CHALMERS
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Interaction Design for Better Communication in Aid Assessment Meetings

An explorative study of how an interactive system may be designed in order to facilitate communication between applicant and care manager

Master's thesis in Interaction Design and Technologies

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Abstract

During aid assessment meetings people with disabilities who feel that they need help with their everyday life meets with a care manager to find suitable solutions. A good dialogue is imperative, as it is the communication of the user's needs that is the basis for the interventions that may be considered. In order to facilitate the communication between applicant and care manager, this thesis explores how an interactive system may be designed to support the user in creating and imparting the story of their life situation. Based on tools and methods used by professionals to elicit an accurate understanding of another person's life situation, the thesis work introduces two methodological concepts, *linear* and *functional storytelling*. With the aim to help the interaction designer who wishes to undertake a project within the area this thesis work is investigating, four prototypes are proposed and used to demonstrate and evaluate these new concepts, leading to the proposal of eleven design guidelines.

Research Question

"How can an interactive system be designed so that it may facilitate the communication between applicant and care manager in aid assessment meetings?"

- What is a strategy for the designer to follow when approaching the interaction design of such a system?
- What general guidelines may apply for designing such a system?

Keywords: Interaction design, communication, welfare, social work, elderly, disabilities, welfare technology.

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Carl Lindvall, Gothenburg, October 2019

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Introduction

Swedish health care and elder care are aspects of the Swedish welfare system, governed by legislation that put the individual's needs at the center of attention. The Swedish Health and Medical Care Act reads about health care on equal terms for all citizens, and that the ones in greatest need of medical care shall have priority. The Swedish Social Care Act states that the person that cannot cater to their needs by other means have the right to be accommodated by the social services. This relief can be home services, home care, accommodation in a nursing home, or other help or support that might be needed (Socialstyrelsen, 2016a).

With the current demographical development, we will see a larger segment of people who need care, at the same time it will be hard and costly to recruit enough personnel to the elder care (Modig, 2012). An interest for technological growth and digitalization can be seen within the social care sector (as well as within the health care system), and technical innovations, known as *welfare technology*, have potential to be offered more often in a near future as an alternative or supplement to conventional interventions. What these welfare technology interventions are differs much depending on the needs of the individual, but what they have in common is that if properly matched with the individual's needs, they will help the individual become more independent, safer and more actively participating in society in their everyday life (Modig, 2012). The vision adopted by the Swedish government and SKL year 2016 reads that by 2025, Sweden will be the best in the world at utilizing the possibilities of digitalization and e-health to help people achieve a good and equal health and welfare, as well as developing and strengthening their own resources for greater independence and social participation (Socialstyrelsen, 2019).

Everyone in need has the right to apply for aid, which is done by reaching out to a care manager who will investigate and decide if and to what extent the applicants needs can be met. During the meeting the care manager learns why the person is applying for aid, which activities the person can manage, and what they need help with. The care manager informs the applicant on what services the municipality can offer, and to their best ability they will consider the applicant's wishes (Socialstyrelsen, 2016a).

These care-planning meetings aim to find suitable interventions that hopefully will have large, positive impact on the applicant's life. Much information is communicated in both directions, and it is imperative that the applicant's needs are correctly expressed and understood during this meeting to find suiting interventions. If the

applicant should have any questions, they should be brought up. With the growing plethora of solutions within welfare technology, it is understandably not possible for the care manager to be updated on all available solutions. Neither is it obvious whether specific modern solutions could be considered for being granted by the municipality or if it is a question of auxiliary means which is the responsibility of the primary care, or if it is for the individual to acquire on their own.

During the meetings, an issue is a perceived and actual inequality between the applicant and the care manager in the asymmetric distribution of knowledge, and the rather small influence that the applicant has in steering the discussion. In a study by Berglund et al. (2012) it was found that the applicant had a median talking space during the care-planning meetings of only 20 per cent if they were held at hospitals, and 40 per cent if they were held at the applicants home. During the meetings, Berglund et al. (2012) saw a tendency that the meetings were steered by the professionals, consciously and unconsciously, towards predefined issues, as a means to keep the discussion within the frame of the help that is available. The opportunities for active influence and involvement may have been obstructed by this, as well as a comprehensive understanding of the older person's needs (Berglund et al., 2012). With this in consideration, it must be hard for the applicant to come prepared to the meeting, to know what questions to expect, and to have the means to formulate and communicate one's needs so that they are heard. Also since it is hard to attain beforehand knowledge on what possible interventions that exist, and by what means these interventions could be acquired, the applicant may not have the possibility to thoroughly reflect on which solution they prefer.

If there were to exist an interactive system, with a single interface, acting as an informing and supportive tool for both the structure of the meetings, the communication of needs, and the available solutions, the hypothesis is that the applicants would perceive a larger degree of equality in, and have a greater influence over the meeting. Further, the system is not only to help the applicant, but also the professionals. By having the applicants informed before the meeting, the meetings could be more focused on the core issues, and the care managers and other professionals could be unburdened, at the same time as the gap between how they position themselves and how they are positioned by the applicants could be reduced. Finally, the vision for the system is that it could also work as a mediating tool to strengthen the means of communication *during* the meeting, in addition to easing the transition into, and out from the meetings.

Based on the understanding of the situation, as described above, this thesis proposes that an interactive system with a suiting user interface should be developed in order to:

(a) help the applicant to formulate their needs and to communicate their life situation
(b) provide accessible and comprehensive information to the applicant, allowing them to research and prepare before meeting with the care manager
(c) allow the care manager to navigate and in a systematic way access up-to-date information on available solutions
(d) present the solutions in a way that is conceivable for the applicant
(e) work as a mediating tool which will aid the care manager and applicant in their communication during assessment
(f) digitize parts of the assessment procedure in order to help the care manager reach higher accuracy and efficiency

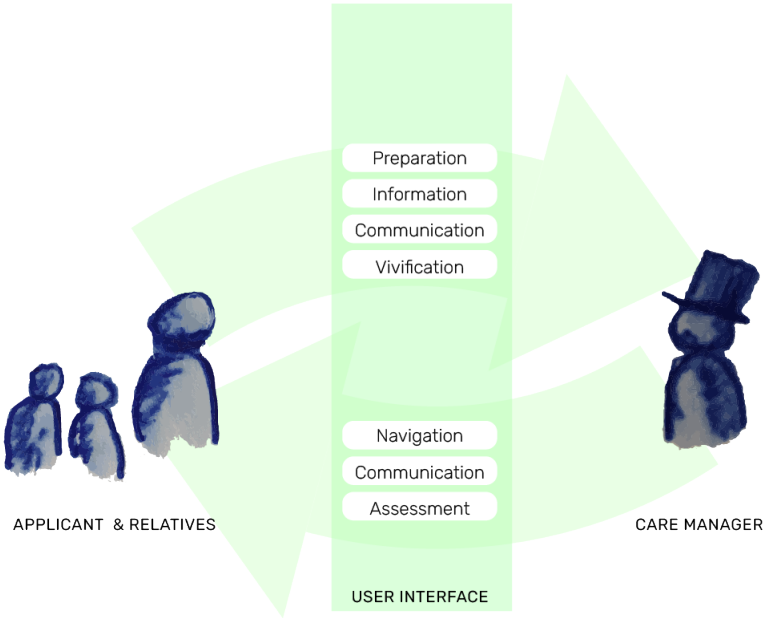


Figure 1.1: The system is imagined as a coherent interface between the applicant and the care manager to mediate, and strengthen their conversation.

The focus for this thesis work is to investigate if such a system could be beneficial, and in that case how the interaction could be designed to benefit the older people and people with disabilities as well as the professionals before and during needs assessment and care management. Mainly investigating the communicative factors addressed in point (a) and (b) above, it will be an exploratory study with the aim of finding a way to improve the current situation, given that mentioned system were to be developed. This renders the following **research question**:

"How can an interactive system be designed so that it may facilitate the communication between applicant and care manager in aid assessment meetings?"

To attempt to answer this research question, the following supporting questions will be addressed:

- What is a strategy for the designer to follow when approaching the interaction design of such a system?
- What general guidelines may apply for designing such a system?

This research question will be investigated by prototyping parts of the system that will be evaluated theoretically and empirically. The vision of the thesis work is that it, given that the findings are unambiguous and positive, would work as a decision basis, strengthening the arguments for that the current situation can and should be improved. Furthermore, the theoretical findings, the prototypes and the evaluation results will act as design guidelines for how an interactive system of this nature could be designed.

Translation/Vocabulary

The terms written on the left side are the one that are used in the text.

Aid, Relief – *Bistånd*

Assistive technology, Auxiliary means – *(Tekniska) Hjälpmedel*

Care manager – *Biståndshandläggare, biståndsbedömare*

Socialstyrelsen – **The National Board of Health and Welfare**

Sveriges Kommuner och Landsting (SKL) – **The Swedish Association of Local Authorities and Regions (SALAR)**

The Swedish Act concerning Support and Service for Persons with Certain Functional Impairments – *Lagen om stöd och service till vissa funktionshindrade (LSS)*

The Swedish Agency for Participation – *Myndigheten för Delaktighet (MFD)*

The Swedish Health and Medical Care Act – ***Hälso- och sjukvårdslagen (HSL)***

The Swedish Social Care Act – *Socialtjänstlagen (SoL)*

Welfare technology – *Välfärdsteknik, Välfärdsteknologi* (welfare technology, and the knowledge about welfare technology respectively)

2
Background

In Sweden, older people and people with disabilities can be granted welfare technology as aid, or via prescription as assistive technology (Socialstyrelsen, 2016b). The term welfare technology is mainly used in the Nordic countries and a broad and typical definition can be found at Wikipedia (2018) that "Welfare technology is the knowledge and use of technology that can contribute to increased safety, activity, participation and independence for people with disbilities, their relatives, and older people." Socialstyrelsen (nn) defines welfare technology as "*digital* technology with the purpose of maintaining or increasing safety, activity, participation or autonomy for a person who has or are at an elevated risk to get a disability." A distinction made by Socialstyrelsen (2019) is between welfare technology and the related term auxiliary means which they define as "individually fitted products for maintaining or increase activity, participation or autonomy by *compensating* for a disability". Brynn (2016) continues on this distinction and argue that while assistive technology is personal equipment with the main purpose to compensate for a specific disability, to facilitate independent living, equality and participation in society, welfare technology holds *general solutions*, where the welfare services aim to solve challenges in the demographic development, an increased number of elderly people and a reduced number of service staff. In his study, various definitions could therefore be found for welfare technology depending on if the focus is on the user, economy, or technology, and if the focus is broad or narrow, i.e., if the target user group is including elderly people and people with disabilities of all ages, or only elderly people (Brynn, 2016). Further, Brynn argues that contrary to assistive technology, these generalized solutions should be developed according to the principles of universal design in order to reduce barriers in society by ensuring equal access to its products and services. The solutions are mainstream equipment that can be used by all, regardless of disabilities. However, Brynn recognizes that the strict distinction is not seen at an administrative level, since welfare technology often can be, and is distributed to individuals under the heading assistive technology but that the legal, administrative or budgetary consequences of a clear definition of the technologies concerned are several.

In contrast to Brynn's philosophy but in line with his observation, Socialstyrelsen recognizes an overlap between welfare technology and auxiliary means/assistive services, and that it is hard to draw a line between them since welfare technology can be prescribed as auxiliary means. However, they make the distinction arguing that welfare technology is always digital while assistive technology does not have to be (Socialstyrelsen, 2017). They however agree with Brynn in that welfare technol-

ogy can be general products available on the consumer market, for example tablets, smartphones and wifi access, but also digital solutions for the personnel, like mobile record keeping, planning systems, and electronic signing of administration of pharmaceuticals (Socialstyrelsen, 2019). Furter, they confirm Brynn's identification when they make a judicial distinction stating that welfare technology often can be granted or loaned through aid decisions in line with SoL or LSS, while assistive technology is prescribed according to HSL (Socialstyrelsen, 2017).

In this thesis work when welfare technology is discussed, the definition will include assistive technology and auxiliary means, as well as general 'off the shelf' products on the consumer market. The user group includes older people as well as people with disabilities of all ages.

2.1 Applicants and Professionals

Welfare technology can be granted as aid by care managers representing the municipalities, by prescription from physiotherapists, district nurses or occupational therapists in the primary care (region), or be acquired by the individual on the consumer market (Socialstyrelsen, 2016c; Seniorval, n.d.). The applicant for aid can be an older person or a person with one or many disabilities, and the care manager assesses the individual needs of the applicant in order to come to a decision on what type of social care and services that will be given. The care manager's professional discretion is limited due to expectations to fulfill three partly contradictory sets of demands: *adapt decisions to limited resources, meet individual needs*, and *ensure equal treatment*, and dilemmas are often related to the gap between needs and resources (Dunér, 2018).

2.2 The MFD Method- and Communication Support

The Swedish Agency for Participation *(MFD)* works to ensure that disability policy will have an impact in all corners of society, on the premise that everyone, regardless of functional ability, is entitled to full participation in society. They work by monitoring and analyzing developments; proposing methods, guidelines and guidance; disseminating knowledge; initiating research and other development work; and providing support and proposing measures to government. Their work is carried out in relation to and on the behalf of national authorities, municipalities and regions, and their task is determined by goals and strategies of disability policy that takes foundation in the UN Convention on the Rights of Persons with Disabilities (MFD, 2017).

As a part of a government assignment to continue the development and distribution of information, and to give support to the municipalities regarding utilization and implementation of digital technologies, MFD produced a service called 'digitalt

bistånd' (digital aid) which was released on their website in March, 2019[1] as part of a compiled method basis.

The explicit purpose of this method and knowledge basis is to increase the municipalities' consciousness on human rights and the ability to support the individual's integrity and personal autonomy with the help of digital technology. Additionally they aim to raise awareness on how to identify risks for digital alienation. Their service is web-based and consists of four parts: fact support, valuation, conversational support, and a section showing examples of digital technologies and how to eliminate, as well as a movie that illustrates risks for digital alienation. The sections are mainly text-based and contains information on digital participation, and interactive exercises to express and valuate one's needs. Much is based on the example situation that the user wants to find a digital solution which can manage who is allowed into their home, however, the idea is scalable and shows potential for this kind of digital service.

[1] www.mfd.se/stod-och-verktyg/digitala-verktyg/metodstod/digitalt-bistand/

3

Theory

This section gives theoretical background for the motivations behind the planning and execution of the design process in this thesis work.

3.1 Human-Centered Design

"Human-centered design (HCD) is a creative approach to problem-solving, one that starts with people and ends with innovative solutions tailored to meet their needs" – IDEO.org (2014)

With emphasis on the human, the HCD-approach provides the designer with a methodological framework to understand the needs of the user, ideate and conceptualize, design, evaluate, and develop a solution that bridges the gap between the desired and the current situation. Involving and understanding the users early on, and throughout the design process is what helps the designer to develop solutions adapted to the human psychology and her capabilities, rather than ending up with frustrating solutions that demands adaptation from the user in order to work properly. Norman puts it neatly that "HCD puts human needs, capabilities, and behavior first, then designs to accommodate those needs, capabilities, and ways of behaving" (Norman, 2013). The different steps of the design process is facilitated with various design methods and principles that help the designer to move towards a solution, while staying grounded in the human-centered focus. More than a framework holding hands-on design methods, the HCD-approach serves as an overall mindset, or a design philosophy as Norman puts it, to how good design is achieved.

Norman emphasizes the importance of communication, especially between machine and person, that the system makes it clear what the possible actions are, what is happening and what is going to happen. The communication is especially important when things go wrong (Norman, 2013). As we can understand, good design is to a large extent about understanding the human, understanding technology, and understanding the gap between the desired situation and the actual one – the problem. This search to understand the real underlying problem is performed iteratively with various techniques, before any solutions are being attempted. When the core issues are identified, the design space expands again when the designer starts to explore possible solutions. Then, finally, the design space is narrowed down to propose a final design. This diverging and converging process, first on the problem then on the solution, is called Design Thinking (c.f. Norman 2013).

3.1.1 The steps of the design process

The constituting phases of the human-centered design process have been given many names in different literature and practices. The process is iterative, but is described linearly by Dam and Siang (2019) as the *design thinking process* (the authors make a slightly different distinction than Norman between the process of design thinking and the mindset of human-centered design) it follows five steps or "modes": (1) Empathize, (2) Define, (3) Ideate, (4) Prototype, and (5) Test.

3.2 Universal Design

"There is no such thing as the average person. This poses a particular problem for the designer, who usually must come up with a single design for everyone." (Norman, 2013, p. 243). The problem stated above is true for everything that is designed, regardless if one designs everyday things for people with or without disabilities. The philosophy of designing society so that as many people as possible may participate, disregarding any disabilities, is called universal design (Brynn, 2016).

3.3 Research Through Design

While many interaction design approaches have as a primary goal to create a (concept) design that supports the use situation, the concept-driven approach to interaction design research proposes a conceptual/theoretical point of departure, rather than empirical, with a final design that is optimized in relation to a specific idea, concept, or theory to support theoretical advancement. However both approaches being design oriented, and both leading to designs, the measure of success is radically different. A concept design has to be strong both as a concept and as a design composition (Stolterman and Wiberg, 2010). On the same line of reasoning, Gaver (2012) advocates that juxtaposing designs as a portfolio with annotations may serve an even more valuable role as an alternative to more formalized theory in conceptual development and practical guidance for design.
However, design theory and the measure of success in research through design can and should be reflected upon, and distinctions can be made between research through design and "regular" research within science. Gaver (2012) points out an important characteristic for research through design, which is that theory by necessity underspecifies design activities. The implication, he argues, of these under-specified theories is that while such design theories take the form "designing for X can lead to successful outcomes", they can never be considered falsifiable, due to the implicit *sometimes* in the theory (Gaver, 2012).
The concept-driven approach is presented by Stolterman and Wiberg (2010) as a complement to the more traditional user-centered approaches, and the basic design activities are similar to a large extent. Also the requirements in knowledge and skills are similar and the writers refer to the assertion by Zimmerman et al. (2007) that the skill and competence of design can be exploited to produce knowledge, and not only as to produce designs (Stolterman and Wiberg, 2010).

