

Iterative Design of a User Interface Adapted for People with Dementia

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MASTER THESIS

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Iterative Design of a User Interface Adapted for People with Dementia

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Dedication

To Olle and Lillis

Abstract

In today society people live longer and along with the rising life expectancy chronic diseases, like dementia, will become more common. The demand on more and better assistive technology, technology that ease the everyday life for the persons with dementia, will increase.

The assistive technology currently recommended by occupational therapists are mainly low-technological solutions. There exists a few applications for technological devices, like smart phones or tablets, however most of them are not adapted to people with dementia.

The goal for this master thesis was to explore which aspects need to be considered when designing a graphical user interface for persons with dementia. Then apply this knowledge when designing a prototype of a graphical user interface, divided into three stages with decreasing difficulty level, for an iPad application for the company FamilyLink.

A literature study was conducted to find the difficulties the persons with dementia might have when interacting with an interface. This was summarized in a checklist together with the results from interviews with professionals within the area of dementia. Then a user centered design approach was used to create the prototype designs in four iterations.

The prototype was evaluated with the checklist and the prototype of stage one was tested in every iteration. From the feedback given the prototype in stage one has potential, but needs to be tested more extensively. The later stages have been discussed with professionals within the field of dementia but needs to be tested properly.

Keywords: dementia, graphical user interface, testing, user centered design, assistive technology

Sammanfattning

I dagens samhälle lever människor längre och tillsammans med den ökade livslängden blir kroniska sjukdomar, som till exempel demens, allt vanligare. Kraven på fler och bättre hjälpmedel, för att underlätta vardagen för personer med demens, kommer att öka.

De nuvarande hjälpmedlen som föreskrivs av arbetsterapeuter är mer lågteknologiska lösningar. Det finns några få applikationer för tekniska enheter, som mobiltelefoner och surfplattor, men dessa är oftast inte anpassade till folk som lider av demens.

Målet för detta examensarbete var att utforska vilka aspekter man bör ta hänsyn till när man designar ett grafiskt användargränssnitt för personer med demens. Sedan applicera kunskapen vid framtagandet av en prototyp av det grafiska användargränssnittet, uppdelad i tre steg med minskande svårighetsgrad, för en iPad applikation åt företaget FamilyLink.

En litteraturstudie utfördes för att hitta de svårigheter som en person med demens kan ha när de interagerar med ett gränssnitt, detta sammanfattades sedan tillsammans med resultatet från intervjuer med experter inom demensområdet i en checklista. Sedan användes en användarcentrerad design metod för att skapa prototypen av designerna i fyra iterationer.

Prototypen utvärderades med checklistan och prototypen i steg ett testades i varje iteration. Från feedbacken visade det sig att prototypen i steg ett har potential, men fler och utförligare tester behöver utföras. De senare stegen har diskuterats med experter inom demensområdet, men behöver testas ordentligt.

Nyckelord: demens, grafiskt användargränssnitt, tester, användarcentrerad design, hjälpmedel

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Lund, June 2016

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List of acronyms, abbreviations and translations

Acronyms and abbreviations:

PWD = Person(s) With Dementia

AT = Assistive Technology

TD = Technological Devices

SOs = Significant Others

UD = Universal Design

UCD = User Centered Design

GUI = Graphical User Interface

AD = Alzheimer's Disease

VA = Visual Acuity

TP = Test Person

Translations:

Tid = Time

Kalender = Calendar

Kontakter = Contacts

Väder = Weather

Titta = Watch

Lyssna = Listen

Spela = Play

Favoriter = Favorites

Länkar = Links

Dokument = Documents

Ljudbok = Audio book

Musik = Music

1 Introduction

Today there are almost 900 million people worldwide aged 60 years or older [1]. The forecast by the year 2050 is that the number of older people in high income countries will increase with 56%. Along with the rising life expectancy and the elderly population the number of chronic diseases, like dementia, will become more common.

The estimated number of people living with dementia is 46.8 million people worldwide in 2015. In 2030 the estimated number has increased to 74.7 million, which means that the number of dementia cases will almost double in 15 years. These new estimates from the World Alzheimer Report are 12-13% higher than the estimations from 2009. In the figure 1 the increasing number of people with dementia (PWD) can be seen.

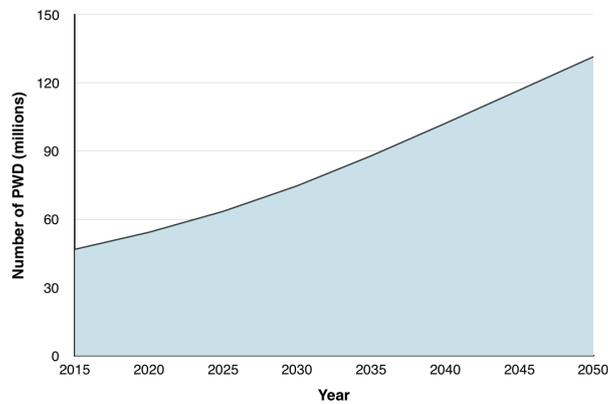


Figure 1: Figure showing the forecast increase of dementia over the years from 2015 to 2050 worldwide [1].

With the increase of the number of PWD comes an increase in the demand for new and better assistive technology (AT), devices that enable someone to carry out a task they otherwise would not be able to. Today the AT aimed at people suffering from dementia is more focused on the "ease of living" rather than focusing on the "quality of life" [2].

Table 1: A review of technologies for PWD [2].

General theme	Number of technologies	Specific purposes
Safety devices	70	Fall prevention (n = 20)
		Cooking safety (n = 12)
		General sensors (n = 2)
		Tracking/wayfinding (n = 34)
		Leak detection (n = 2)
Memory aids	58	Time orientation calendars (n = 8)
		Item locator (n = 6)
		General reminders (n = 28)
		Reminiscing aid (n = 8)
		Medication reminders (n = 8)
Preventing social isolation	37	Communication aids (n = 32)
Supporting everyday tasks	33	Artificial companions (n = 5)
		Hand/body washing aids (n = 8)
		Incontinence/toilet assistance (n = 4)
		Simple task completion (n = 19)
Clinical devices	28	Dressing undressing (n = 2)
		Music therapy (n = 14)
		Symptom monitoring (n = 11)
		Rehabilitation (n = 1)
Leisure activities	7	Doll therapy (n = 2)
		Gaming (n = 4)
Miscellaneous	71 papers	Creativity/arts (n = 3)
		Full paper not found (n = 23)
		No specific technology (n = 48)

In table 1, you can see that only 7 out of the 304 technologies or papers reviewed in the paper "A Systematic Review of Dementia Focused Assistive Technology" [2] are for leisure activities.

Many leisure activities today are dependent on being able to use a technological device (TD) like smart phones, tablets and computers. However many of the more official AT currently available, AT proscribed by the county council, as can be seen on the dementia web store homepage Octopus.se [3], is not using TD but instead more low-technological solutions are used. There are more unofficial AT in a list compiled by Hjälpmedelsinstitutet [4]. However, these applications are mostly in English and usually one application only supports one feature, for example a reminder application or a checklist application, not both. Most of the suggested applications are either designed with another cognitively impaired target group than PWD in mind or have not taken any considerations for persons with disabilities at all.

This shows the need to determine a way to develop technical AT solutions aimed at people with dementia for TD.

1.1 Purpose

To develop AT solutions for TD the part which the user uses to interact with TD needs to be adapted to PWD. This part is called graphical user interface (GUI).

In this master thesis the aim is to explore which aspects that needs to be taken into consideration when designing a GUI for people suffering from dementia and then applying this knowledge by designing a GUI for an iPad application for the company FamilyLink.

First the problems which people with dementia experience when using a GUI to interact with an TD will be explored. This information will then be used to determine how to design in a way which solves or at least take these problems into consideration. These discoveries will then be applied and tested when designing a GUI for the application aimed at PWD.

1.2 Scope

The scope of this master thesis has been limited to focusing on designing a GUI for PWD, however this also partly means taking age related problems into consideration as well.

Regarding the application, it will be a part of a bigger system consisting of, for example, a master application which can control the content in the user application. In this report the GUI for the user application, which is used by the individuals with dementia, is designed.

The GUI will consist of three different versions or stages as they are called in this report. Each stage will be adapted to the the different phases of dementia, where the first stage is easy, second stage is easier and the third stage is easiest.

The user application provides eight different features. Originally there were seven but were then expanded to eight. The features are:

”**Tid**” - displays time and date.

”**Kalender**” - displays the activities planned in a calendar.

”**Kontakta**” - contains information about and ways to contact relatives and friends. This feature was originally called ”Kontakter”.

”**Väder**” - displays the weather and temperature. This feature was originally a part of ”Tid”.

”**Titta**” - contains albums with images, videos and texts.

”**Lyssna**” - allows the user to listen to music, radio and audiobooks.

”**Spela**” - allows the user to play games.

”**Favoriter**” - allows the user to quickly access external applications. This feature was originally called ”Länkar” and it’s functionality differed.

1.3 Disposition

This report is divided into five main parts.

Theory and Interviews: This part is the result of the literature study. Reports and articles were used to gather this information.

Method: This part describes the steps taken after the literature study. First Interviews and the checklist, then the design process.

Iterations: This part describes each iteration of the design process.

Result, Discussion and Conclusion: In this part the final prototype, created in the iterations, will be presented and discussed.

Appendix: This part contains texts and documents produced during this master thesis. For example, interview and test transcripts.

2 Theory

This section will consist of the information gathered during the literature study. First the dementia will be explored. This will then be followed by general design principles for designing an interface and then findings regarding design found during studies performed with people suffering from dementia. The theory section will be rounded off with a shorter section describing User Centered Design which will be the base for the design process used to develop the GUI.

2.1 Dementia

When designing for a special target group it is important to know as much as possible about the group. This becomes especially important in this case since dementia changes the user's behavior and through this how the user interacts with an interface.

Dementia is a generic term for different symptoms that are caused by brain damage. The diseases can be divided into three main groups: Primary degenerative illnesses, Vascular illnesses and Secondary illnesses [5].

Primary degenerative illness: The dementia illness is caused by the increased pace the brain cells dies. The primary degenerative diseases usually effect the person gradually. There is nothing to be done to slow this process. The most common dementia disease is Alzheimer disease. Between 60 to 70 percent of the dementia patients have Alzheimer.

Vascular illness: The Vascular diseases are caused by thrombosis or bleedings that block the oxygen feed to the brain. In contrast to the primary degenerative diseases the Vascular diseases often appear suddenly, usually after a stroke. The Vascular illness is about 20 to 30 percent of all dementia cases.

Secondary illness: The Secondary diseases are illnesses and damages that can lead to dementia, but not in all cases. There exists about seventy different

diseases that can lead to dementia, for example the sexually transmitted diseases syphilis and HIV.[5]

The progress of dementia is usually divided into three phases: mild, moderate and severe dementia [5].

Mild dementia: The symptoms are now obvious, however with some assistance from the significant others (SOs) the people with dementia can still manage the everyday tasks.

Moderate dementia: The symptoms are now affecting the PWD to such extent that the PWD needs daily assistance. This usually means that assistance needs to come from public health care and welfare.

Severe dementia: The person suffering from dementia is now in need of extensive care and cannot be left unattended. A special home is therefore necessary.

Depending on which part of the brain that is targeted the disease expose itself in different ways. A summary of how the dementia affects the PWD in the different phases can be seen in table 2. The symptoms can be divided into four categories: cognitive, psychological, behavioral and physical symptoms [5].

2.1.1 Cognitive Symptoms

The cognitive symptoms are the symptoms which are connected to our thinking and intelligence. Examples of these are:

Memory loss makes it hard for the people with dementia to remember new information. For example whether the person ate lunch an hour ago or not.

Ability to act , in other words to figure out, plan and execute an action, is also affected.

Orientation includes finding places and orientation in both time and space. As the dementia progresses conception of time gets distorted enough to make it hard to tell day from night. It also gets harder for the PWD to navigate his or her body, i.e. the risk of falling or missing the chair when trying to sit down increases.

Speech works fine in the early stages of dementia but then it gradually deteriorates and it gets harder for the person with dementia to keep on track of the line of the conversation.

Concentration gets more difficult as the dementia progresses. It has been described by a PWD as "losing your way in your mind while thinking".

When the dementia reaches a more advanced stage, previously mentioned problems which just made everyday things a bit harder, have now been made more or less impossible [5]. They are then known as:

Apraxia is the inability to remember how everyday tasks are performed.

Agnosia is the inability to interpret sensory impression like taste, smell, sight, hearing and touch.

Aphasia is the inability to understand and express yourself in speech.

Anomia is the inability to remember the names of ordinary objects.

2.1.2 Psychological symptoms

The psychological symptoms are related to the person's state of mind. Here follows some examples [5]:

Confusion When a person has a sudden change in behavior and show sign of worry, aggression or hallucinations. Confusion is usually caused by a change in the affected person's routine.

Psychotic state is a state which is usually characterized by delusions and hallucinations.

Aggression can be both physical and verbal. The cause for the aggression can vary from pain and depression to agnosia.

Depression and anxiety needs to be treated as soon as they are discovered. Depression is very common among PWD. Usually the depression is treated with anti-depressive medicines. Sometimes the anxiety is caused by the depression, then it will ease when the depression is treated.

2.1.3 Behavioral symptoms

The behavioral symptoms usually show in the moderate phase of dementia. Here follows some symptoms [5]:

Wandering is when the a person with dementia walks around and have a hard time settling down. As long as the security aspects are considered there is no need to try to stop the wandering.

Picking is when the person suffering from dementia picks up items and the forgets where the items were left. This is usually frustrating both for the PWD and the people in the surroundings since items get lost on a regular basis.

Repeating is when an action is repeated multiple times, for example opening and closing doors. These repeating behaviors are usually hard to stop through corrections. Usually a distraction is necessary.

Screaming and shouting are one of the hardest symptoms to handle. These behaviors can be caused by pain, anxiety and sometimes epileptic seizures. It is important to quickly identify the reason.

Table 2: Table showing the three different phases of dementia. In every phase the different effects on the PWD are listed. The table is based on the book "Vård och omsorg vid demenssjukdom" [6] and the interview with Wilhelmina Hoffman, see appendix C.

	Phase 1 Mild dementia (0 - 3 years)	Phase 2 Moderate dementia (3 - 6 years)	Phase 3 Severe dementia (6 - 9 years)
Cognitive functions	Learning Executive abilities Problem solving Make decisions Find the right words	Short-time memory Contribution Orientation in time, surroundings Agnosi	Language Attention Apraxia Concentration
Activities of daily living (ADL) functions	Memory Work ability Drive a car Grocery shopping	Ability to handle money Cooking Hobbies Ability to be independent	Getting dressed Ability to walk Incontinence
Behavior	Apathy Anxiety Irritation Depression	Hallucinations Restlessness Physical/Verbal aggression Wandering Sleeping problems Suspiciousness	Impaired inputs control Aggressive outbreaks

There is currently no cure to these dementia diseases [7]. However there are specially designed technology which have been developed to ease the every day struggle for the persons with dementia [7]. Most of the assistive technologies (ATs) are developed to help PWD to lead an independent life and is not focused on increasing their quality of life. The few ATs which do aim to increase the quality of life are either hard to use or not aesthetically appealing to the intended user. To create user friendly and aesthetic designs there are some general design principles.

2.2 General design principles

To start off there are established design principles for designing products and interfaces for the general user. These principles makes the design easy to understand and use. For example there are eight Golden Rules of interface design which are rules defined by Ben Shneiderman. These principles are applicable to most systems [8].

1. Strive for consistency

An interface should strive for consistency. This applies to all the different aspects of an interface. The terminology used should be identical through menus and help screens. Color, layout and text fonts should also strive to be consistent across the whole interface [8]. This will make the interface more coherent and makes it easy for the user to recognize.

2. Cater to universal usability

The design should fit all different multitudes of human abilities, novices, experts, people with disabilities etc [8]. Which means that it should also fit people with dementia.

3. **Offer informative feedback**

Every action performed by the user should result in some form of feedback. The impact of the feedback should correspond to the frequency of the action. Common actions result in subtle feedback and uncommon action results in more prominent feedback [8].

4. **Design dialogs to yield closure**

If an action consists of several sequences then it should have a clear start, middle and end [8].

5. **Prevent errors**

A system should be designed in such a way that the user cannot make any serious errors [8].

6. **Permit easy reversal of actions**

In the extent possible, actions should be reversible [8].

7. **Support internal locus of control**

Allow the user to feel a sense of control of the interface. Avoid changing established behaviors, extensive data-entries, difficulty in accessing necessary information and producing the desired result [8].

8. **Reduce short-term memory load**

Avoid designing an interface which requires the user to remember larger amount of information [8].

These rules can be complemented with some of Don Norman's Fundamental Design Principles [9]:

9. **Discoverability**

It should be possible to determine what actions are possible and which state the system is currently in [9].

10. **Conceptual model**

A good conceptual model should be used to give the user a general understanding of the system. A conceptual model is a very simple explanation of how a system works. A good conceptual model makes the system easier to use for the user. For example computers give the impression that files and documents are stored in folders in the computer. This however is just a conceptual model, the computer does not actually have any folders [9].

11. **Affordances**

Affordances should be used to immediately inform the user how the object can be used. An affordance is the relationship between an object's properties and capabilities of the agent (the user). This relationship determines how the object can be used. For example a chair "is for" sitting or a chair "affords" sitting [9].

12. **Signifiers**

Signifiers should be used to make the interaction with the object as understandable as possible for the user. Signifiers are closely related to affordances. While affordances describes what actions can be performed with an object, signifiers describes where the action should take place [9].

13. Constraints

Constraints should be used to help the user see which actions are possible. Constraints can be divided into four groups, physical, cultural, semantic and logical. Physical constraints are simply a design which physically prevents other actions than the desired action. For example a large peg cannot fit into a small hole.

Cultural constraints are the sets of rules which decides which actions are allowed in a certain culture. An example of this is that on a vehicle the red light should be on the rear and the white light should be on the front.

Semantic constraints are the constraints created by our knowledge of the situation. An example of this is that the only reasonable place to sit on a bicycle to ride it is on the saddle.

Logical constraints are the constraints derived from logical reasoning. For example, if all the pieces of a puzzle, but one piece, has been placed. Then there is logically only one spot where the last piece will fit [9].

14. Mappings

Good mappings should be used to make it easy for the user to navigate in the interface. Mapping is used when designing and making the layout of controls and displays for a system. Mappings are the connections between controls and functions. For example principles from Gestalt psychology can be used to map controls to functions. An example of a Gestalt principle is that related controls should be placed together in a group. Gestalt principles will be explored further in section 2.2.1 below.

Spatial analogies can also be used for mappings. These mappings are usually referred to as natural mappings. An example of this is if you wish to move an object upwards you should move the control upwards [9].

Finally a short mention of how users view an interface:

16. F-shape

When a human wants to gain an overview of for example a webpage the eyes scan the webpage in an F-shape pattern [10]. First the content of the top of the page is scanned from left to right and then that process is repeated a bit further down and finally only the left side of the page is scanned.

This means that the top and the left side is given the most attention and therefore the important information should be placed there.

2.2.1 Gestalt principles of form perception

As mentioned above gestalt principles, which originate from gestalt psychology, can be used for mapping. Gestalt psychology aim to describe the psychological phenomenon which views individual parts as an organized and structured whole [11]. From the investigations on this subject the gestalt laws of perceptual organization were introduced. These laws helps to create uniformed designs that people easily understands.

The law of proximity describes the association between individual elements that are close to each other[12]. This phenomenon can be observed in figure 2, where the individual dots can be grouped in four vertical columns. This occurs because the horizontal spaces are greater than the vertical, therefore the eye organizes the dots in four column groups.

The law of similarity observes the grouping that occurs when individual elements share basic visual characteristics like shape, color, texture or orientation [12]. In the figure 2 the phenomenon can be seen. The individual dots can be divided into two groups with two rows each, one including the gray circles and one including the pink dots. This occur even if the spacing is the same as for the proximity image, hence objects that are similar are usually seen as a unit [11].

The law of continuity describes the preferred form of continuity and unbroken contours, instead of more complex or irregular forms. For example the two lines in figure 2 are seen as two crossing lines rather than four smaller connected lines.



Figure 2: The gestalt grouping phenomena: a) Proximity, b) Similarity, c) Continuity.

The law of closure describes how humans interpret visual images as complete and closed figures when some of the contour information is missing [12]. This can easily be seen in the figure 3, where a triangle and three circles can be seen even if these objects are technically not present.

The law of figure-ground is a phenomenon where some object in an image take a more prominent part and others fade into the background [11]. The visual field can be divided into two parts, the figures and the ground. An example can be seen in figure 3, where the small rectangle is seen as the figure and the larger rectangle is interpreted as the background [12]. This phenomenon is usually used when a logo is created[11].

The law of symmetry describes how we perceive and group objects based on the distinct form of the object instead of the characteristics of the smaller parts of the object [12]. The more alike the objects are, the more likely it is for them to be grouped [11]. In the figure 3 the image is showing two overlapping diamonds rather than three objects [12].

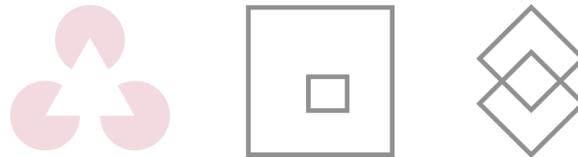


Figure 3: The gestalt phenomena: a) Closure, b) Figure-ground, c) Symmetry.

Although all these principles are important the principle *Cater to universal usability* is especially important in the case of designing a graphical user interface (GUI) for people suffering from dementia. Therefore there is a need to further explore how to design an interface so that it fits PWD.

2.2.2 Universal Design

The universal design (UD) principles are set as guidelines to make products meet the needs of a wide diverseness of people, for example PWD or people with other disabilities. UD are principles that can be applied to any product or environment under development [13]. There are some similarities between the UD and the previously mentioned principles, however the UD specifies the principles a bit differently with more focus on the diverseness.

The seven principles of the universal design are [14]:

Equitable Use: The design is useful and marketable to people with diverse abilities.

Flexibility in Use: The design accommodates a wide range of individual preferences and abilities.

Simple and Intuitive Use: Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.

Perceptible Information: The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.

Tolerance for Error: The design minimizes hazards and the adverse consequences of accidental or unintended actions.

Low Physical Effort: The design can be used efficiently, comfortably, and with a minimum of fatigue.

Size and Space for Approach and Use: Appropriate size and space is provided for approach, reach, manipulation, and use regardless of the user's body size, posture, or mobility.

These principles are aimed at a much larger group than the intended target group in this report. Therefore it is important to explore design principles which specifically applies to people with dementia.

2.3 Special design considerations for dementia

By researching reports and articles where designs have been made for people with dementia, several findings have been made which should be taken into consideration when designing for PWD.

2.3.1 Simplicity

First, the interface needs to be simple. When a person suffers from dementia several cognitive areas are affected. The areas that are affected are attention, executive function, memory, verbal and/or loss of the sense of orientation in the environment by the vision(visuospatial function). This means that the patient can have troubles with coping with many different things that needs attention. For example finding the emergency number among other phone-numbers [15].

Because of this it is important that the product and the design of the product is clear and simple [7].

2.3.2 Health and lifestyle

The design can also affect the health and lifestyle of the PWD. There are doubts concerning new products when it comes to the dementia patients health and lifestyle. Significant others (SOs) of the people with dementia often fear that a new product might provide too much assistance or be too simple and that this would lead to a decrease in the PWD's cognitive abilities [7]. This should therefore be avoided.

It is also considered important that a new product can stimulate activity or provide meaningful pastime for the person suffering from dementia [7].

2.3.3 Self-image

Designing a product in good way can strengthen the user's self-image since the product can make it possible for them to continue using everyday technology. This is also important for the SOs. This is one of many reasons to develop new products which can assist the people suffering from dementia [7].

However, technology can also affect the self-image of PWD in a negative way and through this create a negative attitude towards the product. For example if the product's GUI have the feel that it is developed for a disabled person [15].

Therefore it is very important that a GUI designed for a person with dementia is not only easy to use but aesthetic appealing as well [15].

2.3.4 Integration into existing habits

It is hard for the patient to learn new things, but at the same time it is nearly impossible to design technology which does not require any kind of learning [15]. However the learning can be made easier by using previous knowledge [7].

The best way to use previous knowledge according to SOs, is if the new technology utilize existing habits which are associated with similar technology as a way for the patient to learn how to use the product. Then habits associated with that technology can be used to simplify the interaction with the new product [7].

Optimally the new technology should be flexible and should be able to adapt to every unique patient's needs and habits [7].

2.3.5 Actions

To interact with AT, specially technical, some kind of action or sequence of actions are required. The hardest actions for a person suffering from dementia to complete are to receive and understand spoken instructions and follow them. Technology which proves to be hard for PWD to use turns out to require that several actions are performed in a predetermined order. This should therefore be avoided. Especially when combined with complex feedback [16].

