# Improving User Onboarding Experience with Contextual Design

A case study in developing onboarding systems

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Information Studies

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## Abstract

Onboarding systems are an emerging factor for a successful application. The problem is the data exchange between the system provider and the user: Creating an onboarding experience that users don't skip through with impaired awareness. There is no standard for how to design onboarding systems that solves these issues. The purpose of this case-study is to evaluate the effect on user experience, when designing from a user centered design approach. In this thesis, the onboarding system has been developed through the theory and method of contextual design, in collaboration with the company Hjælp til Pårørende. The onboarding system has been designed to be implemented on the Hjælp til Pårørende application, grounding both data gathering, design and development in an existing product and case. From the user centered design approach, the design activities have aimed to develop onboarding components in context of the specific onboarding activities. The result of the user experience evaluation revealed that the implemented onboarding components enhanced the user experience, though one onboarding components resulted in more friction than support for the user. The analysis also showed that the users weren't aware of the data gathering in several instances. The evaluation indicated an implication of the contextual design approach to developing onboarding systems: When the friction is reduced by gathering data contextually, it can decrease the users' awareness of consent and transparency of privacy. The results pose the question: When does good user experience design and intentions, cross the line and become a nudging interface?

## Abbreviations

OBS:        Onboarding System

HTP:        Hjælp til Pårørende

UX:         User Experience

DT:         Design Thinking

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# 1. Introduction

Skip. Next. Dismiss. Agree. Agree to all. Yes. Confirm. This is a typical way users act when they have downloaded an application and they want to get into the features. You don't want that introduction or a tutorial, you want to order a pizza, check you bank-account or post a picture of your cute dog! Whether it's on an application or a webpage, getting familiar with the features of a service has to be fast so users can get started with their intentions.

Though we as users want data security and privacy online, we don't want it enough to actually read through the terms and conditions. Though we want to be able to use the application without having to think or learn, we don't want to sit through an introduction-video. However, the studies on this subject matter, suggest that for a digital service, it takes more than just providing people with a tool, a system or a service. We have to ensure users are familiarized with the product they are taking into use; show them how to use the product or introduce the functions or the underlying structures. This process is called onboarding, and it's become increasingly important to have a well-designed onboarding system, if you want your service to succeed.

At the core of onboarding systems, we have the information exchange. The exchange is between the user and the system. The system gives information about the use of data in term of privacy and security, and among other, instructions on features and pricing. The information the user exchange is personal data, from a low privacy degree, such as a username, to the more private information such as location, email or even social security number.

In the preliminary research on the subject there is neither an industry standard nor an academic research approach to develop onboarding systems. Some studies have explored how users navigate taking a new system into use and from that investigation proposed onboarding components to aid the users. The research methods have ranged from a minimalist instruction approach to a review of systems and suggestions for common onboarding components. Though an increasing number of applications are developed using a user-centered design-process, none of the studies took a similar approach to designing the onboarding system. I hypothesize that designing an onboarding system from a user-centered design theory, will have a positive effect on the user experience. Aiming to breach this gap in research, this thesis will aim to investigate this hypothesis.

## 1.1 Problem

The thesis focusses on onboarding users into a system that is unknown to them. To ground the study and gather data that is reliable, this is a case study, designing an onboarding system for an actual application and testing it with the target users of

this application. The study will be concerned with how onboarding systems can be designed, utilizing the same design frameworks and principles used for developing the applications design. The aim is that these design frameworks and principles will reduce complexity, reduce friction (getting users to the core value faster) and provide intent for information exchange, in summary enhancing user experience.

### 1.1.1. Problem statement

*What effect will designing an onboarding system from a user-centered design framework have on user experience?*

Investigating and reviewing the literature on the subject of developing, improving or evaluating onboarding systems, will illuminate what an onboarding system consists of and what are at risk when we design for information exchange.

From the findings of the literature review and user centric design theories, the appropriate design framework will structure the design process. What follows is a design process, structured by the chosen design framework, that will result in a high-fidelity prototype of the onboarding system. To answer the problem statement, the onboarding system will then be evaluated from a set of user experience measurements. These measurements will be strengthened by utilizing a mixed method approach, to enhance the validity of the results.

## 1.2 Introduction to case

The company Hjælp Til Pårørende [HTP] has an application for providing relatives to people with mental illness with help. The service consists of knowledge and tools to educate the relatives about the role and practice of being a relative, with the goal of enhancing their life quality. As mentioned in previous section, it is not enough to have a well function product, users need a way of becoming familiarized with it. So far, the onboarding system for the application has consisted of setting up the profile and gathering the relevant user-data, but with the next release of the application promising more users, there is a strong need to develop an onboarding system that gives the novice users the best possible onboarding experience. HTP are also developing from the business strategy of "Freemium" making part of their platform free for trial at a certain content limit, where the users will have to buy premium to access the full content catalog. The Freemium strategy makes it even more important to align the users with the system in a correct manner, so the relatives will purchase the full plan, and get the full value of the application.

### 1.2.1 Application presentation

The Relatives application consist of three features: *Forum, SOS* and *Knowledge*. Besides the three features, the application has a page that is only for the user called *My-site.* Here, users can see the knowledge-courses they are currently enrolled in as well as notifications on new activity on the application (screen 1).

The three features are the main value of the application. Knowledge is where users find all the courses on being a relative (screen 2). It is structured so each course holds a number of lessons and each lesson consist of a number of media-items, that plays automatically in the video player (screen 3). The feature has other functions besides playing content: Users can bookmark and rate courses, lessons and media-items, to access specific content faster.

The forum is a feature that enables the relatives to connect and share knowledge, advice and experiences. There are four different fora: Meet the other relatives, Share knowledge, Challenges and Help for crisis. In each forum users can write, comment and like posts (screen 4).
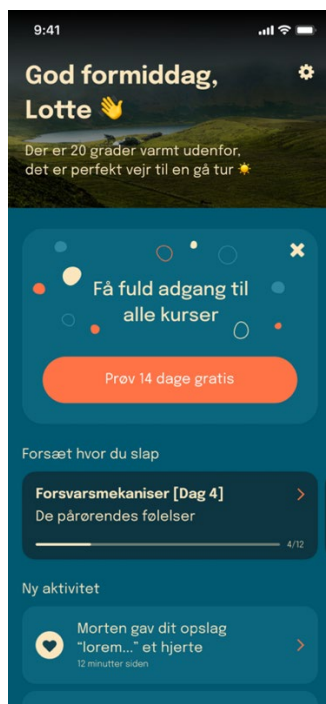
SCREEN 1: MY-SITE. THE LANDING PAGE, WHERE USERS FIND THE COURSES THEY ARE ENROLLED IN AND GET NOTIFIED ON NEW CONTENT AND FORUM ACTIVITY.
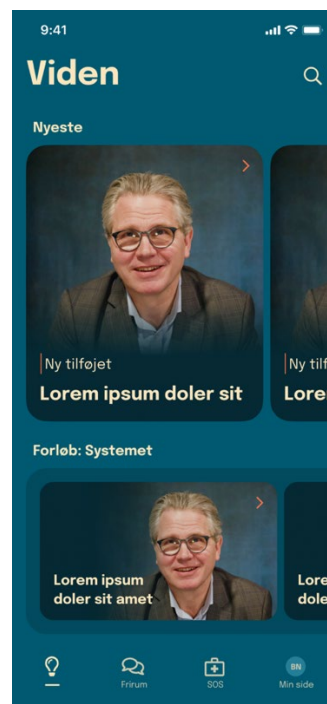
SCREEN 2: KNOWLEDGE. THIS PAGE IS WHERE USERS FIND THE VIDEOS WITH HELP ON HOW TO BE A RELATIVE. THE KNOWLEDGE IS STRUCTURED IN COURSES.
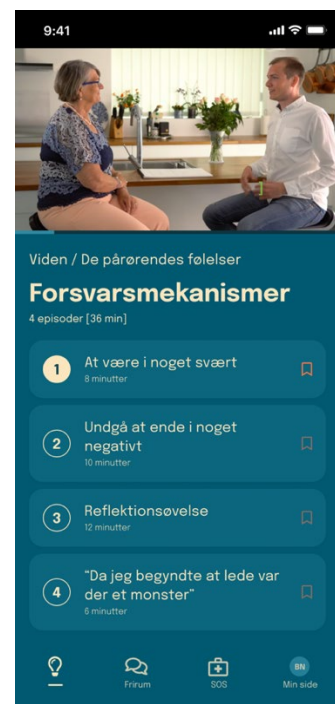
SCREEN 3: MEDIA-PLAYER. THIS PLAYS ONE LECTION OF A COURSE, WHICH CONSISTS OF MULTIPLE MEDIA-ITEMS, AUTO-PLAYING ONE AFTER ANOTHER. GIVING THE USERS THE ABILITY TO SAVE SPECIFIC KNOWLEDGE.

SOS is immediate help for relatives, based on what the ill-person is currently experiencing. The help is presented as step -by-step animated video guides (screen 5). SOS also has the Life-lines function, which provides the relative with telephone numbers for hotlines and psychiatric emergency rooms.



**SCREEN 4: FORUM. HERE USERS CAN WRITE AND READ POSTS. IT'S DIVIDED INTO FOUR CATEGORIES.**

**SCREEN 5: SOS. IF USERS ARE IN AN IMMEDIATE CRISIS, HERE THEY FIND STEP BY STEP GUIDES ON HOW TO AID THE AFFECTED.**

## 2. Literature Review

By reviewing the literature on the subject matter, the goal is to define onboarding systems for this thesis, illuminating what methods and theories has been used for development and what we now know about onboarding systems. The review of methods will also illuminate what methods has been applied when investigating and developing onboarding systems [OBS], this will also inform the methods for this thesis' research design and OBS-development.

The following literature review is structured primarily from the article "A Guide to Writing the Dissertation Literature Review" (Justus J Randolph, 2009), it has a lot of overlapping methods and technics as the Systematic Review approach (Bryman, 2016, p. 99). Taking the systematic approach to the review, by following Justus's framework, one of the gains is a less biased review as the explicit procedures aids in countering my own biases from influencing the review.

The following section will describe the method I have followed in gathering literature and reviewing it. I will lay out the focus of the review and what the purpose and goal is, as well as the structure and organization of the actual review. First and foremost, the review has been conducted with the aim to answer the following questions:

> ***"From previous literature what is the theoretical understanding of user onboarding?*** *What research methods and theories have been used in the past to investigate onboarding systems in regard to enhancing user experience?"*

### 2.1 Collecting the literature

When constructing the literature review problem statement, the preliminary investigation of the field of interest, it is a challenge to determine how broad one should search and what articles should be included and excluded. The coverage has been a purposive sample, and the following section will describe what criteria the literature included had to meet:

1. The academic articles that described the development, optimization or evaluation user-onboarding systems.
2. Web articles and practitioners guides to onboarding practices referred in the academic articles
3. The report was written in English or Danish.