3.4 Author- and reader-driven stories

Ian Reeves discusses, in his presentation, author- and reader-driven stories in the context of data visualization. Reeves ascribes the author-driven story with a linear order of scenes, heavy "messaging" and no interactivity. (With messaging he refers to providing observations and explanations of the text with the use of text or audio). Reader-driven narratives have no prescribed ordering, no messaging and free interactivity (Reeves).

4
Method

This chapter describes in chronological order how the project was carried out.

4.1 Project Initiation

Before the design process started, the administrative foundation of the project was set up. Directives from the university in forms of course criteria, information from the thesis examiner and supervisor was gathered and organized. A structure for documentation was created, necessary registrations were made, the acquisition of an academic supervisor and a Project Initiation Document was made and presented as the Thesis Proposal.

This thesis work started off with the desire to facilitate communication between the care manager and the applicant in needs assessment and care management meetings. The premise was that it must certainly be difficult for the applicant, with such a brief meeting, to express their needs and to get a fair understanding for what implications the discussed interventions might have in their daily life. For the care managers, it seemed as if the amount of information they needed to keep as 'knowledge in the head' was very high, and they would be helped by having a reliable tool to facilitate this ('knowledge in the world' (c.f. Norman 2013, pp. 74-122)). With this as an entry-point, a literature review was initiated.

4.2 Literature Review

The literature review consisted of two main parts: literature on domain knowledge and literature on design. The first part was the start of the diverging phase of understanding the problem, a necessary expansion to obtain knowledge, test the hypothetical problem for validation or falsification in order to later on define the *real* problem. With focus on domain knowledge the literature was about welfare technology, Swedish welfare, the care managers position, etc. Here, continuous talks with my supervisor Associate Professor Leif Sandsjö was very valuable especially on the area of welfare technology. The newly obtained knowledge and understanding of the situation led naturally to a more sophisticated formulation of the problem statement, and the contours of the project scope started to emerge.

The second part of the literature review was on design matters. This had the purpose of finding related theory, design principles, frameworks and methods that

could support the thesis work. The theory section of this planning report is the result of some of the literature that was read, however, much of the value of this phase is also the obtained tacit knowledge spurring and priming the design thinking and enabling a more conscious approach to the problem at hand. What information that would be of use throughout the project would at this point remain to be seen.

4.3 Expert Interview

Parallel to the literature review, an interview was held with Professor Anna Dunér, who authored some of the literature. This semi-structured interview with an expert within the area of social work served well to get a more accurate understanding of the needs assessment conversation between care managers and applicants, as well as the domain in general.

4.4 Refining the Project Scope

After the expanding empathizing stage, it was time to converge as the previous scope from the thesis proposal now could be more accurately defined. The initial scope was built on a light understanding of the situation from an initial meeting with my supervisor and a brief browsing of literature. Now, with newly obtained understanding, the scope naturally would have to be shifted a bit. One of the main insights was the care managers' rather small room for professional discretion. Swaying between being positioned as organizational representatives and professional experts, the care managers are expected to interpret and define the applicants' rights according to the Social Services Act, to treat the applicants as individuals with unique needs, while simultaneously treating them equally (c.f. Dunér 2018). Another quite defining insight was from the literature study was the connection that was made by Brynn (2016) between welfare technology and universal design, and his revulsion against the (in Sweden) common synonymity between welfare technology and assistive technology. Even if the latter might be in line with the definition used in this thesis work, the differing view might have some implications on what the final system should include.

In the definition phase, the context of use also expanded. Originally, the main focus of use for the intended design solution was thought to be during the meetings, however, it was evident that with how the situation looks today, this solution might not be neither feasible nor particularly helpful. This shifted the focus of use to be prior to the meeting, in order to better prepare the applicant. Additionally, the idea of screening the applicants beforehand to ensure that they are actually contacting the right instance (municipality or county council) is thought to unburden both applicants and professionals. This is somewhat similar to other digital services trending within health care today (for example Vårdguiden 1177, and the growing use of chat bots). With the continuously changing and growing amount of welfare technology solutions this screening process might play an even more important part

in the future, since the lines between the responsible parties might become even fuzzier for both applicants and professionals.

4.5 Personas

Based on information gathered from real users, personas are crafted to capture common behavior patterns into meaningful and relatable profiles. They work as useful design targets, while facilitating easy empathy and communication (Hanington and Martin, 2012).

To concatenate the understanding of the target user group into something more tangible, and something that could be used for later ideation and evaluation, three personas were created to represent the users and their needs. These personas were based on the understanding of the users after the literature review and the expert interview. A fourth persona based on transcripts from interviews with older people were created during a workshop.

4.5.1 Perspective: Relatives

The persona Maja represents the worried relatives, one of the archetypal target users. She is based on real life encounters with multiple people.

- *Relative*
- *Empathetic*
- *Worried*
- *Alzheimer's*
- *Hesitant towards welfare technology*

Maja, 33

"Sad really, that budget cuts and the chase for efficiency totally removes human contact whatsoever..."

I met Maja about a month ago when we shared accomodation in a compartment on the night train from Luleå to Gothenburg. Maja was in her thirties and worked as an accountant in a small startup, and now she was on the train after having been visiting her grandmother in the north.

The grandmother had alzheimer's and Maja told me that she was sad that the grandmother lived so far away, geographically but now also mentally. She was also worried about her grandmother seeming so alone, and that no one really seemed to care for her. There was some kind of screen in her apartment that informed her what day it was, if it was morning or evening and whether it was time to eat or go to bed.

Figure 4.1: Persona 1: Maja

4.5.2 Perspective: Maintaining Relationships

Reuben has multiple problems due to a recent stroke. While he is grateful for all the help he gets from his wife, he is not satisfied with what it does to their relationship.

- *Movement*
- *Stroke*
- *Old people*
- *Relationships*
- *Communication*

Reuben, 76

"I want my wife to be my wife!"

Reuben lives with his wife Evy in a residential area in a small town on the east coast of Sweden. They have been married over fifty years and have kids and grandkids that now are adults. Before retirement, Reuben was an author and his favorite place had always been in the attic that since long had been turned into a home office, where he would sit and research and write.

However, now the attic stood unvisited except from when the grandkids visited and curiously went through all the old books and journals. Reuben now had difficulties to move and walk without help, so the stairs were unfortunately too big of a challenge.

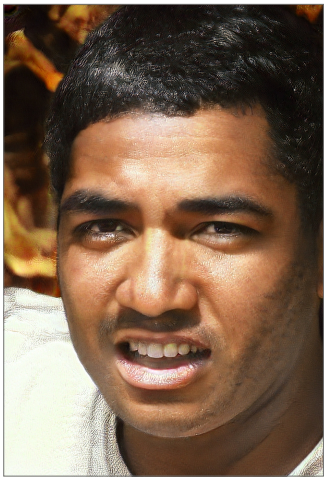
About six months ago, Reuben suffered a stroke and now he also has trouble communicating. The words just don't come to him when he tries to talk or write, and reading is also a struggle.

Reuben needs help with everyday things since his body doesn't keep up with his mind, and Evy who loves him very much wants to care for him, so they denied the option for home care and services. Reuben loves his wife's cooking, and has done so since long before his current condition. However, he doesn't at all like the idea of her helping him up and into bed or in the bathroom. Their relationship is invaluable to him, and he wants to keep that as it is and not see it being transformed into one of caretaking and caregiving.

Figure 4.2: Persona 2: Reuben

4.5.3 Perspective: Crowdsourcing (contribution)

The persona Max developed an application for hearing aid since he had trouble with hearing the lecturer on his university. Max represents a possible user group of people who wants to contribute to the part of the larger system which presents available welfare technology.



- *Developer*
- *Welfare technology*
- *Hearing*
- *Universal design*

Max, 21

"I just saw a problem and wanted to see if I could fix it, for my own sake. I never thought that it would become so popular!"

Max is a computer science student in the middle of his bachelor programme. He has been fascinated by computers and technology since he was a child, and on his spare time he is coding and creating little gadgets for his everyday life at home.

His latest project derived at school. One of his classes took place in an auditorium that was narrow, but very long, something that made it hard to hear the lecturer if one sits in the back. However, if one would want to sit in the front one would have to come quite early, since the class was rather big. The auditorium did not have any speaker system, so Max created a crude application where the sound that went into a microphone in the front was streamed to Max's computer in the back. However, due to a slight delay, and that most of the sound was audible naturally, it was only making it harder to make out what the lecturer said. Max then decided to convert the sound to text which was displayed at the top of his computer screen. Now he could listen to the lecturer live, and if he missed something he could catch it on his screen. The rendered subtitles could also be saved if Max wanted to revisit them later. His application was warmly welcomed by the lecturer who was impressed by the ingenious initiative, and many of Max's classmates utilized the app as well. Max's lecturer used it in other classes as well, and soon the application spread over the campus.

Figure 4.3: Persona 3: Max

4.5.4 Perspective: Autonomy

The persona Anna was created by the participants in the workshop, under supervision. Anna wants to be more active in her everyday life.

- *Mobility*
- *Participation*
- *Multimorbidity*
- *Older people*

Anna, 85

"No no, I'm fine..."

Anna, 85 years old, lives in an apartment with her husband and she is most comfortable at home with him. She likes to cook and to exercise to improve her walking. Anna is social, has two devoted sons and good contact with the municipality personnel. She has the auxiliary means that she needs, even a few too many she reckons.

Due to stairs and doorsteps Anna cannot move around as independently as she would have wished. Also incontinence is a limitation that makes it harder to leave the home.

Anna is constrained after having a fractured hip and being multimorbid. She is more passive than she wishes to be due to her physical environment. She needs help with finding ways to be more active on her own, and she doesn't request the support that she needs from her family since she doesn't want to be a burden.

Anna's condition is not bad enough to grant her a place at a nursing home, but not well enough to manage her current living situation. This makes it hard for her to envision a solution that will work for her.

Figure 4.4: Persona 4: Anna

4.6 Workshop

The workshop was held as part of a collaborative effort within Region Västra Götaland (*Västra Götalandsregionen*), for managers in different health care instances in the county. The aim of the workshop was to introduce the managers to how personas can be created and to investigate how the use of personas could be implemented in the formulation and communication of a joint plan for the elder care. Interview transcripts from three older people were read aloud, as the group wrote down quotes and thoughts on sticky notes. After being informed how to, the group then used the KJ-method (Hanington and Martin, 2012) in order to create an affinity diagram which would facilitate the creation of personas. By the end of the day, one persona was created (Anna in 4.5.4), and the group were to continue the work at their next meeting.

4.7 Speedstorming

Speedstorming is a version of brainstorming where time pressure forces the participants to work swiftly and to act without long discussions or contemplation. With multiple topics prepared, short brainstorm sessions (around three minutes) are held for each topic, and ideas can be spawned quickly Wikberg-Nilsson et al. (2015).

As stated in the introduction, two main goals drive the design project: to *help the applicant to formulate their needs and to communicate their life situation* and to *provide accessible and comprehensive information to the applicant, allowing them to research and prepare before meeting with the care manager*. To explore the gap between the goals and the current situation, a 'speedstorming'[1] session was held with the two goals as input. This was done in order to approach answers to why the goals are important and what it is in the current situation that prevents them from being reached. The session resulted in two lists of problems, one for each goal. The idea at this stage was to spur creativity rather than to find all possible problems.

Help the applicant to formulate their needs and to communicate their life situation

1. Does the care manager understand me correctly?
2. Hard to imagine the implications
3. Did I include everything?
4. How do I make the right choice?

Provide accessible and comprehensive information to the applicant, allowing them to research and prepare before meeting with the care manager

1. The applicant is unprepared
2. A lot of information at once
3. Lack of (perceived) influence
4. Different positionings
5. What are my options?

4.8 How Might We..?

By rephrasing insight [or problem] statements into "how might we"-questions, the designer is given a chance to generate various possible answers, and the statements get framed in a way that suggests that a solution can be found (ideo.org, n.d.). This was done for the problems in the two lists. The problem of the applicant feeling unsure and thinking *"Did I include everything?"* became *"How might we help the applicant to feel that the situation is fully and accurately described?"* (Figure 4.5). When similar transformations had been made for all problems, possible answers were speedstormed upon for three minutes per each question. The generated answers

[1]The fact that the session had only one participant is contradicting the definition. However, it was a fast way to create ideas without inhibitions.

were then clustered into groups by affinity and each group were labeled with a representative name. For the full result, see Appendix A.

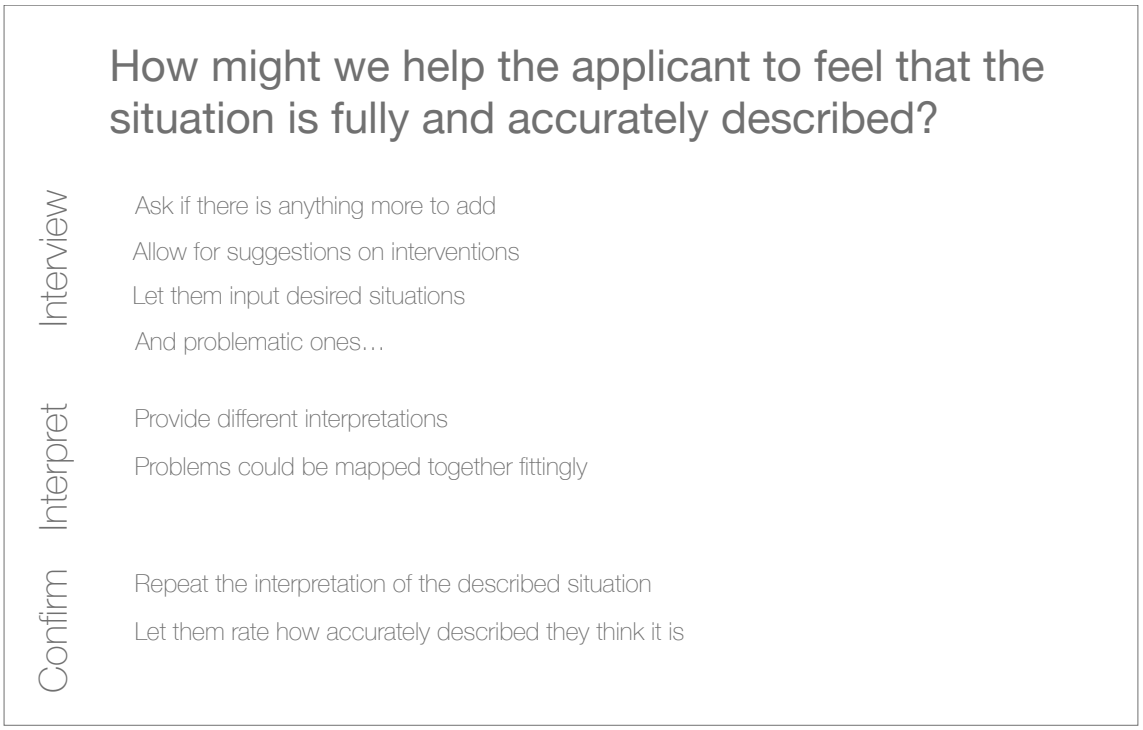


Figure 4.5: Each statement were turned into a question which spurred ideas for answers.

4.9 User Journey

As a starting point for another branch of the ideation process, *user journeys* were created for two of the personas that had been created earlier. These user journeys start with a desire or wish and go through the cognitive journey and a suggested sequence of actions that lead the personas to the point where their desire or wish is fulfilled. By empathizing with the personas and imagining a scenario in which they interact with the service (i.e. the interactive system that does not yet exist), the intention was to link the user's desire with concrete actions throughout the journey. Since no parts of the user-interface had been designed yet, the scenario was based on the persona's mental model of how they would be expected to want to solve their problem. Then the actions in the scenario could work as a guide for how the user-interface could be designed in order to support the scenario.

4.9.1 Maja's Journey

The first user journey is for Maja who feels hesitant to the idea of technology helping her grandmother who has Alzheimer's. It starts with her worries, leading her to encounter the digital service with which she wants to find out about other options. She and her family browse through possible interventions, save the ones that are

desirable, book an aid assessment meeting and forward the documentation of their choices to the care manager. During her journey, Maja obtains more knowledge and with that a more nuanced and open attitude towards the situation. The user journey ends at an aid assessment meeting where Maja, the grandmother and their family meets with a care manager who opens the forwarded file.