On the other hand the actions which were considered easy, were for example to move a button or wheel in the right direction. Especially combined with clear feedback [16].

2.3.6 Usability

According to SOs the people suffering from dementia could use well known and integrated technology relatively well. However there are several examples of technology which do not work for the patients. This even though the dementia patients may have had a lot of previous experience of the technology [7]. This means that depending completely on existing habits are not sufficient.

This makes it very important that the technology have high usability to make it useful for PWD. Otherwise there will be a risk that people with dementia will not use the product. Especially if they feel that they lack the understanding of the new technology. A complex interface will increase this risk [7].

2.3.7 Personalization

Personalization in the sense of adding personal images to the product can have both a positive and negative effect depending on the person using the product. If the dementia is relatively mild it can have the advantage of promoting reminiscence for a person with dementia. However, if the dementia is more severe the reminiscence might fail. The patients might not recognize SOs or even themselves. This can cause distress for both patients and SOs [17]. Therefore personalization should be done with caution.

2.3.8 Physical aspects

The dementia disease is most likely to affect elderly people. It is highly possible that the person with dementia have age-related problems like vision, hearing and/or fine motor impairments. These elements are important to take into consideration when the GUI is created. The style of the text and buttons should be large and the sound clear of any noise. To make the interface more personally adapted, it can be a good idea to make some of the elements in the GUI adjustable by the SOs [15].

2.3.9 Vision impairment

Vision impairment is considered to be a natural result of aging. However, according to R. Armstrong's review of the studies concerning specifically Alzheimer's disease (AD) and the eye [18] there are studies suggesting that AD can affect the vision.

Visual Acuity

In the review it has been concluded that several studies have shown that Visual Acuity (VA) is common in the early stages of AD. However, another study shows that there is no significant difference in VA between people with AD and a control group not suffering from AD [19]. Apart from this there is also a study mentioned in the review suggesting that the VA is reduced when the contrast is reduced. Thus it can be assumed that text which is large enough for an elderly person without dementia should be sufficient for a person with dementia.

Contrast Sensitivity

Regarding contrast sensitivity the review raises the subject that there are some contradictory results from the studies. However, the majority of the studies have suggested that the contrast sensitivity is affected by AD. This is further strengthened by a study on vision in aging and dementia where the test group with AD was compared not only to a healthy age-matched group, but also a group suffering from other types of dementia [20]. This study showed that people suffering from AD have significantly poorer contrast sensitivity compared to the other test groups. Thus it would be recommended to work with high contrast levels when designing a GUI.

Color Vision

The subject of whether AD affects color vision or not is controversial. According to the review some studies suggest that up to 50% of the participants suffer from a deficient color vision while another study suggests that the participants have normal color vision.

One study showed that there was no difference in color vision between people with AD and other dementia or the healthy age-matched group [20]. However these three groups had a significantly degenerated color vision compared to the young test group.

Another study reached several conclusions regarding age related color vision degeneration [21]. In the study they concluded that the combination of desaturated colors, especially red/purple and blue/green in general should be avoided and that red hues should be used to highlight important information. Thus it is reasonable to assume that these conclusions are applicable on people with dementia as well.

2.3.10 Color psychology

There are no dedicated studies to how colors affect the PWD's state of mind. However there have been research done on people without dementia which show that colors carry different meanings and that color can influence human cognition and behavior in achievement. However, the effect the colors have is dependent on the context [22]. For example, in sport red is associated with aggressiveness and dominance[23], while in color of ones face red is associated with health and attractiveness [24]. Assuming that colors affect a person with dementia in a similar fashion the results from these studies can still be used.

Red

There is strong evidence that the color red has a negative effect on performance. This is believed to be rooted in that red is associated with danger and failure. This in turn causes avoidance motivation in the context of challenging tasks requiring flexibility and manipulation [25].

Green

However green has a more positive effect. According to research there is a strong support for the theory that green has a positive effect on creativity [26]. Green has also been linked to calmness [27].

Blue and purple

Blue, similar to green, has been linked to calmness, low anxiety levels, comfortable and soothing [27]. Suggestions has been made that green and blue can have a positive effect on performance [22]. Purple can also associated with calmness and passivity[27].

Black and white

A small study suggests that black is strongly connected with negative feelings. Black is seen as a symbol of evil, malice and death. White was on the other hand viewed as an opposite of black [27].

2.3.11 Time

The sense of time is an important aspect which is affected by dementia. When it comes to entertainment like videos and music the length of the material can be used to achieve different results. The longer the materials are the higher possibility of deeper immersion. Where immersion refers to dreaming themselves away, for example, into a movie. [17].

2.3.12 Animations

Feedback is one of the most important design principles. For a person suffering from dementia, who has problems with remembering recent events, a continuous feedback in form of an animation can be useful.

In a study designing a conversation tool for PWD it was concluded that simple animations can provide feedback to the user, for example a small animation indicating that music is being played by the system. Apart from informing the user that the system is active, the animation also works as an indicator which tells the user where the music is coming from. This can prove very useful for people whose orientation and perception has been affected by dementia [17].

2.3.13 Music

The sense of music is one of the two senses not to be changed during the dementia stages, the other one being the color sense, see appendix C. The research has shown that music can affect a PWD in different ways[28].

Physical Stimulate the heart and brain, pulse, breathing and the hormone balance. Gives motivation to move and increases the motor activity and balance.

Psychological Capture the attention of the individuals with dementia and make them more aware of their surroundings. Give the persons with dementia a sense of identity. Music can also reduce the feeling of anxiety and depression.

Social Stimulate the interaction and the communication. Makes it easier to make contact with other people and reduce the feeling of isolation and loneliness. Creates a harmonic and positive environment

Cognitive Stimulates memories and speech. Can help the PWD to understand associations and open the possibilities for meaningful conversations.

Spiritual Offers a way to give hope, comfort and to ease existential worries.

Music can be used for different purposes, to encourage movement or to calm someone who suffers from dementia. The music should trigger feelings and recognition with the PWD, it is therefore important to adapt the music to the background and the taste of the individual.

2.4 Uncontrolled circumstances

There are many circumstances around a product which can affect how it is received by people with dementia. Many of these circumstances are outside the scope of the design process and hard to influence so that the product can perform in the best way possible. These circumstances are therefore classified as uncontrolled from this master thesis point of view. However, these circumstances should be noted since they have been discovered in previous studies involving PWD.

2.4.0.1 Introduction of the product

When and how a new technology is introduced can greatly affect how it is received. For example introducing the technology in the early phases of dementia makes it easier for the user with dementia to learn how to use it [15]. The product needs to be introduced in way which does not put any pressure on the dementia patient to embrace the product, otherwise they might reject it [7].

2.4.0.2 The effect of SOs attitude

The motivation and effort for the person with dementia to learn and use new technology is not only dependent on the PWD but also the people in the vicinity. In the study "Users' and professionals' contributions in the process of designing an easy-to-use videophone for people with dementia" [29], the people around the individuals with dementia have a large impact on the success of introducing new technology to the PWD. For example if the therapists who prescribe new technology to the people with dementia are unsure of how the technology works, he or she will not recommend it to the PWD even if it could be helpful [29].

The significant others engagement in introducing the person with dementia to the new technology is also essential for the PWD to learn new things. Therefore it is important that all people in the vicinity of the person with dementia is positive to new AT. If the SOs and the professionals have divided thoughts of what is best for the PWD regarding technology, the learning process can be suffering [29].

2.4.0.3 Perceived need

The SOs of the people with dementia claim that the PWD need to experience a need in the present for the new technology to be able to accept it [7]. It is therefore important that the new product serves a specific purpose for the target user.

2.4.0.4 Trial time

It has happened that the dementia patient find ways to use the technology in a way which was not originally intended. It is therefore important to give the patient time to explore the new technology and discover in which different ways it can be used [7].

2.5 User Centered Design

Researching the target group is an important part of creating a design. However to make sure that the design actually fulfills the target group's needs the design needs to be tested. To achieve this the use of User Centered Design (UCD) is usually recommended.

UCD is a wide term which describes the design process where the end-users influence the design during the process [30]. The users can be involved in different stages and levels of the design, but it is important that they are involved in one way or another. By following this process the end-result will be something the user wants and that meets their requirements.

In 2010 the International Organization for Standardization (ISO) published the ISO standard ISO 9241-210 Human-centered design for interactive systems [31]. The standard aims to help the persons designing the products to design usable and useful products that meet the need and requirements. This is done by applying human factors and knowledge and techniques about usability in the design process. In the figure 4 there is an illustration of the UCD process [32]. The illustration is based on the ISO 13407 from 1999, however the standard has not changed much since then [31].

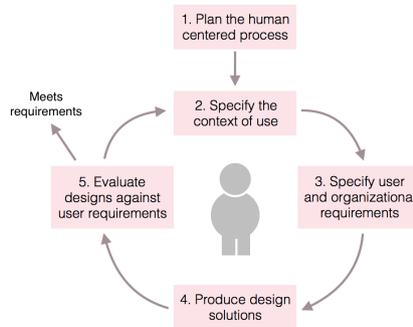


Figure 4: Showing the UCD process, based on the ISO 13407.

In figure 4 the first step is to create a plan for which methods are going to be used in the different stages of the development of the product [32]. Then the iterative cycle starts with specifying the context in which the product is being used which will be used when the requirements of the product is specified. After that the design is implemented, first as a lo-fi prototype which will evolve in every iteration step. In every iteration the design is evaluated against the requirements specifications. If the requirements in not met the iterations continue. The iteration stops when the requirements are met.

3 Method

This section describes how all the information was gathered, used, applied and tested through designing a GUI.

3.1 Design Process

To secure that the prototype fulfilled the requirements of the users, the UCD process was used. The UCD process was modified to make it work with this project. See figure 5 for an illustration of the process used in this project.

Step 1 and 2 were preparatory steps to gain knowledge about dementia in form of a literature study and interviews and then finally summarize it in a checklist.

This knowledge together with the requirements from the company was then used to develop the prototype in an iterative process. The iterative process consists of two phases, the design phase and the test phase. These phases are described in more detail in section 3.7 and 3.8.

The design phase consisted of step 3 and 4. First the design was evaluated, against a checklist produced from the information acquired in the literature study and from the interviews. When the design passed this step the design was tested with a test group in step 5, depending on these tests and the feedback the design passed through step 3 and 4 again. Finally the design was discussed with professionals within field of dementia, step 6. The design was then updated again.

In this iterative process new features were added after the previous features had been tested. Thus all iterations except for the first and final iteration consisted of working on both creating new designs for new features and updating the designs of the previous features.

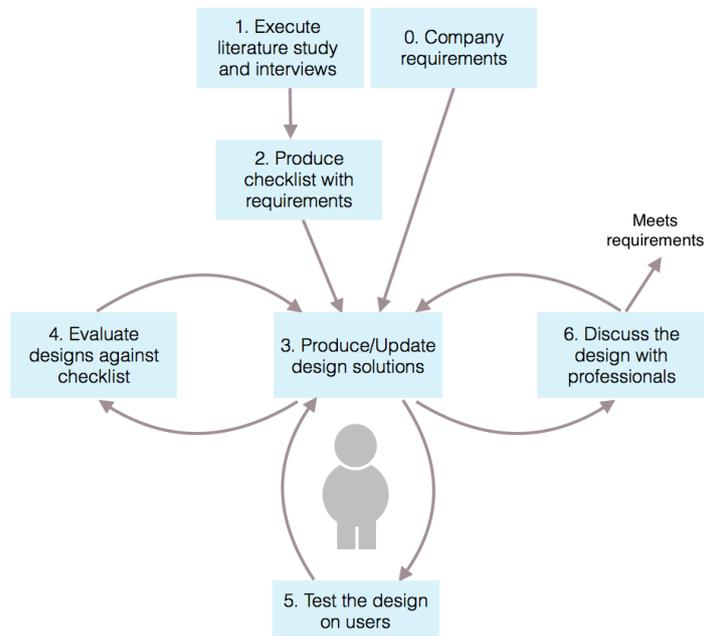


Figure 5: An illustration based on the UCD process changed to fit into our project.

3.2 Participants

In this section all participants in this project are described.

3.2.1 Project group

The project group consisted of two people who also are the authors of this report. Both study computer engineering at the technical faculty of Lund University, with focus on graphics and interaction design.

3.2.2 Interviewees

In the interviews two occupational therapists from Demensförbundet, Charlotta Olofsson and Catharina Montgomery were interviewed. Occupational therapists are people who work with assistive aids and have contact with PWD. Furthermore the CEO of Demenscentrum and the president of the foundation Silviahemmet, Wilhelmina Hoffman and finally Margareta Skog, MD in neuroscience and author of several books on dementia, were interviewed. These people were recommended to the authors by the company FamilyLink AB.

3.2.3 Test subjects

In all iterations except the last a group of six elderly participated in the tests. These persons were recruited through personal contacts. They were asked to participate because they lived in the area and were healthy and could therefore

easily express their opinions. This group's ages range from 65-75 years.

For the last iteration a group of four people with mild dementia in Stockholm took part in the test. The ages of the PWD were estimated to be 50-65 years. This group was a support group for people suffer from dementia. Charlotta Olofsson offered to ask the group if they were willing to help with testing the prototype.

In addition two elderly living at a home also participated in the test. The ages of the people participated in this test session were not provided. However the ages of the two elderly were estimated to 70-90 years. These test persons were provided by the CEO of FamilyLink.

In figure 6 the distribution of the sexes of the test subjects can be seen.

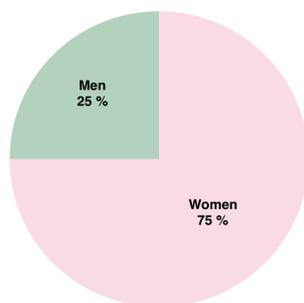


Figure 6: The distribution of male and female test subjects.

3.3 Tools

To create the designs and to test them, four tools have been used. These tools can be found in the list below.

Pages A word processor. Used to create prototypes fast. Only used in iteration one.

Adobe Illustrator A vector graphics editor. Used to create the designs. Used from iteration one.

InVision A test tool. Used to make the prototype interactive and perform test on prototypes. Only used in iteration one.

Proto.io A test tool. Used to make the prototype interactive perform test on prototypes. Used from iteration two.

Smart phone Used to record the interviews.

3.4 Literature study

The literature study was used to gain as much knowledge about dementia and designing products for PWD as possible. The main source for these reports was Google Scholar. Some material in form of books and shorter booklets were

recommended by the interviewees.

While sorting through the material found relevant, the information was continuously included in the theory section of this report.

3.5 Interviews

As a complement to the information gathered in the literature study four semi-structured interviews were conducted with prominent people within the field of dementia in Sweden [33]. Thus predetermined questions were used, however questions were sometimes modified or explanations added to provide better flow in the interviews. Questions were also sometimes omitted depending on if they were deemed to be inappropriate or unnecessary for a particular interviewee.

The interviews were held in the offices belonging to the interviewees and lasted between 1 hour and 1 $\frac{1}{2}$ hour. The interview consisted of 12 questions. These questions were however not followed rigorously, but used as guidelines. The questions can be found in appendix B.

The interviews were recorded. The reason for this was to avoid missing any details and make it easier to focus on making the interview as flexible and relaxed as possible. After the interviews were completed the recordings were summarized. These four summaries were then sent through e-mail to the interviewees to give them a chance to confirm the summary. The summaries can be found in appendix C. The main result of the interviews can be found in a later section, see section 4.

3.6 Checklist

The result of the literature study and the interviews were summarized and the important design concepts were picked out and summarized in a checklist. The most important points from the checklist can be found in the result section for the literature study and interviews, see section 5. The checklist in its complete form can be found in appendix A.

The checklist consists of three different parts, general design guidelines, specific guidelines for dementia and guidelines from the NavMem project[34], which to follow when creating a design for persons suffer from dementia. The checklist was created to make sure the information gathered would be taken into account when designing the interface.

Most of the general guidelines are concepts developed by Ben Schneiderman [8] and Don Norman [9], see section 2.2. These guidelines are considered to be good practice and are good to be kept in mind when creating user friendly designs.

For the specific guidelines for persons with dementia the guidelines have been taken from articles on the subject of design and dementia and from the interviews with professionals within the field of dementia, see section 2.3 and appendix C. This part of the checklist was divided into subsections, to easily

get an overview over the concepts.

The NavMem guidelines in appendix A.3 are a selection of the guidelines from the NavMem project, and were taken from a user requirement list where a navigation device was developed mainly for people who has suffered a stroke, but also partly for people with dementia [34]. The requirements from NavMem's guidelines which were considered applicable to this project were sorted out. Some of the requirements added partly overlap with previously mentioned principles in the checklist, however they were still considered worth mentioning.

The checklist was then integrated into the design process, see section 3.1, by comparing the lo-fi prototypes with the concepts in the checklist. It was also kept in mind when designing the hi-fi prototypes.

3.7 Design phase

In this section the general outline for the design phases are described. During the design phase the prototype was created and in later iterations also updated. The design phase for each iteration is described in the section for each iteration. The design phase consists of three main parts: brainstorming, low-fidelity prototyping and high-fidelity prototyping.

3.7.1 Brainstorming

In general brainstorming is when a group of people have a session where as many ideas as possible are generated [35]. Usually brainstorming is done by writing down ideas on post-it notes.

However to fit this project drawings with pen and paper were made instead of notes on post-it notes. This made the brainstorming sessions blend easily with the low-fidelity prototyping. The brainstorming sessions were conducted by the project group.

3.7.2 Low-fidelity Prototype

Low-fidelity prototype, usually referred to as lo-fi prototype, is a early design of a product [35]. A lo-fi prototype is typically made in a way which is far from the finished product, for example with pen and paper. By separating the lo-fi prototype from the constraints of what is technically possible, new ideas can be explored.

In this project the lo-fi prototyping was combined with the brainstorming. This was done because the drawings made in the brainstorming session naturally became lo-fi prototypes.

To determine which ideas realized as lo-fi prototypes were most suitable, the different prototypes were critically discussed among the authors. The points in the checklist were used to motivate whether a certain lo-fi prototype should be kept for hi-fi prototyping or be discarded.

3.7.3 High-fidelity Prototype

High-fidelity prototype, also known as hi-fi prototype, is a prototype which is similar to the finished product in appearance [36]. However the functionality does not necessarily need to correspond to the finished product. Hi-fi prototypes can be used to test the usability of the future product.

In this project the hi-fi prototypes were created based on the best lo-fi prototypes. While designing the hi-fi prototypes the points in the checklist were kept in mind.

The hi-fi prototypes were mainly created with Illustrator. In the beginning some of the hi-fi prototypes were made with Pages.

To be able to test the hi-fi prototype the prototype was made interactive by using a prototyping tool. First inVision was tried, however it did not support all the interactions needed. Therefore Proto.io was used instead.

The interactive prototype was then used in the test sessions.

3.8 Test phase

The test phase consists of two parts, the tests with the test group and the discussions with professionals within the field of dementia.

The final evaluation was discussions about the design with professionals within the field of dementia, see step 6 in figure 5.

3.8.1 Test session

The test sessions were used to identify design problems within the prototype and to further ensure that the prototype fits the target group. These tests were step 5 in the modified UCD process, see figure 5.

The test session consisted of two stages. First the test person (TP) tested the hi-fi prototype. The TP was then asked to perform several scenarios. Each scenario mainly consisted of navigating the GUI.

The second stage consisted of a short interview, with questions regarding the prototype. This stage was also at one time used to confirm a design choice made. This was done by showing the TP two alternative designs and the TP was then asked to explain which design was the best and why.

Each iteration of the test phase is described in the iteration sections.

In preparation for the test sessions a test plan, a test agreement, scenarios and interview questions were created.

Test plan: In the test plan the whole test is structured, from the purpose of the test to the test setup. This helped to make the test, when performed

with different test subjects, as equally executed as possible. This is important when analyzing the tests. The test plan can be seen in appendix D.

Test agreement: An agreement explaining to the test subject that the test session was to be recorded and how the information gathered was to be used. The test subject had to agree on this before the session could be carried out. Sometimes this was done in writing and sometimes orally. The agreement can be found in appendix E.

Scenarios The scenarios provided instructions to the test subject on how a certain task was to be executed. The scenarios were updated in every iteration, in appendix F all scenarios can be found.

Interview questions (Debriefing) Interview questions that were used to take up the difficulties and feelings from the test session. The interview gave qualitative data.

3.8.1.1 Test groups

The recommended number of TP to use in a usability test is five if the purpose is to find errors [37]. Five TP will find almost as many usability problems as if using larger test groups. Therefore the goal was to use at least five TP in our tests.

3.8.2 Discussions with professionals

The design discussions were performed with two occupational therapists. The discussions were performed with one therapist at a time. The latest available design was shown and the therapists gave their opinions on the prototype and also suggested improvements.

3.9 Ethical considerations

Here the ethical considerations taken are described.

3.9.1 Test persons

To make sure that the test persons are aware of what they were participating in a short description of the master thesis was provided orally.

To preserve the anonymity of test persons the recordings of the test sessions were only listened to by the authors of this report. The results of their tests are also anonymized.

During the tests with our test subjects it was made very clear that any problems or errors which might occur was not their fault and that it was only beneficial to the project if they found any. This to avoid the TP being discouraged by possible errors.

In addition to this any time pressure was avoided during the test with the PWD. This since time pressure can be especially stressful for people with dementia.

3.9.2 Interviewees

To make sure that the interviewees were aware of what they were participating in a short description of the master thesis was provided orally. They were also informed that the information they provided would be used in this report.

To give the interviewees a chance to confirm that the information gathered reflects their view of the interview, a summary of their interview was sent to them. Thus they were able to review the summary before it was included in the report.

3.10 Division of work

The majority of the work was carried out by the project group as a whole. In the few cases where this was not possible, regular contact was held within the group. When it comes to the report, the work was divided, but the other party was usually involved in discussing possible formulations and helped reading through the text.

4 Interview summaries

Here follows the main information gathered from the interviews with the professionals in the field of dementia.

4.0.1 Person with dementia using a tablet

The usage of tablets can give positive effects on PWD. This by giving the person a chance to be independent by using an application of their choice. The tablet can also be used to start a conversation, for example by watching images together with a relative. For a person with dementia to be able to use a tablet he or she needs to practice and learn during a longer period of time. Because the tablets are used by everybody the persons using it as an aid will not be embarrassed to use it in their everyday life.

4.0.2 Assistive Technology

For the assistive technology to be of any use for the person with dementia the aids must be introduced in the early stage of dementia. If they are introduced too late it will be too complicated for the person with dementia to understand. The most common assistive technology are reminder aids. Today it is still popular to use low technology aids, for example paper calendars. However, the occupational therapists think that more technical aids will be used by the next generation that have more experience with technology.

4.0.3 Design of a graphical user interface

Here follows some points to think about when designing a GUI for a person with dementia.

- Use strong contrast between colors.
- Not using images as background.
- Avoid scroll or similar functions where information disappear.
- Combine images with text.
- Simple icons.
- Do not show too much information in one screen.
- Avoid abstract patterns.
- Avoid similar colors on background and buttons.
- Red and green are the colors which the PWD can see best even in the later stages of dementia.

5 Guidelines resulting from the literature study and the interviews

All the information gathered in the literature study and the interviews were summarized into a checklist. Here follows the part of the checklist with design guidelines specific to the target group people with dementia.