The data collection will be initiated from the Aalborg University library, with search key words extracted from web articles on the subject of onboarding. The keyword

"user onboarding" was used searching on three different library data bases: Primo, Google Scholar and ACM:

From the initial search result by reading the titles, I sorted away the articles that weren't relevant (Table 1). I then read the abstracts of the ones with a relevant title, chose the ones that I deemed relevant to answer the literature review's purpose. After a readthrough of the remaining articles, the ones that weren't applicable were dismissed. The remaining eight articles refence lists were used for identifying other relevant articles. By reading through the abstracts of the ones that seemed applicable I gathered seven articles needed for a point of saturation to be reached.

| Search protocol: Databases | | | | |
|---|---|---|---|---|
| **Article result from search** | | Read abstracts | Read articles | Used in literature review |
| Primo | 84 | 12 | 7 | 2 |
| Google Scholar | 4 | 4 | 2 | 1 |
| ACM | 24 | 5 | 5 | 5 |
| Search protocol: Reference lists from collected articles | | | | |
| **Articles from reference lists** | | Read abstracts | Read articles | Used in literature review |
| | **24** | 24 | 12 | 7 |

**TABLE 1: SEARCH PROTOCOL FOR LITERATURE COLLECTION**

### 2.1.1 Evaluating and analyzing the literature

To answer the literature reviews problem, the literature collected will be evaluated and analyzed, by utilizing the analytic software NVivo, to approach this analytic process systematically. First, I created predefined themes (table 2) based on my initial research and prior knowledge about the subject. Secondly, I allowed for new themes to be included as I read through the articles, as the predefined themes weren't sufficient (table 2).

| Relevant themes for literature review | |
|---|---|
| **Predefined themes** | **Emerging themes** |
| Onboarding definitions | The importance of onboarding |
| The evolution of onboarding systems | Central theories and principles in onboarding |
| Methods for developing onboarding | Findings from previous literature |
| Theories for developing onboarding | |

**TABLE 2: THEMATIC ANALYSIS FRAMEWORK**

## 2.2 Review of the literature

Based on the review of the literature and the framework being a conceptual presentation of definitions, concepts, methods and theories of User Onboarding, I will in the following section lay out my review of the literature.

I will start out by reviewing with the definitions of Onboarding and the evolution of the term and practice surrounding it and clarify which definition I will proceed with. I will then present the central issues and problems relating to onboarding users, found in the existing literature and the ones identified by practitioners. Following will be a methodological review of the articles that revolves around developing onboarding systems, focusing on the methods used and the theories and principles that those are developed from. Following this, I will look at what method and requirements of evaluation of onboarding systems the literature has applied.  Lastly, I will present and argue for which definition, method and theory in the field of onboarding, that this thesis will work from. The purpose of this, is to clarify the concepts used in the following development of an Onboarding system for HTP.

### 2.2.1 Defining Onboarding

In their research, Strahm, Gray and Vorvoreanu, draws attention to the fact that Human-computer Interaction has been concerned with the learnability and usability of application interfaces for decades (Strahm et al., 2018, p. 361). In their article form 1984 Carroll and Carrithers draws attention to the issues and frustrations that new users face, when learning to navigate and use a new application system (Carroll & Carrithers, 1984, p. 800). At that point in time the term onboarding wasn't applied, but the notions of designing for easing the learnability of a user interface is the key aspect of onboarding.

The literature  shows that onboarding is the primary aim of bringing users in to a new system, by teaching them about the systems navigation and functions (Cascaes Cardoso 2017, p. 264; Petersen et al., 2017, p. 379; Renz et al., 2014 p. 1; Strahm et al., 2018 p. 361; Zichermann & Cunningham, 2011, p. 60). Designing a system that enables the user to quickly learn to use the application, is about providing the new user with knowledge on the functions and navigation of a system. I agree with this notion of the definition: brining a novice user into a new system by providing them with knowledge on the applications navigation and functions.

When designing an OBS the designer needs to consider more than enabling the user with ways of getting familiar with the system, the literature shows that it is prominent to consider user experience [UX]. This reveals a compellation of onboarding elements to consider when designing such a system. It is no longer enough to provide a manual

or guide, that we expect the user to read, there are more elements and principles to developing a good onboarding system.

### 2.2.1.1 The elements of onboarding

Another way of viewing OBS definition is by viewing the compellation of elements that goes into designing such a system. Some of the elements found in the litterateur includes: Instructional text, tours, progress bars, contextual-guides and interactive tutorials (Renz et al., 2014, pp. 3;6-10)

The NN-group, a collective of UX practitioners, brings one notion of onboarding to the discussion, that I didn't come across in the academic literature: onboarding elements or components are not a part of the regular application interface (Experience, n.d.). This is an important point, as it emphasizes that the applications user interface should be intuitive and have high usability without the onboarding, as it will not be a permanent part of the applications interface. On one hand it is a similar discipline to UX as it should focus on user friendliness, on the other hand it separates itself from these disciplines as it is a specific temporary system to the platform.

Renz et al. argue for their understanding of onboarding as "the sum of methods and elements helping a new user to become familiar with a digital product" (Renz et al., 2014, p. 1). Despite the lack of consensus regarding the definition of these elements in the literature, it is clear that the elements are part of an intended flow that the user goes through in the OBS.

Renz et al.'s provides a list of different elements common in onboarding systems, as well as a list of possible onboarding elements that will improve the OBS. The same goes for the practitioners'' view of onboarding elements - Strahm et al. review practitioners approaches to developing g OBS, they find that the onboarding experience is a combination of task flows for the users and instructional elements in the interface, located in critical points, collectively functioning as a built-in application tutorial for new users ( Strahm et al., 2018, p. 362)."

Reviewing the academic literature on onboarding elements, revealed that there is no overview of elements or a collective understanding of the terms used to describe each element. This could be a consequence of the patterns and specific elements changing constantly in the industry and being adapted to the specific mobile application and their users.

The NN-group have a practice-oriented article on OBS and segment onboarding, not in elements but in components: Feature Promotion, Customization and Instructions (Experience, n.d.). They argue that these are the three frequently encountered components in mobile onboarding flows, and that designers may use one or more of them

to get users familiar with a new interface. The onboarding elements fall under one of these three components: In feature promotion, the element will educate the users about what the application can do. In Customization, the exchange of information between user and system, will customize content and interface to the user's preferences. And finally, in Instructions, elements will teach the users how to use the application interface. As they segment the different components of onboarding in a meaningful way, I will proceed with this way of labeling and regarding onboarding.

Lastly, the literature argues for the importance of OBS, not only to familiarize the users with the application, but due to the issue of churn. Churn is a term that describes the rate of which users leaves an application in favor of another. Petersen et al. describes the extend of the issue to be especially prominent in freemium-based application, where the users haven't made an upfront investment, but need to be convinced in to buying after trying (Petersen et al., 2017, p. 377). Well-designed OBS has the potential to resolve this very prominent issue. The cost of acquiring users on top of the development cost, makes the onboarding experience in freemium application of high concern, and an investment in OBS can generate adequate return, if the churn rate is reduced as a result. In summary, not a defining trait, but definitely a common notion of onboarding systems, is the fact that it has to sell the product.

### 2.2.2 Developing onboarding systems

The aim of the OBS is to bring new users into a system by utilizing OBS components to teach them about the interface, educate about the features and enhance their experience by customizing interface and content for them. But what principles, theories and methods guide the development?

#### 2.2.2.1 Principles and theories

Renz et al. argue in their definition on onboarding, that by providing the users with an OBS they will ´smoothly´ go from novices to efficient users (Renz et al., 2014, p. 1). The emphasis Renz et al. put on ´smoothly´ indicates applying the principle of reducing the friction, when designing the OBS. This is not stated directly in the academic literature as a principle, but in reviewing the practitioners' approach, across many articles on the issue, practitioners highlight reducing friction as a principle of development, not only in OBS but in general for the mobile applications.

Game design principles are also seen utilized in onboarding. In gamification the users' first minute of engaging with a new system is critical, you want to engage users, and a game design approach is to make the users take an action and then award them for doing so (Pian et al., 2020, p. 377; Renz et al., 2014, p. 10). The literature also pointed to the use of a theoretical framework on player motivation as a principle in developing the OBS. They argue for featuring the players motivation in the first phase and in

the following phase learn the players about the rules and tools required to play the game (Petersen et al., 2017, p. 379). Game design often reward task-completion with gamification strategies as badges or another form of reward, this is also a principle that aid in user's motivation and engagement and also the quick win (Pian et al., 2020, p. 377).

This focus on engagement and motivation is central in the gamification theory: Not only making the application easier to learn, aiding the user to go from novice to a capable user, but now to also foster engagement (Petersen et al., 2017, p. 377). In game design, the engagement and motivation element it is often enhanced by introducing the games rules and components as task oriented (Zichermann & Cunningham, 2011, pp.59-61). The practitioners approach has similar properties when teaching the user what functions are available to them. They join the list of elements used to improve UX, such as in-line tutorial, just-in-time hints and badges (Renz et al., 2014, pp. 8-10).

Another principle of onboarding development is the introduced in the minimalist instructional design approach by Carroll (J. M. Carroll, 2014, p. 57). These principles are not designing for the development of OBS, but for minimalist instructions, but it is applied as principles and a framework to the development of OBS by Strahm et al. (2018, p. 363).:

1. Choose an action-oriented approach
2. Anchor the tool in the task domain
3. Support Error Recognition and Recovery
4. Support reading to do, study, and locate

The two first principles are similar to the principles of game design, that focus on engagement and motivation. The third supports the claim of Carroll & Carrithers: That the best way to fix a user issue is by preventing it (Carroll & Carrithers, 1984, p. 800). Finally the last principle explains that instruction should be direct, concise, and contextual (Strahm et al., 2018, pp. 363-364). As Strahm et al. state, these principles support the onboarding goals. This is backed up by the fact that there are several practitioners approaches that reflects these principles as we can see in the common design patterns in OBS as just in time hints or in-line tutorials or tutorial-levels in games (Strahm et al., 2018, pp. 362-363).

### 2.2.2.2 Method for developing

Carrol and Carrithers (1984) conducted user research, to identify the common new-user-errors and from those insights modified the interface by providing a training wheels environment where the common issues were blocked off from the users. This enhanced the performance of new users (Carroll & Carrithers, 1984 p. 800). What is

especially interesting about this research, is that the user research identified *user* errors, this user centered approach is very important, in making sure there is only the components that need to be introduced in OBS. Being selective about the components and elements introduced into an OBS, aids in reducing the friction for the user (Experience, n.d.).

The articles concerned with developing and improving onboarding systems, as opposed to evaluating, are predominantly user centered (Carroll & Carrithers, 1984; Cascaes Cardoso, 2017, p. 265; Strahm et al., 2018, p. 364). One study developing a method for designing OBS, takes an iterative approach in their development of their OBS to verify their minimalist instructional method (Strahm et al., 2018, p. 364). As presented in the section on principles and theories, they used the principles of minimalist instruction in an iterative process with users, to generate onboarding design insights. These insights would then be applied to the OBS-prototype and the next iteration was developed and tested. Comparative research of the users meaning-making was conducted throughout to evaluate the effect on UX (Strahm et al., 2018, p. 362). As opposed to other research done on improving OBS (Renz et al., 2014), the fact that they verify their findings with the users, makes a strong case for their approach and method.