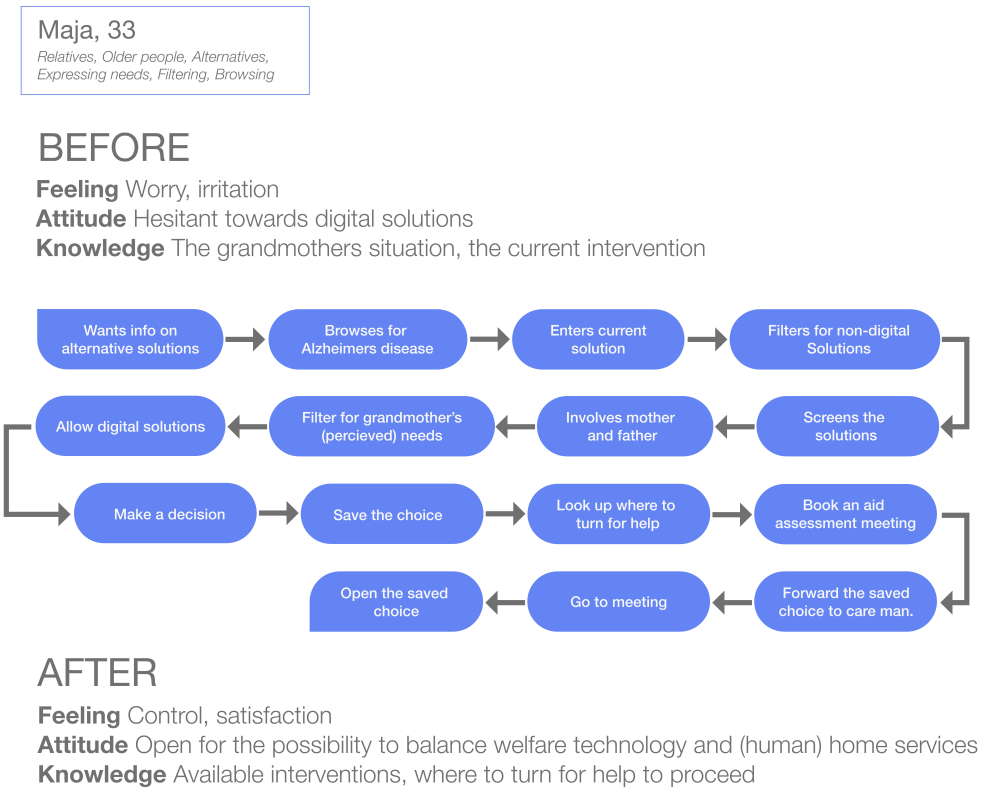


Figure 4.6: The user journey for Maja built on the scenario of her wanting to help her grandmother with Alzheimer's disease.

4.9.2 Reuben's Journey

The second user journey shows the stroke patient Reuben who is dissatisfied with his situation at home, where he gets very much help from his wife. Together they use the digital service to find a solution that better suits them.

Figure 4.7: The user journey for Reuben depicts his way towards finding the desired interventions.

4.10 How Might We..? (reprise)

Having identified some of the possible tasks and actions that takes the user through the interaction with the imagined system, the next step was to ideate on functionalities and elements that could facilitate the execution of them. For this, another "How might we" session was performed. This time two minutes of brainstorming was allotted per each entry point, which in this case was each step in the user journey. However, this session was less structured than the previous one, as the statements were not explicitly rephrased and written down. Rather, the leading question throughout the brainstorming was the thought "Which UX elements in the user-interface could make this action possible?". The generated answers were then written down next to each action in the user journey.

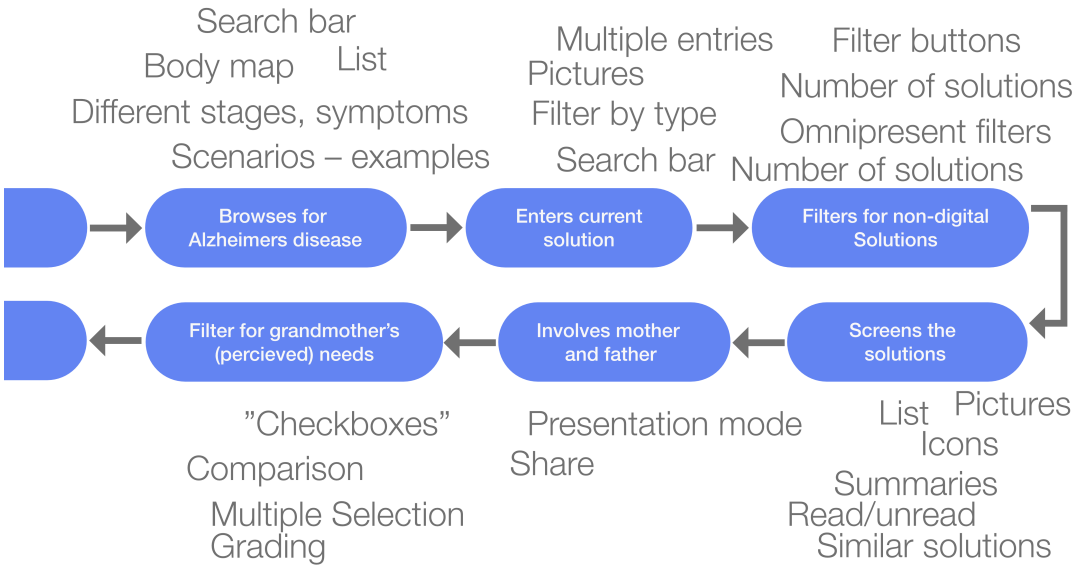


Figure 4.8: The different design elements were linked to the entries in the user journey that they aimed to enable.

4.11 Sketching

Sketching is a good way to test ideas and work as a way of thinking and exploring ideas further. Actions in the user journeys were chosen and with pen and paper different suggestions of how the screen could look like in those particular moments of interaction were materialized. The resulting sketches were of different conceptual ideas and technical solutions, but there was a lack of direction and the ideas felt disconnected, making it hard to know how to proceed.

4.12 Further Scope Management

At this moment the project was off track from the plan that had been set up, mainly for two reasons. The first was that somehow, when sketching commenced, everything became centered around each individual sketch and the smaller, individual ideas. The plan was to create a frame for a clear coherent concept and to fill the frame (from outside and in) with appropriate material to support the concept.

The second issue was that the user journey in focus, Maja's, portrayed a scenario that was too broad, concentrating on tasks outside the scope of the project. This included everything from Maja's initial feelings before her first encounter with the digital service, to her eventually handing over the interaction to the care manager and the user journey focused on Maja looking into various welfare solutions.

There was a need to go back to the two initial focus points and try to move the

project back to those. The focus points were:

(a) help the applicant to formulate their needs and to communicate their life situation
(b) provide accessible and comprehensive information to the applicant, allowing them to research and prepare before meeting with the care manager

What became evident was that more knowledge was needed, and that this was one reason for the confusion that emerged while trying to move the ideation forward with sketching. The big question that needed an answer was *What is needed in order to fulfill (a) and (b)?*. To address (a) the decision was made to investigate the methodologies used by professionals who work with communication as their main tool to understand other people's life situation. This was then to be analyzed and understood in order to distill and translate it to a human-computer-interaction. For (b), in order to design a service that is compatible with the eventual meeting, more knowledge was needed about what information the care managers need. With the aim to answer these questions, preparations were made to conduct expert interviews.

4.13 Expert Interviews

Four interview subjects were chosen because of their profession where they use communication as a method to empathize with other people's stories. Due to a desire to conduct the interviews as soon as possible it was a convenience sample where psychologists, therapists, physicians, and social workers, etc. in my network were approached. The four that were able to participate were:

1. Psychologist, 48. Currently working with children and adolescents.
2. Occupational therapist, 59. Currently at the employement office *Arbetsförmedlingen*.
3. Social worker, 26. Employed at LSS Advice and Support, and at a habilitation center for adults.
4. Social worker, 27. Works as care manager at a social services office.

The interviews were semi-structured and took approximately one hour, two were phone interviews and two were conducted in person. The aim was to learn how the experts interact with people and to ensure that they get a proper understanding of the relevant parts in the other person's story. What tools and methods do they use, what do they need to know, and what is the nature of their questions?

Due to the semi-structured format and the subjects' different professions the direction of the interviews varied, thus also the topics that were discussed. After finishing all the interviews they were analyzed by affinity diagramming in order to get an overview of the gathered data. Recordings and transcripts were broken down into single-line quotes and insights (sometimes together with an explanation). These were then clustered by affinity, which formed groupings that later were named (see Figure 4.9). The main takeaways from the interviews can be seen in section 5.2.

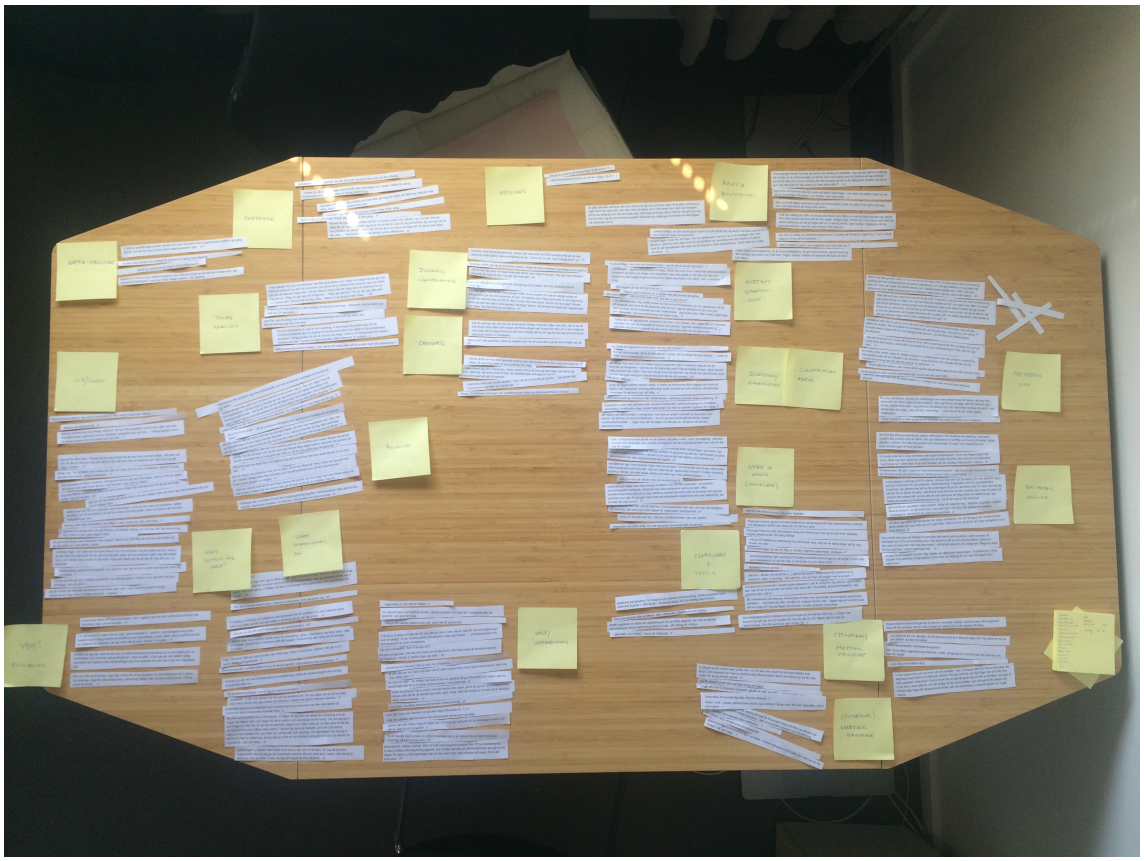


Figure 4.9: The interviews were analyzed with affinity diagramming.

4.14 Creating the Concepts

The next steps went more naturally with the newly acquired understanding. From what was said in the interviews, a paper was produced listing different methods to tell one's tale. The document spawned two matrices that set the basis for the development of design ideas.

4.14.1 Morphological Matrix

By combining the document made from the interview results with the design elements from the augmented user journeys, a morphological matrix (Sullivan, 2010) was created. It consisted of ways to tell one's story, how the system could present information, request user input, provide feedback on how the system interprets user input, and how the collected data could be visualized.

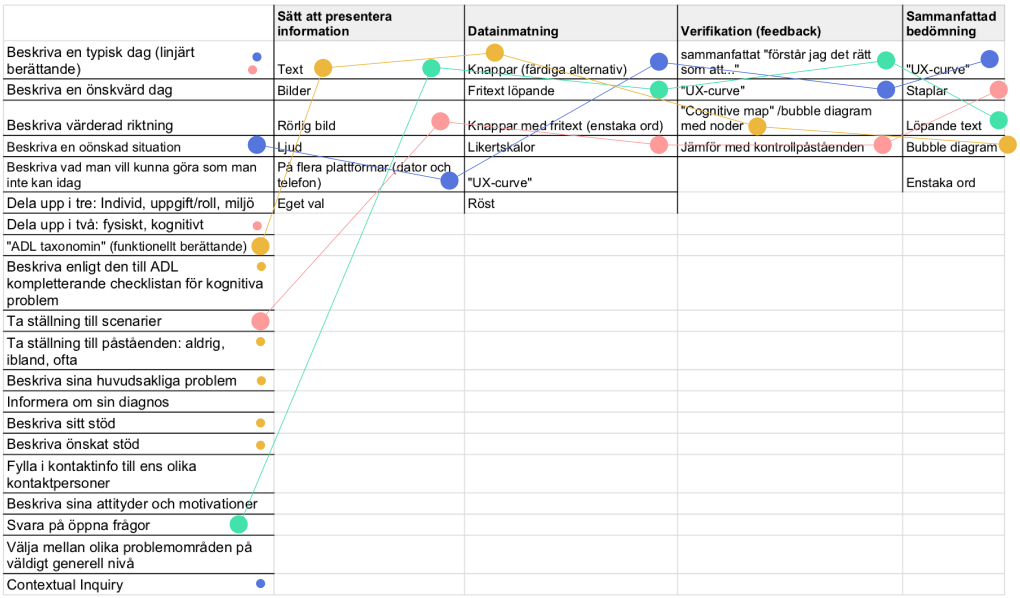


Figure 4.10: The different design elements were linked to the entries in the user journey that they aimed to enable.

4.14.2 Four Concepts for Storytelling

When analyzing the interview results, two approaches to storytelling were identified. Either it could be done chronologically, talking about an event linearly from start to finish. This I call *linear storytelling*. The other approach was to break up the story into different topics, and then keep on talking about everything within that topic before moving on to the next one. For example, the person could talk about having problems with mobility and then share about how it makes it hard to make the bed in the morning, do the dishes after dinner, walking down the stairs. When mobility is covered, the next topic might be cooking, as the association were made when mentioning doing the dishes. This approach decoupled from time I choose to call *functional storytelling*.

In addition to the narrative strategy for the user, the other direction of the dialog–how information should be communicated from the system to the user–was another parameter for the design ideas. When studying the previously produced sketches and the newer ideas that emerged, they could be seen as being within a spectrum spanning from a very plain, verbal presentation of information with very little embellishment or enrichment, to a very graphic and vibrant presentation of visual (nonverbal) information at the other end of the spectrum. These were called *Plain* and *Graphical* information visualization. With these two pairs of parameters, a two-by-two matrix was developed to represent a design space that would contain unique concepts. As the aim was to investigate differences, strengths and weaknesses

following distinct design decisions, four dots were distributed across the matrix to represent four concepts that were to be quite varied (see Figure 4.11). These concepts were then mapped out in the morphological matrix, as seen in Figure 4.10.

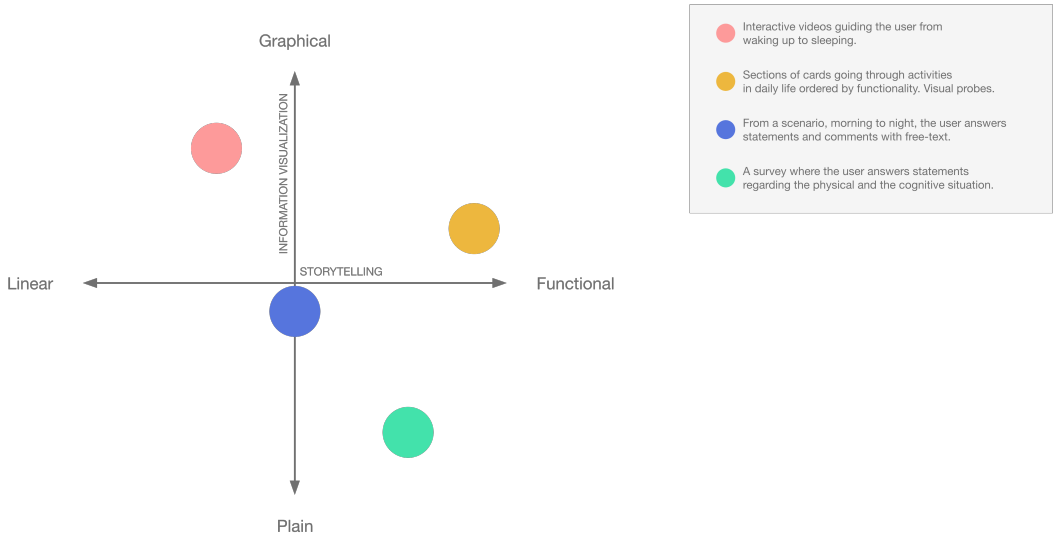


Figure 4.11: The initial idea of the four concepts and their span across the two-by-two matrix.

4.14.3 Interactive Prototypes

Having defined a rough idea of what the four concepts would be, sketching commenced. Since they were interactive design concepts, the sketches soon became many and similar to illustrate how the concepts respond to the interaction. Therefore sketching by hand quickly was abandoned in favor of creating digital wireframes due to the easiness to copy and paste and make small changes. Since much of the previous work had been done or saved into a document in the UI/UX design tool Adobe XD, the wireframes was made there as well. These were eventually linked together to become the four interactive prototypes that would be used as visual probes in the evaluation of the different storytelling strategies. The concepts that were prototyped were called *Cards*, *Video*, *Bot*, and *Live* and are presented in section 5.4 in the Results chapter.

4.15 Focus Groups

For the concept evaluation, two focus groups were assembled and carried out. The groups of participants contained both professionals and people with physical impairments. The focus of the evaluation was to get a nuanced perspective on the potential of the concepts via the opinions and feelings from the participants regarding the means of supporting the communication through the interactive prototypes.

The session started out with a warm up exercise which was called a communication experiment. The participants were shown four randomly generated geometric figures, one by one. They were then told to explain each figure to me so that I could draw it on the whiteboard. Different types of communication support was used, similar to those used in the four concepts.

1. **Describe, then draw**
   The first figure were explained verbally, freely, without support except for feedback where what they said was repeated as I heard it. When the description was done, the figure was drawn.