General GUI design

1. Simple GUI - *The design should only contain necessary information and avoid distracting elements like cluttered images or abstract motives. This should be done without making the design childish.*
2. Adaptable GUI - *Ex. responsive grid layout.*
3. Adapted degree of difficulty - *the design should not be too simple and challenge the user's cognitive abilities to a reasonable level.*
4. Personalisation - *Make its as easy as possible to adapt the GUI to the user's current ability and preference.*
5. Avoid a childish feel - *The GUI should be simple but not childish.*
6. Avoid the look-and-feel of assistive technology - *Avoid designing so that the look-and-feel implies that the product is designed for a disabled person.*
7. Intuitive/high usability - *The learning curve should be close to 0.*
8. Avoid distracting and/or abstract backgrounds or images.
9. The layout orientation must be locked
10. Avoid hidden elements and pop-ups - *Elements which appear and then disappear can confuse a person with dementia. If an element disappear the PWD might start looking for the element outside the device's screen.*
11. Avoid deep navigational hierarchies
12. Use familiar symbols - *Symbols like a heart on the toilet door.*
13. Simple and clean icons
14. Adapt the look to the time period - *A person suffering from dementia often moves "backwards" in time as the dementia progresses. It is therefore important to use symbols which were common in time period when they were young.*
15. Use old habits - *If necessary make use of old habits to ease the use of the product.*
16. Avoid right and wrong - *In later stages of dementia it is important to not remind the user of his/her inabilities. Therefore the possibility of doing right or wrong in , for example games, should be avoided.*

Content

1. Limit the number of elements - *The number should be adapted to the stage of dementia.*
2. Limit the information shown on one screen
3. Limit the possible actions
4. Images with simple motives - *For example images of animals or flowers can be entertaining even for people who has more severe dementia.*
5. Captions for images - *It is important that these texts are short.*
6. Profile images with names - *Combine names with images to make it easier to remember relatives. However if the dementia is more severe images of relatives can be frightening if the user does not remember them.*
7. Large buttons/fonts - *To adapt to the user's possible vision/fine motor impairment.*
8. Avoid long texts - *People with dementia have trouble with reading longer texts. It is therefore important to make the GUI visual more than text-based.*
9. Use well known language which is known by the target group - *Avoid slang and new words which are not familiar to the older generation.*
10. Use music - *Music has proven to have many positive effects on PWD. It can be stimulating physically, psychically, socially, cognitively and spiritually.*
11. Animations - *Should be used sparsely. Animations can be beneficial when used to inform the user that a system is active, ex. that music is playing. But if used too much it will only be distracting.*

Output

1. Voice support - *Use voice support to strengthen the feedback. Avoid giving multiple impressions or making it childish.*
2. Voice support should be optional.
3. Clear sound - *To adapt to the user's possible hearing impairment.*

Color

1. High contrast - *To adapt to the user's possible contrast sensitivity impairment.*
2. Use contrast colors - *The sense of color is not affected by dementia.*
3. Combining colors with substantives can ease the understanding.
4. Use colors for different features to make them easier to distinguish
5. Avoid combinations of desaturated colors - *Desaturated colors are harder to distinguish from each other, especially red/purple and green/blue.*

6. Use red hues for highlighting - *Red hues are the easiest to see.*
7. Take color psychology into consideration - *Color psychology is still an unsettled matter. However it can still be kept in mind.*

Other

1. Introduction of the product - *Introduce the assistive technology early to increase the possibility for the user to use the product later.*
2. Trial time - *It is important to allow the user time to explore the product. The user might find other uses for the product than originally intended.*
3. Significant other's attitude - *The attitude of people close to the user has proven to affect the user's attitude towards the product.*

6 First iteration - General design, "Titta" and "Kalender"

In the first iteration the general design of the GUI, the start page and two features were explored. The features "Titta", which in this iteration focuses on showing photos and images, and the feature "Kalender", which is an activity calendar, are the two features included in this iteration.

6.1 Design

The design phase consisted of multiple sessions of brainstorming and a session of lo-fi prototyping. This was then followed by an extensive period of hi-fi prototyping.

6.1.1 Brainstorming and lo-fi prototyping

The first brainstorming session focused on the start page and the general design. While the second session focused on the features "Titta" and "Kalender".

6.1.1.1 General design

In the first brainstorming session the general content of the different stages of the GUI was discussed. In the company's specification seven different functionalities were provided, "Tid", "Kalender", "Kontakter", "Titta", "Lyssna", "Spela" and "Länkar". In the first stage it was decided that all the functionalities were to be included. However, for the second stage the feature "Länkar" was removed on the basis that the content of "Länkar" would be too hard to regulate and adapt to the PWD's needs.

The third stage is aimed at people whose dementia is severe. At this stage in dementia the PWD are usually so far gone that the only thing the application could possibly provide is simple entertainment. Therefore in this stage all the features except "Titta", "Lyssna" and "Spela" have been removed.

6.1.1.2 Start page

The layout of the start page and the icons was also brainstormed in the first brainstorming session. As mentioned above seven features were included in the first stage GUI, therefore seven buttons are required on the start screen for the first stage. Different layouts with seven buttons were explored through lo-fi prototyping. Both circular and squared layouts were tested. However, it was quickly concluded that two lines with three and four buttons respectively was the best way to get an overview of all features, as seen in figure 7.

As mentioned in the checklist important information should be placed at the top or to the left. Therefore the features most important in everyday life were placed in the top row, where they are seen first, and the entertainment features were placed underneath.

This layout also places the buttons mainly in the center of the screen which is recommended in the checklist.

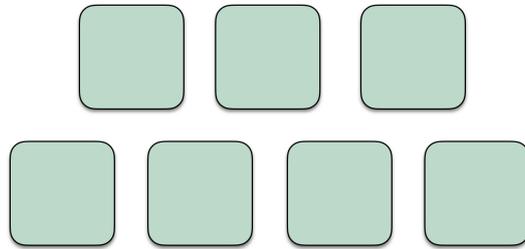


Figure 7: This is an illustration of the layout of the buttons on the start screen on the easy level of the GUI.

The layouts were then adapted to the number of features in the second and third stage of the GUI, because the second stage have 3x2 features and the third stage have 3x1 features which form a grid layout. From the interview performed it was concluded that six and three were a reasonable numbers of features for the second and third stage respectively. The layout of the second stage can be seen in figure 8 and the layout for the third stage can be seen in figure 9.

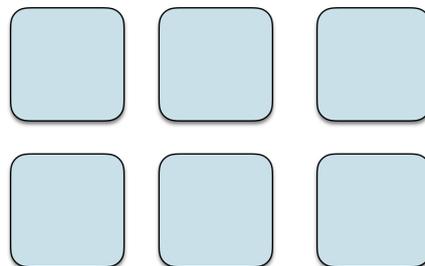


Figure 8: This is an illustration of the layout of the buttons on the start screen on the second stage of the GUI.

6.1.1.4 "Titta" and "Kalender"

In the second brainstorming and lo-fi prototyping session the features "Titta" and "Kalender" were in focus. After a short brainstorming session, lo-fi prototypes of these features were produced for all relevant stages. All the steps in the feature were created. The lo-fi prototypes for the feature "Kalender" in stage one can be seen in figure 11. As suggested in the checklist colors were used to enhance the difference between the days. Different colors were used to mark if the day is in the past, future or if it is today. Both the current day, today, and the buttons at the bottom were marked with red to catch the user's attention.

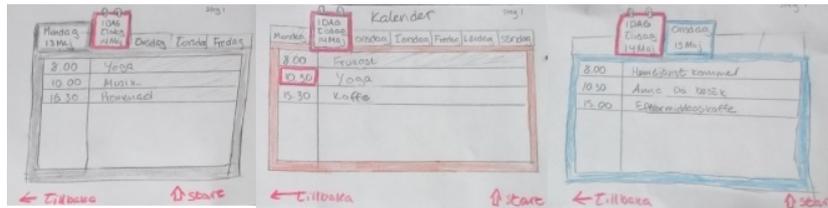


Figure 11: The lo-fi prototype of the feature "Kalender" in the first phase of the dementia phases. Left: A day which has passed. Middle: Today. Right: A day in the future.

The lo-fi prototype for the "Kalender" feature in the second stage was very similar to the first stage. The only difference is that in the second stage only the current day is displayed.

The lo-fi prototype for the "Titta" feature in the first stage can be seen in figure 12.

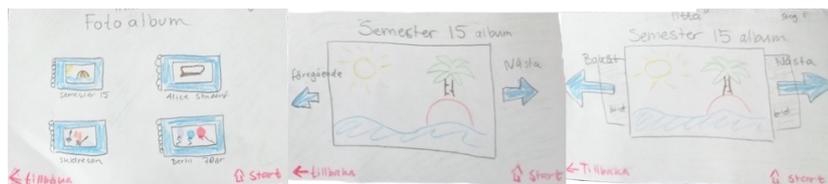


Figure 12: The lo-fi prototype of the feature "Titta" in the first phase of the dementia phases. Left: Album view. Middle and right: Two different versions of the image viewer.

To the left in figure 12 there is a lo-fi prototype of the album view. Here the user can choose which album to view. To make it easier for the user to choose the number of albums has been limited, in accordance with the checklist.

In the middle and to the right are two different versions of the image viewer. However, the version to the right was dismissed on the grounds that the small preview of the previous and next images were unnecessary and distracting which goes against the checklist.

The second and third stage are similar to the first stage but details has gradually been removed. In stage two the image viewer no longer needs feedback from the user to switch image. It is now simply a slideshow. Finally in the third stage the user should no longer be required to choose an album and skips immediately to the slideshow.

6.1.2 Hi-fi prototyping

While the brainstorming and lo-fi prototyping gave a good idea of the layout of the GUI for the different features a hi-fi prototype was necessary to try out different colors, images and other finer details. To enable simple and quick designing the Hi-fi prototypes were created with iWork's Pages.

6.1.2.1 Icons

The icons were created with Adobe's Illustrator. The final designs can be seen in figure 13.

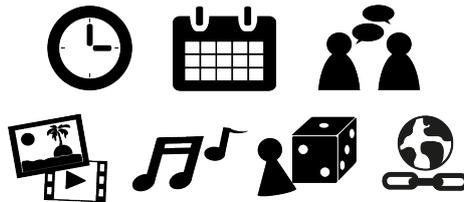


Figure 13: The hi-fi versions of the icons.

These icons were then placed on the button and a label was added beneath, see figure 14



TID

Figure 14: A complete button with icon and a label.

6.1.2.2 Start page

The start page was created in several different versions with different colors and images.

Stage one

To begin with the focus was put on the design for the first stage. The two different designs were created with the button layout created in the lo-fi prototyping phase as base, see figure 15.

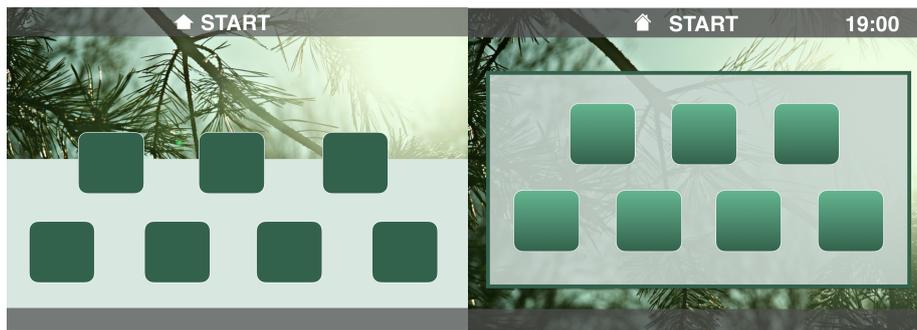


Figure 15: The two first versions of the GUI for level 1.

Both design versions, in figure 15, follow the color scheme idea of a light pastel color as background with dark buttons to create a contrast to the background. Thus using intensity contrast as mentioned in the checklist.

In the two design versions two different designs of the buttons were also explored. To the left a plain single color and to the right a gradient. However both were dismissed on the basis of looking too flat and non-clickable respectively looking too outdated. The theme itself was dismissed because of the lack of color contrast.

The only thing kept from the two first versions were the overall layout of the version to the left in figure 15. It was concluded that this layout was cleaner than the other. This layout was updated with a new theme with more color contrast, see figure 16. The new color on the buttons was set to a light shade of red. From the literature study and interviews it has been concluded that red is a color the PWD can easily detect. Therefore the light red color was chosen on the buttons. The buttons now also have a drop shadow to give them a sense of being placed on top of the background. This to make the buttons appear to be more clickable.

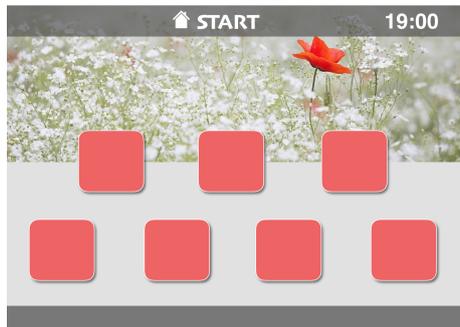


Figure 16: This iteration's final design for the start page.

Side track

The start screen in figure 17 is a side track and was the result of an idea of moving part of the "Tid" feature out onto the start screen. This to provide quick access to information like time, time of day, date and season to ease orientation.

On this start screen a possible design for reminders of upcoming events in the form of a post-it was explored.

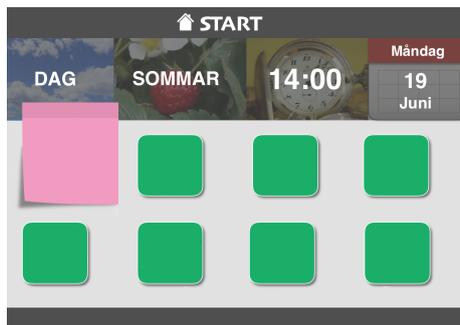


Figure 17: This is an illustration of a side track idea where some information displayed in the "Tid" feature has been moved out to the start screen.

This design was however discarded on the basis of having too many distracting elements.

Stage two and three

In parallel with the design explored above, designs for the second and third stage were developed from the design for the first stage. In comparison to figure 16, figure 18 has almost removed the detailed background image completely, save a hint of it in the top header to make it less distracting. Also the feature "Länkar" has been removed. This has resulted in a cleaner GUI.

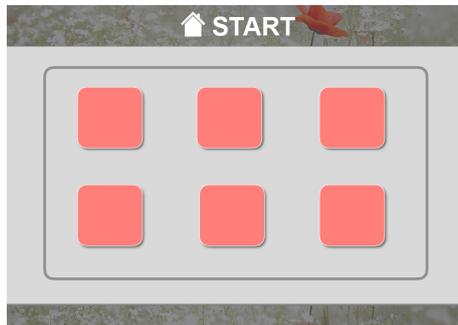


Figure 18: Illustration of the start screen for GUI level 2.

For the third stage the functionality and distracting elements were drastically reduced. In figure 19 are two suggestions for the start screen where the number of buttons has been reduced to three. Here the intention was that the label should be placed in the white area and the icons in the colored area.

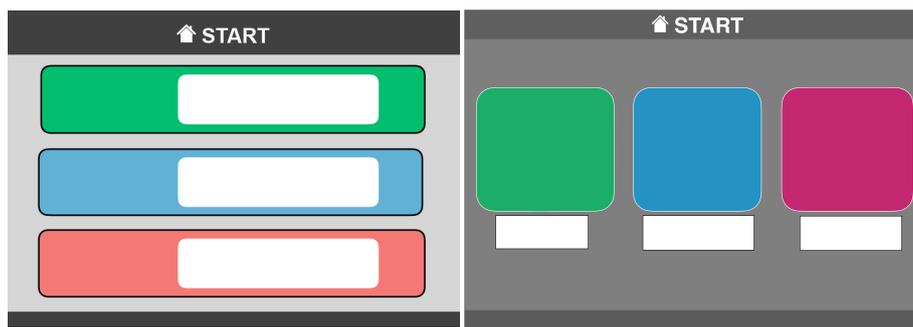


Figure 19: Two images illustrating two different suggestions for the start screen in the GUI for level 3.

6.1.3 Top and bottom bar

The start screen together with all other screens will have a dark gray area at the top and at the bottom, which should always be there. The top area implements the principle of discoverability, by showing in which screen the user is currently. The bottom area is the placeholder for the back- and start-buttons when going down in the menu hierarchy, see figure 20. The start screen, however, will not have the "Tillbaka"- and "Start"-buttons.



Figure 20: The placeholder for the "Tillbaka" and "Start" buttons.

To distinguish these buttons from the ones used in the menus, they have a different shape. The buttons were placed quite far away from each other, and hence the law of similarity was used to map them together. The buttons were placed at the bottom so they should be easy to access.

6.1.4 "Titta" and "Kalender"

The look-and-feel of the design of the start page was then used as a base for the features. The icons and the image from the start screen were included in the design of the features.

In the feature "Titta" in stage one the user is first met by a screen displaying six different photo albums. Each album represented by a button consisting of a preview image and the name of the album, see figure 21



Figure 21: The album button.

After choosing one album the user is met by an image viewer. The image viewer can be seen to the left in figure 22.

In the feature "Kalender" the user is met by a list containing the events for the current day. Above this list the user can choose to display other days of the current week. The next coming event in the calendar was marked with a red boarder, to make it easy to detect. Events that already happened were marked with gray, to make the other events still happening stand out. The calendar can be seen to the right in figure 22.



Figure 22: Two images illustrating the image viewer and the calendar in the GUI.

For the second stage the the amount of information shown and the interaction required were decreased. Compare the images in figure 22 with the images in figure 23. The changes made to the "Titta" feature was that the image viewer now has been changed to a slideshow and requires no active interaction. The calendar has now been reduced from allowing the user to display all the days of the current week to just the current day.



Figure 23: Two images illustrating the image viewer and the calendar in the GUI for level 2.

For the third step the decrease in functionality means that the "Kalender" feature was no longer present. The changes that have been made to the feature "Titta" were that the user no longer chooses an album and that compared to the image viewer in figure 23 there is only a "Tillbaka" button and no "Start" button. The "Start" button was no longer necessary since the navigational depth is now one. This means that the "Start" and "Tillbaka" button fulfill the same functionality.

After completing the design of the parts included in this iteration, the screens of the different levels has been connected into testable prototypes with inVision.

6.2 Testing

The tests were performed at two different occasions. At each occasion two TP participated. Each TP was tested in turn to avoid affecting the other TP results. At the first occasion the test consisted of four scenarios which were followed by seven interview questions. The scenarios can be found in appendix F.

The second test occasion was slightly modified in the interview section to include showing different designs, the designs shown in figure 15 and 17, and asking for the TP opinions. This to confirm the decision to discard these designs.

None of the TP encountered any big problems when participating in the test. However, valuable feedback was received. This feedback is summarized in the result section below, see section 6.3. The transcript of each test can be found in appendix G under Test person 1A, 1B, 2A and 2B. For 2A and 2B the transcripts are in the subsection Test session 2.

6.3 Iteration result

The result from this iteration consists of the design which was later tested, for example see figure 16, and the feedback from the tests.

From the tests conducted the following feedback was received:

- Should be possible to swipe for the more experienced users.
- The text size in the "Kalender" feature is too small for some users.
- Should consider that it could be easier to navigate if each feature were connected with a color.
- The icons are simple and easy.
- Good contrast, this applies both to the text and the icons.
- The layout is simple, logical and perspicuous.
- The marking with color of past, current and future days in the "Kalender" feature is good.
- The background image is beautiful but does not steal the attention from the buttons.
- It was pointed out that the application, in its current state, was not an appealing enough option for elderly and healthy people with some experience with tablets or smart phones.

When asking about the other designs created, figure 15 and 17 the following feedback was received:

- The different elements blend too easily, figure 15.
- The post-it note is better suited in the "Kalender" or "Tid" feature, figure 17.
- The post-it note is unnecessary since the information can be found in the "Kalender" feature, figure 17.
- There is too much information on the start screen, figure 17.

The two TP which were shown the other designs both agreed for the main design in figure 16 was the best.

7 Second iteration - Color change, "Tid" and "Länkar"

In the second iteration new color designs on the GUI were created and modifications based on the feedback received in the first iteration were made. This resulted in that this iteration was dedicated to improving the first stage.

Apart from this the feature "Titta" was moved into the "Kontakter" feature, to try to make the design more person-centered. "Kontakter" contains a list over the user's contacts. The new features included in this iteration were "Tid" and "Länkar". Where "Tid" shows time and date. While "Länkar" shows a list of links to external sites interest.

7.1 Design

In this iteration most time was spent on:

- Modifying the hi-fi prototypes from the first iteration based the feedback the TP provided and by going through the checklist.
- Creating prototypes for the new features.

7.1.1 Brainstorming and lo-fi prototypes

The brainstorming and lo-fi prototyping session is divided into two parts, the first part focuses on improvements based on the feedback from the first iteration and the second focuses on the new features.

7.1.1.1 Modifications

After testing and analyzing the first version in the first iteration some modifications were made to improve the interface.

Firstly a new layout was made for the "Kalender" feature. This to enable a larger font size and more events. This was done by dividing the day into four sections: morning, day, evening and night. Each section can then be accessed through the tabs on the side, see figure 24.

Secondly the entire structure of where images can be found where changed. To achieve a more person-centered layout the feature "Titta" was moved into "Kontakter". On each contact's page there are several albums where that contact can add content which are made available for the user, see figure 25. The content which can be found under "Titta" has also been changed to include videos and documents as well as images.

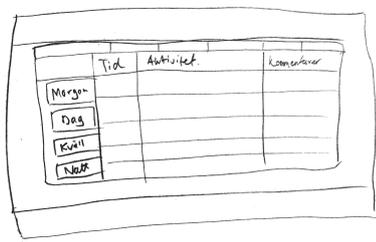


Figure 24: "Kalender" lo-fi showing the new design with tabs.

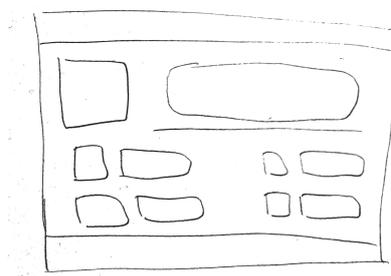


Figure 25: "Kontakter" lo-fi layout for a specific person's page. The page contains an image and a description of the person and below that buttons to albums which the person has added.

7.1.1.2 "Tid" and "Länkar"

To explore possible designs for the new features, brainstorming sessions were held and lo-fi prototypes were drawn. First the layout of the "Tid" feature was explored. These lo-fi prototypes were then analyzed by comparing them with the checklist. The lo-fi prototype in figure 26 was dismissed on the basis that it was hard to read the information since there is no clear structure on where to start reading.

To compensate for this the lo-fi prototype in figure 27 is based on a grid and which provides a clearer reading structure. This prototype had no clear faults, the reason for dismissal was simply that another design, discussed below, proved to be more appealing.

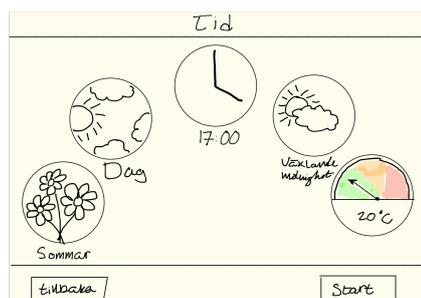


Figure 26: "Tid" feature with a layout playing with the circular form of a clock.

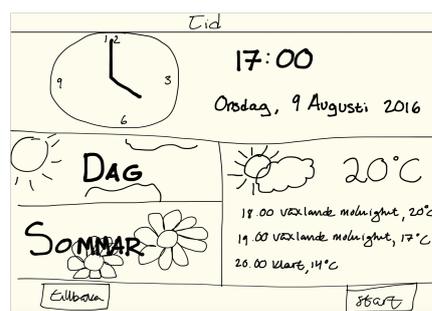


Figure 27: "Tid" feature layout using squares to structure the information.

Two other lo-fi prototypes, which were created separately from the previous designs, can be seen in figure 28 and 29. The layout in figure 28 was dismissed on similar grounds as figure 26.

The final prototype, in figure 29, was chosen to be developed in a hi-fi prototype. The reason for this is the pedagogical time line displaying the time of the day.

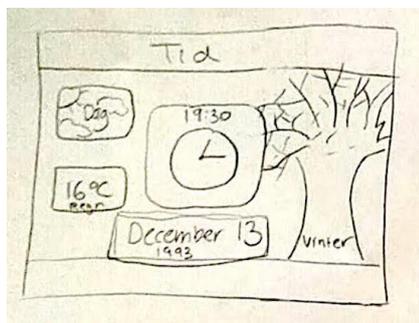


Figure 28: "Tid" feature with a layout with loose squares and where the season is marked by the background image.

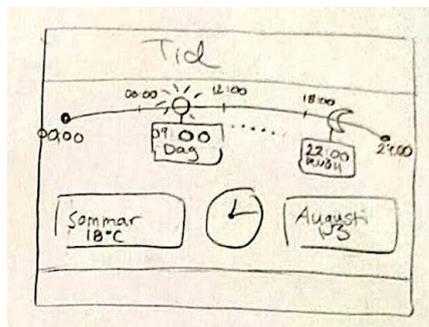


Figure 29: "Tid" feature layout with a time line showing the time of the day.

Next the feature "Länkar" was explored. Since "Länkar" needs to hold many different links, it was natural to use a simple grid as a layout structure. This layout can be found in figure 30. The only detail in this layout which required discussion was whether to use icons with the site's logo or a standardized icon for the media the link contains, video, text, sound etc.



Figure 30: "Länkar" feature with a simple grid layout with icons representing the page linked to.

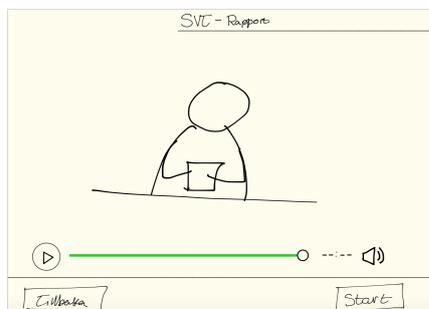


Figure 31: "Länkar" feature's display of embedded video.

