?

Bedankt voor het meedenken!!

IDE Master Graduation

TUDelft

DESIGN FOR our future

IDE Master Graduation
Project team, Procedural checks and personal Project brief

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

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

⚠ USE ADOBE ACROBAT READER TO OPEN, EDIT AND SAVE THIS DOCUMENT
Download again and reopen in case you tried other software, such as Preview (Mac) or a webbrowser.

STUDENT DATA & MASTER PROGRAMME
Save this form according the format "IDE Master Graduation Project Brief_familyname_firstname_studentnumber_dd-mm-yyyy".
Complete all blue parts of the form and include the approved Project Brief in your Graduation Report as Appendix 1 ! ⚠

family name	Elfering	
initials	RE	given name Rosa
student number	4562267	
street & no.		
zipcode & city		
country		
phone		
email		

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

IDE master(s): ( ) IPD ( ) DfI (★) SPD

2ⁿᵈ non-IDE master: _____

individual programme: _____ (give date of approval)

honours programme: (Honours Programme Master)

specialisation / annotation: (★ Medisign)
(Tech. in Sustainable Design)
(Entrepeneurship)

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

** chair	Sylvia Mooij	dept. / section: MCR
** mentor	Dave Murray-Rust	dept. / section: HICD
2ⁿᵈ mentor	Wang Long Li	
	organisation: Tinybots	
	city: Rotterdam	country: The Netherlands

comments (optional)

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

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

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

IDE TU Delft - E&SA Department /// Graduation project brief & study overview /// 2018-01 v30   Page 1 of 7

TUDelft

Procedural Checks - IDE Master Graduation

APPROVAL PROJECT BRIEF
To be filled in by the chair of the supervisory team.

chair   Sylvia Mooij   date   04 - 10 - 2021   signature

Sylvia Mooij - IO
Digitally signed by Sylvia Mooij - IO
Date: 2021.10.05 14:05:15 +02'00'

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

Master electives no. of EC accumulated in total: _____ EC

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

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

(YES) all 1ˢᵗ year master courses passed

(NO) missing 1ˢᵗ year master courses are:

name _____   date __-__-__   signature _____

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

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

Content: (APPROVED) (NOT APPROVED)

Procedure: (APPROVED) (NOT APPROVED)

comments

name _____   date __-__-__   signature _____

IDE TU Delft - E&SA Department /// Graduation project brief & study overview /// 2018-01 v30   Page 2 of 7

Initials & Name   RE   Elfering   Student number   4562267

Title of Project   Designing the product-service of Tessa for General Practitioners.

Designing the product-service of Tessa for General Practitioners.   project title

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

start date   30 - 09 - 2021   18 - 03 - 2022   end date

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

This assignment takes place within the context of the company Tinybots. Tinybots developed care robot Tessa, which enables people with cognitive impairments, like dementia, to live a more independent life. For home care (thuiszorg) companies, Tessa can save up to 2 hours of care per week. The type of care Tessa takes over is verbal care. Normally a nurse or family member would remind their patients of their doctor's appointment, take their medicine, or other simple tasks like a reminder to brush their teeth. It is Tessa's job to take over these tasks. Tessa can do this by reading out messages, giving step by step instructions, asking questions and sending reminders. In addition, Tessa can play music.

Since the launch of Tessa in the market of home care, an opportunity for a new market arose. A group of general practitioners has successfully implemented Tessa. The question has risen whether Tinybots should expand their business in this market. GPs can diagnose Alzheimer's at an early stage, which would mean that Tessa can be implemented earlier than it is now. This would benefit the patient, since the earlier Tessa is implemented, the more beneficial it is for the patient. Successfully expanding to this market would be an opportunity for Tinybots to expand the way in which they support people with dementia or other cognitive impairments.

For the GP it would offer new opportunities to treat patients with dementia or other cognitive impairments. The GP can use Tessa to provide care when a patient does not have or is not eligible yet for home care. It can postpone or remove the need for home care. In other cases, where the patient is eligible for home care, the GP can choose to use Tessa as well. Currently, GP is not able to offer long-term care but can only send them to home care organizations or an institution. Sometimes this type of care is still too excessive or there is a waiting list. Using Tessa in this case could offer a good alternative.

An unknown factor in this market is the possible business model. A patient in this stage is not yet indicated for homecare by the insurance and is therefore not eligible for care at home, but in this case, Tessa would still really benefit the patient. It will be interesting to see how GPs look at this.

Another aspect of the project is looking at the needs of this new market and checking whether the product-service of Tessa needs adjustment to fit within this market. The outcome of this is quite open. It could for example lead to a change in Tessa or the service itself but also in the way the GPs are approached. Additional support and services might be needed for successful implementation via GPs.

space available for images / figures on next page

IDE TU Delft - E&SA Department /// Graduation project brief & study overview /// 2018-01 v30   Page 3 of 7

Initials & Name   RE   Elfering   Student number 4562267

Title of Project   Designing the product-service of Tessa for General Practitioners.

---

introduction (continued): space for images

image / figure 1:   Tessa with a patient

image / figure 2:   Tessa and its functions

IDE TU Delft - E&SA Department /// Graduation project brief & study overview /// 2018-01 v30   Page 4 of 7

Initials & Name   RE   Elfering   Student number 4562267

Title of Project   Designing the product-service of Tessa for General Practitioners.