### 2.2.2.3 Evaluating onboarding systems

Cardoso proposes to evaluate the components of onboarding from the effect they have on the UX. Conducting a comparative study on the UX before with the users experience after the implanting the OBS. (Cascaes Cardoso, 2017, pp. 265-266) The first test being a cognitive walk through, and after implementing OBS, evaluating it be setting up a dependent and independent variable for each component, measuring the UX as a collective of:

- The amount of friction: Measured in time to complete and the amount registered user
- Number of successful components: Whether the components were skipped or used
- Retention: The amount of user returning after the first session (Cascaes Cardoso, 2017, p. 266).

Strahm et al. develops and evaluates the users experience after implementing OBS in relation to what is called the 'aha!' moment. This is a practitioners' approach that they have adopted, they state that the 'aha!' "comprises a moment of realization where new users identify personal benefits to using the application that help organize and cohere their perception of the application"(Strahm et al., 2018, p. 370) it is therefore more of a goal that indicates good UX, than a measurement of it.

Another approach to evaluating the user experience of OBS, is conducted by Petersen et al. in their evaluation of OBS on mobile games: they have a mixed method approach consistent of post-test interview and physiological measurements (Petersen et al., 2017, p. 377). Strengthening their methods and results of the post-test interview with techniques that supports the participants memory and thereby answers (such as experience graphs or videos recordings of the test-session) (Petersen et al., 2017, p. 379).

## 2.3 Concluding remarks

The findings of this literature review point to the fact, that onboarding is concerned with UX, but distinguish itself from the process of designing good UX on a digital product, due its temporal state. It is a specific process, that is getting more and more attention as the user friendliness and learnability of a digital system becomes an increasingly important factor to a successful product. In this thesis I will apply the following definition of onboarding as it emphasizes the fact that it is a temporary system to a platform "Onboarding is the sum of methods and elements temporarily helping a new user to become familiar with a digital product".

In regard to what research methods and theories have been used to develop, improve or evaluate OBS, the studies have revolved around utilizing gamification principles, common web patterns and instructional methods. The measurements for evaluating the onboarding have been predominantly UX measurements, but in different variations from utilizing practitioners' methods, to psychological quantitative measurements. Few articles undertake the importance of use-context in their evaluation, improving or development of OBS. This indicates that utilizing contextual design principles, mostly used in developing applications and platforms, have not yet been investigated.

The user-centered approach to development, was prominent in several articles. Strahm et al. (2018) started their iterative developing process, with going through the application with the users, without any onboarding elements (Strahm et al., 2018, p. 364). They noted the user's reaction to the platform; where and when the meaning-making occurred and where and when it didn't. They used these insights to design the first iteration of an onboarding system from this. I will implement this in my developing phase, as it emphasizes the user's perspective and use of the application, it's features and their attitude towards it.

As mentioned, the other articles made use of game design and gamification principles for their optimization or development for their onboarding system. Not all of the gamification principles fit with the HTP application, as it becomes too heavily reliant

on the narrative (Pian et al., 2020, p. 377), which from the previous research on the demography for HTP seems inappropriate and unnecessary to onboard the users.

From the literature gathered for this review, there is not a standard approach to measuring UX, however the measurements of all studies that evaluates OBS in relation to UX, are focused on or complimented by qualitative user data.

### 2.3.1 Motivation

From my investigation and research on onboarding scholarship, it would seem that the main focus has been on computer supported cooperative work (CSCW), games, instructional design and e-learning applications. In regard to e-learning and CSCW applications, where the users have been obliged to work with the application, the importance of an onboarding system that aims to avoid churn has been less prominent. The articles that investigate game application and the onboarding systems of those, are very conscious of the elements of onboarding that enhances the user's experience, making sure that users get started quick and easy and most importantly staying on *their* platform. However, I hypothesize, and as the literature on OBS in learning setting suggests, that in more recent years the design patterns of e-commerce, social and game applications are beginning to find its way to e-learning and CSCW application systems (Strahm et al., 2018, p. 365). But since I have not found literature that focus on developing onboarding systems for more general applications from a research-based methodology, this definitely points to a knowledge gap in this field.

Another issue of using design thinking to develop onboarding systems for digital products. Design thinking [DT] frameworks are being used increasingly to design digital products, but from the investigated literature, it seems that the temporal OBS is not a result of the design process, but a process that takes place afterwards. I will argue that this leaves us with an opportunity to enhance the UX in users first meeting with a digital product. But due to lack of research on this subject, it is not clear whether taking on onboarding a design challenge – designing it through the design activities and the mindset of a structured design process – will enhance UX.

# 3. Methodology and the theoretic framework

The methodology and theoretical framework for this thesis, have two main functions:

1. Choosing the best suited design method for designing the onboarding system
2. Clarifying the data gathering and analysis, for evaluating the results

I will present the paradigm, used to investigate the problem in this thesis. The paradigm provides reasoning for the subsequent choices of methodology, literature and research design (Mackenzie & Knipe, 2006, p.194). It will therefor guide the conduction of this thesis, as it indicates how knowledge is studied and interpreted.

## 3.1 The pragmatic paradigm

As this thesis will focus on designing an onboarding system that supports the user in going from novice to familiar and proficient, one of the measurements for verifying this, is the users themselves. This means that qualitative measurements are predominate for this research. It will take a Design Thinking [DT] approach to the research and develop of the system, as the process DT allows for research and development to be conducted simultaneously or in an iterative process (Mahmoud-Jouini et al., 2016, p. 148). It is also an approach that seeks to illuminate or solve the problem at hand, using whatever is needed to get to that point. This quality of DT overlaps with taking a pragmatic approach, as it focuses less on a system of philosophy or reality, but on the "what" and "how" of the problem (Mackenzie & Knipe, 2006, p. 195). Chenail (2011) argues in his article "Ten Steps for Conceptualizing and Conducting Qualitative Research Studies in a Pragmatically Curious Manner" for a pragmatic approach for the new types of research problems, where practical experimentation takes use of qualitative methodologies. For this thesis, along with the chosen design framework, it will serve as a guide for planning and executing this predominantly qualitative research (Chenail, 2011, p. 1714).

## 3.2 The methodology and theory of practice-oriented design

Design in itself, is according to Simon (1981) the process of devising courses of action, with the aim of changing existing situations into preferred ones through the creation of artifacts. The artifacts are created through creative reasoning, making designing a cognitive exercise concerned with innovation, defining options and making choices from which optimization is realized. Mahmoud-Jouini et al. (2016, p.148) argues that design has moved from object-oriented optimization to a human-practice oriented form of design. This means that the result of a design process now can include a graphic, an interaction, an experience etc. The outcome of design has become that supports making sense of something.

This orientation requires an understanding of the practice or situation, with the aim to solve a problem or support a practice. This focus on the understanding of a practice, requires us to investigate and analyze. Much like the traditions and history of ethnography, there are many ways and theories on how to do research in this field. Nicolini (2013) presents the different understandings and frameworks of different practice theories, he identifies the common features of these frameworks and has suggests that a heterogeneous approach is best (Nicolini, 2013, p. 214). This approach resembles many design theories approaches, where different methods and 'tools' are taken into use depending on the context. To ensure we are investigating the practice in a prudent manner, we can enhance the quality of our study, by familiarizing ourselves with the repertoire of practice theories and carefully select the appropriate tools and interpret their results (Nicolini, 2013, pp.10-11).

## 3.3 The design framework

Like the many frameworks and theories of practice research and ethnography, the design theories are many. As we just established, we must familiarize ourselves with the catalog and carefully chose. In their article from 2016, Brenner et al. draws attention to a collection of the 47 methods that have been used for design just in the last ten years (Brenner et al., 2016, p. 13). Brenner et al. suggests the same as Nicolini; that the result will be successful when the appropriate tools are chosen. The design theory of Thoughtful Interaction design, takes the same stance (Löwgren & Stolterman, 2007, p. 63), and suggest as common for the design theories a process to structure the design activates in different phases (Löwgren & Stolterman, 2007 pp. 63-65).

The literature review concluded that the contextual approach to designing an OBS hadn't been investigated and conducted. This thesis is contributing to that gap in knowledge, aiming towards answering what effect designing from a practice-oriented lens can have on the users' experience. To investigate the practice of onboarding, we must take a human-centered approach, as humans are at the center of this. Although there many options, the framework DT has the ability to embrace the different theories and methods (Griffin et al., 2016, p. 23), just as Nicolinis does with his practice theory. Instead of Nicolinis five key tenets (Nicolini, 2013. pp. 3-6) there are three tenets of DT: Mindset, Process and Toolbox (Brenner & Uebernickel, 2016, p. 7).

### 3.3.1 The process

Design and DT is a process often divided into three or more phases (Carlgren et al., 2014, p. 344). Common for these phases are the fact that they are centered around following notions: inspiration, ideation and implementation (Carlgren et al., 2014, pp. 345-346, 2016, p. 406, Mahmoud-Jouini et al., 2016, p. 148). Though the label and the number of stages is not always agreed upon, the intention and aim of the phases has the same characteristics.

Inspiration is concerned with exploring the problem. Liedtka (2014, p.928) define inspiration as an exploration of design criteria and user insights based on ethnographic user studies; ideation as the generation of ideas and concepts, and an experimentation phase during which ideas are prototyped and tested with users to select an optimal solution. As DT is an agile process, this exploratory phase is a continuous part of the process, exploring the new questions that arises when the project progresses. Ideation and implementation are also recurring phases as the design iterates throughout the process (Mahmoud-Jouini et al., 2016, p. 148), as rapid prototyping and assessing the design is valuable design activities.

### 3.3.2 The mindset

DT is concerned with involving various stakeholders throughout the process. Users and their practice are at the core of DT, taking an empathic approach when designing solutions that aid or support them, as there are human needs at the root of each design project (Mahmoud-Jouini et al., 2016, p. 150; Brenner et al., 2016, p. 8). Another notion of the mindset is the value of diversity in the design team. Having a diverse and multidisciplinary team is made apparent by Brown. He argues that a diverse team is a necessity for good design, due to the more complex nature of most projects they face today (Brown et al., 2009, pp. 32-34). The final notion of DT is divergent and convergent thinking. This is a practice of diverging your mindset, inquiring and exploring to create opportunities, followed by convergent thinking, where you narrow in and chose from those opportunities (Brown et al., 2009, pp. 73-74). This practice is a continuous activity, especially moving between the phases of the design process, the team will have to work with from this mindset.

### 3.3.3 The toolbox

The three phases of DT consist of different design activities. Depending on the context and the problem at hand, the design team chooses between these tools and methods. All three stages have different design activities that aid with the purpose of that specific stage. The important aspect of DT as a toolbox, is carefully choosing the activity making sure it is appropriate to the design project (Brenner et al., 2016, p.13).

### 3.3.4 The disadvantage of Design Thinking

The disadvantage of following this framework, is the fact that it is best suited for situations where the problem is not well defined and there is a need for innovation (Griffin et al., 2016, p. 21). To ensure that the design theory chosen is appropriate, I will chose a highly practice oriented design theory, that builds on the 3 core tenets of DT, namely Contextual Design.