Figure 33, 32 and 33 show the information from the links, like audio clips, articles and videos. Basically the information will be framed by the top and bottom sections of the design. The information will also be shown in a cleaned version, without distracting elements like flashing advertisements. It was also decided that it was better to add buttons for play/pause etc. in the GUI design and not use the buttons from the embedded media. This because the embedded buttons tend to disappear to give the viewer a clearer view of the video. However this

can be confusing for people with dementia and they might try to look for the disappearing buttons outside the tablet. The embedded buttons are also small and can be hard to pinpoint.

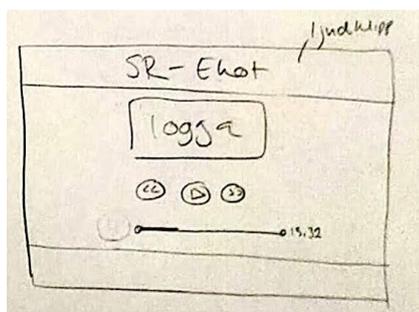


Figure 32: The "Länkar" feature's display of radio clip playback.

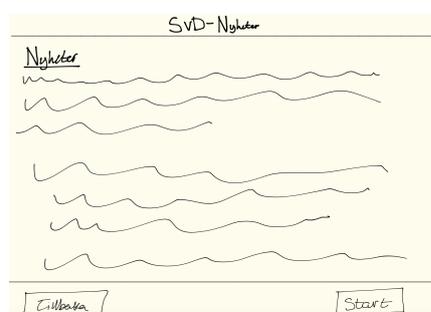


Figure 33: "Länkar" feature's display of embedded text.

These designs will also be used in "Titta" when displaying different kinds of media.

7.1.1.3 Icons

With new features comes new icons. It was decided to use a standardized icon for each media type, since logos can be distracting or hard to recognize. Therefore the design of icons symbolizing each media type was necessary. In figure 34 are three columns where each columns contains the different icon suggestions for newspaper, radio and video.

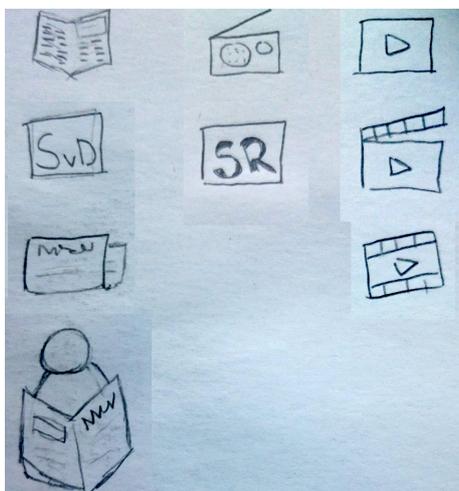


Figure 34: The lo-fi sketches which were the result of a brainstorming session focused around the icons.

7.1.2 Hi-fi prototypes

For this iteration it was decided to change the prototyping tool from inVision to proto.io. This change was based on the feedback that swiping should be possible, which inVision does not support.

When adding the hi-fi prototypes, made in Pages, into proto.io, the colors changed. This hurried up the need and therefore the process of redoing all the hi-fi prototypes in Illustrator. Therefore a large portion of time was spent on updating prototypes.

7.1.2.1 button and icons

The best suggestion for icons for each media type were then drawn in Illustrator. The result can be seen in figure 35. While in the process of creating these icons it was concluded that a general icon for a text or document should also be created. This icon can be seen furthest to the right in the same figure.



Figure 35: The hi-fi version of the icons used for marking different media.

On the start screen a new set of buttons were tested, see figure 37 and compare with the previous design in figure 16.



Figure 36: The new button design.

The new design on the buttons is slightly darker than the ones in figure 16, and have a gradient combined with other details to make them appear clickable but not old-fashioned.

7.1.2.2 Start screen

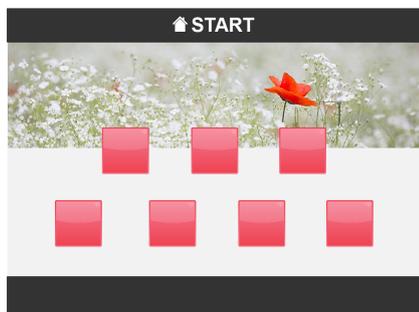


Figure 37: Start screen with light and flowery design.

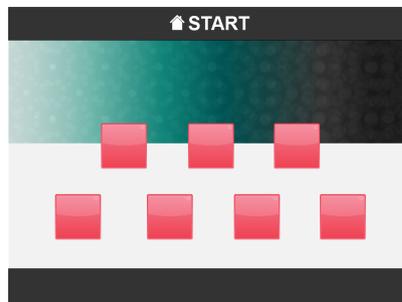


Figure 38: Start screen with gradient and bubble pattern.

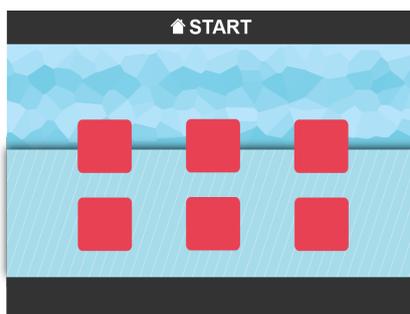


Figure 39: Start screen with light blue design.

The design in figure 37 came across as slightly feminine, and the design in figure 38 was created as a first alternative to try to make a more unisex design. Instead of using an image in the design, a graphical pattern was created. The design in figure 39 was created to give a more colorful approach. The buttons used in this design has gone back to a simpler version and uses no gradient or shadows. This because there are more details in the background and therefore the button will catch attention simply by being simple. The light blue background is used to give the red buttons more color contrast so they are easily detected.

The patterns used in the background on the start screen can only be used in the first stage for people with mild dementia. In later stages of dementia abstract patterns should be avoided to prevent that it takes the attention from more important features. The design in figure 38 was soon dismissed, because it was too dark.

7.1.2.3 "Titta", "Kontakter" and "Kalender"

In the new tab layout of the calendar, color coding was used to separate the different times of the day. Blue was used on the tabs that have passed in time, red was used on the current tab showing the activities happening or happening soon in time and green was used on the tabs displaying later times of the day. The tab layout can be seen in figure 40.

	Tid	Aktivitet	Kommentar
Morgon	10:00	Yoga	
	12:30	Lunch	
Dag	15:00	Eftermiddagskaffe	
Kväll	17:30	Kvällsmat	
Natt			

Figure 40: Updated version of "Kalender" with tabs.

Since the "Titta" feature was placed in the contact view under the feature "Kontakter", a design for displaying all the user's contacts was needed. A simple grid list was created directly as a hi-fi prototype, see figure 41. Each contact was represented by a profile picture together with name and a short description of the relationship to the user, for example son or grandchild.

The content uploaded by the contact, in this case Lisa, will be shown at the bottom of the screen, see figure 42. Here it can be seen that videos and documents can be added as well as images. Because of lack of space the button used for image albums have been changed to a simple white icon picturing an album instead of a preview image from the album. This was also done so that the button would better match those of videos and documents and also the design used in "Länkar" which can be seen in figure 44.

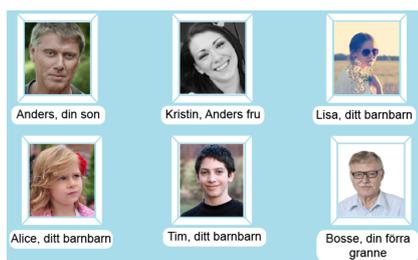


Figure 41: Simple design of the list of contacts.



Figure 42: Person-centered design with "Titta" is placed under each contact.

7.1.2.4 "Tid" and "Länkar"

From the lo-fi stage the best prototypes of the features "Tid" and "Länkar" were created in Illustrator. In the "Tid" feature a timeline was used to show the user the current time and if it was day or night, see figure 43. In addition to the timeline the user can find out the current date, season and the outside temperature. To make it easier for the user to find the current time an analogue clock was also added.

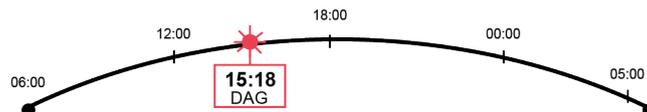


Figure 43: The timeline used in the feature "Tid".

In "Länkar" links from external sources can be shown to the user, for example a video from Youtube.com. The links have different icons depending on if it is a video, article or a radio clip. This can be seen in figure 44.



Figure 44: "Länkar" for the light blue design.

The color on the buttons for the links was set to green. From the interviews, information regarding that the colors red and green where the colors that stayed with the PWD the longest was received. Red was not chosen because the albums should not take the attention from the buttons in the lower gray area.

To be able to add many external links without displaying too many links at a time a navigation system had to be designed. The design of the navigation system can be seen in figure 45. The dots are used to show where you are in the menu, and the red dot show the current position.

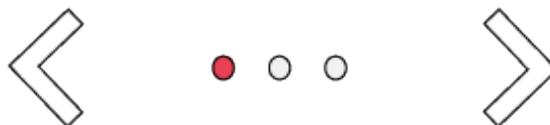


Figure 45: The navigation system to get to a new page.

7.2 Discussion with professionals

Two of the interviews held with professionals were conducted later than the other two. Therefore this opportunity was used to also show and discuss the latest design. Through this discussion valuable feedback which is directly related to dementia was received. This feedback was valuable since it contained points which the TP could not provide.

The feedback received can be found in a summarized version in the section 7.4.

7.3 Testing

In this iteration only one test occasion with two of the TP was held. The tests were performed with the light blue design, figure 39. The test consisted of seven scenarios, see appendix F. Of these seven scenarios three were included from the previous iteration, one was to test the modification of the placement of the feature "Titta" and the final three tested the new features "Tid" and "Länkar". The modifications made to the "Kalender" feature were not included since it was dismissed by the professionals.

After the scenarios were completed the TP was asked some interview questions. The feedback from the tests was summarized and can be found in section 7.4.

7.4 Iteration result

The result from this iteration consists of the design which was later tested, for example see figure 39, the result from the discussions with the professionals and the feedback from the tests.

7.4.1 Test results

From the tests conducted with the TP the following feedback was received:

- When being asked to check what is happening today one user looked in the "Tid" feature instead of the "Kalender" feature as intended.
- Hard to see any change when changing tabs in calendar.
- Hard to understand how the grayed fields should be interpreted.
- Links is a difficult concept to understand.
- One TP would rather have the links be links to an app where all the newspaper articles can be read than links to just one article.
- When being asked to find a link which a relative added to the app one user tried to find the link through "Kontakter".
- The "Dag"-text which informs the user that it is day and not night in "Tid" is hard to find.
- The users interpret each feature as an app.

7.4.2 Result from discussion with professionals

From the discussions with the professionals the following feedback was received:

Start page

- Avoid breaks in the background, it is distracting.
- Simpler with a plain background with just one color.
- The stripes in the background are unnecessary and can cause flickers which is distracting.
- The icons are simple.
- Would be good if the number of features could be adjusted by the relatives.

Tid

- Too much information. Hard to know where to start looking.
- Time and date is more important than season and weather.
- Divide "Tid" into two different pages/features.
- The clock should have numbers.
- Is tomorrow's weather necessary?
- Include the day of the week, Today Wednesday etc.
- Make the time line clearer by adding descriptions like "Morning" etc. However this might be too much information. This requires testing.
- Get the time read aloud if the image of the clock is tapped on.
- Good that the time is shown both digitally and analogically.

Kalender

- Confusing with tabs for morning, day, evening and night.
- The font size is large enough.
- Include dates for all the days.
- The dates should be visible without having to tap on the day.
- Add reminders. Allow some options in the beginning of the dementia.
- Modify reminders with buttons instead of the "Kommentar" section.
- Important that the whole day is visible. However for early stages of dementia scroll could work. Depends on the user's experience.
- One day at the time for later stages of dementia.
- Good to use gray to mark past events. Could be made clearer with strike-through.

Kontakter

- Good that both name and image is used.
- Use a flexible grid which adapts to the number of contacts. This way the number of contacts can be adjusted to the user's level.
- This feature can be available for quite a while, even in the later stages of dementia, if it means that the user can tap on an images of relatives and call them.
- Consider providing some kind of block to avoid inappropriate calls, night calls etc.? Can be enough with the contact just not answering.

Lisa/Contact page

- Too much information.
- Could be divided into two pages.
- In the earlier stages of dementia more steps, deeper hierarchies in the navigation, is manageable.
- The contact (Lisa) should be able to update the information.

Länkar

- Rename to favorites instead? Links can be a confusing concept.
- Too much information. Make the number of items displayed adjustable.
- The radio should have only one button which shifts between pause and play. This removes an unnecessary choice for the user.

Buttons

- Start button should be called "Hem" instead. Start indicates that something should happen.
- Arrows for navigation works in the beginning.
- Good to have both swipe and tap on arrow-buttons, although the buttons invite a tap.
- Good that the buttons have the same position.

8 Third iteration - "Lyssna" and skype call in "Kontakter"

This iteration was dedicated to updating the design according to the results in the previous iteration and creating the designs for the features "Lyssna" and the Skype call of the "Kontakter" feature. In this iteration more time was also spent on stage two and three.

8.1 Design

This iteration consisted of two main brainstorming and lo-fi prototyping sessions followed by a hi-fi prototyping sessions.

8.2 Brainstorming and lo-fi prototypes

There were two brainstorming and lo-fi prototyping sessions. The first session focused on updating the design for all stages according to the result of the previous iteration. Later a session focused on the features "Lyssna" and the Skype call of the "Kontakter" feature.

8.2.1 First session

First the start screen was redefined, see figure 46. All the details in the background were removed. The reason for this was that the stripes, divider and background image were deemed to be too distracting.

The whole start screen was renamed from "Start" to "Hem". This was done because "Start" implies that something will start or happen. "Hem", which means home, also fits better with the house-shaped icon used for the start page.

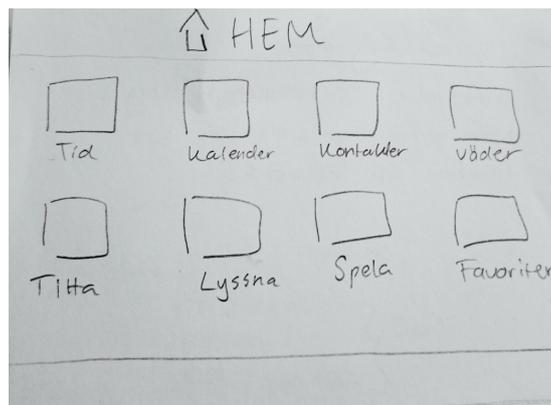


Figure 46: The lo-fi prototype of the start screen.

Throughout the application the information in the features have been reduced.

In "Kontakter" the number of contacts have been reduced from eight to six. In the submenus of "Titta" where the user can chose albums of images, videos and documents the number of element displayed have been decreased from six to four.

In addition to this a new feature was added called "Väder" which holds the functionality showing the weather, previously found in "Tid". This was done to reduce the amount of information in the "Tid" feature. The new design of the "Tid" feature can be seen in the lo-fi prototype in figure 47, and the "Väder" feature in figure 48.

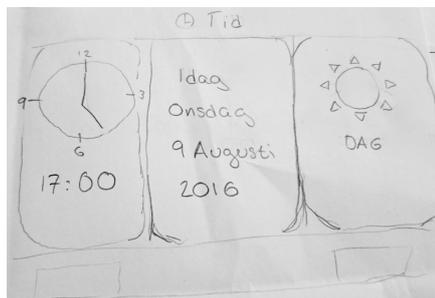


Figure 47: The design for time in the first stage.

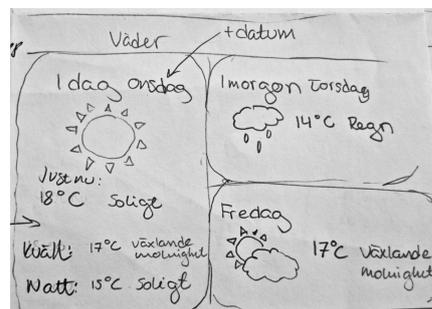


Figure 48: The design for weather in the first stage.

The "Kalender" feature has been updated so that it is possible for the users to edit the calendar by themselves. Another update was that the users now can add a reminder for an activity in the calendar. The tabs tested in previous iteration have also been removed. The tabs were replaced with a scroll bar since the professionals mentioned that this was possible in stage one. The lo-fi prototypes can be found in the figures 49 and 50.



Figure 49: The "Kalender" screen with reminders in the first stage.

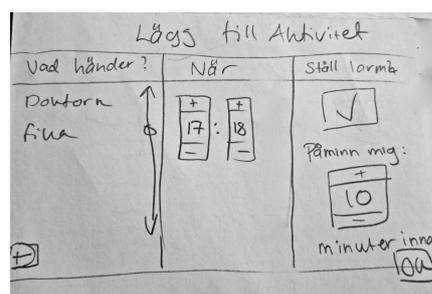


Figure 50: The "Lägg till aktivitet" screen where the user adds the information into the calendar, for the first stage.

The feature "Länkar" was renamed to "Favoriter", because the TP had problems to understand the concept of "Länkar". The feature was also redefined from displaying links to specific content, articles from news papers etc., to displaying the favorite external applications as suggested by one of the TP during the test in the previous iteration.

8.2.2 Second session

The feature "Lyssna" includes being able to listen to music, radio and audio books. The designs for radio reuses the one made for audio clips for "Länkar". The design for audio book and music player are similar to each other. see figure 52 for the lo-fi prototype for the music player.

In "Lyssna" the user can choose to listen to music and then the user can choose a playlist. The playlists will be displayed in a similar manner like the links in figure 44. When a playlist has been chosen the user will see a list of songs, see figure 51. The user can play the song by tapping the song in the list. Then the song will start and the song's album cover will be displayed, see figure 52.

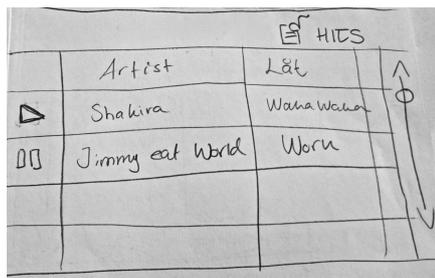


Figure 51: The screen for the different playlists in the first stage.



Figure 52: The screen for when a song plays in the first stage.

In "Kontakter" a call feature has been added. In the call feature the user can choose to use video or not. This design was done directly as a hi-fi prototype. The result can be seen in the hi-fi prototype section.

8.2.3 Icons

With the new name of "Länkar", now called "Favoriter", a new icon was created. It was discussed if it should be a star or a heart. The heart was chosen because it is a general symbol for liking, while the star is used in browsers for saving a page to favorites. The target group may not do the same connection between the star and favorites because it did not exist when they were young.

For the new features in "Lyssna", a new set of icons were created. The icon first used to represent "Lyssna" was moved to represent music and "Lyssna" was given a new icon. The new icons can be seen below in figure 53. The icons marked with red are the icons used in the application.

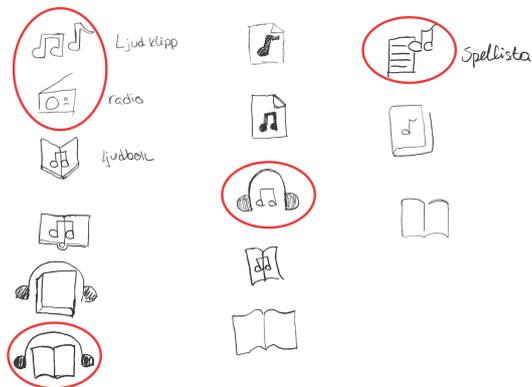


Figure 53: The lo-fi prototype of the icons for "Lyssna". From top to bottom and left to right: 1. icon for music, 2. icon for radio, 3. icon for audio book, 4. icon for "Lyssna", 5. icon for playlist.

8.3 Hi-fi prototypes

From the lo-fi prototypes hi-fi prototypes were created.

8.3.1 Stage 1

To make sure the main functionality in the application is in focus, all unnecessary details have been removed. The background color have therefore been simplified throughout the application, and consists now only by one single color, see figure 54.

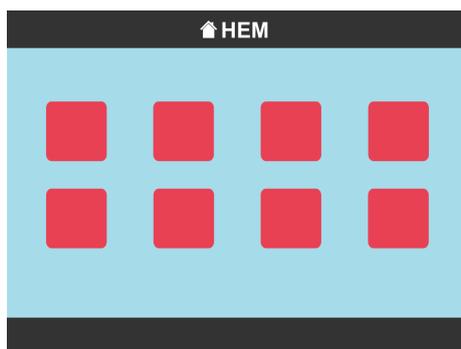


Figure 54: The start screen for the first stage.

In most of the lists in the application the amount of elements have been decreased. An example of the new layout is shown in the new feature audio book in figure 55.

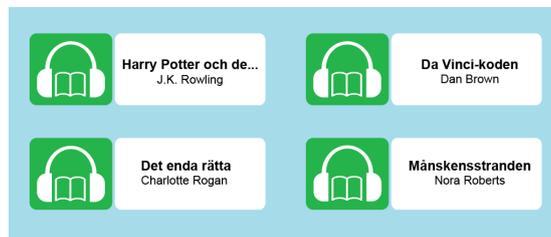


Figure 55: The new layout for the buttons in the feature "Ljudböcker" in the first stage.

On the contact page for "Lisa" the top part of the screen is dedicated to information about the person, in this case Lisa. Beside the information a call button is placed. The top design is shown in figure 56.

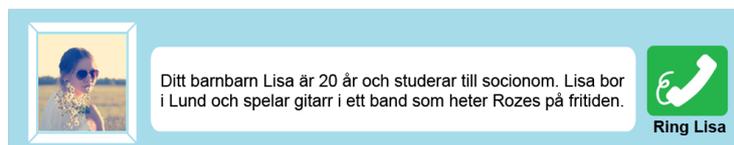


Figure 56: The top layout of the contact page of Lisa.

The bottom part of the contact page have been changed due to feedback given in the discussions with professionals. Earlier the content that Lisa had uploaded was shown as in figure 42. However, it was discarded because there was too much information on one page. The new design can be seen in figure 57. A similar design is also used in "Lyssna" where the user chooses whether to listen to music, radio or audio books.



Figure 57: The bottom layout of the contact page of Lisa.

In figure 58 the call feature screen is shown. The text "Du ringer Lisa..." will disappear when the person on the other end answers. The text will also be accompanied by a ringing tone. The user can also decide if they want to use video call or not, this to avoid the ethical problem of being monitored against their will.

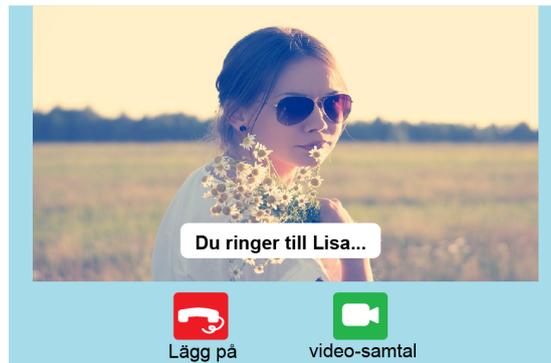


Figure 58: The call screen when calling Lisa.

The "Tid" feature has been simplified as well. The timeline was dismissed based on being too complex to understand, and instead three fields that each show only one type of information is used. The field in the middle showing the analog clock and a digital clock is a bit bigger than the rest. This because the time is the most essential feature in "Tid". The new layout can be seen in figure 59.

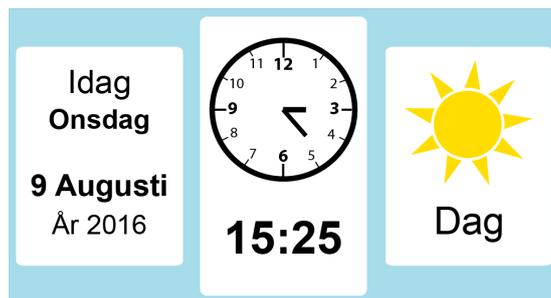


Figure 59: The new layout of the Time screen for the first stage.

The weather information, earlier placed in the "Tid" feature, has been move to a new feature named "Väder". The icon for the new feature can be seen in the figure 60.



Figure 60: The weather icon.

The weather screen in stage 1 is divided into three fields, showing the weather on different days. The current day has the largest field, and is showing the weather and temperatures throughout the day. The next coming days only show the mid-day weather and temperature. The layout of the "Väder" feature can be seen in figure 61.

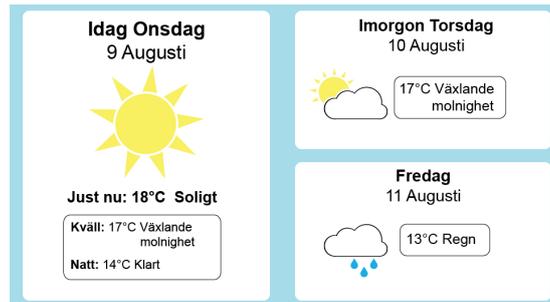


Figure 61: The layout for the feature "Väder" in the first stage.