2. **Describe with a template (as in *Cards*)**
   The description of the second figure was supported by a premade template:

   (a) The figure has X corners
   (b) The figure is one-dimensional/two-dimensional/three-dimensional
   (c) The figure is built with straight lines/curves/both
   (d) The figure is symmetrical/asymmetrical in the horizontal plane
   (e) The figure is symmetrical/asymmetrical in the vertical plane

3. **Describe while drawing (as in *Bot* and *Live*)**
   For the third figure the pen was put on the whiteboard and the group gave directions in real time for how the drawing should continue.

4. **Draw, then describe (as in *Video*)**
   Sets of three figures were drawn on the whiteboard, then the participants chose the one that they felt related most to the figure they aimed to describe. The figures went from being very different (straight/edgy/curvy, 1D/2D/3D) in the early triads, to become more alike in the later as they were closing in on the target figure.

The exercise was meant to be a fast way to create a safe space for discussion with low pressure, as well as to introduce the participants to the mindset of evaluating different means of support. When the exercise was done, the four prototypes were presented. Each concept was walked through following a scenario tied to one of the two personas (Maja and Reuben), and comments, questions and discussion was freely made during and between each concept walk through. The different qualities were discussed, strengths and weaknesses depending on the context and the different users. The two sessions were analyzed with affinity diagramming, and the result is found in section 5.5.

4.16 Extracting Supportive Characteristics

By further analyzing the prototypes, the interviews and the evaluation, different supportive characteristics were identified. These are found in section 5.3.2.

4.17 Formulating Design Guidelines

The design guidelines are the result of all previous work. They are formulated based upon insights that emerged and were distilled throughout the design process. Some originates in discussions during the expert interviews, other from prototyping, or the analysis of the evaluation. The final set is comprised by eleven design guidelines.

5
Results

This chapter describes the design rationale that is the result of iterating the stages *empathize*, *define*, and *ideate*. It presents the results from the expert interviews that informed how communication could be used to help the user to express their situation. A model for storytelling is presented, followed by supportive characteristics and prototypes for four design concepts. The result of the evaluation of the prototypes is presented, followed by a set of design guidelines for the endeavour to design the interaction for a digital service such as the one proposed in this thesis.

5.1 Design Rationale

A rationale for the proposed interactive system emerged and evolved subsequently throughout the process. First it was defined that the focus is to help the applicant, and that it is done before meeting a care manager. This way, the design can aim to have the user come to the meeting empowered by information, well prepared for the context, and knowing to say. The design also works as a screening to make sure that meeting with a care manager is the appropriate course of action. The system informs the user of their options.

Hypothesis 1: The aid assessment meeting can be facilitated by focusing to help the applicant. The help has the best opportunities to be effective if given before the meeting is applied for.

This help could come in many shapes, however, when first ideating concepts, many ideas could be traced back to the utility of one feature in particular: supporting the user in describing their situation and what they need help with. Besides the support the interaction process provides itself, it constitutes the possibilities for effective subsequent support, since the system then will be able to provide the support based on the needs of the individual. This may for instance be to inform the user about what their options are, and different interventions that exist. The interaction should be designed so that it entices reflection and facilitates articulate description of the user's life and needs, and this should be allowed to take place in a safe environment at the user's own pace. By designing the content in a way that is consistent with what the care manager requires, the pressure and imbalance of power between applicant and care manager is removed from the task to formulate one's needs, and reduced during the meeting since the user comes with the experience from going through the interaction process as well as with the resulting life descriptions as a supporting

basis.

Hypothesis 2: In order to help the user prior to an aid assessment meeting or another course of action, the interactive system should provide the user with tools to effectively describe their life situation and the areas where they need help with. If an aid assessment meeting is to be attended, the user a can do so well prepared and articulate, with a higher sense of control and self-esteem which is expected to reduce the imbalance of power between the applicant and care manager and take pressure off the meeting.

The user is enticed to reflect upon and express their needs at the required level of abstraction, simultaneously it allows the system to find and present options that are based on the needs of the individual, The user (applicant) is empowered by being in control, being informed, and by having formulated and prepared what to say when asked to express their needs in the future.

5.1.1 The Suggested System

As stated in the introduction, this thesis works on the premise that an interactive system is developed to support the user in various ways, where supporting the user in communicating their life situation and preparing for meeting with a professional only is a part of the system in full. While this thesis does not investigate how the other necessary parts of the system should be designed, it has relevance as context, as the subsystem that is investigated will not be designed to exist in isolation.

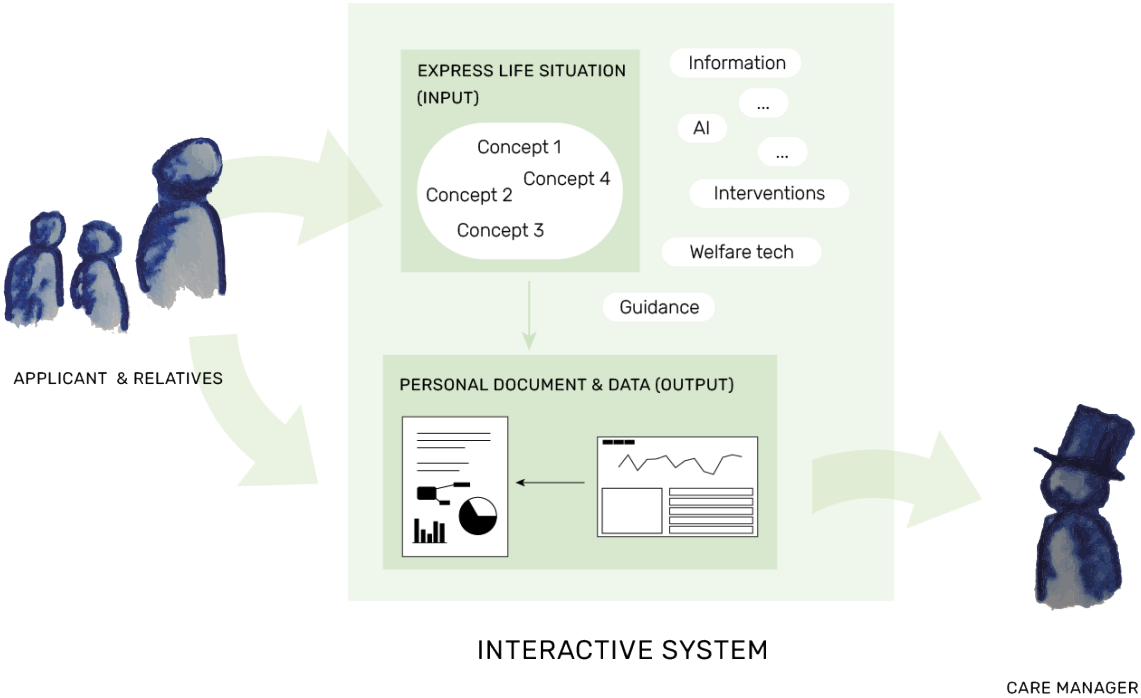


Figure 5.1: The system is imagined as a coherent interface between the applicant and the care manager to mediate, and strengthen their conversation.

5.2 Interview Results

The affinity diagramming for the interview transcripts resulted in the themes presented below. The four interview subjects are referred to as *The psychologist, The occupational therapist, the social worker,* and *the care manager*. The topics below describe contextual aspects of the situation that, even if not directly tied to specific methods of facilitating the communication of the experienced situation, give a valuable background to the concept generation. At the end of the section, a list of more concrete methods and approaches to help the narrator (patient/client/applicant in this case) elicit the core issues of their situation is presented in 5.2.11.

5.2.1 Help and Interventions

While the psychologist experienced that many people experience that they are helped by feeling that they are being listened to, the occupational therapist mentioned the importance of instilling hope that a better situation is possible. The social worker said that it is good to inform about the law, LSS in particular.

In line with the study by Dunér (2018), the care manager described a smaller room for professional discretion and regarding help and interventions home care services had predominance during the interview. The difference between municipalities and the difficulty to determine what is legislative was brought up, where short term accommodations and retirement homes were examples of difficult cases. Other more unusual interventions were mentioned, such as housing support (*boendestöd*). When welfare technology was discussed, well-known technology like safety alarms, door alarms and supervisory cameras were mentioned. However, the care manager had never heard of more unconventional technology being granted as aid, and referred to occupational therapists, adding that "Everything that has to do with assistive technology comes from occupational therapists".

The occupational therapists within primary health care do have the right to prescribe assistive technology, however during the interview, the occupational therapist at Arbetsförmedlingen had an approach to interventions that was rather free, often targeting behavioral change in ways that doesn't necessarily cost anything or include any auxiliary means. Instead, the interventions were often ingenious little nudges to facilitate a favorable behavior, for example to provide tools for planning and structure, like making checklists or laying out everything for the day the night before. There was little sense of restriction or predefined sets of solutions, and the occupational therapist stated that as long as there exists medical documentation, they are very free to use their professional discretion.

5.2.2 Eligibility

The social worker had two jobs, one under the jurisdiction of LSS and one under HsL. The support that is offered is similar between the two, however, LSS has more distinct requirements on eligibility. SoL does not have as high requirements, however

for some services it is good to have documentation, a diagnose, a doctor's certificate or similar. However it differs between municipalities.

5.2.3 Feedback

Providing feedback to the client/patient was part of the method for all of the professionals that were interviewed. During conversation, all of the professionals stated that they use some variation of "Do I understand you correctly that..., is it like this?" For the professional to repeat what they understand has been said is a way of validating and confirming that their understanding is accurate, and gives them a chance to correct it if necessary. There is a sender and a receiver in the discussion, and while the client transmits, the receiver's task is to distill and reflect back. This is done continuously throughout conversation. Feedback between and after conversations is important as well. During the psychologist's three first sessions with a new patient, her goal is to understand the patient's problem. Continuous feedback is used during conversation to refine the understanding of the problem, feedback of the accumulated understanding is given between sessions, and the final assessment is made after the third session has ended.

5.2.4 Third Parties

While the social worker in a municipality in the northern parts of Sweden said that a big part of what they do is to coordinate interventions and helping people to contact the right instance, the social worker in a municipality at the west coast had very little contact with other instances. Similarly, working in cross-disciplinary teams was common for the social worker in the north, while on the workplace on the west coast it was not. While the two professionals had quite different jobs, they both confessed that there is a large difference in procedure and collaboration between instances in different municipalities.

The occupational therapist at Arbetsförmedlingen frequently consulted third parties with large knowledge about technical solutions, the psychologist emphasized that it is important not to create expectations or to promise that any services will be granted from another party, and the care manager saw that the patient tends to have reflected less on what they need help with in the cases where the contact is set up by health care personnel instead of by the patient.

5.2.5 Wanting Help

The people who wants help can come either by referral or by establishing contact themselves. The psychologist said that the reason for wanting help rarely is expressed with distinction, initially. The patient tend to have quite general wishes like "I want to be well" or "I want to feel better", rather than "I want medication so that I sleep and don't cry". The psychologist thought that people appreciate the help to disentangle the problems. This unraveling process the psychologist refers to as moving from a helicopter perspective to a spotlight perspective (comparable to

macro to micro perspective). The psychologist also talked about identifying goals. For example, if a person needs hearing aid which can help their hearing, the goal is not itself to hear better, rather it might be that friendship is important, and in order to maintain the relations, hearing your friends is important.

Both the psychologist and the care manager often get contacted by relatives (parents for the psychologist, and usually children for the care manager), who are then active participants throughout the process. The care manager experienced that sometimes when older people are used to getting a lot of help from their relatives, they do not want to accept help from home care services. This can lead to tricky situations when the relatives reach a point where they are not able to help as much as would be necessary. The occupational therapist saw that a reason for not wanting help is when people have lived a long time with functional hinders and anxiety, sometimes they believe that this is how things must be, not knowing that things can be better. Similarly the occupational therapist continued and said that people sometimes give up, for example if you struggled with dyslexia throughout your education, just to then encounter that all job advertisements ask for someone with "good abilities in writing and speech". Further the occupational therapist mentioned trouble coming back from sick-leave, exhaustion, lack of energy due to neurological conditions, changed functional abilities as common reasons for wanting help.

5.2.6 Relatives

Since the psychologist was working with children and the care manager with older people, they had much contact with relatives. It is hard to do in-depth interviews with children, so the parents often are spokesmen since they are more articulate and might have a greater ability to see and express things in the child's life than the child itself is able to. The care manager also acknowledge that not everyone can speak for themselves. Further, the care manager sees that relatives often can be the driving party and sometimes have to persuade the older person to accept help. Sometimes the relatives use alternative paths, like suggesting to the older person that someone can help out with a training program, while the actual target might be to ease in and motivate the older person to be open for accepting help with hygiene after a while. When the person gets old, relatives do not always see the person as an adult capable of taking the best decisions for themselves anymore, which can be troubling and create conflicting wishes. For example the older person might not get dressed at all, which gets the relatives bothered. At the same time, the older person is an adult and if he or she doesn't want to get dressed, who has the right to force her? There are limitations to the decisions that can be made by relatives.

5.2.7 Openness

It is important to be open towards the client about what you think, partly of respect but also to ensure that you understand what they actually want. Equally important is to have an open mind and to let go of preconceptions. It is easy to look for a general solution, but the notions of the problems can differ. The occupational

therapist had an example of a person in a wheelchair because of a broken neck. The occupational therapist thought that of course the person would want to be able to get dressed and to eat, but what the person actually wanted the most was to be able to light a cigarette without help.

5.2.8 Roles and Positioning

The social worker stated that sometimes they see needs that the patients themselves do not. The psychologist agrees and recognizes that the patients trust in her being an expert and expect to be given advice. It all starts and ends with the patient. People put great faith in the psychologist to understand them, better than they understand themselves. The psychologist knows that her words carry much weight, for which she feels great responsibility to be humble with her words and to get things right. However, all needs that are identified cannot always be met. The psychologist's role cannot be one of a friend, someone to talk to for the sake of company, or to be there for waking the patient up in the morning. She would then fail those who need psychiatric treatment. The supply is lower than the demand regarding human needs. The psychologist also lifts that her role is to help the patients to be constructive, to talk about stuff they can work with, as opposed to complaining or putting blame on others.

For the psychologist, relatives take a very active role. As a practicing child psychologist, most of the time she talks to the parents. They are her helpers as they do most of the work at home. The psychologist provides the parents with tools, asks, listens, and steers them right within the problem areas they can address.

The care manager feels responsibility for steering the conversation and to ask the questions that need answers. The older person might not think of the inability to make their bed on their own when sharing their general story, however these constituents to the situation as a whole are what the home care services need to know in order to know what to do. She also lifts that people sometimes believe that they are there to order interventions. The care manager then needs to be clear about the nature of the meeting, that she is there to assess whether the person needs help and that she needs to know what the situation is like in order to find cause for the interventions.

The occupational therapist mentioned that the human factor, the professional's knowledge and competence of course will affect the outcome. The social worker saw that outside of the meetings with professionals sometimes people with little experience can be afraid or cautious of how to talk to people with cognitive disabilities. Her philosophy was that one should work on the supposition that the person has adequate understanding, but to be direct and clear.

5.2.9 Before Meetings (Professional)

For equal treatment of patients, in many municipalities and county councils a phone interview (Brief Child and Family Phone Interview, BCFPI) is performed as a first screening for a child that may need to meet a psychologist. A nurse interviews a parent for around forty-five minutes, following a set of predefined questions and areas. This produces a basis for the psychologist to build on during the first meeting with the family, who generally appreciates that the psychologist already is familiar to their situation. The basis covers a wide range of areas and aims to ensure that nothing is missed, like for example boys having eating disorders. The document that is given to the psychologist contains a written summary made by the interviewing nurse, bar charts and numerical values illustrating the most problematic areas from the parent's valuation, and the interview answers. The psychologist is positive to the idea of equal treatment and sees that the screening helps to reassure that the family has reached the appropriate level of health care. However, the psychologist lifts that the method has received some critique since it only depicts the view of one parent. The view of the other parent and the child may be different.

For the social worker the basis before the first meeting is the referral. The meeting takes off from that document, and the applicant gets to explain further what their condition is like in order for the care manager to make an assessment. At this social worker's workplace they also assemble the different contacts the individual has with other instances to facilitate coordination between instances.

5.2.10 Before Meetings (Applicant)

A good thing with having the applicants fill out things before meeting with a professional is that they get a chance to reflect upon what they need help with and what difficulties they experience. The care manager said that when she makes follow-up calls a week after the needs assessment meeting, many people have come up with a lot of new things, and the care manager then has to write a new assessment. Further, the care manager adds that people can have a hard time articulating what they want help with, but rather more generally asks for help.

The social worker lifts that a large part of the user group will have autism, and might have trouble to express themselves and to make contact, and could benefit from getting the right support before meetings. She continues that sometimes the initiative for the meeting is taken by a relative and that in these cases the individual might not be sure what to talk about during the meeting.

The psychologist says that there is much to gain to think through a difficult conversation beforehand, and that the self-awareness will increase. The occupational therapist agrees that it would be helpful if the applicant could botanize by themselves in advance. They both mention that it would be easier for people if they had greater knowledge of what their options were and what can be offered, before

seeking help.

5.2.11 Methods and Approaches

The professionals also had different ways of eliciting the information they needed. These could be transferred into the interactive system. Mentioned methods and approaches for how to lead or guide the conversation so that the communication of underlying needs and core issues can be facilitated are:

Asking the individual to describe:

- A typical day
- A desirable day
- An undesired situation
- What they want to be able to do, that they cannot do today
- Their main issues
- Their current support
- Their desired support
- Their attitudes and motivations

Letting the individual:

- React to scenarios
- React to statements: never, sometimes, often
- Answer open ended questions
- Choose between predefined problem areas at a very general level

Dividing the conversation into:

- Three parts: the individual, their task/role, and the environment
- Two parts: physiological and cognitive issues
- The categories in Activities of Daily Living (ADL)
- The categories from the complementary checklist to the ADL taxonomy

Asking the individual about:

- Diagnoses and medical documentation
- Contact information to contact persons in other instances (e.g., within the primary care or employment agency)

5.3 The Concept Space

The concept space refers to the space of possible concepts that would hold solutions to the problem. The designs within this space were informed and constrained by two main ideas that the concepts had to relate to: an idea about storytelling strategies, and another on supportive characteristics.