## 3.4 Contextual Design

Contextual design is a highly appropriate design theory and framework as it revolves around investigating practice and it's context (Holtzblatt & Beyer, 2016. p. 43). Besides understanding and investigating, the actual creation of design is highly data driven. It provides a human centered process, providing tools to choose from, adapting the methods and techniques as the process progresses. As stated it is built on the same tenets as DT, but is more founded in investigating practice and context, supporting the designs ability to enhance and be a natural extension of that practice (Holtzblatt & Beyer, 2016. pp. 4-7).

### 3.4.1 Principles and evaluation

When conducting the contextual design method, we work from the design principles that will enhance the UX, these are the Joy in Use factors. The Joy in Use factors consist of the Learning Delta, the Hassle factor and Direct into Action (Holtzblatt & Beyer, 2016, p. 13).

- Direct into Action: Making sure the user's intent is supported without them having to search or work for it. It's more than bringing down the friction, it's about knowing the different intents of the users and designing for it to be achieved in moments.
- The Hassle factor: This revolves around reducing friction to the bare minimum. Removing interruptions to the flow of the users' actions. This is where thinking about context can create a smoother experience. Inconveniences such as profile setup and technical hassle can be re-thinked to become less hassle and instead a part of the intended flow.
- The Learning Delta: This is all about an intuitive user interface and providing the user with hints where needed. A good user-interface that reduces the number of things the users have to know to use the application and elegantly teaching the user the thing they do, will reduce the complexity and enhance the experience as there is as little to learn as possible to use the product.

These are the design principles and goals to design toward and the final design of the OBS will therefor also be measured in relation to these. However, they will not stand alone. The evaluation will consist of combining a qualitive evaluation of the user experiences achieving the aim of the principle, with quantitative UX-evaluation measurements from Cascaes Cardoso (2017, p. 266). Having both qualitative and quantitative measures will enhance validity of the evaluation.

### 3.4.2 The design process

Contextual design is centered around the user and the user's practice. The methods and design activities in this thesis will be concerned with gathering user data on their

behavior and attitude on the application, to get into the mindset and practice of using the application from the user's perspective.

Secondly, the contextual design method is based on an iterative practice, going from data to prototypes at a rapid pace. As it is user centric, the analysis of the user data is a central step, where contextual design applies the activity *affinity diagram*. The next step of the method is representing the findings in a suited contextual design model. This will ensure that we bring the users practice and their perspective into the actual design decisions in the following step: Ideation. Ideation consists of a brainstorming phase, in which we bring in the contextual models and the available technology. The available technology will for this research be common design patterns in OBS supplemented by the OBS elements found in the literature review.

### 3.4.2.1 The inquiry phase

This phase aims to inquire data on the user and the practice they have, as well understanding the existing solutions and technologies that relates to this. As the data is utilized for design and not to confirm or deny a hypothesis, the data gathering will follow the framework and design activities from contextual inquiry. The principles of data inquiry in contextual design, is to go to the user, watch them in the target activity while you note their actions and behavior and talk about what they are doing, right then and there. This approach is built on the academic research method of field interviews, but expand in the way that it helps understand the users practice in wider life context and design for core human motives (Holtzblatt & Beyer, 2016, p. 43).

This is beneficial as it ground the questions and answers in an actual activity and not in generalizations on the topic (Holtzblatt & Beyer, 2016, p. 47), as well as asking questions related to the contextual models chosen beforehand. As the aim is to design an OBS, *the sequence model* is highly applicable as it breaks down how different users do different task and illuminates users' intent (Holtzblatt & Beyer, 2016, p. 209). It is prudent as it is more of a tool to guide detailed design, not innovative in inspiring new product concepts. It supports the intent and actual steps of action of the users, as its functions as a task analysis (Holtzblatt & Beyer, 2016, p. 217).

### 3.4.2.2 The exploration phase

When the data is gathered, we explore. We explore to find commonalities between the users and where they differ from each other. Hidden wants, showcasing their intents and what triggers those intent and of course the context of use. There are a lot of layers to explore and a lot of layers to focus on. To aid the ideation and the composition of design, representation of the data and selecting the most appropriate layer is key for keeping the users and practice at mind. Contextual Design has a

method for doing so, representing data through contextual design models and consolidating these models throughout the design process (Holtzblatt & Beyer, 2016, pp. 117-121).

The models are a graphical representation qualitative data, after it has been synthesized, revealing either the big picture or the small details of the target market. By communicating the insight of the data exploration, the team can easily consolidate the models, designing for the common pattern without losing the variations between users.

The exploration of data is a two-part analysis, the first part is the interpretation session, an activity that is concerned with sharing the interview. The interviewer goes through the interview and her own interpretations. This session is concerned with having the team have a collective understanding of the data. The aim is also to get more nuanced insights to the surface, through questions and perspectives contributed by the rest of the team. All the data-points are written down on post it notes. At the same time, one team member is in charge of writing down every action and data-point needed for the contextual models (Holtzblatt & Beyer, 2016, pp. 81.94). As stated, the sequence model will be beneficial and chosen beforehand, other design models will become more apparent in the *affinity diagram session*. This is due to the fact, that this is a data-driven process and themes will emerge as we explore.

The second part of the exploration is coding the post-it notes captured in the interpretation session via the *affinity diagram session*. This is an inductive coding technique, where themes and insights emerge, instead of grouping and naming patterns beforehand. All the data from the interview, that are on post-it notes after the interpretation session, are put up on a wall, the team group notes of the same intent, problem or issue, in relation to the projects focus. When group the team gives each group of notes a label on a different colored post-it note. This is to indicate that this note is higher level, and the text on is should represent the insights of that group of post it notes (Holtzblatt & Beyer, 2016, pp. 230-335).  The team continue with this process with another level of synthesis, which is then transformed into a contextual design model.

### 3.4.2.3 The ideation phase
The users' practices are at this point visualized and the team is highly immersed in the data. As we are conducting design where the domain is giving and not striving for a complete innovative product, the ideation is focused on designing onboarding components that enhance UX. Working from the contextual design framework, we will design with the aim of enhancing the Joy in Use factors. The ideation phase in con-

textual design is essentially a brainstorm structured by the Joy in Use factors, available technology, web pattern and the contextual design models. Looking across the models, to see a unified picture of the practice, using the team's perspective and skills. Reasoning towards new creative solutions, keeping in mind the Joy in Use factors, making sure they are built into the foundation of the design (Holtzblatt & Beyer, 2016, pp. 251).

### 3.4.2.4 The composition phase

When settled on a high-level idea, the challenge of designing a prototype can begin. One technique is designing alongside common interaction patterns, taking the high-level idea and designing the structure of the idea, from interaction pattern known from interaction design and information architecture. User centered interaction design is focusing on the actual behavior of users and a system (Saffer, 2010, pp. 20-21), utilizing the sequence model, we can see where users struggle or have breakdowns, and design the structure to optimize the users interaction with the system. The interaction designers Preece, Rogers and Sharp (2019) presents three questions to consider in making choices for the design:

- What are the users good and bad at?
- What could help the users with the way they usually conduct their practices?
- How can we enhance the quality of the experience? (Sharp et al., 2019, p. 9)
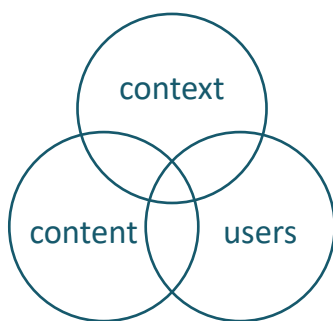


**FIGURE 1: INFORMATION ECOLOGY. THE INTERDEPENDENCE OF USER BEHAVIOR, CONTEXT AND CONTENT.**

The principles of Information architecture can also help us to address the complexity of the information in a system. Rosenfeldt & Morville (2015) use the concept of information ecology, to describe the interdepends of the users' behavior, the context and the content they are navigating (figure 1). The context is the goal of the design and the resources available to achieve and implement it. The content is the notion of the vast amount of information your product is placed among and how that might change. Lastly users are concerned with learning about user behavior and sense making and needs (Rosenfeldt & Morville, 2015, p.32). When we build from the principles of ecology in information architecture, we can design structures of the interfaces that are easy to make sense of and navigate (Rosenfeldt & Morville, 2015, p.22).

Utilizing the principles and methods from information architecture and interaction design, enhances the usability. It aids in designing towards meeting the goal of that

high-level idea while not getting lost in the details (Holtzblatt & Beyer, 2016, pp. 377). The domain being the HTP application, we will also consider the action-components of the existing application, making sure there is coherency between the application and the temporary OBS.

One of the key tenets of DT and Contextual design is the iterative approach. As soon as a prototype is made, high or low-fidelity, users are brought in for testing. Initiating quick iterations that enables the redesign to be based on user feedback (Griffin et al., 2016, p. 27; Holtzblatt & Beyer, 2016, p. 415). A prototype are representative and manifested designs that are in development or nearly finished (Lim et al., 2008, p. 7). Prototypes can have a high or low level of detail, it can take form of paper mock-ups or digital wireframes, depending on what the designers want to filter and get feedback on (Lim et al., 2008, p. 3). For this study, prototyping will be initiated after the first ideation phase, staring with low fidelity, testing the protype with users and having their feedback provoke iteration. This will be implemented in a high-fidelity prototype, which will be tested again before that feedback will change the design into the final OBS for evaluation.

### 3.4.2.5 The assessment phase

As the design process is an iterative approach, assessing the design happens both with users doing user test and validating the design before implementing it. This section focuses on the user tests during the design process, as the validation will be the final UX evaluation and be the result-basis for this thesis.

The user test will focus on the usability of the design, using the Think-aloud test method. This method is based on cognitive-engineering, that brings forth people's cognitive processes, while performing tasks (van den Haak et al., 2003, p. 339; Wilson et al., 2013, p. 17). Studies show that the use of cognitive-engineering are beneficial, as the end products developed with this method, are better received by users in relation to task-performance (Jaspers, 2006, p. 597). As stated, think-aloud falls under the category of cognitive-engineering methods, as it probes users to disclose their thought process for observation, when using and task performing with a system. The design of the usability test, is set in tasks related to the research and representative of an actual use context (Jaspers, 2006, p. 598), probing questions about satisfaction afterwards and checking immediate interpretations of their thought process to enhance validity of the data (Holtzblatt & Beyer, 2016, p. 61; Sharp et al., 2019, p. 525).

### 3.4.3 The participants

To ensure that the data is qualified to the research question asked, the participants are gathered from a purposive sampling approach. The participants will be members of the target user group: relatives of mentally ill people and in the age range of 40-60 (Ghaoui, 2005). They are also a group characterized by not being digital natives

(Wang et al., 2013, p. 409), therefor it is prudent to test the design on them, not only because they are the target users, but also because they have a harder time figuring out new platforms (Wang et al., 2013, p. 412).

The first contextual inquiry, consist of interviews with the sample group, afterwards the initial prototype is tested with users from the same sample group, then initiating a redesign based on that feedback. The final prototype will be evaluated with four new participants, who meets the same criteria as the initial sample group.

I recruited subjects for the study through a video shared on Social Media: LinkedIn, Facebook and Instagram, using my own and HTPs platform. It was viewed approximately 1600 times and 16 people reached out to me, signing up to test or be interviewed.