One of the changes made to the "Kalender" is that instead of the comments, (see the right image in figure 23), the user can set reminders, and instead of green a red color is used.

The new feature of being able to add reminders has also been added in "Kalender", so that the user can get help to remember chosen events. Here the user can set all necessary information, see figure 62.

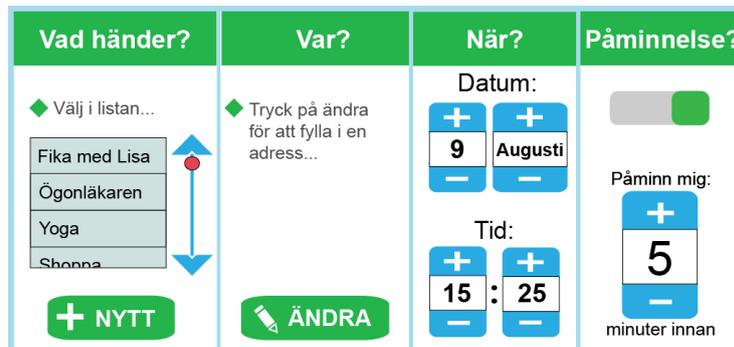


Figure 62: The reminder banner.

The reminder will appear as a red banner just below the top gray bar, to catch the attention of the user. It should be visible in every screen until the activity starts. The time in the banner will update at regular intervals. In figure 63 the banner can be seen.

Du ska ha eftermiddagskaffe om 15 minuter

Figure 63: The reminder banner.

The hi-fi prototypes for listening to an audio book, a song or a radio station looks similar, in figure 64 the design for the audio book player is shown.



Figure 64: The design for the audio book player.

In music the user can choose between different playlists, in the playlist a song will start to play when clicked and then go to a view showing the cover of the song, see figure 65.

	Titel	Artist	Längd
⏸	Waterloo	ABBA	2:48
▶	Fyra bugg & en Coca-Cola	Lotta Engberg	2:58
▶	Dover Calais	Freestyle	2:54
▶	Musik skall byggas utav ...	Lill Lindfors	4:01
▶	Kärleken är evig	Lena Philipsson	3:07

Figure 65: The playlist in the feature "Lyssna".

8.3.2 Stage 2

In stage two most functionality is still present. The only feature removed was "Favoriter" to limit the user from exposure to flashy images and things which are too distracting.

The thought behind leaving most of the functionality was that the content of the application should be adjustable so that it suits the user's current state.

In line with this it was decided that in "Titta" it should be optional whether the images should be shown as a slideshow or if the user should control when to move on to the next image. Therefore the controls for changing image were added to stage 2.

Apart from this some information and functionality in the application has been removed. For example the possibility for the user to choose a song from a list has been removed since that screen contains a lot of information which can be hard for the user to navigate and use.

In both the "Väder" and "Kalender" features the information has been reduced to only showing one day to make it easier for the user to take in the information. The Weather is now showing the information in two large fields, where the left field is showing the weather for the current time, and the field to the right is showing the weather from morning to night. The right field of the whole day weather view can be seen in figure 66.



Figure 66: The whole day weather view for the second stage.

In the second stage the layout for both audio books and songs were changed slightly. The biggest change was that instead of showing the remaining time in

only numbers besides the progress bar, a whole sentence is now placed under the progress bar showing the remaining time. The playlists were considered to be too hard for a user with dementia in this stage so now when choosing a playlist the songs will start playing in random order. However, they can still change song and pause a song in the music player view layout.



Figure 67: The progress bar used in the features "Ljudbok" and "Musik" in the second stage.

8.3.3 Stage 3

In stage three most of the functionality has been removed. The only features remaining are "Titta", "Lyssna" and "Spela" which have been thoroughly simplified.

To make the application more receptive to random interaction the start screen is divided into three sections where the whole sections are buttons, see figure 68.

When a button is pressed the response from the application is always immediate. This means that the navigational depth is always only one step. For example: if "Titta" is pressed then immediately a slide show displaying different images will start. The same applies to "Lyssna" which starts playing songs in a random order and "Spela" starts a random game.

Inside all features the top and bottom bars framing the content changes color depending on the feature currently being used, see figure 69. This was done to further ease the orientation in the application.

Finally the "Hem" button has been removed. Instead the "Tillbaka" button has been enlarged and centered. This since the navigational depth is one and both buttons therefore always have the same result.

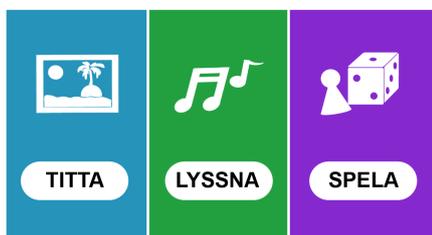


Figure 68: The start screen for stage 3.



Figure 69: Showing the color coding at the top and bottom bar for stage 3.

8.4 Testing

The tests were performed on two TP. These TP also participated in the tests held in the second iteration. The test was performed on the design described in section 8.3.1.

The test was constructed in the same fashion as the previous tests, with some scenarios followed by a couple of interview questions.

The main focus of this test was on new features. Seven of the scenarios tested "Lyssna" and "Väder" features. The remaining three scenarios tested the updated details or layouts of "Titta", "Tid" and "Kalender".

The interview questions consisted of three general questions regarding the experience of the test. Included in this part of the test was also a short display of the feature "Favoriter". The reason for this was that "Favoriter" was hard to make testable. Depending on how the scenarios testing the "Lyssna" feature, a quick walk-through of the music section of the "Lyssna" feature was done.

The complete transcript from the tests can be found under test session 4 in appendix G.3 and G.4 A summary of the result from the tests can be found below in section 8.5.

8.5 Iteration result

The result of this iteration consists of the design described in 8.3.1 and the feedback from the tests performed.

Generally there were no large design issues with this design. However minor details and errors were discovered.

- A smaller bug in the test prototype in proto.io in the music section of the "Lyssna" feature.
- The vertical scroll bar in the "Kalender" feature was hard to detect and know how to interact with. The TP tried to drag on the activity list instead of on the scroll bar.
- The TP read the text under the icons rather than looking at the icons. The motivation was that under "Lyssna" all the icons had a theme of listening to something so the text was used to distinguish them.
- One of the TP had problems with interacting with the prototype because the prototype did not respond to the TP taps. This is a previously acknowledged problem.

8.6 Fixes

Since the feedback received in this iteration was mostly positive and contained few suggestions for changes needed, these changes were quickly fixed in preparation for the final iteration which has a different structure compared to the other iterations. The following changes were made:

- The bug was resolved.
- Scrolling through tap and drag was enabled.
- The problem with the interaction with the prototype is unfortunately hard to fix since it is not caused by the design of the prototype.

9 Final iteration

The final iteration differs from the previous iterations. This iteration started with tests performed with people who has a milder degree of dementia and also two other test persons. The two other test persons represented the elderly.

9.1 Discussion with professional

A second discussion with a occupational therapist was held. This was done to discuss the changes made in the design for the first stage since the first discussion. The designs for the second and third stage were also discussed.

9.2 Testing

This testing consisted of two test occasions. The first test occasion was held with four people who have a milder degree of dementia. The second occasion was held with two elderly persons from a care home.

The experience of technology within the test groups varied. Some owned an iPad while some had little or no experience.

The test consisted of six scenarios covering the main functionality of the application. The scenarios were formulated in such way that as much unnecessary information as possible was removed. This to keep the scenarios short and concise.

The tests were performed with one TP at a time and all the TP, both with and without dementia, received the same scenarios. The complete result from each test can be found in appendix G.7.1, G.8.1 and H.

9.3 Iteration result

Here follows the result from the tests with PWD and elderly. This is then followed by the result from the discussions with the professionals.

9.3.1 Results from test with persons with dementia

- The area on the "Väder" screen containing tomorrow's weather was interpreted as a clickable area.
- One TP was confused whether the playlist "Svensktoppen" could be found under "Radio" or "Musik".
- Some TP had trouble finding Lisa among the other contacts.
- The different colors, in the calendar, were appreciated.
- The icons were considered good.
- The scroll function was hard to find for several.
- The text was large enough for most of the TP. One TP suggested a larger font size for the time in the calendar.

- One TP also had trouble with navigating among the events in the calendar.
- The arrows for navigating among the albums were hard to find for many.
- Some of the TP tried to click on activities or times in the calendar.

9.3.2 Results from test with elderly

Unfortunately no extensive conclusions could be made from these tests. One of the TP suffered from Aphasia and could not answer the interview questions. However the TP completed the scenarios without any larger problems.

The other TP had some troubles with his/her eyesight. The TP completed the scenarios through trial and error. The TP also had a hard time focusing on the tasks which resulted in a discontinuity throughout the test.

9.3.3 Results from discussions with professional

From the discussions with the occupational therapist the following feedback was received:

Stage 2

- Voice support should be accessible throughout the application.
- Adding the possibility to display the time in text ex. "half past three". Either by replacing or combining it with the digital clock.
- Make the playlists more themed, for example a playlist for when the user is stressed.
- The text showing the remaining time of a song is unnecessary, the progress bar should be enough.

Stage 3:

- The number of features available on the start screen should be adjustable to the individual user.

9.4 Design

The final design phase consisted of solving the problems discovered in the test phase and also some changes were made upon request from the company. In a lot of features the information is displayed on a white background that has the same shape as the buttons. It was decided that if clicked on it should give sound feedback, and read out the information to the user. It is important that this feature is a setting, because some users with dementia could be confused by a voice talking and not to be able to see who it is.

9.4.1 Test changes

Here follows a description of the changes made as a result of the feedback received from the tests.

Start page

The features available should be able to be adapted to the user's needs. This refers mostly to stage two.

Tid

One of the TP had problems with numbers. This issue resulted in a discussion on making it possible to display the time in text, see figure 70. It was concluded that this should be a setting which can be changed to suit the user's needs.



Figure 70: Time displayed as text instead of using a digital clock.

Kalender

The scrolling feature was hard to find. According to the checklist important information should be placed at the top or to the left. Thus placing the scroll-bar to the left of the calendar should make it more noticeable. This should make the scroll-bar easier to find.

The design of the scroll-bar was also changed to make it easier to find. Instead of simply being outlined with black the arrows were filled with a darker gray to make it easier to see, see figure 71.

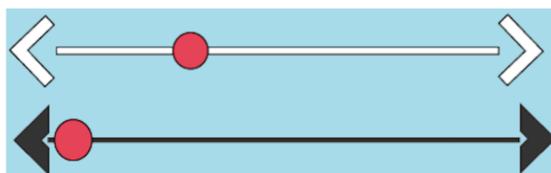


Figure 71: An comparison between two different designs of a scroll-bar.

One TP had problem with navigating among the activities. This problem has also been noticed before. Therefore the calendar was simplified by removing the column to the left indicating morning, day, evening and night. This column was only removed in stage 1 it was kept for stage 2. The column reserved for marking with a bell icon whether the activity has a reminder was removed as well. A reminder is now marked simply by placing the bell icon after the activity name, see figure 72.

TID	AKTIVITET
07:30	Hemtjänsten kommer
10:15	Gå till optikern 
15:00	Yoga 
16:30	Möta Lisa i parken

Figure 72: The new design of the calendar.

The number of activities shown on one page were decreased from 9 to 7. This to make the table more airy and easier to read. The row representing the current activity is slightly larger than the other rows. The background of the top row containing "Tid" and "Aktivitet" was changed to match the color of the chosen day while the surrounding frame of the same color was removed, see figure 72.

Finally the colors of passed days were changed to gray. This was done to match the scheme where passed activities are given a gray background and crossed out. However the name of the passed day was not crossed out in favor of readability.

Apart from these design changes the functionality which makes it possible to click on an activity was added. This to make it easier for the user to focus on the information regarding a specific activity and make it easier to remove or modify the chosen activity.

Kontakter

Some had trouble figuring out which feature to use to contact a given person. To solve this "Kontakter" was changed to "Kontakta". Also some had trouble finding a specific contact among 6 contacts. To solve this the number of contacts were decreased to 4 in one page. In addition to this a side bar was added to the left side to provide information like phone number and address to places like the home care service.

Väder

Some areas under this feature were interpreted as a clickable area. The best solution to this was to use the fact that the area invites to clicking to provide sound feedback.

Titta

The arrows used for navigating among the different albums were hard to find for some. To solve this the design was modified in a similar way as the scroll-bar. The arrows were filled with a dark gray color and the arrows were enlarged, see figure 73. The design was also changed in other similar features.

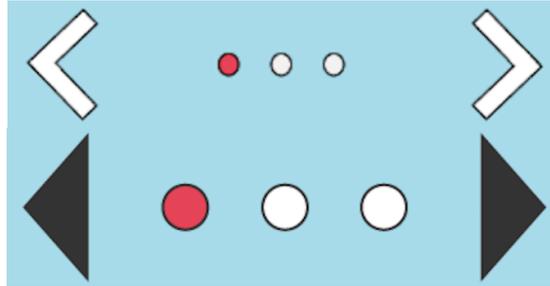


Figure 73: An comparison between two different designs of a navigational bar.

Lyssna

One TP was confused by the naming of the playlist "Svensktoppen". Since "Svensktoppen" originally is a radio program this caused confusion. The easiest way to solve this is simply to take more care when naming playlists. The occupational therapist suggests making the playlists mood themed and name them accordingly. This is however up to the user and the SOs to decide what is most suitable.

9.4.2 Company requests

Here follows the changes which were requested by the company after viewing the same design as used in the tests.

Icons for time of day: Increase the number of icons from two of just a sun or moon to show that it is day or night, to four by including icons for morning and evening, see figure 74.

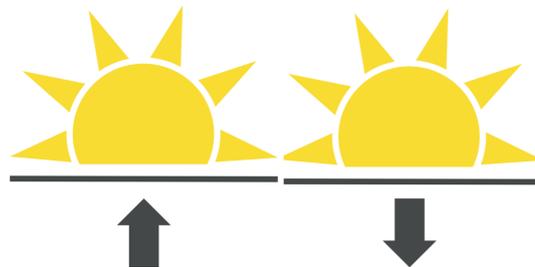


Figure 74: An comparison between two different designs of a navigational bar.

Current activity at the top: The activity which is currently happening should be in the top row when the calendar is opened. Scroll should then be used to find earlier or later activities.

Month view: Added a button to allow the user to view events further in the future than in the current week. However the design of the month view was left as a future development because of lack of time.

Change the name of "Dokument": Changed the name of "Dokument" to "Text" to make the name more general.

Notifications: When new content has been added the user should be notified. This was achieved by adding a small marking on the top right corner of the new content, see figure 75. This marking will disappear when the content has been viewed. Apart from this a banner similar to the one used for reminders, see figure 63, will be used to alert the user of the new content. If the banner is clicked on the user will be brought to the new content.

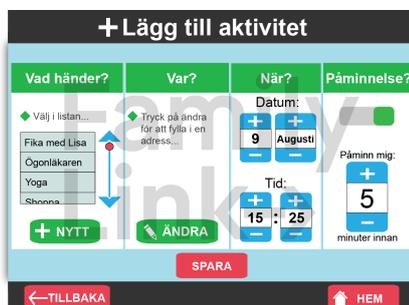
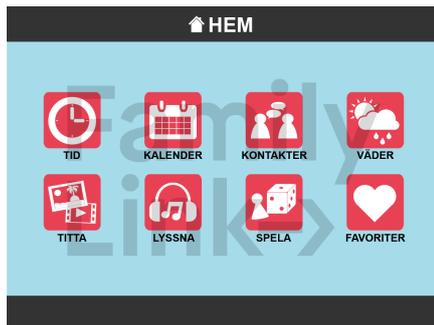


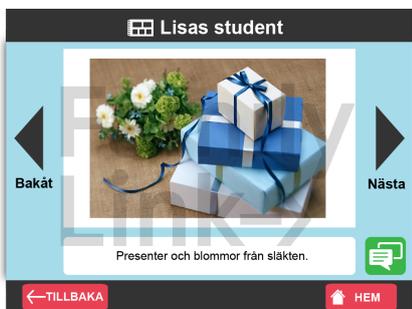
Figure 75: Marking of a new photo album.

10 Result

10.1 Stage one

The final GUI includes a start page and eight features. The eight features are "Tid", "Kalender", "Kontakta", "Väder", "Titta", "Lyssna", "Spela" and "Favoriter". Some of the designs look very similar, hence they are not included in the result.





☰ "Mogna män slogs..."

Mogna män slogs med paraply

Två mogna män kom i lösnery på västergården. När den ene slog den andra med sitt paraply ringde den sågare polisen.



Händelsen utspelade sig i torsdags kväll i Borlänge. Männen, som både är i 50-årsåldern, blev dömda. När domstolarna för den ene såg att de två slog han till sin kompis med sitt paraply. Denne ringde den sågare polisen. Förhöret avslutades och de två kunde dock konstatera att den sågare inte hade några ytterligare skador. Dock tog en armad om misshandling.

16:00 17:00, uppdaterad 17:00, 17:00

←TILLBAKA HEM

🎧 LYSSNA





MUSIK



RADIO



LJUDBÖCKER

←TILLBAKA HEM

☰ "Svensktoppen"

	Titel	Artist	Längd
⏸	Waterloo	ABBA	2:48
▶	Fyra bugg & en Coca-Cola	Lotta Engberg	2:58
▶	Dover Calais	Freestyle	2:54
▶	Musik skall byggas utav ...	Lill Lindfors	4:01
▶	Karleken är evig	Lena Philipsson	3:07

Tillbaka till uppspelningen

←TILLBAKA HEM

☰ "Svensktoppen"

Waterloo - ABBA





←TILLBAKA HEM

"Harry Potter och de vises sten" - J.K. Rowling





←TILLBAKA HEM

📺 P3





←TILLBAKA HEM

♥ FAVORITER



Skånetrafiken



tv.nu



YouTube



SMHI



Dagens Nyheter

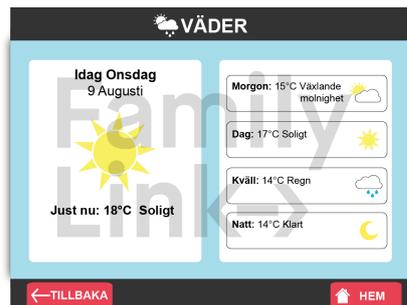
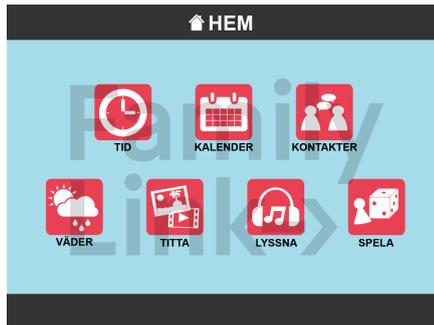


Svenska dagbladet

←TILLBAKA HEM

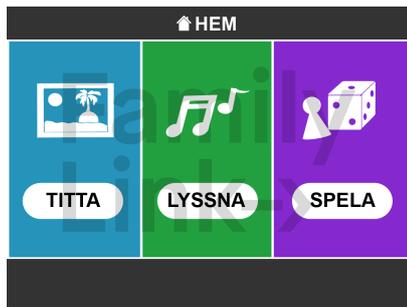
10.2 Stage two

The final GUI includes a start page and seven features. The seven features are "Tid", "Kalender", "Kontakta", "Väder", "Titta", "Lyssna" and "Spela". Most features are looking exactly as in stage one, hence only the designs which differ are shown.



10.3 Stage three

The final GUI includes a start page and three features. The three features are "Titta", "Lyssna" and "Spela". Creating a game adapted for people with dementia was not included in the scope of this master thesis, therefore only the surrounding bars are shown in the design.



11 Discussion

In this section the design process and the final results will be discussed. This will be rounded off with suggestions of future work and improvements.

11.1 Project group

Working as a pair has proved to be valuable in this project due to the many discussions needed in the design process. We believe that working as a pair have had a great impact on the success of this project.

In the lo-fi prototyping stage brainstorming was used. Performing a brainstorming session with only one person is not going to generate a lot of ideas. For us it was necessary to be more than one to discuss all design solutions so they fit our target group.

To be able to have a test leader and one observer in the test sessions made it possible to focus on one task. If only one person had been present problems that occurred could have been missed. This because the test leader needs to lead the TP through the test and hence have difficulties to observe all the time.

11.2 Design process

In this section the design process will be critically analyzed and discussed.

The design process used was user centered, which made sure that errors in the design was discovered quickly. This turned out to be invaluable when we had trouble discovering problems like too small font sizes, too distracting elements etc.

Apart from being user centered the design process was also iterative. This made it possible to try different solutions and continuously get feedback and integrate the feedback in our designs. Through this, larger amount of time was only spent on following design leads with potential.

The only drawback with an iterative design was that a lot of time was spent on organizing several test sessions. However, considering the valuable feedback received from these tests it was time well spent.

11.2.1 Checklist

One of the important parts of the design process and our results was the checklist. The intention of the checklist was to make sure that all the information found during the literature study and interviews would be taken into account when creating the designs for the GUI. Although the checklist did not ensure that all information was considered, mainly because of human error, it did help us include most of it. Certainly more than would have been included if the checklist had not been used.

One reason why some design decisions were made which was not in line with the checklist is that the checklist was not used as often as planned in our modified UCD process, see figure 5. Mostly the checklist was kept mentally in the back of our minds while creating the hi-fi prototypes instead of thoroughly going through the checklist for each design. If the plan had been followed then some mistakes might not have been made and other mistakes not covered by the checklist could have been discovered instead.

It was concluded from the test sessions that the checklist covered most of the problems found during tests. These problems had usually accidentally been overlooked or misinterpreted. This implies that perhaps the checklist could be restructured to be easier to use. Perhaps the list could be shortened in a way which does not remove any important points. This could promote using the checklist more often throughout the design process in a more structured manner.

The creation of the checklist gave us a good opportunity to go through all the information gathered and think of it from a user interface design point of view.

As mentioned earlier, part of the concepts that are specifically aimed at persons suffering from dementia were collected from the literature study and the four interviews conducted. These persons did not have knowledge about how to create a user interface for people with dementia, and most of the things mentioned in the checklist are from their own experiences with working with PWD and other people with cognitive impairments. The checklist might have been better if we, in addition to these interviews, interviewed persons who are involved in research in the field of dementia and AT.

The checklist was used when creating the lo-fi and hi-fi prototypes, however some of the interviews were conducted after the design process had been initiated. This caused the checklist to be updated during the design process which means that the earlier designs were not checked with the complete checklist. However we believe that this had minor or no effect since the corrected in later versions.

11.2.2 Design phase

The first step in the design phase was to perform a session with brainstorming and lo-fi prototyping. By performing this session several different designs were explored without requiring too much effort or time. This made it easier to find new and better solutions which might not have been found otherwise.

Since the project group consisted of two people we could both brainstorm together and separately to generate as many different ideas as possible. Both methods were tried at separate sessions. When brainstorming together we had better discussions but fewer ideas. While when brainstorming separately we had more ideas but the discussions tended to more consist of critique of the each

others designs. Thus we mainly performed these sessions together.

However, all designs were not always covered in these sessions. The reason for this was that some details were forgotten or simply discovered along the way. Simpler brainstorming and lo-fi prototyping sessions were performed on the larger design decisions. The smaller details were however made directly into a hi-fi prototype.

This might have caused design possibilities to not be fully explored and better design choices missed.

As mentioned earlier the feedback received was usually already covered by the checklist but had been missed or misinterpreted. In the beginning it was mostly cases of parts of the design being too complicated or confusing for a PWD, which we had missed because we thought it was simple. In the later iterations when our knowledge and understanding for PWD had grown it was mostly smaller details that were missed.

The reason for this was probably that we, during the early part of the design process, had a hard time putting ourselves in the target group's position. One technique which could have made this easier from the start is the use of personas [35]. Personas are made up characters which fit into the target group. This characters are then used to see the design from the target group's perspective.

When hi-fi prototyping two different programs were used. In the beginning Pages was used since it is easier to use and learn. This allowed us to quickly start converting our lo-fi ideas into hi-fi prototypes. However, it had been decided from the beginning that Illustrator was going to be used for the final designs. Thus we reached a point where we had to switch to Illustrator quite early. After a period of learning we were as comfortable in using Illustrator as Pages. Since Illustrator has a larger range of tools the switch quickly started to pay off.

11.2.3 Test phase

The test phase was one of the most important phases in the design process. This phase allowed us to regularly check if our designs were in line with the target group.

The recommended number of TP to use in a usability test is five [37], a number which we did not reach. In every iteration only 2-4 TP participated. However, as Jacob Nielsen says in the article "How Many Test Users in a Usability Study?" [37], for low-overhead projects it is often more optimal using only two TP. In the iteration tests an overview of the potential problems that could occur was the desired result, hence the usage of 2-4 TP was acceptable in this case.