5.3.1 Functional and Linear Storytelling

The strategy for how the user is to tell their story is described based on how it utilizes linear storytelling and functional storytelling. The model derives from analysis of the methods provided by the professionals, leading to that they could be divided into two main storytelling strategies. The two strategies have different characteristics which can be used and weaved into the storytelling, hence it is represented as a spectrum rather than a two-state scale. These two methodological concepts were introduced in order to investigate what potential qualities the communication acquires depending on their position in this spectrum.

Functional storytelling disregards temporality and treats the storytelling as a collection of discrete units of information. There is no necessary inherent hierarchy between these units, and the narrator (the user) may process them in the order they see fit. While the units are not connected, the narrator may form the story by making their own associations or prioritization between the units, hence an anthology is created that conveys the user's message. Functional storytelling is used for instance, when a person is asked to describe their most acute problems, or talk about what they desire to do but cannot do today.

Linear storytelling follows a chronological chain of events, with a starting point and an endpoint. The continuous story may be used to describe a scenario where parts in sequence are tied together, and their causality may be discussed in a way that functional storytelling does not allow. Methods like asking a person to describe their day or to reproduce an episode from the past are examples where linear storytelling is applied.

The storytelling strategies are represented as the horizontal axis in the two-by-two matrix in Figure 5.2 and Figure 5.3. The vertical axis of the matrix represent how the system is presenting information to the user and goes from plain to graphical. Verbal to visual communication might be more precise, however, the use of a lot of visual communication does not infer restriction of verbal communication. Rather, the axis represents how graphically dense or sparse the design is, to enable the investigation of the effects it has on the communication between the system and the user.

Four design concepts were prototyped and evaluated, and below they are presented in the two-by-two matrix both as how they were intended to be distributed before they were designed (Figure 5.2), and how they actually turned out when the prototypes

were done (Figure 5.3).

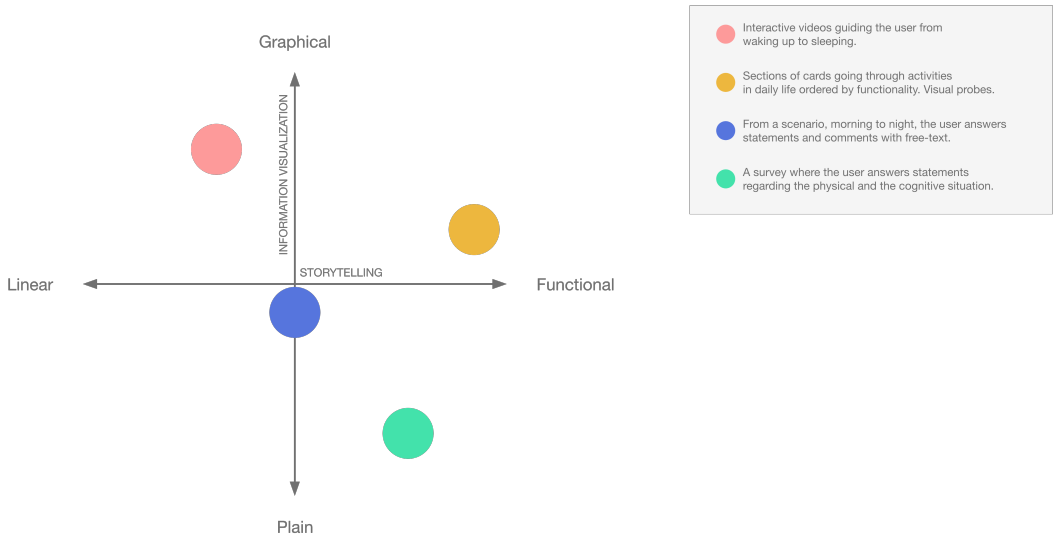


Figure 5.2: The initial idea of the four concepts and the distribution of them in the two axis system.

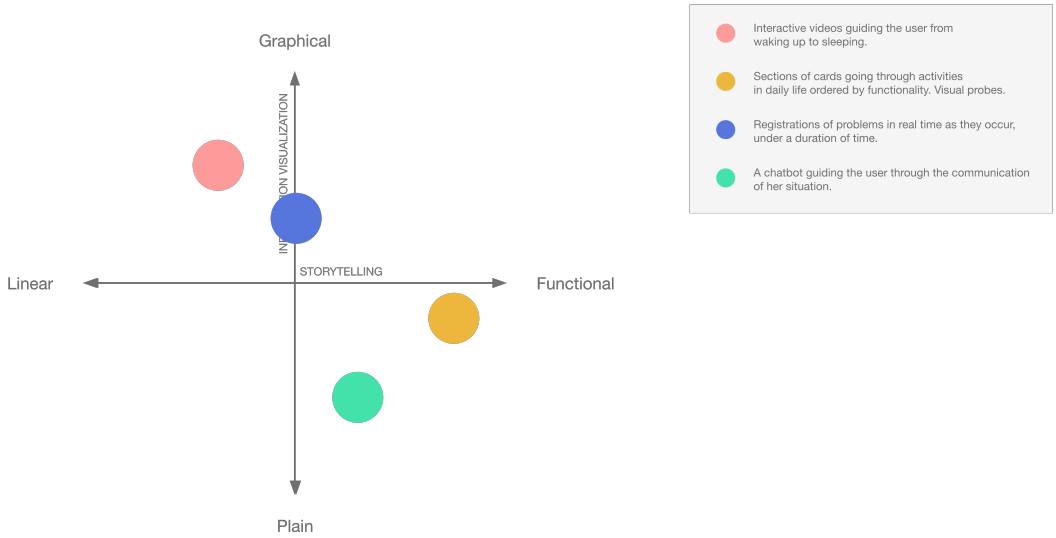


Figure 5.3: The actual four concepts and the distribution of them in the two axis system, as evaluated after prototyping.

5.3.2 Supportive Characteristics

To facilitate the user in their communication of needs, different types of support should be considered. The supportive characteristics listed below were formulated with the intention that they should be built into the design concepts. They derive from reflection on what was learnt in the empathize phase, and from analyzing the expert interviews.

Move from Macro to Micro

To get an understanding for the user's situation we need to be able to identify the core issues in their everyday life. As the psychologist that was interviewed expressed, the aim is to find answers to the questions "What is it that you need help with", and " What can I do for you?". These questions are rarely answered with distinction. The wishes tend to be quite general in the style of "I want to be well" or "I want to feel better", rather than "I want medication so that I sleep and don't cry". The system should support the user in moving from the general and abstract way of reflecting upon their situation to a place where they can comprehend and feel confident in articulating the underlying problems in a way that can be understood and addressed.

Knowledge

Knowing what the process that has to be gone through is like, knowing where to turn, one's rights, and which instances that are responsible for handling different areas is not particularly easy, and the system should give support in how to navigate the Swedish welfare system.

Inspiration

Rather than handing the user a blank sheet and leave them to write down their story, they should be provided with examples and different mediating objects that might trigger associations or memories that will support the user in starting or continuing their story.

Articulation

In order to ensure that the user is understood by the receiving party (the system itself or a professional), the system should support the user in telling their story by helping them to be articulate in their descriptions. In this context, being well articulated refers to being a good communicator that successfully conveys their message to the receiver.

Power

One of the large overall aims for the system is to empower the user in order to diminish or eliminate the power imbalance that exists during meetings with professionals. It belongs to the context that the target user turns to this system from a

position where they feel that they need help, and this position comes with a sense of vulnerability in many cases. With the investigated concepts the rationale has been to allow the user to reflect on their situation in a safe environment at the desired tempo while being offered support in different ways to do this, as mentioned above.

Self Awareness and Self Esteem

By supporting the user to break down their situation into activities and underlying problems, the designed concepts aim to start reflection and to prepare the user for the perspective that the professionals will have. Even in the case of the user not meeting a professional after using the system, the self reflection and preparation aims to make the user more self aware and able to express their situation with higher eloquence and self esteem.

5.4 The Prototypes

The prototypes that are described in this section were created as interactive demonstrators of the four design concepts, which were to be used as a basis for the focus group discussions. The concepts are suggestions of how the different storytelling strategies can be manifested within the graphical user interface. Below, the four concepts are described, supported by snapshots from the interactive prototypes.

5.4.1 Concept: Cards

Cards is a clear example of where the macro to micro support characteristic is implemented to break down the abstract cloud of problems to a structured set of addressable problem categories. Daily life is broken down to activities and problem areas which are presented on individual cards, providing the user with a structure to support their story telling. The choice to use the UI design pattern "cards" to present the areas was made for its suitability when the user is browsing through content (cf. Laubheimer 2016).

Each card is representing an activity or a situation in daily life. Within the frame of the predefined categories, the user drives the narrative and is free to choose which cards to interact with in a way that makes sense to them in order to express their life situation. The cards aim to steer them towards a micro perspective in their reflections and spur them to recall situations or activities that are problematic in their own life. By presenting all the cards for the user, they get an overview of possible topics and a hint of what might be important to mention.

The activities on the cards are from the ADL (Activities of Daily Life) taxonomy developed by (Törnquist and Sonn, 1994), and a complementary checklist to the ADL taxonomy developed by (Andersson et al., 2012). The ADL taxonomy is a conceptual framework comprised of twelve general activities which can be considered as a foundation for daily life and is used by occupational therapists in order to assess and systematically describe a person's ability for daily activities (fsa.se). The

complementary checklist was developed to better capture the cognitive difficulties and resources experienced by people with cognitive disabilities (Andersson et al., 2012).

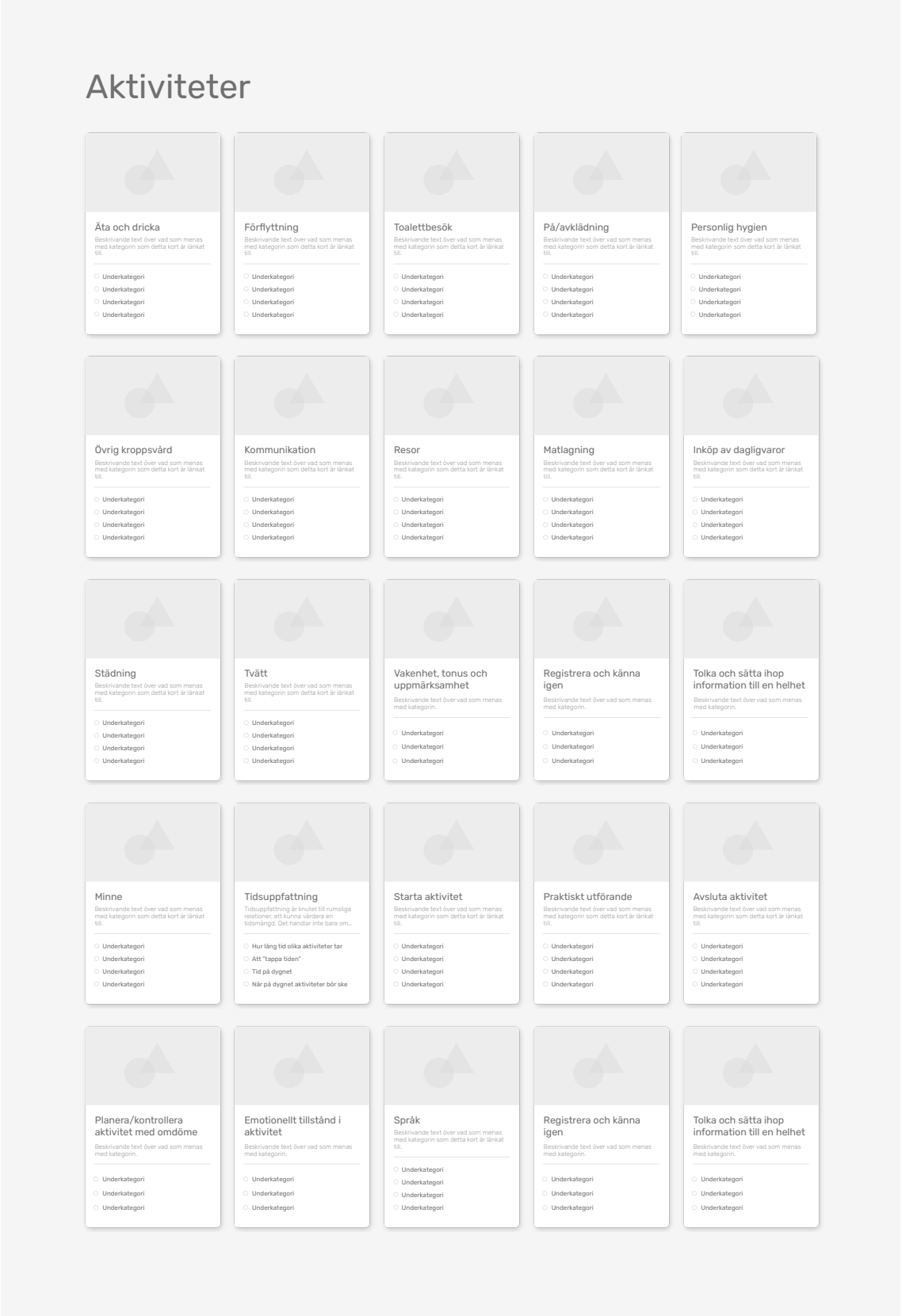


Figure 5.4: Cards are used so that the user can browse through the categories and choose the ones that match their problem areas.

In this concept the cards are presented to the user to allow them to self-evaluate their situation. Each card has the respective activity or situation as a header, a short description and examples of its content. When a card is selected it expands and reveals a more detailed explanation of what is meant by the chosen topic. The user is then presented to a number of statements regarding their situation which the user reacts to by answering yes, no, or don't know/not relevant. They are asked to specify what type of support they are interested in and inform about the support they have today. If the fixed statements and answering options does not suffice, a free-text input field is presented for more in depth explanations, other similar problems or comments.

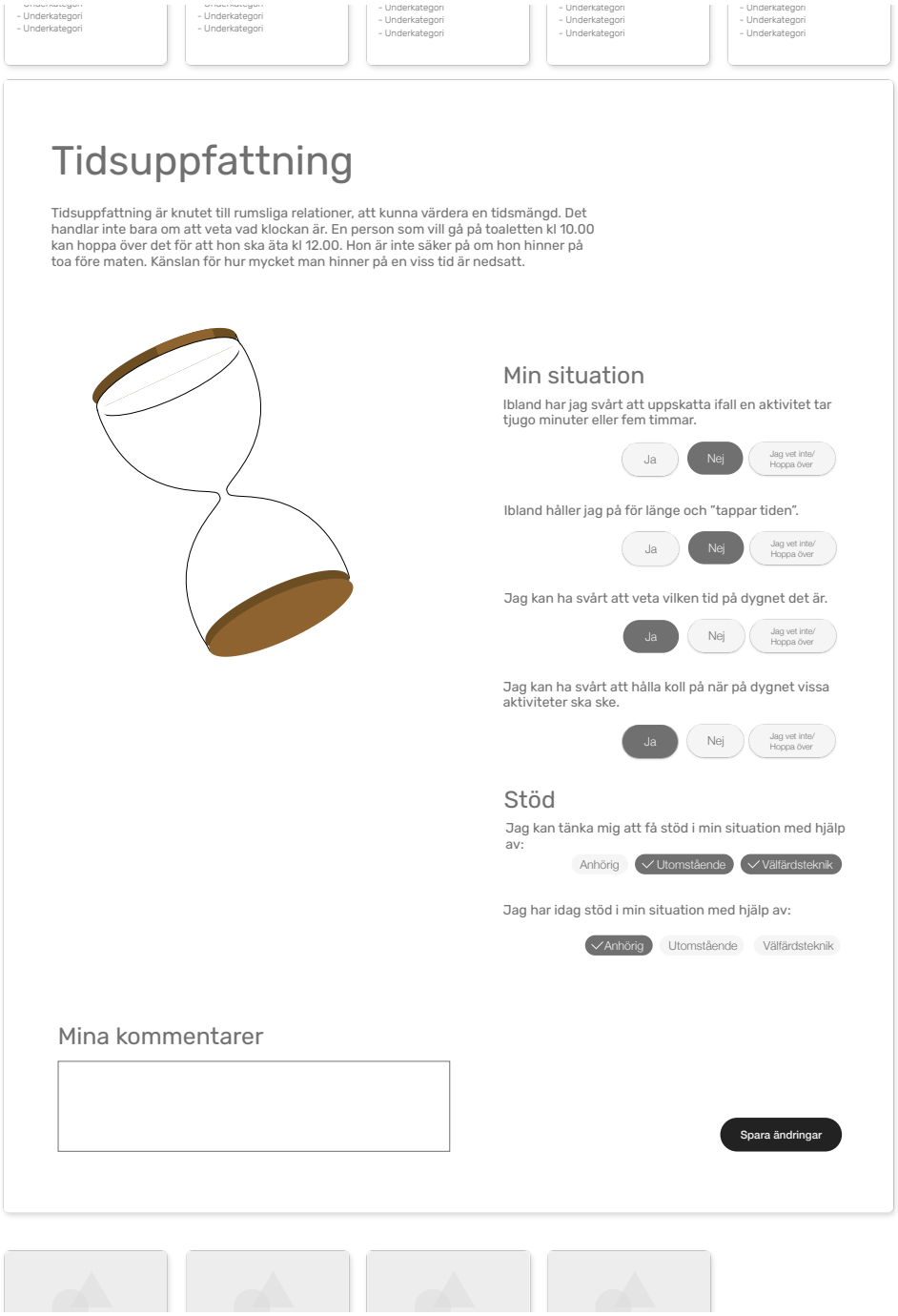


Figure 5.5: When the cards expand, the user gets to respond to statements about their situation. (The introduction text and statements are from the cognitive checklist for occupational therapeutic assessment of ADL capability by (Andersson et al., 2012)).