## 3.5 User experience evaluation

The final user test will be a combination of assessing the usability and evaluating the user experience. The methods of usability testing are focused on task performance, a methods that are tested more thoroughly than evaluating the UX (Vermeeren et al., 2010, p. 521). UX evaluation are focused on uncovering the lived experiences of the users while using the system, a pressing evaluation as UX becomes more relevant for successful design (Sharp et al., 2019, p. 497). The challenge is that UX is qualitative, and the subjects expressed opinions, doesn't always match the reality, influencing the validity of the data. To address this issue, a mixed-method approach will be applied in the test-design. The qualitative UX indicators will be supported by a quantitative question, that serves support for the qualitative measurements, strengthening the data overall. This mixed method-approach is called embedded design, with either the qualitative or quantitative as the priority approach, integrating the other approach to produce a more complete picture (Bryman, 2016, pp. 639-641).

The UX measurements will be framed by Contextual Design. As stated, contextual design is guided by the UX design principles called Joy in Use Factors, and The Joy in Use factors consist of the Learning Delta, the Hassle factor and Direct into Action. I will implement observational questions to the test-design, based on Cascaes Cardosos (2017) UX evaluation method presented in the literature review and quantitative survey questions (table 3). These questions will enhance the test-design as it focusses on gathering data on user behavior and not only the users' express attitudes and experience.

| Final UX evaluation framework | | | |
|---|---|---|---|
| | **The Learning Delta** | **The Hassle Factor** | **Direct to use** |
| **Qualitative** | Post-test interview about the functions and features in the application to evaluate if the users got familiar with the purpose of these. Asking questions about the onboarding components implemented in relation to the learning delta. | Post-test questions about the users experience of the flow and the transparency of intent behind data gathering. | Post-test question about onboarding components relating to Direct to Use:<br><br>Did they enhance you experience of the application?<br><br>During-test questions: what is your intent with this action? Assessing whether the onboarding components supported the intent. |
| **Quantitative** | Analysis of behavior: number of errors users made in navigation<br><br>Post-test question on quantifying the ease of learning to use the application. | Analysis of behavior: Whether they made use of onboarding components or skipped them<br><br>Post-test question on quantifying the friction and flow on the application. | Post-test question on quantifying the application support of the users' intentions. |

TABLE 3: MIXED METHOD FRAMEWORK FOR USER-EXPERIENCE EVALUATION

# 4. The design processes

The design process consisted of five phases: inquiry, exploration, ideation, composition and assessment. The following section will provide a description of the design activities conducted in each phase and the result of set design activities. The purpose is to showcase and argue for the design decisions that were made during the design process, resulting in the final prototype.

## 1st Design Phase: Inquiry

In line with the principles of DT and contextual design, the inquiry phase will explore the users practice of getting familiar with an application. The contextual interview was a combination of a semi-structured interview and a think-aloud user-test (Appendix 1, p. 2). Relatives from the sample group, were to explore and familiarize themselves with the HTP application. The difference from a standard think-aloud test being that it is designed as an explorative contextual interview and not assessing a prototype.

## 2nd Design Phase: Exploration

From the contextual user interviews conducted, the data has been analyzed via the method 'interpretation session'. For each interview user statements, actions and attitudes has been collected on post-it notes.

The team brought the post-it notes into the Affinity Diagram Session. The post it notes where organized inductively and following the structure of actives as the Affinity Diagram Session has. Grouping first and looking at emerging themes, labeling the themes with post-it of another color, making user statements of these themes, in the users' voice. The second level post-it notes can be seen in figure 2.

After making the second level labels, we continued on making the top-level labels, that we would then build our contextual design model from. The contextual design model emerged from the process of building the affinity diagram. The proposed models from the method weren't applicable, so we structured a new one with the aim of



**FIGURE 2: SECOND-LEVEL NOTES FROM AFFINITY DIAGRAM**

revealing the interaction between user and system as the user onboards a new application: "Getting Onboard the Relatives Application", (figure 3).
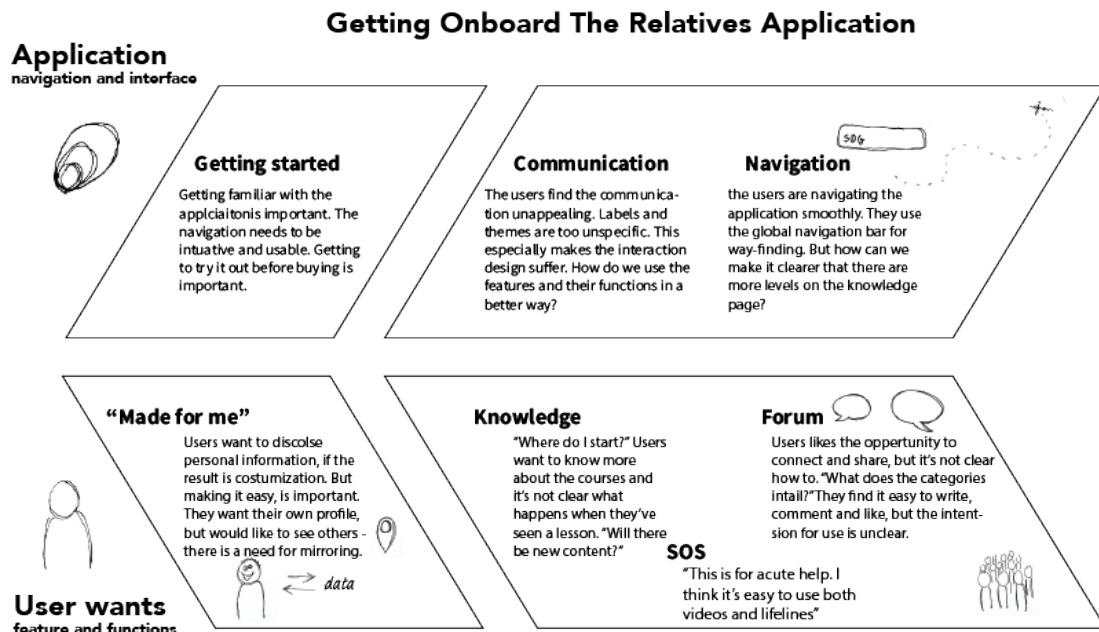


FIGURE 3: CONTEXTUAL DESIGN MODEL

The relevant data from the interviews that would inform the making of the sequence model was collected in the same interpretation session, as the post-it notes where made. One person of the team was in charge of noting and writing down each step in the sequence of getting familiar and navigation with the application.

Afterwards we went through the screen recordings along with the interview, mapping out each step the users took in getting familiar with the application. This resulted in four sequence models (appendix 3, pp. 79-85) that were merged into one representative consolidation model.

The following design activities were centered around improving the steps the users have to take, to become familiar with the application. By investigating the steps and break downs in relation to the underlying intention captured in the sequence-model, the aim was to design a user-centered solution. The solution has to support intents and the different task flows different users take (Holtzblatt & Beyer, 2016, p. 272). The process was initiated by looking at the primary intents: Setting up a profile; being presented with personalized content and getting familiar with the features

### 4.2.1 Identifying onboarding opportunities

The following section will analyze where onboarding components should be implemented. It will follow the sequence model and bringing in the insights from contextual design model. This will result in an analysis that includes both the actions users

take to get onboarded, as well as enhancing the UX. Enhancing the UX is done by starting to identify onboarding components that has influence on the Contextual design measurement: Joy in Use. However, it is the sequence of the onboarding, making sure they get familiarized with the application in the appropriate steps, that is the primary intent for this analysis.

### 4.2.1.1 Setting up the profile

To access more interaction with the application and the features, the users need to set up a profile. Besides the fact that it is necessary from the applications perspective, users stated that they wanted a profile when using the application – both in terms of using the functions with your profile, but also to have the content of the application be customized. Setting up the profile will be an onboarding component, nevertheless, it is not given when this should profile initiation will occur. One way is setting up the profile, before accessing the main applications platform, so the user enters the application with a profile already set up. Another approach is to initiate the profile set-up at a more contextual opportunity.

### 4.2.1.2 Getting familiar with navigation and the features

*My-site,* the first page the users meet, presents an opportunity to personalize a greeting. *My-site* doubles as the landing page, the users stated that they wanted a clear homepage, something to return to, therefor *My-site* should communicate that this page is the home page.

Navigation
The data shows that users find the navigation usable and intuitive, they navigated the application without help and to many errors. This were the case for both the bottom navigation bar and other navigation elements such as chevron buttons and call to action buttons, which are all marked with an orange color. Other common web patterns that are used in the application, such as finding profile settings via the gear-button, also showed to be intuitive for the users. This is therefore not necessary an onboarding opportunity, as it could create unnecessary friction.

In general, the users went through the features with approximately the same actions: Pressing one feature, investigating it until some sort meaning-making had occurred and then moving on to the next. In exploring the forum- and the knowledge page, users showed different sequences to familiarizing themselves with the feature. In forum some users started out with writing a post and others read the existing post first. In the knowledge page some users scrolled though the content before pressing a course or lesson, other users pressed the lesson labelled "introduction" first and saw the video. This is important to note, as the onboarding system needs to cater to the different actions the new users take in their meaning-making.

SOS

The users' response to the SOS function was positive: The label SOS was inter-
preted by all users, that this feature was for crisis and they easily navigated
and used the feature. The one user who was confused about the label, made
sense of the function by presses a SOS situation tile. The page behind the ti-
tle, aided in the user's meaning-making, but the fact that the user had to
take an extra step, is evidence for friction.

The function *lifelines* was misinterpreted by most users, therefor this needs an
onboarding component to aid in the users meaning making of this function.
The contextual design model shows that users are highly interested in giving
their location, to receive a location-based result to where they can call for
help in a crisis. This therefor present both an opportunity for an onboarding
component as well as enhancing the Joy in Use.

Knowledge

Both labels and interaction design in knowledge showed unclear for the users.
Some scrolled through the content, some pressed introduction. The data
points to the fact that there is no clear action to take, when entering this
feature. The levels course and lesson were also a point of confusion for the
users, this however points to a change in design, as it will not be resolved
with a temporal onboarding component. The same goes for the labeling in
this function. Personalizing the content, the users are presented with will
enhance the users experience, and the knowledge page provides a big op-
portunity for the users to see content important to them immediately, in-
stead of having to search for it.

Forum

The users intuitively understood how to navigate the forum page, write posts
and comment and like other posts. They had a positive attitude towards hav-
ing a forum, but the intent of the forum was unclear to half of the users.
They were confused about who the forum was between, the users or the us-
ers and HTP and if they were anonymous or not. This presents an onboard-
ing opportunity, to ensure that it is clear who is using the forum and how
you enter and interact in it.

## 3rd Design Phase: Ideation

This phase was highly influenced by the divergent and convergent mindset, pro-
ceeding with a divergent approach in the ideation session. A session structured by
the Joy in Use factors and the contextual design models along with common web-
patterns of onboarding components. The ideation was initiated from the analysis of

onboarding opportunities and was influenced by the common web pattern seen in onboarding strategy *lazy registration[1]*.

As we know from reviewing the literature and from or contextual design model, there is a data exchange when we onboard users. It is common to set up a profile with an email and an array of different information about the user. Instead of having a seg-mented experience in setting up a profile and then entering the app, we initiate the data gathering contextually, starting it of after the users first interaction with the ap-plication. It's important here to distinguish between the user navigating and familiar-izing themselves with the features and interacting directly with it: When the users want to see the videos, post, comment or like in the forum or access the lifelines in SOS, they are interacting beyond navigating and getting an impression of the features – they are interaction directly with its functions.