One of the reasons that more TP were not involved was that to execute a test session takes time, both in preparation and execution. In addition to this our TP lived quite far away from each other, which made it hard to test with

all TP in every iteration.

The test group participating in most of the tests were elderly without dementia and therefore not a part of the intended target group. The reason for this is that we do not have any professional experience with working with PWD. This limited us to people whose dementia is mild enough for us to be able to be the test leaders.

We managed to get in contact with a occupational therapist who leads support groups for PWD. One of these groups consisted of people in the early stages of dementia and they were willing to participate in our tests.

We got in touch with this group in the final stages of our design process. Thus we got the chance to performed the final test on this group. We believe that this strengthens the credibility of our designs. By performing the tests with this group we received feedback which our test group could not provide.

The layout of our test had both advantaged and disadvantages. Because only a few features were implemented in every iteration the execution time for the whole test session was usually very short. This resulted in a lot of time being spent to prepare and travel to the TP in exchange for feedback on a small number of features. However, this provided us with continuous feedback which made the design process smoother.

11.2.3.1 Prototyping tool

To make our prototypes interactive we used a prototyping tool called Proto.io. Proto.io supports several different interactions, both tap and swipe. Proto.io was essential for us to be able to preform tests. It allowed us to simulate a finished product and therefore provide a realistic experience for our test group.

Some of the more important features which Proto.io support are sound and video. Although these features were flawed and did not always work as intended they did allow us to test features like listening to music.

When testing our prototype built in Proto.io we regularly had trouble with the prototype not responding to the TP's taps. Whether the prototype responded or not varied between the TP and the problems were to frequent to just be caused by dry finger tips. This caused a lot of problems in some tests since this interrupted the TP. This affected both the TP's experience of the GUI and the TP's confidence when using it. Without the disruptions the TP might have felt more comfortable with exploring the application during the tests and more design faults might have been discovered.

11.2.4 Icons

When the dementia progress the things the PWD remembers easiest are from when they were 20-30 years old. This is very important to remember when creating the icons and it was concluded through testing that the icons were easy to understand. The icons used in the prototype were tested many times and

with many different persons. The only icon that caused trouble for the TP was the old icon for the "Länkar" function. This function was later renamed "Favoriter" with the new icon in the form of a heart. This icon worked much better.

All test persons thought that the icons were easy to understand, however some mentioned that because the whole GUI was new the TP read the text under the buttons instead of looking at the icons. This shows the importance to use both icons and text to make the navigation as easy as possible.

11.3 Final design stage one

The layout is based on having the tablet in landscape mode. The dark gray bars at the top and bottom at the screen are static, this means that the height of the area left to design on is reduced. The most notable example is in the "Kalender", where there are hardly any margins left. This resulted in the need of a scroll-bar to be able to see all information in case there are many activities in one day.

Choosing good colors for the prototype was challenging. This because the colors must have a significant difference in both color and intensity contrast. From our research we got the tip to avoid to use desaturated colors, especially combinations of blue and green, see section 2.3.9. Another color which should be avoided is purple, because it can be experienced as gray. From the interviews we also got the recommendation to avoid using similar colors and that red hues should be used to mark out the important information.

Being able to reverse ones actions are more important than being able to perform a new action. Therefore the two buttons on the bottom bar should stand out more than the other buttons. Thus the two buttons should be red. For these buttons to stand out the other buttons need to be another color to not overshadow the buttons at the bottom. Thus the other buttons are green.

Thus the design has combinations of blue background with green buttons in several places. As mentioned above desaturated colors, especially green and blue should be avoided. The combination of green and blue could have been avoided altogether by using yellow as the background color. However, we could not find a nuance of yellow which could work as a background color and still be aesthetically appealing.

To avoid the desaturated combination of blue and green we chose to use a clear and more saturated green for the buttons while the background is lighter and a more, compared to the green, desaturated color. Thus we use both lightness and saturation to enhance the difference between the background and the color. In our tests the combination with blue and green did not cause any problems.

The choice of using green buttons on blue background also partly breaks another guideline, consistency. On the start screen the GUI have blue background and red buttons, but after choosing a feature on the start screen the buttons change color to green, thus breaking the consistency. However, since the change of the color of the buttons is consistently changed to green when choosing a feature it

could be considered consistent in a different way.

This could also turn out to be an advantage. Since the start screen is not the same as the other menus, it does not have "Tillbaka" and "Hem" buttons, it could be good that it differs from the others. Thus, hopefully, the user will easier find their way back to the start screen and not get confused and try to look for the "Tillbaka" and "Hem" buttons on start screen.

In the third iteration, see section 8, the possibility for the user to add activities with reminders was added. This resulted in the need for input from the user. To make it possible for the user to name and write the position for the activity it was necessary to use the pop-up keyboard. This goes against the recommendations in the checklist. Thus in some situations the checklist's suggestions are not realistic, as in this case. The pop-up keyboard is necessary for the user to be able to provide more advanced input, like text. However, it can make the designer think through the design one more time to see if the keyboard is absolutely necessary.

If the pop-up keyboard is unavoidable it is important the usage of the keyboard as easy as possible. In this case we chose to solve it by taking the user to a new screen with only a text field and the keyboard. This to avoid that the keyboard covers any elements or "pushes" the elements outside the screen.

Apart from the keyboard being pop-up it also adds another problem, errors in input. At the prototype's current state the user can go and change the details of the activity. However, warnings of input errors have not been taken into consideration in this prototype. It could be useful to add warnings when the user, for example, sets a date or time which has already passed. The best solution would be to make the warning red and have it appear in close proximity to where the error has occurred and have a clear descriptive text of the error.

11.4 Final design stage two

Dementia can affect people in various different ways. This usually becomes most apparent in the stages of moderate dementia. This makes this stage the hardest to design. In this stage the optimal solution would have been to have the master, who knows the user best, modify the GUI so that the GUI is customized to fit the user. However this would mean that every master would need to re-design the GUI. This is not a viable solution.

We chose to solve it by making this design dependent on that the master is able to adjust which of the features available, "Tid", "Kalender", "Kontakta", "Väder", "Titta", "Lyssna" and "Spela", should be visible to the user. In addition to this, the master should also be able to control simpler settings like voice support.

11.5 Final design stage three

In this stage the intended user's dementia is so severe that we wanted to simplify it in any way possible. Thus we chose to limit the number of features to

"Titta", "Lyssna" and "Spela". These features are in turn color coded. Each feature's button is given a unique color and this color is then used in the top and bottom bar for that feature.

By color coding we once again had trouble finding the best colors. We now need 5 different colors, one for each feature, one for the "Tillbaka" button and one background color. For the background we chose a light gray, this to avoid pure white which gives a very strong background light. For the "Tillbaka" button we chose red, the reason for this is the same as reasoning on the two bottom buttons in stage one. This leaves the colors for the features.

Since the "Tillbaka" button is red this color is not an option. This roughly leaves blue, green, yellow and purple. Yellow was discarded as a result of being too light, which makes the feature's icon hard to see. A solution could have been to simply choose a darker nuance of yellow. However darker nuances of yellow tend to go towards brown which is not aesthetically appealing.

Thus the features colors are blue, green and purple. However we had a hard time finding suitable nuances and still think better colors could be found. Because of lack of time the current nuances were chosen.

Because of the intended user's dementia being too severe, a test session with PWD in this stage could not be performed. The reason for this is the project group's lack of experience with working with PWD. Hence we do not know if the GUI is simple enough for them to use or if they want to use it. However, from the discussions with the occupational therapists we were able to create a design which they think could work for people with severe dementia.

11.6 Ethical considerations

Some of the ethical considerations made were very important for the results. For example ensuring that the test person is aware that any occurring errors were not the TP's fault. This hopefully gave the test persons more confidence when testing the prototype and made them more confident in expressing their opinions.

By avoiding time pressure, specially with the PWD, we avoided making the test sessions a stressful experience for the test persons. This gave the test session a more relaxed atmosphere which hopefully also increased the test persons' confidence.

When we were trying to recruit test persons we were limited to person with mild dementia. This group is hard to get in contact with, since they do not live in a home dedicated to PWD yet. We could try to contact a memory clinic where people with dementia are diagnosed. However, we chose not to, since we felt that the people who are newly diagnosed are in a very vulnerable state and we feared that meeting us and discussing dementia might upset them. Thus we chose to use elderly as a test group until we got in contact with the support group for people with mild dementia.

11.7 Future improvements

In this section specific improvements which should be taken into consideration when this GUI is developed further.

11.7.1 Testing

To improve the GUI further more tests with people with dementia need to be conducted. In stage one the design has only been tested once with PWD, and to know if the updated version of the GUI is easy to understand new tests needs to be performed.

The designs of stage two and three were never tested properly with persons with dementia. This is necessary to verify that the designs live up to the need of the PWD whose dementia is moderate to severe. For this to be possible expertise in performing tests with people with dementia will be needed and a fully functional prototype.

As mentioned earlier the number of TP at each test varied between 2-4. To cover most usability faults five TP are recommended. For future test it would be better if the designs were tested with more TP.

11.7.2 Professionals within the dementia area

In the beginning interviews with a few prominent people within the dementia area were held. Later two of them were also involved in discussing the designs. Both of these persons were occupational therapists. In future development of this GUI it would be better if the designs were discussed with a larger group of prominent people where these people have different professions.

11.7.3 Complete application

To be able to test the GUI to its full extent the functionality behind the GUI needs to be implemented. If a complete application, with functionality and GUI, is used for testing then a test where the TP is allowed to freely explore the GUI can be performed. If the application can be explored more freely then hidden design faults which were not thought of when the test was created can be found. A future improvement would therefore be to create a complete application and use it to perform the tests.

12 Conclusion

In this report a checklist and a prototype of the user interface for an application for people suffering from dementia was created.

The checklist includes the aspects which needs to be taken into consideration when designing a prototype of a GUI for persons suffering from dementia. The list has been confirmed, through testing, to cover most of the important areas. However, even if the checklist was used continuously during the design process it was difficult to apply the guidelines mentioned in the checklist in a correct way without the help of professionals with experience of working with PWD or without the PWD themselves. Thus the checklist needs to be combined with tests with people with dementia and discussions with experienced professionals within the area of dementia. If these suggestions are followed then the checklist could be applicable in other similar projects.

The prototype was developed through four iterations, where brainstorming, lo-fi prototyping, hi-fi prototyping and testing are methods which were included in each iteration. The prototype was also tested on professionals at two occasions during the later iterations. The prototype has come a long way from its original design and has proved to have potential after positive results from the final test with PWD. However, only the first stage has been tested by persons suffering from dementia and only once. To fully validate the whole prototype the second and third stage needs to be tested properly and the first stage also needs to be tested more extensively.

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Appendices

A Guidelines checklist

A.1 General design guidelines

1. Consistency - *Strive to have common theme throughout menus and the whole app*
2. Informative feedback - *For every action there should be a clear feedback which clearly corresponds to that action.*
3. Prevent errors - *Design in such a way that the user cannot commit any serious errors.*
4. Reversible actions - *to the extent possible an action should be reversible.*
5. Dialogs should yield closure - *If an action consists of several sequences then it should have a clear start, middle and end.*
6. Minimal short-term memory load - *Design the interface so that the user wont have to remember larger or any amount of information.*
7. Sense of control - *Allow the user to feel a sense of control of the interface by avoid changing established behaviours, extensive data-eateries, difficulty in accessing necessary information and producing the desired result.*
8. Discoverability - *Make it as easy as possible for the user to discover what actions are possible and which state the system is in. This can be done with affordances, signifiers and constraints.*
9. If possible use a good conceptual model - *This is to give the user a general understanding of the system.*
10. Use good mappings - *Mappings are used to make it easier for the user to navigate in the interface.*
11. Use affordances, signifiers and constraints - *Use affordances, signifiers and constraints to make the interface more intuitive for the user.*
12. Placement of information - *The most important information should be placed at the top or to the left.*

A.2 Specific guidelines for dementia

General GUI design

1. Simple GUI - *The design should only contain necessary information and avoid distracting elements like cluttered images or abstract motives. This should be done without making the design childish.*
2. Adaptable GUI - *Ex. responsive grid layout.*
3. Adapted degree of difficulty - *the design should not be too simple and challenge the user's cognitive abilities to a reasonable level.*

4. Personalisation - *Make it as easy as possible to adapt the GUI to the user's current ability and preference.*
5. Avoid a childish feel - *The GUI should be simple but not childish.*
6. Avoid the look-and-feel of assistive technology - *Avoid designing so that the look-and-feel implies that the product is designed for a disabled person.*
7. Intuitive/high usability - *The learning curve should be close to 0.*
8. Avoid distracting and/or abstract backgrounds or images.
9. The layout orientation must be locked
10. Avoid hidden elements and pop-ups - *Elements which appear and then disappear can confuse a PWD. If an element disappears the PWD might start looking for the element outside the device's screen.*
11. Avoid deep navigational hierarchies
12. Use familiar symbols - *Symbols like a heart on the toilet door.*
13. Simple and clean icons
14. Adapt the look to the time period - *PWD often move "backwards" in time as the dementia progresses. It is therefore important to use symbols which were common in time period when they were young.*
15. Use old habits - *If necessary make use of old habits to ease the use of the product.*
16. Avoid right and wrong - *In later stages of dementia it is important to not remind the user of his/her inabilities. Therefore the possibility of doing right or wrong in , for example games, should be avoided.*

Content

1. Limit the number of elements - *The number should be adapted to the stage of dementia.*
2. Limit the information shown on one screen
3. Limit the possible actions
4. Images with simple motives - *For example images of animals or flowers can be entertaining even for people who have more severe dementia.*
5. Captions for images - *It is important that these texts are short.*
6. Profile images with names - *Combine names with images to make it easier to remember relatives. However if the dementia is more severe images of relatives can be frightening if the user does not remember them.*
7. Large buttons/fonts - *To adapt to the user's possible vision/fine motor impairment.*
8. Avoid long texts - *PWD have trouble with reading longer texts. It is therefore important to make the GUI visual more than text-based.*

9. Use well known language which is known by the target group - *Avoid slang and new words which are not familiar to the older generation.*
10. Use music - *Music has proven to have many positive effects on people suffering from dementia. It can be stimulating physically, psychically, socially, cognitively and spiritually.*
11. Animations - *Should be used sparsely. Animations can be beneficial when used to inform the user that a system is active, ex. that music is playing. But if used too much it will only be distracting.*

Output

1. Voice support - *Use voice support to strengthen the feedback. Avoid giving multiple impressions or making it childish.*
2. Voice support should be optional.
3. Clear sound - *To adapt to the user's possible hearing impairment.*

Color

1. High contrast - *To adapt to the user's possible contrast sensitivity impairment.*
2. Use contrast colors - *The sense of color is not affected by dementia.*
3. Avoid using similar colors on background and content .
4. Combining colors with substantives can ease the understanding.
5. Use different colors for different features to make them easier to distinguish
6. Avoid combinations of desaturated colors - *Desaturated colors are harder to distinguish from each other, especially red/purple and green/blue.*
7. Use red hues for highlighting - *Red hues are the easiest to see.*
8. Take color psychology into consideration - *Color psychology is still an unsettled matter. However it can still be kept in mind.*

Other

1. Introduction of the product - *Introduce the assistive technology early to increase the possibility for the user to use the product later.*
2. Trial time - *It is important to allow the user time to explore the product. The user might find other uses for the product then originally intended.*
3. Significant other's attitude - *The attitude of people close to the user has proven to affect the user's attitude towards the product.*

A.3 NavMem Guidelines [34]

1. Zoom - *Provide the possibility to zoom in on small text.*
2. Avoid double click - *Older users should not be expected to double click because of slower hand movements.*
3. Static return button - *A single, consistently placed button for returning to the home state should be included.*
4. Graphics - *Graphics should be relevant and not for decoration.*
5. Tapping - *Tapping is often preferred to drag and drop.*
6. Centered information - *Information should be concentrated mainly in the centre.*
7. Avoid moving text
8. Avoid fancy font types
9. On screen keyboard - *Slide-out keyboards should be avoided.*
10. Target capture - *Provide clear confirmation of target capture (i.e. button press, visited link). The user should not be expected to detect small changes.*
11. Location - *Provide current location in the interface.*
12. Active tasks - *Clearly show which tasks are active.*
13. Avoid pull down menus
14. Provide ample time to read information
15. Main navigation - *Main navigation should always be the same and critical functions should not disappear.*
16. Icons - *Icons should be simple and meaningful and also labeled (with a large enough font).*

B Interview questions

The interviews were held in Swedish, therefore the questions are in Swedish.
These questions below were asked to Wilhelmina and Margareta.

1. Hur kom det sig att du började jobba och inrikta dig mot demens?
2. Hur länge har du jobbat inom detta område?
3. Vad jobbar du med just nu?
4. Om man delar in demenssjukdomens förlopp i 3 stadier:
 - (a) Vad skulle vara de mest markanta symptomen för de olika stadierna?
 - (b) Vilka sysslor klarar de av i de olika stadierna?
5. Vilka är de 3 vanligaste hjälpmedlen för personer med demens?
6. Ser du några positiva effekter och/eller utmaningar för en person med demens att använda en touchscreen (iPad)?
7. Vad i en apps utseende kan underlätta och/eller orsaka svårigheter för en person med demens?
8. Finns det färger och former som kan underlätta och/eller orsaka svårigheter för personer med demens?
9. Används symboler eller associationer på något vis för att underlätta vardagen för personer med demens?
10. Hur väl tar de som lider av demens till sig information från:
 - (a) bilder? t.ex. tex bild på höstlöv indikerar att det är höst.
 - (b) bildtexter?
 - (c) talad information (röststöd)?
11. Vad tror du är det viktigaste att tänka på vid utformningen av en app för en person med en svårare grad av demens? Utseendemässigt?
12. Om du skulle få bestämma, hur skulle ett kommunikations-hjälpmiddel för en person med demens se ut, vilka funktioner skulle finnas med?

These questions below were asked to Charlotta and Catharina.

1. Hur kom det sig att du började jobba och inrikta dig mot demens?
2. Hur länge har du jobbat inom detta område?
3. Vad jobbar du med just nu?
4. Vad erbjuds det för hjälpmedel idag?
 - (a) Hur mycket används de tekniska hjälpmedlen idag?

- (b) Vad gör att de används/inte används?
- 5. Hur påverkar utseendet på hjälpmedlet inställningen till hjälpmedlet?
- 6. Ser du några positiva effekter och/eller utmaningar för en person med demens att använda en touchscreen (iPad)?
- 7. Vad i en apps utseende kan underlätta och/eller orsaka svårigheter för en person med demens?
- 8. Finns det färger och former som kan underlätta och/eller orsaka svårigheter för den med demens?
- 9. Hur väl tar de som lider av demens till sig information från:
 - (a) bilder? t.ex. tex bild på höstlöv indikerar att det är höst.
 - (b) bildtexter?
 - (c) talad information (röststöd)?
- 10. Vad tror du är det viktigaste att tänka på vid utformningen av en app för en person med demens? Utseendemässigt?

C Interview summaries

Here follows the summaries of the interview conducted in the literature study phase. Since the interviews were conducted in Swedish, the summaries will also be in Swedish.

C.1 Interview 1: Wilhelmina Hoffman

The interview with Wilhelmina Hoffman was conducted on 26th February 2016.

C.1.1 Kort om Wilhelmina

Hon började som vårdbiträde inom långvården och fortsatte sedan med att vidareutbilda sig inom medicin riktat mot äldreområdet. Hon deltog sedan i Kungsholmsprojektet som är en longitudinell epidemiologisk studie av alla äldre i en stadsdel.

Hon har sedan dess:

1. Varit med och startat en minnesmottagning i Norrmalm.
2. Varit med och startat en utbildningsenhet om hur man stöt.
3. Blivit chef och rektor för Silviahemmet.
4. Varit med och startat Demenscentrum, ett nationellt kompetenscentrum, startades 2008 för att sprida kunskap om demens för att förbättra livskvaliten.

och har nu jobbat i 37 år inom demensvården.

C.1.2 Generellt om demens

160 000 demenssjuka i Sverige idag ca 100 olika sjukdomar/skador som orsakar syndromet demens. Alzheimers sjukdom är den vanligaste, ca 66%. För att räknas som demens måste minst två olika delar/områden i hjärnan vara skadade. Dessa skador måste dessutom vara så pass allvarliga att de påverkar det dagliga livet.

C.1.3 Alzhotvecklamers sjukdoms förlopp

Alzheimers börjar troligtvis 10-20 år i hjärnan innan man får symptom. Det är individuellt hur länge en person har sin sjukdom. Det beror mycket på vilken ålder de är i när de utvecklar demens. Vid viss nivå av neurodegeneration uppfylls demensskriterierna.

Mild fas:

De tre vanligaste tidiga symptomen för alzheimers är:

1. Nedsatt exekutiv förmåga. Detta är ofta det som sker först. Detta leder ofta till inaktivitet och det blir inte bättre över tiden.
2. Närminnes problem, dvs att lära sig och lagra ny information. Exempelvis när hela episoder glöms bort t.ex. att man pratade med någon i telefon igår.

3. Spatiala svårigheter, dvs har svårt att navigera sig i sin omgivning utanför närmiljön (hemmet).

I denna fasen klarar man sig oftast själv med lite stöd från anhöriga. Man klarar även ofta av att kommunicera normalt och läsa skrift. I denna fas är det också viktigt att spendera tid i sociala sammanhang för att undvika isolation. Isolation leder till försämrad självkänsla och självförtroende. Detta skapar en negativ stress som gör det svårare att komma ihåg saker.

Medelsvår fas:

I denna fas har man förlorat ganska många funktioner. Det är dock väldigt individuellt vilka funktioner som har påverkats. Det är viktigt att notera att vissa har stora problem med vissa områden men är helt opåverkade inom andra områden. Här följer en lista av vanliga symptom:

1. Problem att hitta ord och uttrycka sig.
2. Problem med att orientera sig i rum, tid, plats och person. Ex var ens kropp är i förhållande till en stol.
3. Problem med att uppfatta omvärlden, perceptionsförmågan. Detta kallas även för Agnosi.
4. Beteendeförändringar
5. Hallucinationer/vanföreställningar
6. Misstänksamhet
7. Apraxi, det inlärda motoriska minnet har påverkats så att det blir svårt att utföra invanda rörelser.
8. Den exekutiva förmågan försämras ytterligare.

I denna fas är det viktigt att undvika abstrakta motiv/konst och plotter/massa små detaljer. Det är också viktigt att använda kontraster. I denna fasen behöver personen med demens väldigt mycket hjälp och stöd. Att lära sig nytt är möjligt i en tidig fas om det är väldigt enkelt och naturligt. Det är enklare för personen med demens att prata om det som hände förr.

Svår fas:

Alla symptom är nu värre. Det kallas för en global kognitiv svikt. Personen med demens behöver nu hjälp med i stort sätt allt.

C.1.4 MMSE/MMT

MMSE test, även kallat MMT, som är ett kognitivt screening instrument. MMSE test mäter en persons olika kognitiva förmågor. MMSE används inte för att avgöra om en person har demens eller inte, utan detta avgörs utifrån de symptom som kan bekräftas. Om MMSE genomförs med jämna mellanrum så ger poängen en kurva som visar förloppet för alzheimers, denna kurva är lika för de flesta.

C.1.5 Använda iPad

Användning av iPad kan ge positiva effekter, speciellt tidigt i den milda fasen då personen med demens själv kan ta initiativ till att använda iPaden. Detta kan ge den som lider av demens en möjlighet till självständighet och själv få styra en app. En iPad kan också användas tillsammans med någon för att skapa en dialog.

Kan fungera även för de med medelsvår demens om den är anpassad för folk med lite större kognitiva problem och krävs att någon hjälper till och tar initiativ. Kan även kanske fungera i den svåra fasen men då i form av mer passivt användande.

C.1.6 Utseendet på en app

- Enkla motiv, ex. bilder på djur, en blomma, ett höstlöv.
- Inte för plottrigt eller abstrakt.
- Vara försiktig med vilka bilder som visas. Bilder på barnbarn eller personer som den drabbade inte känner igen kan vara skrämmande.
- Kombinera bilder med kort text och röststöd. Tilltalande, fräsch.
- Använda färg. Detta då färgsinnet är ett av två områden som inte påverkas av demens. Rött och grönt är de färger som man ser längst. Ex. kombinera substantiv med färger för att göra det lättare att förstå.
- Musik. Detta då sinnet för musik är det andra området som inte påverkas.
- Symboler, gärna äldre symboler som t.ex. ett hjärta på toalettdörren.
- Avskalade ikoner snarare än en bild tagen med kamera.
- Ev. bilder på anhöriga när de är unga, som "profilbild" när de ringer.
- Underlätta för anhöriga att anpassa appen så att det passar en viss persons preferenser.
- 7 ikoner kan vara lite mycket för en person med mild demens, men beror på upplägget. Kan funka om man delar upp det i enkla tydliga steg.