When the user has gone through the card, they save the changes and the card shrinks into its original size. It is moved to the top and changes state to "done". The information below the header is now summarizing the user's responses. The user can move on to another card, or re-open a previously filled card to check or change their answers. The information that is saved in the cards is also sent to the

user's personal file which provides overview over the accumulated data, showing the user's story from a macro point-of-view.

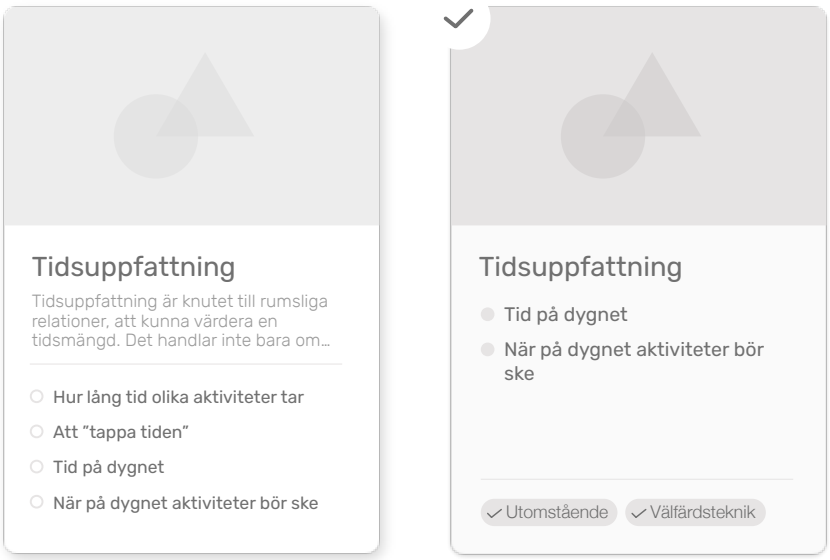


Figure 5.6: When information has been saved, the card changes appearance when the user is done interacting with it.

5.4.2 Concept: Video

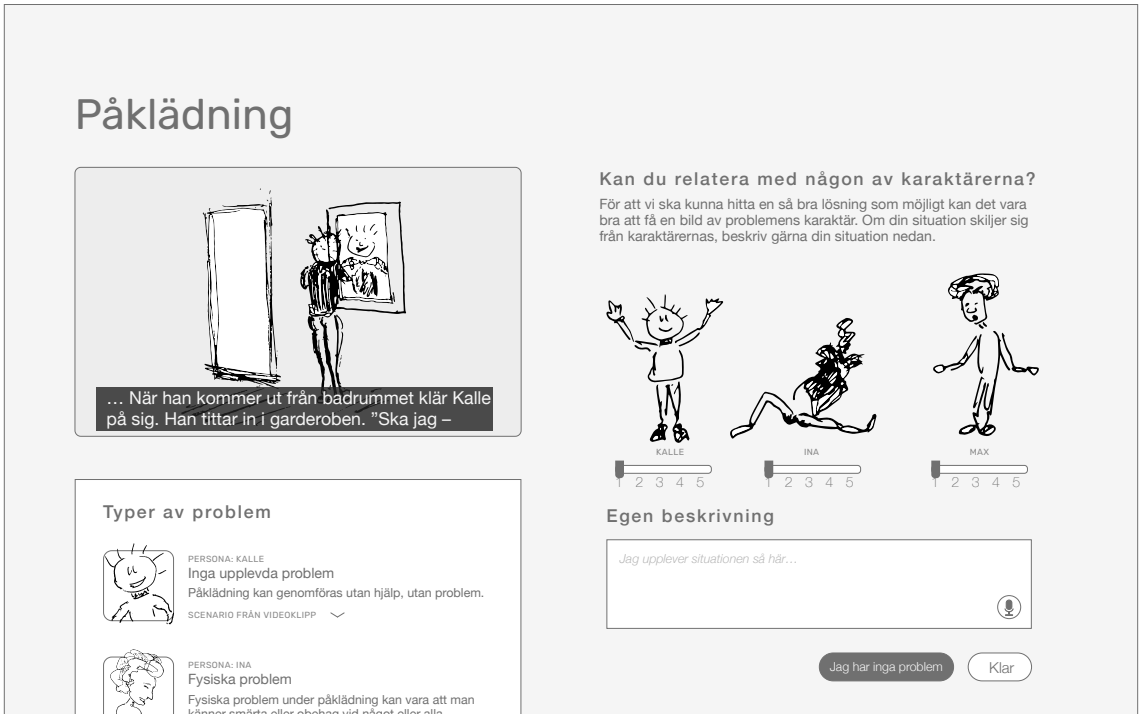


Figure 5.7: Getting dressed is one activity the user may go through in Video. After watching the video the user can self-assess how well the characters' experiences match their own.

Video derives from the idea of linear storytelling and to use graphics to convey information and provoke thought and emotion. The user is taken through a day that starts with waking up in the morning and ends by sleeping at night. The different daily activities are presented as scenarios depicted with motion graphics and audio. By allowing the user to relate to examples of how other people experience different activities and situations the concept aims to spur self reflection. Even if the depicted scenarios does not fully coincide with the user's life situation they offer something to relate and compare to which can work as a starting point for the user when describing their own life situation.

Figure 5.8: The linear storytelling in Video is centered around a timeline depicting a day in the user's life.

The interaction starts by the user customizing a generic day by choosing from a set of activities to add, move, or remove to make the day resemble how their own day might look like. The activities are based on the ADL taxonomy (Törnquist and Sonn, 2017) and the complementary checklist by Andersson et al. (2012). The user then go through each daily activity in chronological order. For each activity the user is shown a video in which three characters with varied performance capacity go through tasks belonging to that activity, with different results and difficulties. After watching the video the user is asked to rate to what extent they relate to the different characters on five-graded scales, and then describe how the situation works for them.

The portrayed characters work similarly to personas, where one represents persons with no difficulties performing the tasks, one people that experience cognitive difficulties, and one the ones physiological difficulties. The characters and their scenarios in the video aims to give examples of other people's experiences of the situation, something that the psychologist mentioned as one method that may help the patient to express their own experience. With the accumulated ratings the user do of the extent to which they relate to the characters, in a way, the user creates a character of their own that is much more nuanced than the archetypal characters in the videos. This persona can be used as a mediating tool used for communication. Considering the concept within the larger system, this character and its attributes can also be used to help the system identify proper interventions or technological aid for the user. The information is also saved to the user's personal file, and with sensible visualization of the data it could also be used for communicative purposes. The free-text description offers a way for the user to reflect on their experience and prepare how to articulate it, for themselves or to someone else. While all days might look a little bit different, having it all tied to a timeline that roughly represents how activities are spread out may reveal clues for how the user's need for help might differ over the course of the day, which may help the user and the professional during care planning.

5.4.3 Concept: Bot

Bot emulates a conversation between two people over a desk. It is a dynamic concept that alternates between being user-driven and system-driven, as the system will adapt the user interface in respect to where the conversation is heading in order to provide the right support and gather the right information.

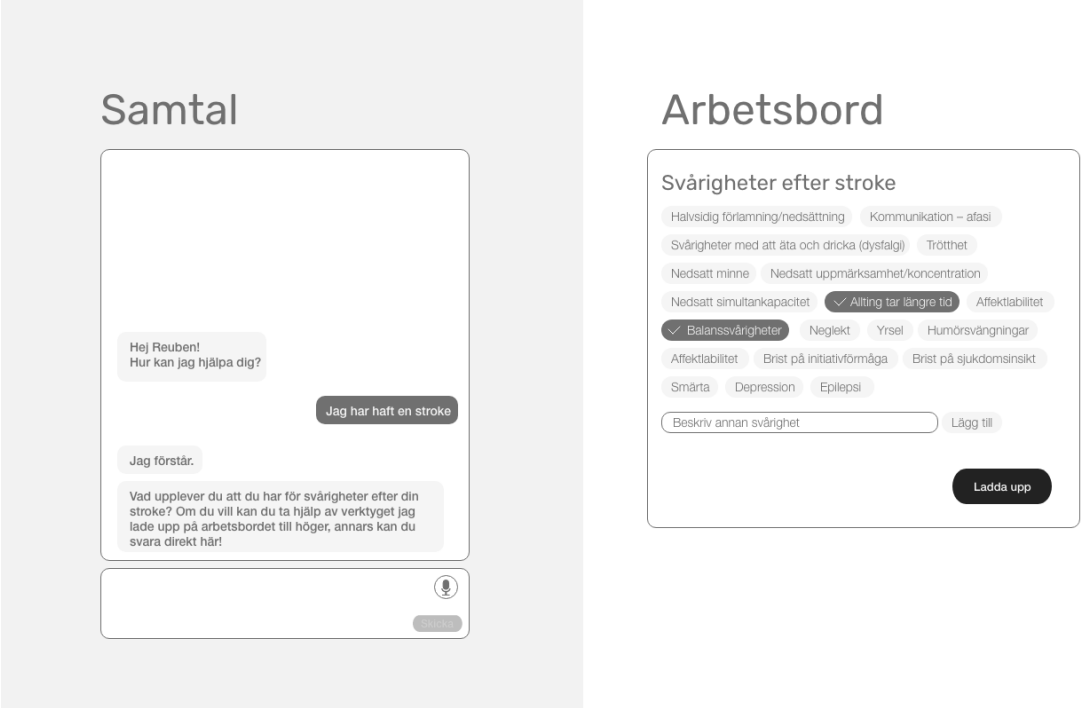


Figure 5.9: *Bot* is combining a chatbot with a flexible worktable, where different tools can appear depending on the direction of the conversation.

The user interface contains two parts and presents a screen vertically divided in half. The left side holds a chat window in which the user communicates with the bot by text or speech. Aside from the chat messages, this side of the interface is static and will look the same throughout the interaction. The right side shows 'Arbetsbordet', the work table, which is at the chatbot's disposal to supply the user with different tools that aim to support them in the conversation and interaction. Depending on what the user wants to or should do, the appearance of the work table will change during the interaction. The chatbot has the role of the professional that will listen and help the user to describe their situation in a way that is accurately understood, and will take responsibility for keeping the conversation moving forward in the right direction. Like with *Cards* and *Video*, information that can help the user to articulate themselves or to get an overview is saved to the user's personal file.

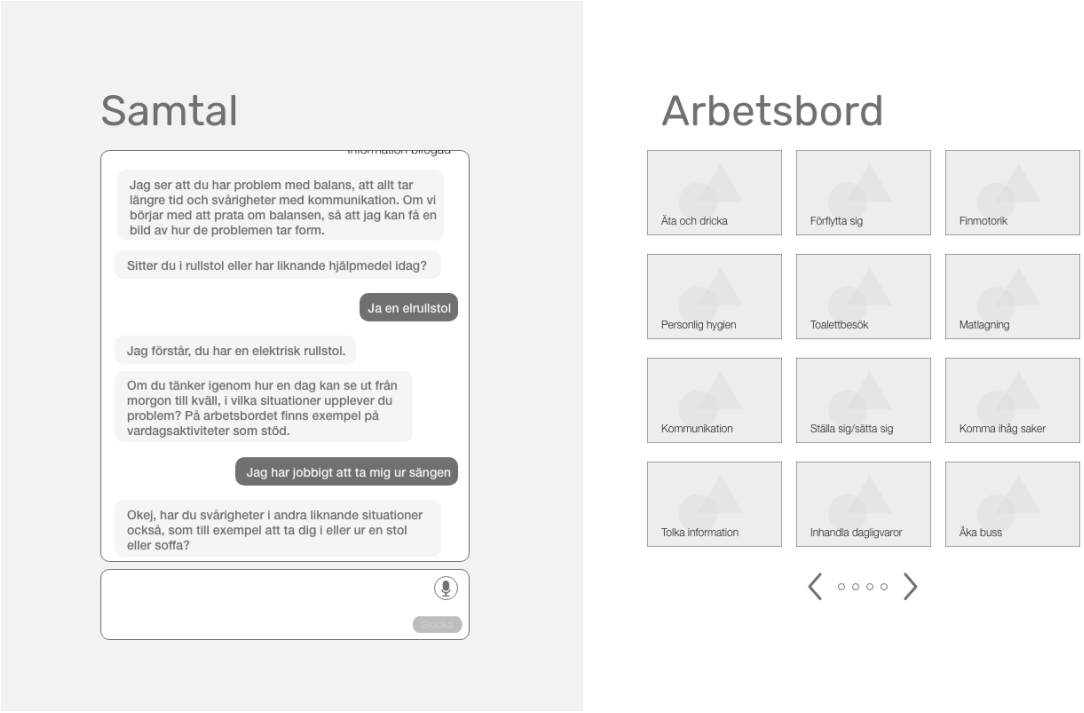


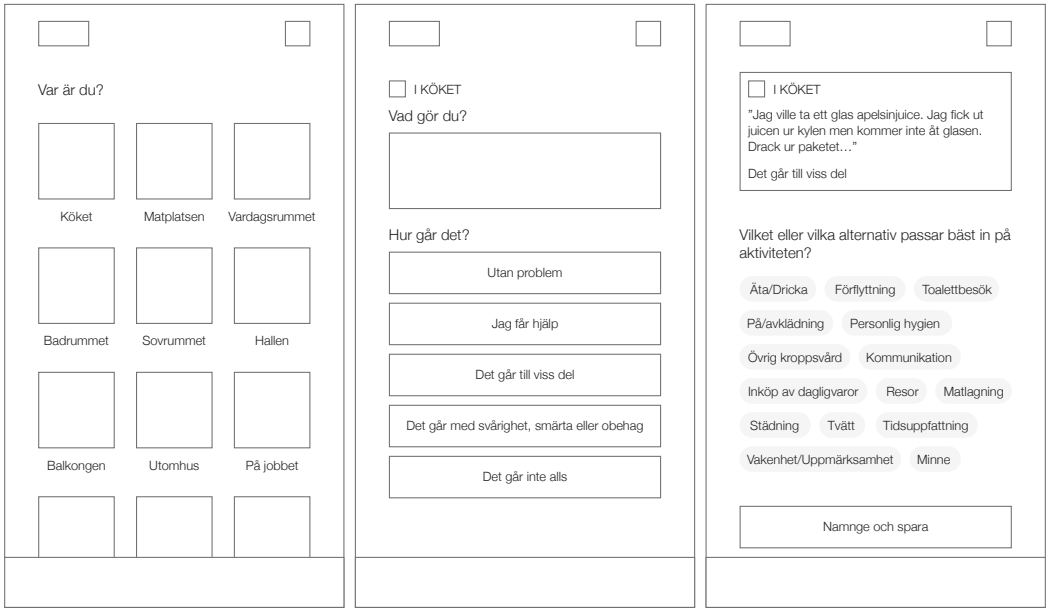
Figure 5.10: The worktable with another tool to support the user in telling their story.

5.4.4 Concept: Live

This concept differs from the other three both in the platform it is designed for and in its posture[1]. While the other concepts are sovereign web applications designed to be interacted with on a computer, *Live* is designed for mobile devices and has a transient posture. The user register activities in real time as they occur, on their mobile device. With brief momentary interactions spread over time, the app tracks the problematic events, where they occur and their frequency to give the user or professional insight for care planning.

The user can choose to register an event at any time. First they are asked to register where they are by choosing one of the predefined alternatives. Not all problems are tied to a specific location, but if a large amount of the problems occur in the same room, this would give a hint that it is an area of interest when looking for interventions. Having the entries coded by location also provides an ability to filter the collected data. Next, the user is asked to describe what they are doing in free-text, and how it is going by choosing one of five options: *successful without problems*, *successful with help*, *partially successful*, *successful with difficulties/pain/discomfort*, or *not successful*. The free-text gives a short description of what the problem is in

[1] A product's posture is the predominant manner of how it's presented to the user. If a product has a transient posture, it has a single function and a limited set of controls. It is invoked when needed and then quickly leaves the user to their normal activities when the job is done. A product with a sovereign posture demands the user's attention for longer, continuous periods of time and often offers a large set of functions and features (Cooper et al., 2003).



(a) **(b)** **(c)**

Figure 5.11: Live asks the user to (a) register where they are, (b) describe their current activity, and (c) to code the activity for further organisation.

order to make sense of the data, and by having fixed alternatives for the severity of the problems uniform coding and filtering is provided. Before naming and saving the entry, the user is asked to choose between a set of categories to tag the event with, once again for uniform coding and more flexibility for the person looking at the data.
Besides choosing to register problematic events when they occur, the user will also get system-driven inquiries at random or at times where there are gaps in the data (hence the alternative *successful without problems*). This aims to circumvent that the user only registers very severe problems or problems of a certain nature due to their attitude. Some people are hesitant to admit that they need help, and some that are accustomed to their situation lack knowledge of that things can be better. Having a system-driven trigger for registering activities may get the user to reflect and reevaluate, enabling the system to pick up problems that otherwise would stay invisible and/or undocumented.

All registered activities are compiled into a file that can be opened and managed on the computer. A summary of the data is sent to and visualized in the user's personal document.

5.5 Evaluation Results

The evaluation were comprised by two focus groups with professionals in the field and adjacent areas (for example a speech therapist). First, a general discussion is

presented, followed by discussion specifically tied to each of the four design concepts.

5.5.1 The Experiment

No conclusive results could be made from the communication experiment in regards to finding a superior method, mostly due to that the randomised geometries that were described had a large variation in complexity. However, it worked well as a warm-up exercise, introducing the different ways of supporting communication in a playful way that started a relaxed discussion immediately.