### 4.3.1 Onboarding component for initiating profile creation

As stated above, the profile-setup will not be conducted all in one sequence and will also not be initiated as the first thing the user must do when entering the application for the first time. They will be allowed access to the platform and all features, but in the direct interactions the profile setup initiates. This decision was on the basis of reducing friction and providing the users with intent when asking for their data. This also means that the profile-setup will not ask for other data than e-mail address, as the remaining user data can be gathered contextually.

### 4.3.2 Onboarding component for data gathering

Consulting with the sequence model, there are data gathering opportunities in each of the features. In the forum, users will be asked to enter a user name when they want to like or comment an existing post or write their own. This will again support the data gathering by asking for it when needed, providing the users with intent (screen 6).

The sequence model shows us that the users don't have a call to action on the knowledge page. To ac-commodate this, we implement an onboarding com-ponent *Introduction Course*. This component will ini-tiate a short data gathering survey from the user, that will both provide the users with a course based on

**SCREEN 6: CONTEXTUAL DATA GATHERING COMPONENT IN FO-RUM, GATHERING USER NAME.**

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[1] Lazy registration is the strategy for a digital system or service: there is no initial sign-up form on the page or application, but the user can instead try out the service, and user data is gathered as a part of their natural trajectory.

their answers as well as providing HTP with user data. This provides the user with intent for why we need to know their age, relation and the possible the diagnosis of the person to whom they are relative to: Giving them the right knowledge for their situation, letting the data exchange become a part of their natural flow supporting the want of personalized content.

In the SOS function lifelines and in two of the SOS situations, the users are given phone numbers to aid them in crisis; they are either hotlines or psychiatric emergency rooms. The psychiatric emergency rooms are different from region to region; this is therefore an onboarding opportunity to ask permission for location. The location will determine which of the regions emergency phone numbers the users will be presented with - personalizing this feature when contextually appropriate, not interrupting the users flow unnecessarily.

### 4.3.3 Onboarding component for hints

The common web patterns for onboarding, showed many ways of guiding the users to familiarize themselves with the application. Many of them are tutorial based, which conflicts with the Hassle factor due to the extra friction and doesn't support the principle Direct into Action as it doesn't account for supporting behavior in the moment. Aiming to enhance the UX we followed the common web pattern of *just in time hints*[2]. This is also supported by The Learning Delta, providing users with hints when needed. For our design, this meant consulting the sequence model for breakdowns and where the users struggled and providing hints for actions in those exact moments.

Lifelines: The data shows us that not all users understood the intention of this function. Since we ask for location here and are already interrupting flow for data exchange, this provides an opportunity for adding a hint to the users in the same message (screen 7). The users will be given the opportunity to dismiss the notification.

My site: The function on *My-site*, where new activity is presented, the first of those post will be a hint. A text explaining the function and at the same time providing the users with the information that the application will be updated with new content regularly *"This is where you will see notifications about comment or likes on posts in our forum or if a new video has been uploaded in knowledge"*.

Knowledge: The users showed to be confused about the structure and levels of the knowledge page. The need for hints – either in the form of a course tile with the hint on or one that occurs as an action overlay which users can dismiss. However, having a call-to-action button on the knowledge page might initiate the process of users

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[2] A strategy in onboarding components, where a system or service knows about a common user-struggle or misconception and automatically delivers a hint.

learning the design. By making sense of the levels by using it, instead of having to explain with a hint, is also a way of not introducing unnecessary friction.

Forum: The user data shows that it wasn't clear enough for the users that the forum was between users - and not the users and HTP. Another hint will there for be implemented here, in the form of a post with the hint on underneath the categories (screen 8).



SCREEN 7: CONTEXTUAL DATA GATHERING & HINT



SCREEN 8: HINT IN FORUM

## 4ᵗʰ Design Phase: Composition

Going from the ideation phase to composing the OBS, the ideas were concretized by making a low-fidelity prototype. Using paper mock-ups, the onboarding opportunities and chosen onboarding components were sketched upon screen shots of the existing application. By prototyping quickly in a low-fidelity, the onboarding components were able to be assessed quickly by the team and iterated in terms of intended use-flow. The feedback-initiated changes in the design of the OBS. This was then developed as a high-fidelity prototype in the design software Figma.

### 4.4.1 User-evaluation of first high fidelity prototype

The initial composition phase is followed by having users evaluate the first high-fidelity prototype, with the aim to iterate it for the final user assessment. The purpose behind this is the same as with the team assessment, catching errors and fine tuning the design, to ensure the most valuable feedback from the final evaluation.

The user test of the high-fidelity prototype was conducted with two users. As stated, the aim for the test was catching errors and fine-tuning design, and the test-procedure was designed to have the users feel autonomous and investigating the application in their own way (appendix 1, p. 4), in line with the contextual design principles (Holtzblatt & Beyer, 2016, p. 417).

The test showed two main issues that will be iterated upon for the final UX evaluation (appendix 2, pp. 50-51). The first thing was the onboarding component of contextual data gathering in 'Knowledge'. Having one course titled *introduction course*, didn't cause enough attention for users to take action and click on this function. This will therefore be re-designed as a more insistent call-to-action button. It will be its own entity at the top of the page, and it will be rephrased to "Get a good start – find the right course".

The second issue that users had, was the content of the application. The test was done with placeholder content. This means that a lot of the pictures on the knowledge page and SOS-page where the same, text in forum and knowledge was Lorum Ipsum. This however caused great confusion in both making sense of the application features and navigation. This will all be replaced by proxy data, that makes sense and simulates the actual content that will eventually be on the application. This will both enhance users experience and the validity of the data, as the prototype is closer to the actual product.

## 5<sup>th</sup> Design Phase: Assessment

For the final evaluation of the onboarding system, as explained in the methodology section I am testing the UX with a mixed method approach. The UX will be evaluated from the contextual design principles of joy in use: The learning Delta, The Hassle Factor and Direct to Use. Each of the applied onboarding components will be evaluated from these principles either from a qualitative or quantitative measurement or both (table 4).

| Final UX evaluation | | | |
|---|---|---|---|
| | **The Learning Delta** | **The Hassle Factor** | **Direct to use** |
| Qualitative | Post-test interview about the functions and features in the application to evaluate if the users got familiar with the purpose of these<br><br>**Just in time hints:** Post-test questions on if the hints aided in the users meaning making | **Profile Set-up:** Post-test interview questions about the users experience of the flow and the transparency of intent behind data gathering | **Just in time hints:** Did the hints enhance you experience of the application?<br><br>**Find course:** Did it enhance you experience of the application? Did it aid in any intent you had?<br><br>**Intent questioning:** During test questions: what is your intent with this action? Assessing whether the onboarding components supported the intent. |

| Quantitative | **Analysis of behavior:** | **Just in time hints:** whether they made use of these hints or skipped them | Post-test question on quantifying the application support of the users' intentions. |
|---|---|---|---|
| | Number of errors users made in navigation | **Profile set-up:** | |
| | Post-test question on quantifying the ease of learning to use the application. | Did they make use of the profile set-up opportunities? | |
| | | Post-test question on quantifying the friction and flow on the application. | |

**TABLE 4: MIXED METHODS USER EXPERIENCE EVALUATION DESIGN**

## 5. Analysis

I will evaluate the onboarding components and UX from the framework of the Joy in Use measurements. The onboarding components implemented on the HTP application are:

1. Contextual profile initiation
2. Contextual data gathering
3. Hints

As laid out in the method section I did user testing of the prototype with the think aloud method. This was supplemented by pre and post interviews, with the focus on investigating the users experience with getting familiar with the application, asking about Direct to Use, The hassle factor and the learning Delta. Lastly to enhance the validity of the data, I asked them to quantify their experience, this parameter aided in verifying the qualitative responses, to see if the two measurements corresponded.

I analyzed the data with the coding software NVivo, making the following code book to structure the data from the user test. The codes are the specific analysis-point that the data illuminates. The references are how many analysis points in the data that reference to that code (table 5).

| Framework for analysis and number of datapoints | | |
|---|---|---|
| **UX measurement: Direct to Use** | | |
| **Qualitative codes** | | References |
| | Did hints enhance users' experience | 2 |
| | Evidence of the users' intentions being supported | 19 |
| | Evidence of the users' intentions not being supported | 12 |
| | When did they initiate profile-set up | 4 |
| **Quantitative codes** | | References |
| | Quantification of users' intentions being supported | 3 |
| **UX measurement: The Hassle Factor** | | |
| **Qualitative codes** | | References |
| | Evidence of users' flow being interrupted | 3 |
| | Evidence of users' flow being sustained | 18 |
| **Quantitative codes** | | |

| | | |
|---|---|---|
| | Quantification of users experience of flow | 3 |
| | Skipped hints | 4 |
| **UX measurement: The learning delta** | | |
| **Qualitative codes** | | References |
| | Evidence of features not making sense to users | 12 |
| | Evidence of hints aiding in meaning-making | 2 |
| | Evidence of hints not aiding in sense making | 7 |
| | Evidence of users getting familiar with features | 30 |
| **Quantitative codes** | | References |
| | Quantification of learning to use the application | 5 |

TABLE 5: FRAMEWORK FOR ANALYSIS

The analysis will be structured by this codebook, going through each of the Joy in Use measurements, and analyzing the data that sheds light over each factor and to what onboarding component it relates.

## 5.1 Direct to Use

This measurement is centered around supporting the users' intentions. What I found in the sequence model during the exploration phase, was that different users have different intentions and behaviors. The way users behave to familiarize themselves with the application is individually dependent. Just with four users there was at least two different behaviors in most of the sequences' steps (appendix 3). The OBS were design to support multiple intents, this resulted in the two onboarding components: Contextual Profile Initiation and Contextual data gathering.

### 5.1.1 Contextual Profile Initiation

If we take a look at the Profile initiation component, the design of the OBS supports that the users can create a profile, when they first want direct interaction with the application. There is also a call-to-action button for creating a profile on the landing page *My-site*. Even though users had multiple options to initiate the creation of their profile, all users initiated the profile set-up from *My-site* via the call-to-action button (appendix 2, p. 54, 62, 67,74). Half of the users initiated the profile set-up before getting familiar with the applications features. The other half went through one or more of the application features before signing up and creating a profile (appendix 2, p. 54, 62, 67, 74). This shows us that the users have different intents and attitudes towards onboarding an application. The following user statements makes it even clearer:

> *So, I can create a profile to access the features, I actually assumed that I had to. You usually have to do that. And I click and then I have to type my email address. I'll do that (appendix 2, p. 67).*

This user has no problem giving his email address and sees it as an intuitive part of onboarding an application. Another user stated "and I can see there is something to do with creating a profile. I rarely do that immediately" (appendix 2, p. 53). This user has a more critical approach to giving away her information, her attitude is seen in her intention of getting familiar with the applications features, deciding whether the application will be useful and then committing by giving her email address and setting up a profile.