C.1.7 funktioner i en app

Person centrerad app. Ha tillgång till kort beskrivning av sitt liv. Bilder på sina barn och kort beskrivning av dem och bilderna. Även möjlighet att ringa barnen i anslutning till deras beskrivningar.

Kalender med dagens datum, årstid, viktiga tider. Veckovy med tydlig markering av den innevarande dagen.

C.1.8 Kontakt

Wilhelmina var intresserad av fortsatt kontakt. Hon rekommenderade även:

- Helle Wijk, skrivit mycket om miljö och färger.
- Sara Hjulström och Ann-Christin Kärrman på demenscentrum
- Ann-Charlotte Roupe
- Lotta Olofsson

C.2 Interview 2: Margareta Skog

The interview with Margareta Skog was conducted on 26th February 2016.

C.2.1 Första tankar vid projektbeskrivningen

Demenssjukdomens förlopp kan sträcka sig över en 10 till 20 års period. Att täcka in hela detta intervall i en app kan bli ett gigantiskt arbete och kanske blir det att greppa över för mycket. Ett första råd var att fundera över att begränsa ner arbetet.

I de olika stadierna kommer appen användas av olika personer, vid mild grad av demens kommer personen med demens att använda appen själv, vid medelsvår demens kommer personen behöva hjälp av anhöriga för att kunna använda appen och vid svår demens är det stor chans att appen enbart kommer användas/styras av de anhöriga, vilket kan vara bra att tänka på vid utformningen av appen. Om trådlös styrning ska användas kan den skapa förvirring om inte implementerad på rätt sätt.

Margareta tycker projektet låter spännande och påpekar att ju renare projektet är desto större framgång.

C.2.2 Kort om Margareta

Har jobbat inom vården i sammanlagt 40 år, och av dessa har hon jobbat 25 år med demens. Hon började inom vården genom att sommarjobba på ett äldreboende, sedan utbildade hon sig till undersköterska för att senare utbilda sig vidare till sjuksköterska.

Hon började jobba på akutvården men har alltid varit intresserad av den gamla människan och har stött på många personer med minnesproblem under åren. Det stora steget in i demensforskningen blev ett stipendie, som Drottning Silvia delade ut. Hon har även skrivit läroböcker inom ämnet.

C.2.3 Användning av iPad/plattor

De flesta äldre med demens idag har inte den tekniska vanan, detta gäller såklart inte alla. Men det börjar bli vanligare på daghemsverksamheter att de äldre börjar ha med och använda mobiltelefon.

För att personen med demens ska kunna ha nytta av en iPad så länge som

möjligt är det viktigt att den introduceras tidigt, ju tidigare desto större chans att den kommer användas även senare i sjukdomsförloppet.

Plattor används redan lite idag. Det är ett väldigt bra hjälpmedel för att kunna förstärka det man pratar om, till exempel om man pratar om fåglar kan man enkelt ta upp en bild på en fågel. Eftersom den demenssjuke lever i stunden, är det bra att kunna få fram det man behöver för att förstärka samtalet snabbt.

C.2.4 Anpassa appen efter användaren

Demenssjukdomen gör att man oftast går bakåt i tiden intellektuellt och det man kommer ihåg bäst är ifrån när man är ung. Det är då viktigt att tänka på hur världen såg ut på den tiden och anpassar appen till den tidsperioden, till exempel implementera spel som var vanliga när patienten var ung.

Vid medelsvår demens kan en person med demens fortfarande klara av att spela spel på en platta, om designen är enkel och man sitter med någon annan som kan hjälpa till. I detta stadiet i sjukdomen är det inte viktigt för personen med demens att vinna, utan spelet ska mer vara till för nöje och sysselsättning. Om det finns rätt och fel i ett spel kommer den demenssjuke bli påmind om sina förmågor.

C.2.5 Ikoner och bilder

Appen bör vara mer visuell och inte innehålla för mycket text. Det är mycket viktigt att ikoner testas noga, eftersom det finns en stor generations skillnad i hur man uppfattar olika ikoner. En idé som togs upp vara att kunna byta ikon.

Eftersom sjukdomen utvecklas kan det vara bra att ändra ikonerna så de är anpassade till den tidsperiod den demenssjuke befinner sig i och förenklas under sjukdomens förlopp. Ofta när sjukdomen kommer till fasen när man ska byta till ett enklare gränssnitt så kommer patienten inte komma ihåg plattan eller appen, det kommer därför inte att bli så förvirrande för de demenssjuka om ikonerna ändras i de olika nivåerna.

För ikonerna är det viktigt att de är enkla och rena utan att de blir barnsliga. Det kan vara bra att använda vackra bilder, eftersom de väcker känslor, för att förstärka olika saker, till exempel blåsippor för att förstärka att det är vår.

C.2.6 Begränsa valmöjligheterna

Det är även viktigt att tänka på att inte ge den demenssjuke för mycket valmöjligheter, eftersom det kan leda till förvirring. Samma sak gäller rörliga bilder eller animationer i en app.

C.2.7 Befintliga hjälpmedel

Några av funktionerna i projektet finns redan som enskilda hjälpmedel på hemsidan octopus.se, kan vara bra att kolla på dem.

C.2.8 Layout

Layouten, porträtt- eller landskapslayout, måste vara låst eftersom det kan bli väldigt förvirrande när knapparna byter plats. Det kan också uppstå att knapparna byter plats även om man inte menade att vända på plattan, till exempel om man är darrig om händerna.

I början av demenssjukdomens förlopp kan den sjuke hantera att både hålla plattan och trycka på knappar, men när sjukdomen fortskrider kommer det att bli svårt. Det kan då vara bra att ha plattan i landskapsläge i någon ställning. Scroll funktioner eller liknande där information ser ut att försvinna i tomma intet bör undvikas då personen med demens kan bli förvirrad och börja leta efter den försvunna informationen utanför plattan.

C.2.9 Färger

Det är även bra att använda klara färger i layouten för att indikera vilka knappar som går att trycka på. När personer med demens målar själva så använder de mycket klara färger.

Rött är en bra färg att markera ut viktiga saker med, det ska dock inte vara för mycket rött då rött även är en aggressiv färg. I rummet kan svart färg upplevas som en nivåändring och på så sätt uppge förvirring. Det kan dock fungera i ett gränssnitt och svart färg på text med vit bakgrund är bra.

C.2.10 Ljudstöd

Det kan vara bra att förstärka bilder med ljud, till exempel djurläten. Det är viktigt att man inte ger två olika intryck till den demenssjuke, då ljud som inte passar kan leda iväg tankarna och förvirring uppstår. Vid användandet av talad information får man ta det lite försiktigt så det inte blir barnsligt.

C.2.11 Storlek

Det kan vara svårt i det tidiga stadiet att designa knappar och text i rätt storlek. Eftersom personen ofta har använt mobiltelefon och är van vid de små ikonerna så kan det upplevas som kränkande att använda ett gränssnitt med stor text och stora knappar.

C.2.12 Utseende vid senare stadier

Vid de senare stadierna kan möjligtvis fyra knappar vara okej. Det kan även vara kul för den demenssjuke att kunna trycka runt bland knapparna och se att det händer saker. Det är också viktigt med bildtext vid visandet av bilder på barn och barnbarn.

Det kommer bli svårt att hitta en universallösning för alla, i vissa fall kommer det fungera utmärkt och i andra inte alls. Margareta var intresserad av fortsatt kontakt.

C.3 Interview 3: Lotta Olofsson

The interview with Lotta Olofsson was conducted on 30th March 2016.

C.3.1 Kort om Lotta

Utbildad arbetsterapeut som började att jobba med rehabilitering av strokepatienter, samtidigt hade alla arbetsterapeuterna ett gemensamt ansvar för en demensavdelning. Demens och stroke påverkar hjärnan på liknande sätt, men medan stroke skadar hjärnan på ett visst område så är demens mer komplicerad och en sjukdom som försämras vilket gör att man behöver kunna ännu mer om hjärnan och hur den fungerar. Lotta tyckte detta var spännande och efter tre år som arbetsterapeut började hon jobba på demensavdelningen.

Tillsammans med en kollega skrev hon en bok (Sinnesstimulering i demensvården) där Demensförbundet var med som en referensgrupp. 2008 började hon jobba på Demensförbundet. Hon jobbar även med demens på äldreförvaltningen, där hon utbildar biståndshandläggare och folk inom hemtjänsten.

C.3.2 Hjälpmedel

Det finns många olika hjälpmedel på marknaden, men alla får inte arbetsterapeuterna förskriva utan de får bekostas själva. Det kan vara så att Landstingen inte har upphandlat hjälpmedlen, men det betyder inte att de inte finns. De vanligaste hjälpmedlen är påminnelsehjälpmedlen. Exempelvis påminnelse att ta medicin och olika slags almanackor, både på whiteboard och digitalt. Andra tekniska hjälpmedel är programvara för en mobiltelefon och GPS i form av en klocka eller dosa.

GPS är ett vanligt hjälpmedel tidigt i sjukdomen, eftersom många i början har en stor rädsla för att gå vilse. Mobiltelefonen är här väldigt bra att tidigt lära sig att alltid ha med sig, eftersom den har en inbyggd GPS. Det är även viktigt att hjälpmedlet används frivilligt som en trygghet. Om till exempel GPS introduceras för sent så kan det vara svårt för personerna med demens att förstå vad GPS är och varför de behöver det. Att introducera hjälpmedlen tidigt gäller de flesta kognitiva hjälpmedlen. Senare i sjukdomen kan hjälpmedel som larm behövas, till exempel ett larm i dörrar som går ingång om personen går ut.

I Stockholm finns en visningsmiljö där olika kognitiva hjälpmedel finns samlade.

De kognitiva hjälpmedlen används mycket mindre än vad de idag hade kunnat göra. Vissa Landsting ser hjälpmedlen som en kostnadsfråga och det finns ett stort behov av att utbilda arbetsterapeuter som ordinatorer så att de känner till hjälpmedlen och känner sig bekväma med att förskriva hjälpmedlen. Arbetsterapeuterna är inte proffs på teknik, det kan vara så att det behövs en ny yrkesgrupp med mer teknisk kunnighet.

De demenssjuka själva behöver också få mer information om vad det finns för hjälpmedel. Demensförbundet har grupper där det pratas om egna strategier och tekniska hjälpmedel som personerna med demens använder för att underlätta vardagen.

C.3.3 Användning av hjälpmedel

Personer med demens kan lära sig nya saker, men de måste öva och användas under en längre tid. Ibland finns inte den tiden för att introducera nya hjälpmedel vilket gör att hjälpmedlet hamnar i en byrålåda. De vill inte heller ha ett hjälpmedel som ser ut som ett hjälpmedel, därför är smartphones och plattor bra. Till dessa kan man anpassa programvaran. Utseendet på hjälpmedlet är mer viktigt i början av sjukdomen, senare spelar det inte lika stor roll utan de vill istället ha något som är bekant och de är vana vid.

C.3.4 Användning av en platta

För att personer med demens ska kunna använda en platta måste det som nämnts tidigare få mycket träning. Plattan är inget konstigt bara de får lära sig att använda den. För programvara på plattan är det viktigt att elementen inte är för små och att man inte kan hamna fel eftersom koordinationen blir sämre med åldern. Swipe funktionen är inte heller något problem om de har fått lära sig det ordentligt.

Tillslut kommer dock personerna med demens att komma till ett steg där de inte längre själva kan använda vissa funktioner, till exempel tangentbord. Efter ett tag kanske det behövs att någon annan sköter knapparna medan den demenssjuke kanske berättar om bilder som visas. Ganska länge kan de dock göra enkla tryckningar, men att hitta ord på ett tangentbord blir för svårt.

Det är även viktigt att det inte är för många moment innan man kommer in till en app. Det är mycket individuellt hur många moment en person klarar av men om det blir 3-4 moment innan man ens har kommit in till den tänkta appen så kan det försvåra för personer med demens. Startskärmen bör även vara rensad från onödigheter, och bara visa appar som används.

C.3.5 Utseende

Vid utformning av ett användargränssnitt är det viktigt att använda mycket kontraster och göra det så rent som möjligt. Inte för mycket information och inget som förvirrar. Bakgrundsbilder är inte bra att använda då de kan bli förvirrande, istället bör enkla och rena färger användas som bakgrund. Och man bör även tänka på att inte använda för likartade färger på till exempel bakgrund och knappar. Utseendet ska tydligt visa vad man ska göra.

C.3.6 Bilder, bildtext och röststöd

En del personer kan ha stor nytta av att få information från bilder, inom om sorgen för personer med utvecklingsstörning är det vanligt att man använder sig av bilder. Personer med demens har dock inte samma förståelse för bilder eftersom de var helt friska innan sjukdomen. Bilder på kända ting som telefon eller en bild på personens dotter kan ge en tydlig ledtråd till vad man försöker åstadkomma. Till exempel en telefon bredvid en bild på dottern indikerar på att man ringer upp dottern. Ju fler sinnen som stimuleras desto bättre, dock inga bilder bara för att det är fint de måste betyda något.

Röststöd kan vara bra för vissa, då vissa tappar förmågan att läsa medan andra inte gör det. Därför är det viktigt att röststödet kan sättas på och stängas av. En del kan också bli förvirrade om plattan pratar och de inte vet vart rösten kommer ifrån.

C.3.7 Test av prototyp

Startsida

- Bättre med enkel enfärgad bakgrund, eventuellt två men helst en färg.
- Ränderna är onödiga och kan flimra. Använd hellre skuggor eller något som inte distraherar/flimrar.
- Ikonerna är tydliga.
- Justera antal funktioner. Helst att anhörig kan modifiera vilka funktioner som ska finnas med på startsidan.

Kontakter

- Kontakter kan finnas med ganska länge om det innebär att trycka på en bild på sin dotter för att ringa.
- Abilia har ett rutsystem så att man kan välja hur många kontakter man vill ha. Det är bra så att antalet kontakter anpassas efter hur många användaren kan hantera.

Lisa

- Mycket information under "Lisa". Dela upp det i "Om Lisa" och "Mer om Lisa"
- I början klarar man av fler steg i navigation medan i slutet gör man inte det.
- Lisa ska själv ha möjlighet att uppdatera informationen som visas på hennes sida.
- Pilar → tydligt nog i början
- Start, indikerar att något ska hända. Byt till Hem istället.

Tid

- siffror på klockan.
- Behöver imorgon vara med på vädret?
- Skriva ut veckodagen → idag onsdag
- Tidslinjen → tydliggöra med text "morgon" osv. Kanske för mycket information. Behövs testas.

- Få tiden uppläst om man trycker på klockan.
- Bra att tiden står både digitalt och analogt.

Kalender

- För förvirrande med flikar.
- Tror texten är stor nog.
- datum på alla dagarna. Se datum utan att behöva trycka på fliken.
- Lägga in påminnelser ← utnyttja kommentar utrymmet för det. Valmöjligheter i början. Med alternativ (15 min innan osv.) Fungerar med knapp i kommentarsutrymmet i början.

Länkar

- Heta Mina favoriter istället? Lite mer konkret än länkar.

Radio

- Bättre med en paus/play knapp. Har man två knappar så är den en knapp som inte har något syfte. Det gör det också lättare då man inte behöver tänka efter på vad man ska trycka på.

På god och rätt väg om vi skippar bakgrunden.

C.4 Interview 3: Catharina Montgomery

The interview with Catharina Montgomery was conducted on 30th March 2016.

C.4.1 Kort om Catharina

Catharina är en arbetsterapeut. Hon började arbeta med funktionshindrade. Efter en omorganisation valde hon att lämna det. Hon hamnade sedan i ett projekt inom äldreomsorgen som handlade om aktivitet, miljö och bemötande. Hon har samarbetat med Lotta i flera projekt. Idag arbetar Katarina på demensförbundet en gång i veckan.

C.4.2 Hjälpmedel

Det vanligaste tekniska hjälpmedlet är en kalender som heter förgetmigej som Abilia tillverkat. Den består av en skärm som visar dagens datum och veckodag. Det finns många hjälpmedel idag, bla. programvara som abilia tillverkar. Även små bandspelare, minnesklockor m.m. Hjälpmedel har även blivit vanligare inom den öppna handeln, tex saker man kan hitta i vanliga affärer som Claes Ohlson. Det varierar väldigt mycket vilka hjälpmedel man får beroende på var man bor i landet.

De hjälpmedel som används är de som den som lider av demens fått vänja

sig vid och haft glädje av tidigt i sjukdomen. Av denna anledningen så är det väldigt viktigt att hjälpmedlet introduceras tidigt. De hjälpmedel som inte används är de hjälpmedel som blir för komplicerade och som kräver mycket support, speciellt om man inte har tillgång till den supporten.

Idag är det fortfarande populärt att använda sig av strategier och andra “låg-teknologiska” hjälpmedel som t.ex. Papper och penna, kalender osv. Catharina tror att det kommer komma mer tekniska hjälpmedel i och med att nästa generation har större vana med att använda mobiltelefoner osv. Hon tycker även att “trycka-händatekniken” som en iPad erbjuder är bra.

C.4.3 Hjälpmedels utseende

Catharina tror att preferenserna för ett hjälpmedels utseende är generationsrelaterat. För äldre ska det inte vara för “flashigt”, det ska gärna påminna om något annat. Det finns dock säkert de som tycker det är häftigt att ha en iPad precis som barnbarnen.

För yngre så tror hon att hjälpmedlen ska se så lite ut som ett hjälpmedel som möjligt. Detta tar hon ifrån sin erfarenhet med funktionshindrade.

C.4.4 iPad som hjälpmedel

Catharina tror inte att det är några större svårigheter så länge användaren får öva och få upp vanan med att använda en touchscreen. Det kan dock vara svårt att navigera och hålla reda på vart man befinner sig i appen. Detta då det inte är som ett fysiskt blädrande, som i en bok, där det är lätt att gå tillbaka dit man var innan.

Exempel där iPad var en stor fördel:

Det fanns en föredetta datoranvändare som Catharina haft kontakt med. Hon kunde inte längre använda sin dator för att hon tappade fokus när hon skulle skifta mellan att titta på tangentbordet och skärmen. När hon fick prova en iPad gick det mycket bättre då hon både kunde se tangentbordet och det som visades på skärmen samtidigt.

C.4.5 App-design

Det är viktigt att utseendet är rent. Från att jobba med synskadade vet hon att gul bakgrund med svart text syns tydligt då det ger en bra kontrast. Rött är en bra färg för att signalera. Generellt är det bra att använda kontrast färger. Man måste dock vara försiktig med färger då de av samhället har laddats med olika innebörder.

Generellt ska det inte vara för stökigt eller för mycket information.

C.4.6 Bilder, bildtext och röststöd

Hon tror att bilder på objekt som är välbekanta, som t.ex. Ett höstlöv, så kan det vara givande.

Catharina har jobbat med personer med begåvningshandikapp där man använt almanacka med olika färger för de olika dagarna istället för bara veckodagarna. De olika färgerna kan sedan användas för att förstärka vilken dag det är. T.ex. kan man märka upp olika matlådor med de olika färgerna för att personen ska veta vilken matlåda som ska ätas på vilken dag. På liknande vis skulle bilder kunna användas för att förstärka.

Kombinera bild med bildtext är jättebra. Detta speciellt med tanke på att det är många invandrare som jobbar inom vård och omsorg. Genom att kombinera bilder med text kan även vårdarna lättare förstå. Det blir då som piktogram vilket är väldigt bra enligt Catharina.

När det gäller röststöd måste man vara försiktig. Röststöd kan vara till stor hjälp för vissa. Det kan dock också bli förvirrande för vissa då de kanske inte förstår vart ljudet kommer ifrån. Det hade därför varit bra om ljudet kan vara möjligt att stänga av och sätta på beroende på individen.

Det viktigaste:

Det viktigaste är att det är rent och tydligt. Det är även bra om så mycket som möjligt kan anpassas efter individen med hjälp av inställningar eller dylikt.

C.4.7 Test av prototyp

Startsida

- Inte dela upp bakgrunden → ha en hel bakgrund utan avbrott.
- Ränderna är inte lika distraherande och därmed inte lika störande.

Tid

- För mycket information under "Tid". Man vet inte riktigt vart man ska börja läsa/titta.
- Veta tid och datum är viktigare än årstid och väder.
- Hellre dela upp information i olika sidor. Man skulle då kunna gå vidare för att se vädret för att t.ex. Kunna avgöra vad man ska ha för kläder.

Knappar

- Bra att knappar för att ta sig tillbaka alltid har samma position.
- Pilar fungerar för att visa att man kan bläddra. Pilknapparna bjuder in till att trycka → men inte fel att ha både swipe och trycka

Kalender

- Förvirrande med flikar i kalendern
- Viktigt att få med hela dagen.

- Scroll kan fungera i tidigt stadie men beror på individens vana.
- En dag i taget i senare stadie.
- Bra att det som hänt är gråmarkerat → Kanske ha överstrykning för att förtydliga

Kontakter

- Bild och namn är bra.
- Inte för mycket med 8 kontakter i tidigt stadie
- I senare stadie är det bra att ha möjlighet att får upp färre och då de man använder oftast.
- Se till så att personen inte ringer runt när det är olämpligt? Eller ska det ligga på mottagaren att inte svara?

Lisa

- Minska ner informationen under "Lisa" → trycka på en knapp för att gå vidare och se lisas album? Bli fler steg men kan fungera i början.
- Eventuellt bara lägga 2 album istället för 4.

Länkar

- För mycket information på länkar också → dra ner antalet, för många val. Göra antalet till en inställning.

Radio

- Bättre med en play och en paus knapp → markera ut knapparna med färg (grönt och rött)

D Test plan

The test were conducted in Swedish, therefore the test plan is written in Swedish.

Syfte

Detta är en del i ett examensarbete. Syftet är att utvärdera en delversion av gränssnittet som ska tas fram.

Frågeställningar

Uppfattar användaren gränssnittet som lättförståelig?
Hur tilltalande tycker användaren att gränssnittets tema är?
Hur lätt har användaren för att läsa de olika texterna i gränssnittet?
Hur lätt hittar användaren de funktioner som efterfrågas?
Hur väl förstår användaren symboler och ikoner?

Vilken data ska samlas in?

Försökspersonen kommer observeras under testets gång, detta möjliggör insamling av subjektiv och objektiv kvalitativ data. Intervjufrågor kommer ställa under testets gång för att samla in subjektiv kvalitativ.

Upplägg för genomförande

FP = Försöksperson

FP hälsas välkommen
FP skriver under och godkänner testavtal
FP utför testerna
FP svarar på intervjufrågor (debriefing)
FP får ett "tack" och går hem

Urval av försökspersoner

Försökspersonerna för iterationstesterna består av äldre personer. Studien genomförs på 6 friska personer i åldersspannet 65-75 år. Inför den sista testningen av de slutgiltiga designerna hade det varit bra att testa med personer med mild grad av demens om möjligt.

Testmiljö och testutrustning

Försöken kommer spelas in.
Testledaren och observatören kommer befinna sig i testlokalen under hela försöket.

Rollfördelning under test

Testledaren: Befinner sig hos försökspersonen.
Övervakare: Observerar studiens fortskridning

Hur ska resultatet rapporteras

Resultatet av studien kommer att sammanställas i en rapport.

E Test agreement

Testavtal

Jag samtycker till att frivilligt medverka i en användarstudie om ett gränssnitt för en app, specialdesignad för personer med demens.

Jag tillåter att sessionen ljud spelas in, och att inspelat material endast kommer att användas internt inom examensarbetet.

Jag är informerad om att mina personuppgifter och mina resultat behandlas konfidentiellt, och presenteras anonymiserat.

Jag är medveten om att jag när som helst kan avbryta sessionen.

Datum

Namnteckning/namnförtydligande

F Scenarios

In this appendix all scenarios throughout the project can be seen. The tests were conducted in Swedish, hence the scenarios are written in Swedish.

F.1 Scenarios for iteration 1

Du heter Kim och är 75 år gammal. Nyligen blev du diagnostiserad med demens och Facebook har blivit lite för krångligt att använda. För att kunna fortsätta ha koll på vad som händer i ditt och andras liv, har du skaffat dig en ny app på din iPad.

Scenario 1

Din son Anders har nyss berättat att han har lagt in bilder i din apps fotoalbum, från när han och hans familj var på semester. Börja med att gå in och kolla på bilderna från semestern -15.

Scenario 2

Det är onsdag och klockan är snart 15. Du har en smygande känsla av att det händer något idag, men du kan inte komma ihåg vad. Kolla upp vad som händer idag.

Scenario 3

Väl inne i kalendern så tänker du att det hade varit bra att kolla upp om det händer något imorgon torsdag. Kolla upp vad som är första aktiviteten i schemat för imorgon.

Scenario 4

Du känner nu dig klar med kalendern och vill gå tillbaka till startskärmen. Gå tillbaka till start.