PROBLEM DEFINITION **

Limit and define the scope and solution space of your project to one that is manageable within one Master Graduation Project of 30 EC (= 20 full time weeks or 100 working days) and clearly indicate what issue(s) should be addressed in this project.

The problem definition consists of two main questions:

1. What does the market of General Practitioners for Tessa look like?
• How big is this market, who does it consist of, how is it organized?
• What potential do the GPs see? What fears, requirements and needs do they have?
• How would they want to implement Tessa? How do they organize financing and decision making on what type of products they use?

2. What does Tessa, as it is now, need to fit this new market?
Also taking into regard the needs of people with early-stage dementia, a group that can be reached through GPs.
• Are the needs of the GPs and the patients and their relatives satisfied with the current product-service?
• Are adjustments needed in the product, the app, the branding, the marketing, or in any other field?

ASSIGNMENT **

State in 2 or 3 sentences what you are going to research, design, create and / or generate, that will solve (part of) the issue(s) pointed out in "problem definition". Then illustrate this assignment by indicating what kind of solution you expect and / or aim to deliver, for instance: a product, a product-service combination, a strategy illustrated through product or product-service combination ideas, ... In case of a Specialisation and/or Annotation, make sure the assignment reflects this/these.

I will research the potential of Tessa in the market of GPs and their patients with dementia or other cognitive impairments. I will generate an analysis of the stakeholders involved and their needs. I will translate the needs into a design or re-design of an aspect the product-service of Tessa. What aspect of Tessa this is, will be based on the outcome of the research.

I expect to deliver useful and practical insights into the new market of GPs as distributor of Tessa and a good understanding of the stakeholders, their context and needs. I will do this by conducting user research, in the form of interviews, questionnaires or co-design sessions. With these insights I can form design guidelines for Tessa and the service around Tessa (e.g. the app, the communication, the marketing).

I aim to create a strategy that will show how Tessa can be implemented in this market. I want to use the insights from the research to locate what aspects of Tessa need improvements or changes. I would like to (re)design these aspects or try out new possibilities and take them back to the users to test them, especially changes to the product itself, and repeat this several times to create a non-linear process.

The final deliverable will be a strategy supported by user insights showing the potential of the market and tested adjustments to the product-service Tessa with which it can be implemented in this market successfully. More specifically, in the strategy, all insights from the different stakeholders are combined to show the opportunities and threats within the market and what needs or worries need to be considered to become successful in the market. Additionally, the proposed adjustments will be incorporated.

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Initials & Name   RE   Elfering   Student number 4562267

Title of Project   Designing the product-service of Tessa for General Practitioners.

PLANNING AND APPROACH **

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

start date 30 - 9 - 2021   18 - 3 - 2022 end date
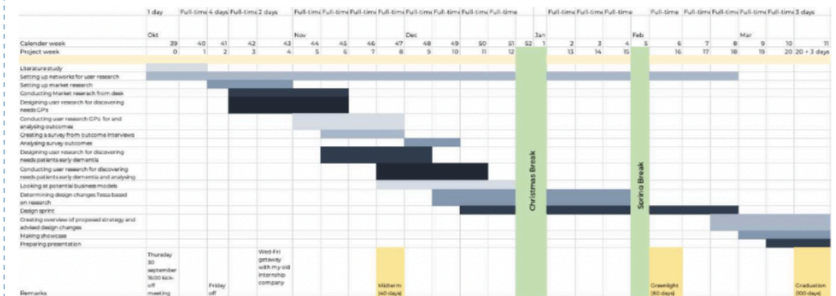
The project will commence with a literature study on various topics, such as how to design for/with people with dementia or other cognitive impairments, to get a better sense of the context. After that the different user researches can be set up and conducted. From the beginning of the project I will start looking for participants for the user research. After every research will follow an analysis that will give insights in the market and what adjustments are necessary for Tessa or the service surrounding it. Finally design sprints will be done to design the adjustments.

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

I set up this project because I'm passionate about combining design and technology in healthcare to improve the quality of life for people who are dealing with illness. More specifically, I have always been intrigued by care robots. By how they work, but also the ethics part behind it and the human-robot relation. What I love about Tessa is the way in which Tinybots has narrowed it down to the essentials. In this use case, the simplicity of it is what makes it effective. I think that is what good design is all about and I want to be a part of that.

I want to prove that:
• I am competent in analyzing a potential market and being able to point out strengths and weaknesses, but also see opportunities and threats.
• I can provide a strategy which does not only focus on the business side, but also greatly values the human-centered side. I want to learn how to find a balance in this.
• I can design and conduct good user research, can analyze outcomes, and create useful insights.

I want to focus on having a non-linear process. I have learned about this approach during both my bachelors and masters, but I have never really done it. I think in a project of this timespan I can try to implement this.

A personal ambition is to be able to manage a project like this properly. I think it will be a nice challenge for me to provide a good collaboration between the perspective of Tinybots, the TU Delft and my own.

Another personal ambition of mine is to experience a project in the setting of a real company and learning to design outside of the safe space of a fictional assignment or the safe space within a course.

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

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