Even though none of the users in the test scenario, made use of contextual profile creation, the fact that the users weren't forced to create a profile before exploring the application, shows that the OBS supports different users' intentions: those who wanted to explore the application before signing up and those who didn't.

### 5.1.2 Contextual Data Gathering

Contextual data gathering is related to Direct to Use, in sense that asking for data customizes content and makes it even more applicable for the specific user. Therefor this analysis point is concerned with the users finding meaning and intentions being more supported by the OBS component of contextual data gathering.

There are three elements in the OBS that are a contextual data gathering components.

- The survey of questions in 'Find Course'
- Location permission in lifelines
- Username in forum

Find Course and location permission is the only two that relates to Direct to Use, due to the fact, that when users give data in these instances, the result are more customized content. The gathering of username in forum, is only related to the Hassle Factor.

#### *5.1.2.1 Users' opinions about customization*

All users found the data gathering components to enhance their experience and support their intentions. There is evidence of this, both during the user test and when asked about their experience in the post-test interview. During the test, when asked about the Find Course component, user M2 said that it is the usual way he finds content in applications if it is a function that is available "I would definitely try it out and then unquestionably say this is completely off. That would be part of me wondering,

what will they recommend me?" (Appendix 2, p. 79). User M1 expressed that he expected some sort of customization, because HTP promises so in their adds "There is also 'find the right course and get started'. I would like to do that. It has to be customized as it was said earlier" (appendix 2, p. 68).

The function of the lifelines being customized to the users based on their location, was also appreciated by the users in the test-scenario. All users gave permission to their location and users F1 and F2 was seemingly positively surprised, when they saw what the information was used to inform:

> *Yes, you can use my region [looks at the lifelines] Its really smart. And it actually only took me two clicks to get to that. I think it is a really good idea. I think so, because when you are at that point and you need help, then it should just not be too difficult (appendix 2, p. 54)*

All users found that the two elements that initiate customization to be useful and when asked about if the elements supported their intentions, the users confirmed that this was the instances.

### 5.1.2.2 Users' opinions on data gathering

Another notion of supporting users' intention and designing for Direct to Use, is ensuring that the data we ask for has purpose and making that purpose transparent for the user. As mentioned, all users gave permission to use their location, no remarks were made about this in the test scenario, and when ask about their thoughts on the application asking for this data, no user had an issue with this. User M1 elaborated, when asked if he was okay with the application knowing his location "Yes, I don't care. Everyone knows where I am anyways" (appendix 2, p. 67).

When the users went through the questions in *Find Course*, none of them expressed any concern with the questions or when entering their own data. The first screen of *Find Course* explains the purpose of the question, which might aid in the users' unconcerned approach to filling out the questions. When asked about if they could see the purpose of the questions asked during the onboarding, M2 replied with a simple yes (appendix 2 p. 78). M1 elaborated on what purpose he found in the questions "yes, to be able to customize content to me" (appendix 2, p 71). F1 said the same thing, that the data gathering would be reflected in the application, being customized to her. In the post-test interview, she was asked about if she had giving it any thought to the purpose of the specific questions such as age and gender, when filling out the questionnaire: Interviewer: "But you didn't give it any thought, you just gave it [the data]?" F1: "Yes" (appendix 2, p. 58).

F1, F2 and M2 didn't read through first screen in the *Find Course,* which explained the purpose of the questions, but they still gave their data. This implies one of two things:

1. They both trust HTP and find meaning behind the question.
2. They have become so used to giving their data, that their awareness has been impaired to a certain extend.

The first explanation is backed up the fact that they all found purpose with the data asked for by the application and expected it to benefit them in terms of the content being customized. The second explanation is backed up by M1's statement about his data, specifically his location, being known anyways. Nonetheless the users expressed that they felt that there was purpose behind the data gathering and that it aided in their intentions of getting familiar with the application.

### 5.1.3 Hints

The onboarding component *Hints* relates to Direct to Use in the users experience of the application. Not related to reducing friction or learning about the Learning Delta, I will try to separate the data points related to *Hints* and the users experience of being supported in their intentions. The hints were given in two places on the application: In the forum, on each fora tile, a small text gave an explaining hint to what this forum was about. The second hint was on *My-Site* where a text explained the fact that this is where the notifications can be viewed. From both the users' behavior in the test and in the post-test interview, it is clear that they didn't make use of the hints. When asked about if it enhanced his experience, user M2 said the following about the hints on My-Site, that he preferred the notification style on Facebook and got confused by the ones in the HTP application (appendix 2, p. 59).

When F2 explored My-Site after creating a profile, she looked at the notifications, but this quote tells us that the hint didn't support any intentions, in fact she didn't seem to notice it.

*Well, when I see this, I think, what is this? It doesn't say anything about relatives here. The only thing I see is something about Morten gave your post a like. And then I think about dating, so I'm not too sure (appendix 2, p. 63).*

Other remarks on the hints are related to the hassle factor and learning delta, which will be analyzed in the following sections. But in relation to Direct to Use, the data shows no evidence of the Hints aiding the users in their intentions.

### 5.1.4 Other Intentions

During the test, the users expressed specific intentions that would aid them in their overall purpose of getting familiar with the application. User F2 gave this remark when she had created a profile and was ready to explore the application "what is this? It doesn't say anything about relatives here" (appendix 2, p. 63). This shows that her intention was to be met by content about the relatives. Instead, what she saw was *My-site* which consist of a picture with a welcoming phrase and a section of notifications with the new activity on the application. This points to the fact that it might be more prudent to start users on the Knowledge page instead. This claim is supported by user F1, who also express her confusion with *My-site* and answers that she would rather land on the knowledge page, when opening the app for the first time (appendix 2, p. 60).

Another remark made by user F2 came quite early in the test "What is the price?". She followed up with a statement that made it clear that she would like to know how much it cost "And then it says enroll for free, yes. Yes, because that has something to say" (appendix 2, p. 62). The fact that the price is quite important, when she initiates the profile set-up, is an important notion, as this intention is not supported at all in the OBS.

### 5.1.5 Quantifying the onboarding systems ability to support intentions

Lastly the users were asked to quantify how well they thought their intentions were supported by the application. On a scale from 1-10, 10 being the best score, the users gave the following scores: M1: 6, M2:8, F1:7 and F2:7. This results in an average score of 7, indicating that users found the applications ability to be Direct to Use quite high. This indication fits the result of the analyses of qualitative data: Overall users' intentions were supported, but with room for improvement, having the users' intents being supported faster and providing them with the information that they didn't receive in this design of the OBS.

## 5.2 The Hassle Factor

This is a measurement of the flow the users experience. The OBS were designed to reduce friction, so the users would experience less interruptions. Implementing the two onboarding components Contextual Data Gathering and Contextual Profile Initiation, the users weren't forced to go through the profile creation at a set time. These components reduce the users flow from interrupted, as they don't have to give more data at a time, than needed for using a specific feature or function.

### 5.2.1 Contextual Profile Creation

When analyzing the data for evidence of the flow being sustained or interrupted, in relation to the users initialing the profile creation, we are looking at their behavior in the user test and how they regarded the flow in the post-test-interview. As we established in the analysis of Direct to Action, half the users explored the features before setting up a profile, the other half started out with the profile creation. As the Contextual Profile Creation component allows for both flows, this means that both flows were sustained.

All four users expressed that they thought creating a profile was easy and that it didn't feel disruptive. User M1 asked the following question when asked if he had the feeling of his experience being interrupted when he created his profile: " When did I have to create a profile, in the beginning?" Interviewer: "You could choose yourself, but you chose to do it in the beginning". Participant: "All right, it didn't feel disruptive. I could choose for myself" (appendix 2, p. 71)

The fact that M1 couldn't remember when he created a profile, is a good indication of the success of this component in relation to the Hassle Factor. It shouldn't be the cause of too much attention, it is not the important part of getting familiar with the application.

### 5.2.2 Contextual Data Gathering

Contextual data gathering is related to The Hassle Factor, in sense that asking for data contextually reduces profile set-up time and provides intent and context for why we need the specific data. In forum we asked for username, in SOS we asked for permission to their location and in knowledge we gather information about their goal as a relative, as well as age, gender and what illness to which they are relatives to.

#### 5.2.2.1 Forum

The data from the test-scenario shows that it felt natural and a part of the flow for user M1 to write a username when he wanted to write a comment on a post in the forum "Yes, they need a username if I have to write a comment. Yes, that is me. Yes. I have participated in the forum. I can't participate without a username, so that makes sense" (appendix 2, p. 69)

It is clear from the above quote that he is fully aware of the intent behind the data gathering. M2 had the same experience with the Contextual Data Gathering as M1 had when M1 created his profile. When asked about gathering his data contextually in the post-test-interview, having him type a username in his first interaction with the forum, he said "Oh well I don't think I caught that". Interviewer: "At least you didn't notice it". Participant: "No, I am not sure. No, I probably didn't" (appendix 2, p. 78).

### 5.2.2.2 Knowledge

All four users went through the survey of questions in Find Course without expressing any concern about the questions. Although there are four questions to get through, no remarks were made about it being interruptive or a hassle, neither in the test or the interview.

There was however another issue with the Find Course element: Having the profile set-up and scrolling through My-Site, one user expressed his intention of wanting to get to knowledge that solved his problems faster. Instead of navigating to Knowledge and initiating "Find Course", he proposed having it being a part of the profile creation or similar to the wants of users F1 and F2, being taken directly to Knowledge where the "Find Course" is a call-to-action button.

> *I would get rid of the new activities section on the frontpage and put it [find course] in here instead. But it's because we don't interact with application as we would in normal circumstances, if that was the case, then I would click that as the first thing, and the possibility to skip is there, if you want to do that (appendix 2, p. 75)*

### 5.2.2.3 SOS

In the SOS feature, users M1 and F1 both made remarks when they were asked permission to use their location. However, it might be attributed to the fact that this was a think-aloud test. All four users allowed their location to be used, and no remarks were made about it being disruptive. The intent was also self-explanatory after they gave permission, as they could see that the lifelines were adjusted to their location. As mentioned in the Direct to Use segment F1 and F2 were pleasantly surprised and immediately got the intention behind this data exchange. This means it might not be necessary to include the explanation of the purpose behind knowing user's location, but for more critical users, it might still be valuable to explain the purpose. Besides taking up more screen estate, it doesn't add more the Hassle Factor, due to the fact that the explainer text is on the same component as the permission YES/NO button.

### 5.2.3 Hints

As the hints weren't used, the immediate conclusion could be that they should be removed to reduce friction. Nevertheless, the users express different attitudes about

the hints: User F2 made the remarks, that even though she didn't read it immediately, she thought it had purpose "if you're interested you can quickly read it" (appendix 2, p. 65). M1 had the same opinion, he didn't use the hints, but felt it were nice to have them as clarifying elements. Users F1 and M2 did also not see the hint and explained that the visuals were more important too "I didn't notice at all, I think I am much more… Apps for me are much more about the visual opposed to the text" (appendix 2, p. 57).

In the user test, user F1 made this remark, when reading the Hint about activities on My-Site "Here you can see new activity [reads the hint] now I am a bit confused" (appendix 2, p. 54). She was trying to find the 'Home-page', which she was on, but the hint added to more confusion than it cleared things up. This indicates that the Hassle factor was raised due to the Hint.