5.5.2 Overarching Feedback

The following topics were brought up during the focus groups in a rather free discussion format. While some comments were made in relation to discussing a specific prototype, the subject matter is still regarding general considerations for the system and its overall context.

5.5.2.1 Roles

The power imbalance was brought up, and the fact that people turning to the health care is there wanting to be "cured" might make them inclined to position the care giver as the one that should have all the answers. Just having to express one's needs from a position of needing help, and having someone assessing you can induce negative feelings. There was consensus that equalizing the power balance would be a positive thing, and during both focus groups it was said that one way to diminish experienced insecurity could be by having more information.

There is flexibility in the communication between humans, and one participant argued that it is the narrator's responsibility to make sure that they are understood correctly when telling a story.

Further it was mentioned that in many cases people with cognitive disabilities would not attend care management meetings alone, and that the user of the service could be a representative (probably a relative). Relatives was mentioned as having an important role for informing and persuading the user to search for help.

5.5.2.2 Aphasia

A large fraction of stroke patients get aphasia, like the persona in the simulated scenario for the evaluation of the mainly text based *Chatbot*. Concerns were expressed and an option to change method of interaction was suggested to be suitable. However, many of the patients with aphasia have trouble with both text as well as pictures, and some could also have firm ideas like "cartoons are for children" or "I'm not a girl" resulting in them neglecting information that they do not feel is targeting them, (something which was commented regarding *Video*). It was concluded that graphics are sensitive, and that the general attitude towards the service is depending

on the complexity of the topic, the user's preconception and their ability to acquaint themselves with the subject.

5.5.2.3 Content

For the evaluation of *Cards* the importance of asking the right questions and not to forget any important questions were brought up. General reflection on what you do today, how you manage, and what you want to do was pointed out as important. About the *Chatbot*, a suggestion was made that it could be good to use more examples of solutions that other people with similar struggles had found. Regarding the content of *Video* there was a discussion about what kind of day that should be described. Can we identify all problematic situations if we talk about a regular day, and conversely, what does an atypical day really mean, and could that be representative? It was also pointed out that there could be more than three characters to relate to. One participant was arguing that it would be clearer if the user could answer yes or no to the question "did it work out well?" in *Live*, rather than the current five possible answers to "How did it work out?". The same person also had concerns about that there will be blanks in the collected data.

Overall, it was seen as beneficial if the user could be informed about the questions that will be asked during an eventual needs assessment with a care manager, and that it is important to have information to give, and to pick up the information that is provided by the user.

5.5.2.4 Information Structure

Information structure was brought up during both of the focus group sessions. Having the right structure and to think about the receiving party of the communication (i.e. the user), as well as choosing the starting point were things that were deemed to be important. For *Cards* in particular, information hierarchy was brought up due to the flat organization of the landing page.

It was concluded that wrong information structure could hurt the usability, however it was said that any structure is better than none at all, which was the notion that some had of the existing situation. Even if the information structure would not be optimal, it is not equivalent to that the service is unusable.

5.5.3 Concept: Bot

With *Bot*, unnecessary hospital visits could be avoided, but conversely it could also support relatives in convincing their stubborn loved ones that "are fine" or "just wants to go home" to get or continue getting help when they actually need it. The concept could also be suitable prior to discharge from the hospital as a starting point for care planning. It is good practice for future communication and helps to raise self-awareness for one's difficulties in communication. Keeping the user active throughout the interaction process is good for self-esteem, and the flexibility of the tool on the right, "Arbetsbord", is appreciated. However, as a large part of stroke

victims (like the persona in the example scenario) get aphasia, users might have trouble with the text-heavy interface.

5.5.4 Concept: Video

This concept could be a good way to talk about decisions and to get children to actively partake in the decision making, and the concept was thought to be suited especially well to people with cognitive disabilities. The utility was questioned, as more parameters might be needed to get valuable information. The characters could be more than three, and more nuances in their personas might be introduced. It is a concept that will require much material. It was unclear to the focus group who the concept is targeting. It was also concluded that the use of graphics is a delicate matter. Some users might have trouble relating to the scenarios due to the way they are presented (see 5.5.2.2 Aphasia).

5.5.5 Concept: Cards

Cards was appreciated for its ease of use, and its potential to be developed further. The card collection could easily be expanded, and the predefined questions and statements on the card can be updated to match trends found in the data from free-text user input. A suggestion was made that the user could be offered the ability to prioritize the answers after importance. Regarding the information structure it was suggested to implement a hierarchical structure, to group and to color code the cards. There could also be a more in-depth mode with more hierarchy levels of questions going deeper into each topic. The value of the concept is relying on that the right questions are asked, and that no important questions are forgotten. The concept fails to pick up problematic situations that occur between activities or when they are combined (e.g. Mobility and Eating could hold problems that occur when activities from the two cards coincide).

5.5.6 Concept: Live

Live increases awareness in different situations, and by using the app the user might become more perceptive to the core issues in daily life. It is convenient to avoid having to think back in time to recall problematic situations, and it is good that the user does not have to break down a bigger picture. The system driven inquiries could be randomly distributed, but an alternative suggestion was brought up during discussion that they could be configured to be sent on times where there are gaps in the collected data. A comment was made that not all problems are tied to which room the user is in. One of the focus groups concluded that it was important that the discrete interactions do not require much work in order to keep the user motivated when using the app repeatedly over time. However, *Live* seems to require the user to be highly active, with high motivation and compliance.

5.6 Design Guidelines

In this section a set of eleven guidelines for undertaking the interaction design of a system that aims to support effective communication between applicant and care manager in aid assessment meetings. They aim to be specific for the design task that is explored in this thesis, however general and open towards the possible artefacts that become the solutions.

GL1. Use existing guidelines

Apart from this set, there are already many existing guidelines that the designer should get acquainted with, both regarding universal design and on communicating with older people and people with cognitive impairments (examples[2345]). It is recommended that the designer is aware of these and let them help the design process.

GL2. Take responsibility for being understood

Use a distinct and simple communication, both verbal and non-verbal. Lead the conversation with the supposition that it will be adequately understood, but provide alternative formulations in the case it is not.

GL3. Keep the user in the loop

Be clear about what needs to be done and be transparent about why. It is the user's choice what tasks they want to perform, but that choice should be informed. When performing the chosen task, understanding the reason for it and its place in the bigger picture makes it easier to perform and misconceptions are avoided.

GL4. Predefine when possible

For conducting interviews, open-ended questions are usually recommended, but for people with cognitive impairments it is advisable to consider yes-or-no or multiple-choice formats (National Institute on Aging, 2017). If the user is asked to react to a statement where there is a fixed amount of possible answers or if the topic is well known to the system, a rigid structure with predefined options would make more efficient and supportive interaction and the input data would be easier to interpret and organize. However, predefined options are only sensible if the system has enough knowledge. If not, open-ended questions should be considered in order to prevent circumstances where all possible alternatives would lead to inaccurate input (see GL4).

[2]https://inclusivedesignprinciples.org
[3]http://universaldesign.ie/What-is-Universal-Design/The-7-Principles/
[4]http://udlguidelines.cast.org
[5]https://www.nia.nih.gov/health/communicating-confused-patient

Figure 5.12: The questionnaire in the communication support tool offered by The Swedish Agency of Participation (MFD), is consistently transparent and pedagogical throughout the interaction about why each question is asked, and what will happen with the information.

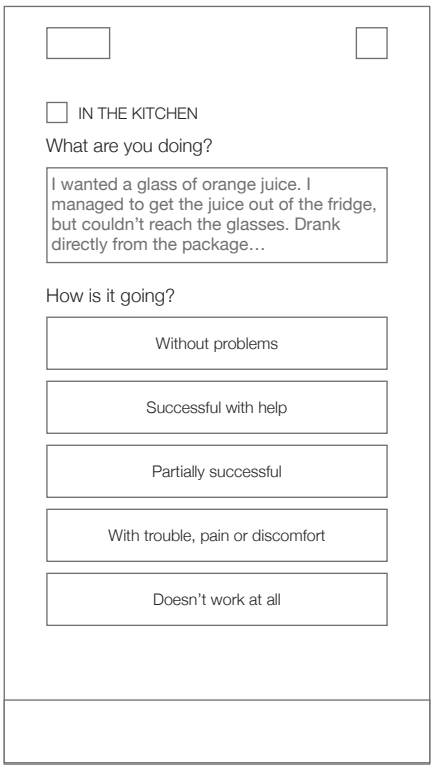


Figure 5.13: Predefined options can be used as a tool to support communication where there is a limited set of answers that can be expected. For "How is it going?" in *Live*, predefined options was considered sufficient, however for "What are you doing?" the possible answers were too many.

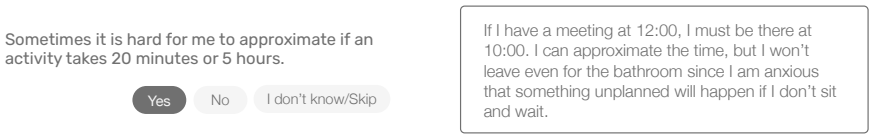


Figure 5.14: Using scenarios and statements works like anchors that the user can relate and compare their experience with. However, when predefined options are displayed, complementing it with free-text input provides a way for the user to more correctly describe their views. To the left: what the user could answer in *Cards*, to the right: what the user really wants to say.

GL5. Support accuracy when it is needed

Allowing some deviation from the predefined trajectory may open up for more errors, but can also be a way of preventing errors. The task of describing one's life situation is a complicated one, and if the instruments given to facilitate this task are not precise, the usability will suffer. If the designers are aware of this, they can give the user the chance to solve the issue by enabling them to take another way out. This alternative option may be weaker in terms of facilitating articulation and may weaken the system's likelihood of correctly adapting the subsequent discussion and proposed course of action. However, it provides a way to continue without pushing the user into a scenario where she has to sacrifice the accuracy of her tale owing to structural constraints.

GL6. Provide information and interaction via multiple channels

All essential parts of the interface should be presented with multiple modality (e.g. visually, auditory). By offering different means of receiving information, a wide range of cognitive and physiological capabilities can be accommodated. Multiple modalities may also complement each other and provide richer information. Where possible, the format within a modality should be customizable, for instance allowing bigger text or higher contrast.

GL7. Allow the user interface to be stripped of stimuli

Similar to how we want the system to be flexible for how information is presented, it should also provide flexibility in respect to information density. If the user needs silence or gets disturbed by lights and motion, the system should offer ways of removing such disturbing elements. These are global preferences that will affect the

Figure 5.15: Another way to support accuracy is to add an option for "other" where the user can give a description in free-text.

Figure 5.16: *Video* uses motion graphics, audio, and text to convey the same information.

whole system, and could desirably be offered to be done in the beginning of the interaction.

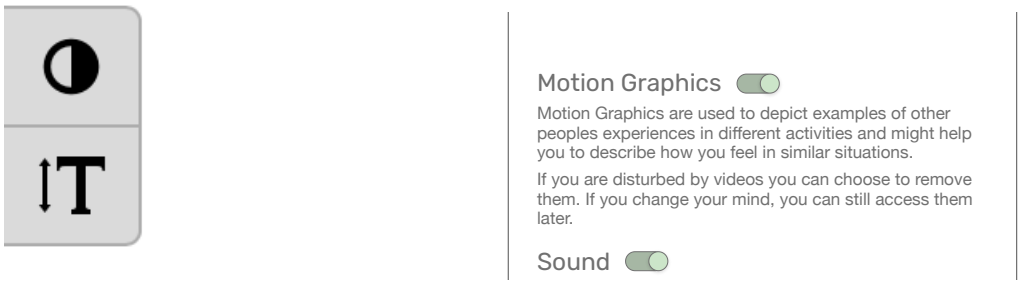


Figure 5.17: In the method and communication support by The Swedish Agency for Participation (MFD), the user can increase the size of the text and toggle dark mode. Similarly could be added to hide images, sounds etc. Another possibility is to let the user to enter these preferences at the beginning of interaction.

GL8. Aim for long term development

Providing an accurate description of one's life situation allows the system to give suggestions for fitting interventions, steps to take, appropriate instances to contact, and/or technology that could make the life better for the individual. However, the support of communication provided by various tools in the system should not end at the end of the interaction, but should also train the user into becoming more articulate and self aware about her situation also for future communication.

GL9. Get an overview before gathering details

Supporting the person in describing their situation is not a service that can be supplied as a painting-by-numbers sheet. The story that the user is trying to tell is a complex one consisting of chapters portraying highly individual behaviors, thoughts, desires, functional abilities, and resulting functional limitations in their daily life.

To investigate and understand the problem activities, aim to first create a rough overall knowledge and then work inward, adding more information, continually sculpting the understood scenario to suit the real condition of the user more correctly. This approach will allow the user to stop when she feels that she is understood well enough, as opposed to the reverse approach where each troubling activity is described in detail sequentially, and a good understanding of the whole situation will be reached only when enough situations have been registered.

"Just like a sketch artist creates a phantom picture, it is okay to not understand the full picture from start. A first draft will have many errors, but if we help each other, we will come as close as possible to what the patient wants. Communicate your desire to reach a common understanding" – the psychologist, expert interviews (freely translated from Swedish).

GL10. Design for coherency

While working on specific parts of the service, the designer must not lose sight of what the end goal for that part is and make sure that the design allows this end goal to be reached. But it is also important to consider the goals of subsequent parts of the service. If the subsystem you are working on is very accurate in creating a description of the user's condition, it has little relevance if not conformable with future steps in the user journey. If you for example want the collected data to be distilled into a final document that is to be forwarded to a care manager, make sure that you collect and code the data in a way that makes sense for that distillation. What does the document need to include, and how is it best presented? If the collected data should be processed in order to find appropriate assistive technology to present for the user, what requirements might that put on the data coding? Which qualities are needed for a human recipient and which are required for a machine?

While it is necessary to ensure that the parts are conformable, this does not mean that a smooth transfer between parts must dictate the interaction. The different parts of the system support different needs and these needs should of course be the main driver for the design. However, the designer should keep track of how the choices made for one part impacts another in order not to accidentally design herself into a dead end.

GL11. Focus on needs, not diagnoses

In order for the service to be coherent with society today, diagnoses and medical conditions may be very important, but for the user and for the one seeking to understand the user's needs it is many times not as interesting. In meetings with many of the instances in society, medical documentation and diagnoses are a prerequisite for being granted various services and interventions. Knowing about the user's diagnosis can help the designed system to make assumptions and adapt accordingly. However, if the designer wants the service to ask about the user's diagnosis, she should be conscious about why and not throw it just because it is a standard question to ask.

"More often than not you are supposed to have medical documentation. It is interesting that diagnoses are so important, since they don't matter. What helps a person with intellectual disabilities can help people with depression or ADHD, but we need certification." – the occupational therapist, expert interviews (freely translated from Swedish).

"The diagnosis is not always particularly important, unless the child herself wants to know" – the psychologist, expert interviews (freely translated from Swedish).

6

Discussion

The proposed interactive system in this thesis aims to provide better preconditions for an effective, efficient and satisfactory aid assessment meeting for all attending parties. The intention is not to replace care managers nor to undermine their education and professional capability to learn the needs of the applicant. Rather, the aim is to facilitate the meeting by preparing both parties on the direction of conversation and to remove tension by increasing the self confidence and awareness of the applicant. Thus the research question: "How can an interactive system be designed so that it may facilitate the communication between applicant and care manager in aid assessment meetings?".

The concept-driven approach to interaction design Stolterman and Wiberg (2010) has inspired the approach for this thesis work, and colored the design process with its underlying ideas and motives as a valuable complement to the human centered design process. This resonates well with the main intention of this thesis work being to produce new knowledge through design while exploring answers to the posed research question.

6.1 Welfare Technology

At the onset of this work a goal was to make an entrance for emerging welfare technological solutions as possible interventions to be granted as aid. However, as the project progressed, the growing understanding of the context made it clear that while the value of a more natural inclusion of welfare technology should be recognized, the situation today gives little room for the care manager to operate in a way where this is possible. Also, the search of a way to help the user express their needs naturally took precedence over finding a way to present solutions (such as welfare technology), due to that the former is enabling the latter. This emerging focus of the thesis work aimed for results that leave the design space open for subsequent design work (or research), while results from a continued focus on introducing welfare technology would have been forcing the subsequent work to be 'filling the gap'. Now, when the situation is mature to integrate welfare technology as a more natural part, whether it be administered as aid, prescription or as consumer products, the results of this thesis work, and the design concepts are made to support it.

6.1.1 The Implications of Definition

Both Brynn Brynn (2016) and Socialstyrelsen Socialstyrelsen (2017) touch upon the responsibility for distributing welfare technology, something that has interesting implications for this thesis work and the system that is to be designed. While the end user of welfare technology (older people or people with disabilities) is not especially affected by which definition is chosen, it has some implication on this thesis work and on the system that is to be designed. If the system were to follow the definition by Socialstyrelsen and promote welfare technology strictly according to the definition (excluding assistive aid and non-digital solutions), the regions' interest in the system could be expected to be incurious, as the responsibility and profit would lie at the municipalities. However, for the greatest benefit for the end user the system should present or refers to all types of available interventions, regardless of the responsible entity. This is not problematic for the system design, however it raises the question who the appropriate client is, or rather, who will claim ownership for the project.