F.2 Scenarios for iteration 2

Du heter Kim och är 75 år gammal. Nyligen blev du diagnostiserad med demens och Facebook har blivit lite för krångligt att använda. För att kunna fortsätta ha koll på vad som händer i ditt och andras liv, har du skaffat dig en ny app på din iPad.

Scenario 1

Det är onsdag och klockan är snart 15. Du har en smygande känsla av att det händer något idag, men du kan inte komma ihåg vad. Kolla upp vad som händer idag.

Scenario 2

Väl inne i kalendern så tänker du att det hade varit bra att kolla upp om det händer något imorgon torsdag. Kolla upp vad som är första aktiviteten i schemat för imorgon.

Scenario 3

Du känner nu dig klar med kalendern och vill gå tillbaka till startskärmen. Gå

tillbaka till start.

Scenario 4

Lisa ringde nyss och berättade att hon har lagt upp nya bilder i sitt album studenten. Gå och kolla på hennes bilder.

Scenario 5

Du har nu kollat upp när kvällsfikan är, du blir nu osäker på vad klockan är. Ta reda på vad klockan är.

Scenario 6

Du kommer nu på att din son Anders sagt att han lagt in en länk till ett bra radioklipp i din app. Leta upp länken till P3s radio hits och lyssna på klippet.

Scenario 7

Du har suttit och lyssnat på radio nu ett tag. Du har suttit inne hela dagen och känner dig osäker på vilken tid på dygnet det är. Kolla upp om det är dag eller natt.

F.3 Scenarios for iteration 3

Scenario 4

Lisa ringde nyss och berättade att hon har lagt upp nya bilder i sitt album studenten. Gå och kolla på hennes bilder.

Scenario 4 $\frac{3}{4}$ Prova ring tillbaka till Lisa.

Scenario 5

Du är osäker på vad klockan är. Ta reda på vad klockan är.

Scenario 6

Du ser att det snart är dags för nyheterna på P3. Leta upp Sveriges radio P3 och lyssna på nyheterna.

Scenario 7

Du har suttit och lyssnat på radio nu ett tag. Du har suttit inne hela dagen och känner dig osäker på vilken tid på dygnet det är. Kolla upp om det är dag eller natt.

Scenario 8

Din favoritlåt Waterloo av ABBA har precis nått första plats på svensktoppen. Gå in och lyssna på den.

Scenario 9

Svensktoppen innehöll många bra låtar. Gå tillbaka till listan och kolla vilken låt som ligger på andra plats.

Scenario 10

Waterloo börjar nu bli lite tjatig att lyssna på. Pausa låten i listan.

Scenario 11

På torsdag har du bestämt med Lisa att ni ska ut och gå en runda i skogen. Kolla upp vädret på torsdag.

Scenario 12

Kolla upp när du ska gå och lägga dig imorgon, torsdag.

F.4 Scenarios for the group of PWD in Stockholm

Du har precis fått ett nytt utseende till din iPad(Platta). Som du ser (visa på plattan) finns det massa knappar med olika funktioner.

EASY (Stage one)

1. Kan du kolla upp i kalendern vad som händer kl 19.40 imorgon (Torsdag)?
2. Använd iPaden för att ta reda på vad klockan är.
3. Du har ett barnbarn som heter Lisa. Hon har nyss tagit studenten. Titta på bilderna från hennes studentfirande.
4. Ta reda på vad det blir för väder imorgon.
5. Ring Lisa.
6. Waterloo av ABBA ligger etta på musiklistan svensktoppen. Lyssna på låten.

EASIER (Stage two)

1. Kan du kolla upp i kalendern vad som händer kl 19.00 (Onsdag)?
2. Använd iPaden för att ta reda på vad klockan är.
3. Ett av dina barn har nyligen varit i Spanien med sin familj. Titta på bilderna från Spanien.
4. Ta reda på vad det blir för väder ikväll.
5. Ring Lisa.
6. Waterloo av ABBA ligger etta på musiklistan svensktoppen. Lyssna på låten.

G Transcripts from tests with elderly

The tests were conducted in Swedish, therefore the transcripts are in Swedish. Each test person is marked by a number and a letter. The number marks the test occasion and the letter marks the test person of that occasion.

G.1 Test person 1A

G.1.1 Test session 1, Scenarios from iteration 1

Scenario 1

Tid: 10s

Att hitta till albumet var inga problem.

Scenario 2

Tid: 8s

Inga problem. Här användes "Start" för att gå tillbaka till startsidan.

Scenario 3

Tid: 32s

Tidsfördröjningen berodde förmodligen på missförstånd. En av testpersonerna försökte trycka på hållpunkterna i kalendern.

Scenario 4

Tid: 1 s

Inga problem.

G.1.2 Intervjufrågor

Upplevdes något som svårt under testets gång? Nej.

Var någon funktion svår att hitta? Nej.

Var det enkelt att förstå vad ikonerna betyder? Ja, tydliga.

Upplevdes ikonerna som svåra att se? Nej, klara och tydliga.

Var texten i appen lättläst? Texten var liten i kalendern och det fanns mycket utrymme i spalterna i kalendern som skulle kunna användas för att förstora texten.

Vad tycker du om utseendet på appen? Appen var lättöverskådlig. Bra att knapparna var röda då de syns enkelt.

Hade du kunnat tänka dig använda appen? Ja. Detta svar kan dock ha påverkats av ren artighet.

G.2 Test person 1B

G.2.1 Test session 1, Scenarios from iteration 1

Scenario 1

Tid: 34s

Att hitta till albumet var inga problem. Däremot att bläddra bland bilder orsakade vissa problem. En testperson försökte swipa istället för att trycka på pilen. Detta gjordes då detta var något testpersonen var van vid att göra och det var så man gjorde i andra appar som testpersonen har.

Scenario 2

Tid: 20s

Här användes "Start" för att gå tillbaka till startsidan. Testpersonen fick tänka efter lite och uttryckte tvivel på den egna förmågan att hantera teknik. Testpersonen klarade dock av uppgiften snabbt när den väl försökte.

Scenario 3

Tid: 5s

Inga problem

Scenario 4

Tid: 1 s

Här användes "Tillbaka" knappen. Inga problem.

G.2.2 Intervjufrågor

Upplevdes något som svårt under testets gång? Nej, allt var lätt förutom att testpersonen försökte swipa istället för att trycka på knapparna. Hade varit bättre att antingen vara tydligare med att man ska trycka eller göra det möjligt att både klicka och swipa.

Var någon funktion svår att hitta? Nej.

Var det enkelt att förstå vad ikonerna betyder? Ja, tydliga.

Upplevdes ikonerna som svåra att se? Nej, klara och tydliga.

Var texten i appen lättläst? Testpersonen tyckte att texten var lagom stor.

Vad tycker du om utseendet på appen? Appen var lättöverskådlig. Bra att knapparna var röda då de syns enkelt. Speciellt mot vit bakgrund. Appen var väldigt logisk.

Hade du kunnat tänka dig använda appen? Ja. Testpersonen uttryckte dock att det först skulle vara aktuellt när minnet börja svikta. Detta sades skämtsamt, men antydde en tveksamhet till att använda appen i nuläget.

G.3 Test person 2A

G.3.1 Test session 2, Scenarios from iteration 1

Scenario 1

Tid: 23s

Att hitta till albumet var inga större problem. Dock gjorde en av testpersonerna reflektionen att bilderna skulle kunna finnas i kalendern under de datum då resan inträffade. Denna tanken avfärdades dock snabbt och albumet hittades.

Scenario 2

Tid: 13s

Tillbaka knappen användes för att ta sig till startskärmen. Inga problem.

Scenario 3

Tid: 2s

Inga problem.

Scenario 4

Tid: 1s

Inga problem.

G.3.1.1 Intervjufrågor

Upplivedes något som svårt under testets gång? Inget var svårt att hitta.

Var någon funktion svår att hitta? Nej.

Var det enkelt att förstå vad ikonerna betyder? Generellt enkla ikoner.

Länkar kan dock vara svår. Om användarna inte är bekanta med Begreppet länkar sedan innan så kan det vara svårt att förstå ikonerna och vad länkar innebär.

Upplivedes ikonerna som svåra att se? Nej. Tydliga.

Var texten i appen lättläst? Ja. Åtminstone med glasögon.

Vad tycker du om utseendet på appen? Kalendern är bra. Bra med färgerna som markerar ut de dagar som har varit, idag och kommande dagar var bra. Bakgrundsbilden på startsidan var fin, men upptäcktes inte av testpersonen förrän efter scenarierna. Detta är bra då det innebär att den inte snor uppmärksamheten från knapparna.

Är det någon av dessa (visa bilder) som är mer tilltalande? Multiinfo design: Postit-lappen är bättre i kalendern eller under "Tid". Den känns obehövlig på startskärmen då den informationen finns under kalender. Postit-lappen kändes som ett moment för mycket. Den röd/vita designen är bättre.

Grön ram design/ Grön design: Denna designen så går de olika elementen samman för mycket då alla element har olika nyanser av grönt. Den röd/vita designen är bättre.

Hade du kunnat tänka dig använda appen? Ja

G.3.2 Test session 4, Scenarios from iteration 3

Scenario 4

Tid: 15s

Inga problem. Gick via "Titta" för att hitta bilderna.

Scenario 4 $\frac{3}{4}$

Tid: 18s

Inga problem.

Scenario 5

Tid: 24s

Inga problem. Hade problem med att få iPaden att svara på testpersonens tryck.

Scenario 6

Tid: 17s

Inga problem.

Scenario 7

Tid: 14s

Inga problem.

Scenario 8

Tid: 27s

Inga problem. Fördröjdes lite av bugg i prototypen. Detta gjorde att appen hoppade över en "skärm" vilket gjorde att nästa uppgift blev lite förvirrat då testpersonen aldrig såg listan när hen startade låten.

Scenario 9

Tid: 13s

Inga problem.

Scenario 10

Detta scenario utfördes i samband med scenario 8.

Scenario 11

Tid: 7s

Inga problem.

Scenario 12

Tid: 58s

Hittade inte den vertikala scrollbar. Försökte trycka och dra i själva listan. Detta fördröjde utförandet.

Övriga kommentarer: TP hade kontinuerligt problem med att få iPaden att svara på tryck.

G.3.2.1 Intervjufrågor

Upplevdes något som svårt under testets gång? Nej. Men behövde lite mer tid för att kolla över alla alternativ. Med mer vana så skulle detta försvinna.

Var någon funktion svår att hitta? Svårt med att hitta hur man scrollade ner på en sida. Men det löste sig med "trial and error". Antar att man får en introduktion.

Var det enkelt att förstå vad ikonerna betyder? Tittade inte direkt på ikonerna utan läste istället. I och med att alla ikonerna (under Lyssna)

var någon form av ”lyssna-ikon” så läste testpersonen texten för att skilja dem åt.

Vad tycker du om ikonerna för favoriter? Tror den är bättre än stjärna då hjärtat kan tolkas som något man har nära hjärtat.

G.4 Test person 2B

G.4.1 Test session 2, Scenarios from iteration 1

Scenario 1

Tid: 10s

Att hitta till albumet var inga större problem.

Scenario 2

Tid: 10s

Inga problem.

Scenario 3

Tid: 6s

Inga problem.

Scenario 4

Tid: 2s

Inga problem. Tillbaka-knappen användes.

G.4.1.1 Intervjufrågor

Upplevdes något som svårt under testets gång? Inget var svårt att hitta.

Var någon funktion svår att hitta? Nej.

Var det enkelt att förstå vad ikonerna betyder? Generellt enkla ikoner.

Upplevdes ikonerna som svåra att se? Nej. Tydliga. Kontrasten mellan svart och vitt (för texten) och rött och vitt (för ikonerna). Detta kan dock upplevas olika av olika personer.

Var texten i appen lättläst? Ja

Vad tycker du om utseendet på appen? Kalendern är bra. Den ser ut som en almanacka, vilket folk är vana vid och känner igen. Eventuellt hade designen kunnat bli bättre om kopplat olika färger till olika funktioner för att underlätta navigeringen.

Är det någon av dessa (visa bilder) som är mer tilltalande?

G.4.2 Test session 4, Scenarios from iteration 3

Scenario 4

Tid: 12s

Inga problem. Hittade bilderna genom att gå via ”Titta”.

Scenario 4 $\frac{3}{4}$

Tid: 14s

Inga problem.

Scenario 5

Tid: 6s

Inga problem.

Scenario 6

Tid: 11s

Inga problem.

Scenario 7

Tid: 8s

Inga problem.

Scenario 8

Tid: 10s

Inga problem.

Scenario 9

Tid: 2s

Inga problem.

Scenario 10

Detta scenario utfördes i samband med scenario 8.

Scenario 11

Tid: 7s

Inga problem.

Scenario 12

Tid: 30s

Fick Inga problem.

G.4.2.1 Intervjufrågor

Upplevdes något som svårt under testets gång? Nej.

Var någon funktion svår att hitta? Nej, tydligt alltihop.

Var det enkelt att förstå vad ikonerna betyder? Nej, då kan man ju läsa namnen.

G.5 Test person 3A

G.5.1 Test session 3, Scenarios from iteration 2

Scenario 1

Tid: 96 s

Gick in och letade under "Tid" istället för "Kalender".

Scenario 2

Tid: 13 s

Svårt att se att något ändrades när man tryckte på olika dagar i kalendern. Förstod inte direkt hur den grå färgen skulle tolkas. Tyckte färgen på tisdag flöt ihop med bakgrunden.

Scenario 3

Tid: 8 s

Inga problem

Scenario 4

Tid: 60 s

Inga problem, tog lite tid på sig att trycka och ibland hängde sig knapparna i testverktyget.

Scenario 5

Tid: 20 s

Inga problem

Scenario 6

Tid: 88 s

Gick in i "Kontakter" och letade efter Anders länkar. Konceptet länkar är svårt att förstå. Hittade rätt när ordet länkar i beskrivningen betonades.

Scenario 7

Tid: 14 s

Inga problem

G.5.2 Intervjufrågor

Upplevdes något som svårt under testets gång? Det var inte svårt när man hade fått leka lite med appen. Svårt att veta vad start knappen gjorde, tydligare om den heter hem eftersom den gör det på hemsidor och liknande.

Var någon funktion svår att hitta? Nej, inget svårt. Uppfattade inte ordet länkar så blev lite svårt att hitta den. Letade efter Anders länkar under kontakter, där Lisas grejer fanns. Helt rätt tankegång, man bör kunna hitta alla Anders saker han har lagt upp under hans kontaktinformation.

Var det enkelt att förstå vad ikonerna betyder? Ja, de var tydliga att förstå, alla utan länkar. Länkar är ett svårt koncept.

Upplevdes ikonerna som svåra att se? ———

Var texten i appen lättläst? ———

Vad tycker du om utseendet på appen? Inget man tänker på.

Hade du kunnat tänka dig använda appen? Ja, det är ju ett hjälpmedel.

G.6 Test person 3B

G.6.1 Test session 3, Scenarios from iteration 2

Scenario 1

Tid: 4 s

Inga problem

Scenario 2

Tid: 25 s

Svårt att se att något ändrade sig när man byter dag i kalendern.

Scenario 3

Tid: 1 s

Inga problem.

Scenario 4

Tid: 22 s

Inga problem. Använder tillbaka knappen hela vägen till startsidan.

Scenario 5

Tid: 29 s

Inga problem. Glömde bort att säga vad klockan var högt. Använder tillbaka knappen hela vägen till startsidan.

Scenario 6

Tid: 13 s

Inga problem

Scenario 7

Tid: 18 s

Såg om det var dag från den digitala klockan. Svårt att upptäcka "DAG" texten.

G.6.2 Intervjufrågor

Upplevdes något som svårt under testets gång? Det var inte så svårt.
Tydligt.

Var någon funktion svår att hitta? Nej, fast hittade bara länkar genom hintan i texten. Tycker dessutom att det är konstigt att bara kunna läsa en artikel. Vill hellre kunna gå och läsa flera så som TP gör idag med sin tidningsapp.

Var det enkelt att förstå vad ikonerna betyder? Ja, det är enkla att förstå.

Upplevdes ikonerna som svåra att se? ———

Var texten i appen lättläst? Ja, som det är nu syns det bra.

Vad tycker du om utseendet på appen? Det gråa i kalendern lite svårt att förstå. Kanske använda bockar? Bakgrund bra.

Hade du kunnat tänka dig använda appen? Tolkar appen som 6 olika appar. Tycker den verkar tydlig. Men behöver den inte just nu.

G.7 Test person 5A

G.7.1 Test session 5, Scenarios from Stockholm(EASY)

Scenario 1

Tid:

TP behövde mycket vägledning för att hitta rätt.

Scenario 2

Tid:

TP hade inga problem med att hitta vad tiden var.

Scenario 3

Tid:

TP hittade till "Lisas student"-album med lite vägledning.

Scenario 4

Tid:

Det var inga problem för TP att hitta till väder-funktionen.

Scenario 5

Tid:

TP gick först in på Lyssna för att hitta att ringa till Lisa. Fick vägleda TP rätt. Lärde sig hur pilarna i gränssnittet fungerar.

Scenario 6

Tid:

Efter vägledning klarade TP av uppgiften.

Övriga kommentarer: TP var väldigt pratglad, vilket ledde till att testet blev diskontinuerligt. TP ville även iväg på ett event så testet avslutades tidigare, vilket gjorde att alla intervju frågorna inte kunde ställas. TP såg även ganska dåligt vilket kan ha påverkat testet.

G.7.2 Intervjufrågor

Upplevdes något som svårt under testets gång? TP tyckte det mesta var enkelt att förstå.

Var det enkelt att förstå vad ikonerna betyder? TP tyckte ikonerna var lite svåra att förstå, speciellt musik ikonerna.

G.8 Test person 5B

G.8.1 Test session 5, Scenarios from Stockholm(EASY)

Scenario 1

Tid:

Inga större problem. Hade lite problem att förstå att pilarna till höger kan användas för att scrollera ner. Efter detta visades var det inga problem.

Scenario 2

Tid:
Inga problem.

Scenario 3

Tid:
Inga problem.

Scenario 4

Tid:
Inga problem.

Scenario 5

Tid:
Gick först till musik. Fick sedan titta igenom alternativen på startsidan noga. TP hittade sedan rätt.

Scenario 6

Tid:
Inga problem.

Övriga kommentarer: TP led av afasi och kunde därmed inte uttrycka sig i tal. TP hade även ett plåster på sitt pekfinger och kunde därför inte få iPaden att reagera. Detta löstes genom att TP tryckte/pekade och vi tryckte sedan för att få iPaden att reagera.

H Transcripts from tests with people with dementia

All this tests have been performed with the scenarios for PWD in Stockholm version EASY.

H.1 Test person α

Scenario 1

Tid:
TP hade inga problem med att hitta kalendern och att använda scroll-funktionen för att bläddra ner till senare aktiviteter i kalendern. Fick återupprepa vilken dag och tid som TP skulle hitta. TP använde knapparna för att bläddra ner i kalendern.

Scenario 2

Tid:
TP hade inga problem med att hitta vad tiden var.

Scenario 3

Tid:
TP hittade snabbt till foto-albumen under Titta. Det var inga problem för TP att hitta hur man med hjälp av pilarna kom till rätt sida där "Lisas student"-album fanns.

Scenario 4

Tid:

Det var inga problem för TP att hitta till väder-funktionen. Inne i Väder försökte TP trycka på området som visade vädret för "Imorgon Torsdag".

Scenario 5

Tid:

TP hade inga problem med att hitta till Lisa och sedan att hitta "ring Lisa"-knappen.

Scenario 6

Tid:

TP hade inga problem med att hitta till Lyssna från startmenyn. Inne i Lyssna blev TP förvirrad och visste inte om man skulle gå in på musik eller radio. Chansade på musik och hittade tillslut till låten.

Övriga kommentarer: TP hade allmänt svårt att trycka på knapparna under testets gång. Prototypen ville inte reagera på när TP försökte trycka.

H.1.1 Intervjufrågor

Upplevdes något som svårt under testets gång? TP tyckte det mesta var enkelt att förstå. Det enda var att det var svårt att veta om "Svensktoppen" låg under musik eller radio.

Var någon funktion svår att hitta? Nej, det var lätt att hitta i appen.

Var det enkelt att förstå vad ikonerna betyder? Det var inga problem med att förstå vad ikonerna betydde.

Var texten i appen lättläst? Det var inga problem.

Vad tycker du om utseendet på appen? Utseendet var helt okey, bra kontraster så det var enkelt att se.

H.2 Test person β

Scenario 1

Tid:

TP hade inga problem med att hitta kalendern och men fick tänka till för att hitta scroll-funktionen för att bläddra ner till senare aktiviteter i kalendern. Fick återupprepa vilken dag och tid som TP skulle hitta. TP scrollade i kalender fönstret för att bläddra ner i kalendern.

Scenario 2

Tid:

TP hade inga problem med att hitta vad tiden var.

Scenario 3

Tid:

TP hittade snabbt till foto-albumen under Titta. Det var inga problem för TP

att hitta "Lisas student"-album fanns. Dock hade inte prototypen nollställts och "Lisas student" fanns med på första sidan. Pilarna testades därför inte.

Scenario 4

Tid:

Det var inga problem för TP att hitta till väder-funktionen.

Scenario 5

Tid:

TP hade inga problem med att hitta till Kontakter. Inne i Kontakter bläddrade TP runt bland personerna och hade lite svårt att hitta Lisa. Efter upprepning av uppgiften hittade TP rätt och lyckades "ringa" Lisa.

Scenario 6

Tid:

TP hade inga problem med att hitta till Lyssna från startmenyn. Efter upprepning av uppgiften hade TP inga problem att hitta till låten.

H.2.1 Intervjufrågor

Upplevdes något som svårt under testets gång? TP tyckte att det gick bra och att det inte var så svårt, men att TP inte vågade trycka på allt.

Var någon funktion svår att hitta? —

Var det enkelt att förstå vad ikonerna betyder? Det var inga problem med att förstå vad ikonerna betydde. Det var tydliga bilder.

Var texten i appen lättläst? Det var inga problem.

Vad tycker du om utseendet på appen? TP tyckte det var bra att olika färger användes i gränssnittet.

H.3 Test person γ

Scenario 1

Tid: s

TP fick mycket vägledning, men klarade av uppgiften.

Scenario 2

Tid: s

Inga problem.

Scenario 3

Tid: s

TP fick återigen mycket vägledning.

Scenario 4

Tid: s

Inga problem.

Scenario 5

Tid: s

Hittade kontakter. Inga problem.

Scenario 6

Tid: s

Inga problem.

Övriga kommentarer: TP hade aldrig använt en iPad förrut och hade därmed låg självkänsla. Därför fick TP mycket vägledning.

H.3.1 Intervjufrågor

Upplevdes något som svårt under testets gång? Svårt när man aldrig testat en iPad förrut.

Var någon funktion svår att hitta? —

Var det enkelt att förstå vad ikonerna betyder? Ikonerna var bra.

Var texten i appen lättläst? Lagom stor text.

Vad tycker du om utseendet på appen? Ser bra ut.

H.4 Test person δ

Scenario 1

Tid: s

Vi uppmärksammades om att TP har problem med siffror. Detta gjorde det svårt för TP att navigera sig bland aktiviteterna i kalendern. Detta gjorde att TP fick lägga mycket koncentration på att hitta rätt bland klockslagen och därmed missade pilarna för att scrolla ner och hitta senare aktiviteter. Efter hjälp med att scrolla ner hittade TP rätt tidpunkt och försökte trycka på tidpunkten. TP såg alltså inte att aktiviteten stod till höger om tidpunkten.

TP fick sedan även en förklaring av "Tillbaka"- och "Hem"-knapparna.

Scenario 2

Tid: s

Inga problem.

Scenario 3

Tid: s

Inga större problem. TP hade lite problem med att hitta rätt album.

Scenario 4

Tid: s

Hittade till "Väder" funktionen utan problem. Hade dock sedan svårt att hitta värdet för imorgon.

Scenario 5

Tid: s

Hade till en början svårt att hitta Lisa. Hittade tillslut rätt genom att prova sig fram.

Scenario 6

Tid: s

Gick in på "Titta" och valde först "Filmklipp". Hittade sedan rätt med lite hjälp.

Övriga kommentarer: TP hade svårt med att få iPaden att svara på tryck.

H.4.1 Intervjufrågor

Upplevdes något som svårt under testets gång? Inte när man fått testa lite.

Var någon funktion svår att hitta? Tiden. I och med att TP har svårt med siffor. (Vi tror att TP menar tiden i kalendern)

Var det enkelt att förstå vad ikonerna betyder? Tydliga och lättförståeliga.

Var texten i appen lättläst? Större siffor.

Vad tycker du om utseendet på appen? Gillar inte färgerna. Förknippar rött och grönt med julen. Ville hellre ha cerise och gult.