6.2 Method

It is customary to involve the users early in the process when carrying out design work with a human-centered approach, however this was not done for this thesis work. The understanding of the problem as well as the formulation of the hypotheses that drove this work are based on literature review, particularly inspired by the previous studies by Dunér (2018) and Berglund et al. (2012), and an initial expert interview. These studies had involved more participants from the target user group than the scope for this thesis work could allow, and the findings helped verify and further define the problem. The approach has definitively shaped the work, and it is possible that the result might have been very different if it would have taken off on field research and user interviews. In the original time plan user interviews were part of the early stages, as a way to confirm that the problem was understood correctly based on the experts and literature. Of course, direct confirmation (or contradicting statements) from real users could have been ensuring in terms of the validity regarding the premise of this thesis work, however, the studies mentioned above were considered sufficient. The other reason for the planned user interviews was to investigate the interest for the proposed interactive system. However, the endeavour to find users, organize a session where the background is explained and then to discuss whether the idea of a non-existing service is good or bad on a (at that stage) very abstract level, did not seem as the right course of action. In retrospect, while interviews might not have been feasible, a simple survey could have served well as a complement the speedstorming (4.7) and 'how might we'-session (4.8), probing a bit further into the attitudes, experiences and underlying reasons for the problems during the meetings with the care managers.

For the later stages, on the premise that the problem was real and accurately understood, testing the hypotheses and finding ways to facilitate communication of the users' needs was the main focus, and once again professionals were more sensible to inform the design choices (the research). At this point the ideology from

concept-driven design (Stolterman and Wiberg, 2010) were more prevalent and the preference was to get input and a broader understanding of how the designer could approach designing for facilitation of the communication rather than moving further ahead in the process, making a specific design artifact ready for user testing.

To continue the iteration and further developments of the concepts and prototypes lies in the future work. On another level, the storytelling strategies and design guidelines have another target user group entirely, *the designers*. These results are also in need of being evaluated to see how they stand and how they can be implemented in the design process. Some of the guidelines are quite actionable and direct, while others are more attitudinal suggestions such as *GL8. Aim for long term development*. It is hard to provide examples of how that guideline could be implemented in the user interface, still, the ambition is a general and important quality for the design. The question remains, will such a guideline be helpful? Now, the presented set of guidelines has gone through multiple iterations and should go through some more, however it might be time to also here include the users (designers) to inform further refinement.

6.3 Storytelling Strategy

While functional storytelling has shown characteristics that produce an atmosphere in which the user sculpts a description of their situation, it encourages direct communication that focuses on key problems and rapidly captures the general situation. Designed with predefined categories it renders a discovery-based interaction, and the design patterns that the designer constructs such concepts with should support that. This design strategy may be well suited for early phases of communication owing to low effort requirements while generating high value, regardless of whether the customer does not continue to use the system afterwards. The investigated examples were designed for a deductive interaction process, i.e., with categories derived prior to the storytelling. In this case it is important that the categories are made to be easily understood by the user. In order for the interface to align with the user's mental model, wording should be chosen with care, and tested considering the pragmatic semantics by which the user is assigning meaning to them. However in order to support the user in articulating an effective description of their situation the resulting story needs to also be conformable with the format that is owing the implemented occupational models of the professionals. If this dual requirement for some reason cannot be met, a translation of the user's input, post-interaction, into a format that suits the recipient would be one possible strategy for indirect support. However, I believe that it would be easier to achieve an effective communication that carries over to other contexts in the user's life, if the support were to be provided actively during interaction.

Supporting communication with a linear storytelling process places higher demands on user motivation and that they complete the full process. If the user decides to leave the service halfway through an explanation of their day, there is no way to ensure that this half of the day has captured the most immediate needs. However,

since the activities are chronologically linked together, this approach may be better capture insights about problematic situations that arise between activities and may shed light on important issues.

Video was the concept that explored a clearly linear approach to storytelling as the user constructs a chronological representation of their own day by choosing which activities to include. It is sensible to expect that this timeline may become quite long, which could give rise to a daunting anticipation of the subsequent user experience once realizing that every activity should be processed. However, many of the activities on that timeline are likely not viewed as difficult for the user, which the user could get the chance to indicate so that there will be no need for further interaction with them. This, however, makes it questionable, on fair grounds, how much the user is rewarded for the effort to handle these activities at all, not to mention the value of all the graphic content that needs to be created by the developer. With the prototype for the concept the intention was to mediate the idea of how the video scenario worked and how the characters were then used for self-assessment. However, this is just one part of the concept, and the other important part is the timeline that the user creates. With the present prototype, I believe some significant aspects of the idea have gone over the heads of the evaluators, including myself. For the next iteration, instead, I would let the prototype focus on interaction with the timeline, perhaps not primarily on how it is constructed, but on how it is used to navigate through the different activities, how to shift between them, and how the timeline could be used to record insights regarding problems between activities. It would have made more sense, in retrospect, to give priority to the evaluation of these functionalities, since they hold the core of the concept as a whole. As it was executed now, it is hard to assess the validity of conclusions regarding linear storytelling as a strategy solely based on the evaluation and analysis of the prototype for *Video*.

Live has linear storytelling attributes, not in the direct story that the user tells during interaction, but in the meta-story (the story about the stories) that they communicate when the entries are spread over time. In this overarching story, the linear storytelling helps to communicate *when* the user needs help, based on real events without any extra user effort. If this were to be achieved with a functional storytelling concept we would have to put further demands on the user with yet another dimension to recall and reflect upon for their story. Apart from this added temporal aspect gained from linear storytelling, *Live* is built on functional storytelling. If the data processing is carefully designed, the aggregated data could be clustered and presented in categories just as in *Cards*, however, with the benefit of being built on real activities rather than approximations due to passed time or questions that were off target.

There is resemblance between functional storytelling and the reader-driven story in information visualization discussed by Reeves (n.d.) in the absence of prescribed ordering, and the linear storytelling shares with author-driven stories the linear order of scenes. However, while linear- and functional storytelling are the strategies,

the method with which the user convey their story, the author- and reader-driven stories describe the narrative for the information flow in the reverse direction, from computer to human. In contrast the concepts discussed by Reeves (n.d.), the storytelling model introduced in this thesis can not be said to hold interactivity or not, nor messaging. Interactivity and messaging resides (or not) within *the channel* through which the story is told, the interactive system in this case. The interaction dictates how the user can tell their story. Conversely, the choices made for the interaction design should be informed by how the storytelling strategies color the story.

6.4 The Second Axis

While the storytelling strategies forms the horizontal axis in the model, the vertical axis represents the graphical density of the user interface ranging from plain to graphical. The horizontal axis was modeled first and derives from analyzing the expert interviews and the different methods used by the human professionals to facilitate the expression of needs. The vertical axis was then added to the model with a vaguely formulated idea that there could be interesting findings in how the varying graphical density in the user interface could affect the interaction. Contrary to the horizontal axis which frames the strategies for the user's communication to the system, the vertical axis was considered to regard aspects of the system's communication to the user. The constraints that came with the predefined graphical density helped as a method to initiate the ideation of the four design concepts, however the findings were thin on how the interaction is affected due to their vertical placement in the matrix. In retrospect, there are many possible reasons for why the following through of investigating this vertical axis was neglected. It might be due to the view of it being subordinate as "the second axis" and a bias might have existed towards exploring the initial horizontal one. Also, much less time and effort were put into identifying the right parameters and formulating the intention for investigating them. If more time would have been spent on this, it could have been included in a more structured manner in the evaluation sessions and thus entail clearer findings. The ambiguity in the prototypes due to the level of fidelity intentionally made for open discussions, but firmer moderation would have been beneficial.

While being a helpful in its current state, this thesis work leaves the model open for further sophistication, recognizing that a more thorough work on the vertical axis would make a richer contribution to the design methodology. As of now, the uncertainty of the parameters, but also of the implication, opens up for considering other options (including adding a third or even more dimensions to the model).

6.5 The Fifth Concept

Four concepts were designed with different design elements owing to the chosen storytelling strategy and ratio between the use of verbal and nonverbal communication. This gave them different supporting characteristics, which in turn may entice dif-

ferent qualities in the stories told by the user. The effects of these design choices is what this thesis set out to investigate, and by evaluating and analyzing the different concepts we can. However, the concept that might be most interesting to analyze is the fifth concept that emerged during the thesis work, in which the other four are parts operating in parallel as well as complementary to each other.

While *Cards* takes the user from a macro to a micro perspective, and uses written statements as anchors for the users storytelling, *Video* does the same but through a graphical user journey based on examples as imagination spurs. By including multiple ways for the user to engage in a task with comparable experience, they are given an opportunity to find the interaction that suits them best. This is sprung from existing principles for inclusive design (Swan et al. n.d.).
Similarly, *Bot* is flexible and aims to shape the interaction after what is needed for the situation to lead the user in the right direction. Besides offering the user to conversate in the chat, it can provide other tools for the user on *"Arbetsbordet"*. However, where *Cards* and *Video* are variations of the same task, the flexibility in *Bot* provides opportunity to collect complementary information. How well the bot can converse, and how well adaptable it's tools may be depends solely on how sophisticated the software is. In the combined concept, the many possibilities in the flexible nature of *Bot* should be capitalized upon. It is sensible that the chatbot persona would be integrated also as a globally accessible feature which could guide the user throughout the interaction, provide feedback, introduce the user to modules within the concept like Cards or Video. Further, it may utilize functionalities from other parts of the system, outside of the part that is investigated in this thesis, like suggesting appropriate welfare tech solutions or providing information on how to contact a care manager. For obvious reasons the chatbot's intelligence could not be tested with lo-fi prototypes, so this part may be considered as furthest from being viable regarded as a design artefact.

Live is essentially a contextual inquiry based on short effortless interactions spread over time, (the required length of this time period needs to be tested). The main interaction with *Live* is separated from the interaction with the rest of the concept since it takes place on a mobile platform. Instead it connects to the remaining concept parts via the collected data, which can be reached and interacted with on the computer. In this connection lies a neat opportunity to drastically lower the cognitive load required in *Video* by letting the data collected in *Live* provide the timeline. This may also answer the valid question that was discussed during evaluation regarding what kind of day the user should be constructing, be it a normal day or a very problematic one. If the problematic activities from weeks of contextual inquiry would be layered and represented on the timeline as if they were occurring during one day, the short answer would be a quite problematic day and the other short answer not an actual day at all, but rather a representation of juxtaposed activities from a greater sample. The storytelling Video then promotes could be considered as gaining functional qualities as units with parallel linearity are presented in a way that allows the continued interaction to be built on linear storytelling. However, an alternative view would be to say that it becomes less linear but not more func-

tional. This would challenge the model of a strictly linear-functional spectrum, by suggesting also the existence of filtered or distorted storytelling strategies. This added parameter to the model is not investigated in this thesis, but it highlights the possibility of further future development.

7

Summary and Conclusions

"How can an interactive system be designed so that it may facilitate the communication between applicant and care manager in aid assessment meetings?"

- What is a strategy for the designer to follow when approaching the interaction design of such a system?
- What general guidelines may apply for designing such a system?

This thesis work suggests that the user must be able to communicate their situation to the interactive system in order for it to provide any assistance based on the needs of the individual. In order to design a system so that a) the user can express accurately how they experience their situation, and b) the input of the user's situation can be accurately understood by the system, various ideas of how this communication could be designed were investigated by considering how it would work if the system were a human professional. A model was created for the identified communication methods where they could be analyzed as belonging to either functional storytelling or linear storytelling, and four concepts were created to investigate what potential qualities the communication acquires depending on the choice of storytelling strategy.

The results of this thesis suggest that functional storytelling has qualities that can give higher value to the user with less effort, since the user can choose to interact with only the parts that seem to be relevant to their situation and quickly "sculpt" an overall story. This comes with the risk that some problems are missed, however, if the user does not find them relevant they are not expected to be very acute. The story that the user is supported to convey to the care manager provides a solid general understanding of the main areas to discuss, with a level of details that depends on how the communication is designed in the system.

Linear storytelling goes chronologically from start to finish, thus it requires the user to complete each interaction process. Therefore, the designer should strive to design the interaction so that it is either brief or requires low enough effort to retain the user until the interaction is completed. The continuity in the storytelling makes it possible to discuss how problems relate to and affect each other, in a way that is missed by the functional storytelling. The user may impart a story to the care manager that is very thorough, and which clearly communicates what interventions are needed, and when.

The initial motivation was to produce knowledge on how to facilitate the communication between the applicant and care manager during an aid assessment meeting. With the aim to make the user better prepared and articulate, the thesis suggest that the system asks from the user that they describe their situation through an interaction that steers them to do that in a way that gives the care manager what they require. By doing this, the user is introduced to the questions and the format they can expect from the meeting, and is given a chance to reflect and formulate answers at the expected abstraction level, at their own pace. At the same time, the system gets the opportunity to offer guidance, information and suggest solutions to the user based on their individual needs.

This thesis offers to the design methodology two new concepts, linear storytelling and functional storytelling, each with different qualities that may be strategically weaved into the interface, independently or in combination, to design facilitation of the communication between applicant and care manager during aid assessment meetings. Four prototypes serves as artifacts giving body to how the theory can be put in practice. A taxonomy for supportive characteristics are defined for the designer to consider and the work resulted in eleven design guidelines that aim to help the designer who wish to create their own artifacts.

GL1: Use existing guidelines
GL2: Take responsibility for being understood
GL3: Keep the user in the loop
GL4: Predefine when possible
GL5: Support accuracy
GL6: Provide information and interaction via multiple channels
GL7: Allow the user interface to be stripped of stimuli
GL8: Aim for long term development
GL9: Get an overview before gathering details
GL10: Design for coherency
GL11: Focus on needs, not diagnoses

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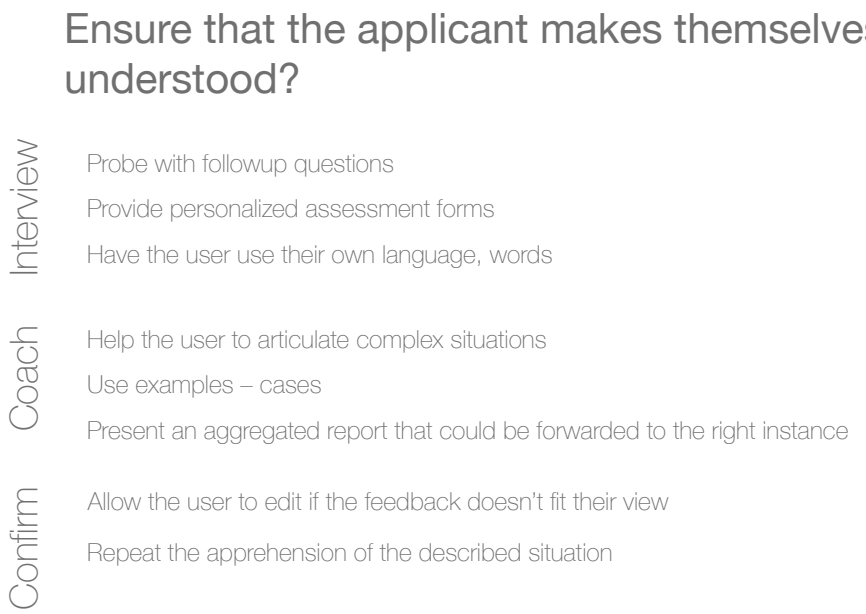
A

Appendix 1

How might we...



Help the applicant imagine the implications of interventions?

Actualize

Examplify with cases, scenarios

Actualize the interventions In the users environment

Use visual probes

Contextualize

Standardize the information visualization

Video

Tutorials

Inform

Allow for questions/answers to questions

Provide facts about how the intervention would work

Provide information bout how the interventions could be personalized

How might we help the applicant to feel that the situation is fully and accurately described?

Interview

Ask if there is anything more to add

Allow for suggestions on interventions

Let them input desired situations

And problematic ones…

Interpret

Provide different interpretations

Problems could be mapped together fittingly

Confirm

Repeat the interpretation of the described situation

Let them rate how accurately described they think it is

Help the applicant to feel that the right choice is being made?

Compare

Clearly provide comparison possibilities

Provide information on costs and options

See what others felt about the interventions

Personalize

Clarify how an unsatisfying intervention could be changed

Steer

Guide the user where to turn for care management

Provide contact information to appropriate professionals

Actualize

Demo

Actualize with examples

Explain how the chosen intervention will help with the stated desires and problems

Help the applicant to prepare for the needs assessment meeting?

Inform

Let them know beforehand what questions the care manager is going to ask

Provide precedent cases

Inform them on the other possible instances

Teach them about the rights, and resources – the process

Coach

Help them articulate their desires

And problems…

Help them to triangulate the possible interventions that might help

Guide

Lead them to the right instance

Make sure that the large amount of information is taken in?

Break down

Divide it into comprehensive chapters
Spread it out over the interaction
Appropriate hierarchies

Detail

Provide a summarized version
Allow for "zooming in"
Share contact information on where to turn for more detailed questions

Include

Include for different cognitive skills
And physical ones… (sight, hearing…)

Support

Use examples
Support with symbols, visuals

Improve

Let the user rate the presentation of information

Strengthen the feeling of influence on the care management situation?

Coach
- Back their arguments with facts and precedents
- Help them to articulate
- Give them time to prepare
- Let them know their rights

Inform
- Teach them about the process and regulations
- Let them in on the meeting agenda – possibly let them steer it

Equalize
- Make the situation more relatable by keeping the same interface
- Help them empathize with the care manager
- Enable the possibility to have the meetings in the home environment
- Enable the possibility for smaller meetings

Reduce the gap between how care managers position themselves and how they are positioned by the applicants?

Applicant
- Inform them about the process
- Help them empathize with the care manager
- Help them learn about the process, and responsible instances

Professional
- Help the care manager to talk the applicant's language
- Help the care manager to be updated on different solutions
- Help the care manager to get room for professional discression

Are these positions bad?

Inform the applicant about the different available options?

Present

- External links
- Provide a database
- Filter feasibility, cost, responsible instance… regional differences
- Allow them to browse interventions

Evaluate

- Let them know the implications of freely chosen solutions
- Give feedback on the feasibility of chosen interventions

Compare

- Show previous interventions for similar situations
- Provide different solutions
- Project future scenarios