User M2 also made a remark that indicates that the hint adds more hassle than it reduces friction "I think I would get rid of this section [new activity hint]"(appendix 2, p. 77). The hint explaining new activity on My-Site is definitely redundant and the data points to the fact that it adds friction for the users. The hints on the forum page, the users didn't have as one-sided opinions. Although they didn't read it before entering a forum, users F2 and M1 explained that they liked the fact that they were there. Whereas user F1 only used the visuals and M2 didn't make much sense of the forum altogether. I will argue for the fact, that the hint should be removed from My-Site, but stay on the forum. Having them on the forum along with the visual aid will support multiple user behaviors', not adding to friction but adding to the meaning making, more on that in the analysis of the Learning Delta.

### 5.2.3.1 Quantifying the Hassle Factor

The users were asked to rate the hassle of using the application on a scale from 1-10, 10 being the most of a bother to use. The rated as follows: F1: 2, F2: 2, M1: 2 and M2: 3. This is an average of 2,25. A low score for the hassle factor, which comply with the qualitative data that didn't show much friction, the friction that was made remarks upon, being primarily the hints.

## 5.3 The Learning Delta

This measurement is concerned with the learnability of the application, how easy is it to use and getting to know? This is at the center of onboarding *and* UX; a well-designed application reduces the number of things the users have to know, to use the application. The onboarding components will elegantly reduce the complexity and enhance the experience, as there is as little to learn as possible to use the product. Analyzing the learning delta in relation to the onboarding, we also have taken the users experience of the permanent user interface into consideration. Even though it is not temporary as the onboarding components are, the intuitiveness and learning delta of the application, indicates whether there are need for more onboarding components for the users to get familiarized with the application.

As we have established in the analysis of Direct to Use and The Hassle factor, the onboarding components Contextual Profile Creation and Contextual Data Gathering reduces friction for the users. Therefor this part of the analysis will be structured from the features on the application and how the users made sense of these and lastly if the navigation and wayfinding was intuitive for the users.

### 5.3.1 My-Site

For users F1 and F2 My-site wasn't intuitive and caused confusion. They both indicated that they were lost and had difficulty making sense of the purpose of that page. They expressed they were looking for a 'home-page' or starting page, that they could return to, which is the purpose of My-site. However, as those two, which makes it half of the users didn't get familiar or learned what that page was about intuitively, indicates a poor user interface, not relying heavily enough on common web patterns. As we found out in the previous analysis sections, the hint on My-site definitely didn't aid in meaning-making for the users, and for F1 and F2 actually caused more confusion in making sense of the page.

User M1 didn't show any sign of confusion when scrolling through My-Site, he also returned to My-Site after looking through all of the applications features, indicating an understanding of this as the 'Home-Page' users F1 and F2 were looking for. When asked My-site in the post-test interview, he explained his understanding of it "Well, there I have some sort of feed over my activity on the forum and maybe some notifications if there is new videos" (appendix 2, p. 65). He explains exactly what My-sites purpose is. M2 also stated during the test, that he regarded My-site as the front-page of the application. When asked about what gave him that indication, he said "Well, because I think so". This indicates that nothing particular aided him in his sense making, the UI being a result of common web-patterns this argues for the exact opposite of users F1 and F2s experience.

### 5.3.2 SOS

The SOS feature was the feature that received the most praise from the users. They all found it to be very intuitive to use and found a lot of purpose in the actual feature. They stated that the labeling SOS indicated that this was a feature for acute situations. Both in the post-test interview and in during the user test, the users seemed to immediately understand how to use the feature and its functions. As user M2 stated during the test" Well this SOS page makes complete sense, totally intuitive" (appendix 2, p. 76). The only remark about the SOS function that indicates difficulty with making sense of the feature was from user F1, who initially thought it was aid for herself, and she would be meet by a mindfulness-exercise when clicking one of the SOS situations. But as soon as she looked through the rest of the SOS situations and saw an animation, it made sense to her "But my immediate thought when I saw it was that it was a mindfulness setting, but as soon as I click it and get to the animation it makes sense, it is still help for myself" (appendix 2, p. 53). But the conclusion of the learning delta for this feature, is that the users found it intuitive, and meaning-making was almost instant, aided by the SOS label.

### 5.3.3 Forum

There was division between the users in regard to getting familiar with the forum feature. Although they were all able to explain the feature in the post-test interview, during the test M1 and M2 struggled to navigate and learning to use the forum. M2 expressed his confusion with the four forums, when asked to clarify, he responded "this is only the thread? It's like a forum where you say bla bla bla, does anyone feel the same way?" (appendix 2, p. 76). This expresses that he had an understanding of how a forum works, but that he doesn't recognize the same patterns in this forum. M1's issues with the forum, also revolved around the four different fora, but for him, the title of the different fora, didn't indicate the right thing "I enter the recommendations forum. In here I will find posts that are recommended for me for some reason, maybe because of some things I have interacted with earlier" (appendix 2, p.69). I would argue that he understands that there are different fora for different topics, but the topic of 'recommendations' gets misunderstood. However, reading through the first few posts, will in all likelihood aid in meaning-making and would result in him getting to the conclusion of the right understanding of the recommendations forum.

It was mainly the purpose behind the four forums that were the issue and not the functions. User liked and easily filtered (via tags) post and wrote comments, as user F1 demonstrated during the test "well I am a parent [Presses the parent tag to filter posts]"(appendix 2, p. 53).

The fact that all users were able to explain the feature in the post-test interview, indicates that the issue of getting familiar with the feature, wasn't an explicit learning

delta issue. But it does express a need for a different UX design, enhancing the design to a more intuitive user interface.

### 5.3.4 Knowledge

The users all expressed that they understood the purpose of the knowledge feature and in the post-test interview they all made statements that indicated they had gotten familiar with the feature. During the test, the users had different experiences with getting familiar and learning how to use it: M1 understood the interaction design, as it wasn't unfamiliar to him "It's similar to the way streaming services are build, where you can scroll up and down and left and right. So, the newest content is at the top and then there are the courses" (appendix 2, p. 68).

The users F1 and F2 had issues with learning how to use the knowledge feature. During the test, user F2 clicked on a lection called introduction, the lection started to play, and she seemed confused by the video playing immediately "Well I think, when you get in it from the outside, then I don't know where I am. I have to know something about what I have downloaded" (appendix 2, p. 63). She expresses a need for knowledge on what she is about to see. This is something that is actually a part of the design, but only if you click on a course from the main knowledge page. However, even though we did design for this intent, the interaction design is not thought out to support multiple strategies or have interventions that ensures users from getting lost. The design of the knowledge modules is in three levels: Course, which has lections, which consist of media-items. You can access both courses and lections from the main knowledge page. As seen in the above statement, this was neither clear or intuitive for user F1 and user F2 expressed the same confusion about the levels "I didn't understand the levels at all" (appendix 2, p. 56). Even though we had implemented the common web pattern 'bread crumb trail' to make the levels even clearer, this didn't aid user F1, who said she had doubts as to what the backslash indicated.

Nevertheless, user F1 did express during the test, a good understanding of the purpose behind the feature, but since she still had trouble making sense of the interaction design, this reveals that the UX and interface should either be redesigned for knowledge or there should be implemented more onboarding components to aid in meaning-making.

### 5.3.5 Navigation

Navigating the pages of the application was not a problem to any of the users. During the test, they all went straight to the global navigation bar in bottom. User F1 said when starting to explore the application "there is a line at the bottom, knowledge, forum and SOS. And I will always click on these things, so I click on knowledge" (appendix 2, p. 53). And when continuing her exploration after looking through the

knowledge page "yes, and then I return to my line at the bottom again" (appendix 2, p. 53). There where unfortunately instances for users F1 and F2 where they got lost in the application.

The other common web-patterns used in the navigation-design was the Chevron button. The chevron indicates where users can navigate back one-page and also communicates that they *have* moved in one or more levels on the application. This was intuitive for all users and users has no error or struggles using or making sense of that navigation function.

The navigation got an average score of 7,75 points out of 10, this is again quite high and complies with the qualitative data. The qualitative analysis emphasizes that there isn't need for hints about the global navigation bar or chevrons used, there is nevertheless the issue with My-site as a homepage. The data suggest that there is more a need of a redesign of that page, rather than a hint that aids the users meaning making. This is based upon the fact that the purpose of My-site, as concluded in the Direct to Use analysis, wasn't clear to users, as well as not catering to their wants and need of a that page.

## 5.4 Summary

The OBS designing for the HTP application, was evaluated from the UX parameters of Joy in Use: Joy in Use, The Hassle Factor and the Learning Delta.

As the exploration phase showed, users have different intentions and approaches when familiarizing themselves with a new application. The users' different intentions were supported in regard to setting up a profile. Some initiated it from the beginning, others explored the features and returned to sign-up afterwards. However, none of the users made use of the contextual profile initiation. All users found purpose in the data they were asked to share with the application. Besides being uncritical about giving their data, they expected it to customize the content of the application. The onboarding component 'Hints' didn't have any effect on supporting users in their intentions and data also showed that there was a need for more information to be provided to the users.

Though the users had different flows through the application, the Hassle factor analysis indicated that the onboarding components supported the flow, reducing the hassle. There were no remarks on friction in creating a profile or with the contextual data gathering, several users even forgot that their flow had been interrupted. The users felt that questions had purpose and would enhance customization, reducing the feeling of being interrupted when asked about providing the application with their data. There were two notions of the OBS that caused friction: the hints, which weren't used

and reducing the hassle of finding the right course by enabling users to use that function directly from the 'front-page' My-site.

When analyzing the learning delta, the data showed that half the users found My-site and the interaction design of the forum to be confusing and difficult to use. This means a need for redesign of these pages, as the temporariness of the OBS will not solve the issue. Though the users were able to explain the features in the post-test interview, the data shows a need for a more intuitive and recognizable design. The users regarded the SOS function as highly intuitive and navigating the application with the global navigation bar and chevrons, was also easily learned and used by the users. However, the users expressed confusion about the levels of the knowledge page, the fact that not all users had this opinion could point to the fact that it isn't in need for a redesign, but there could be implemented onboarding components to aid in meaning making.

# 6. Discussion

The discussion will consist of a methodological discussion, the results and how we can interpret them in relation to the theory and aim of the design theories applied. Specifically, a discussion on whether design methods actually do result in design that support users' practice. Lastly, I will discuss the relevance of clarifying intent behind data gathering for the user. The aim of the first part of the discussion is to assess the methods and results in term of validity and reliability. The second part aims to nuance the view of using user centered design frameworks and its actual effect on UX of a system.

For the first part of the discussion, the methods will be discussed in relation to social research methods and the validity and reliability standard and requirements. For the second part of the discussion, I will present the data and results of this thesis, as well as research that presents counter views.

## 6.1. Discussion of applied method

The number of participants in the research amounted to a total of eight different participants. Four participants for the design process and four participants for the final UX evaluation. In terms of sample size for the design process, there is a general approach of gathering participants and new insights, until a point of saturation has been reached (Sharp et al., 2019, pp. 261-262). Social research methods also argue for this saturation point as a guideline for sample size (Bryman, 2016, p.17). However, Bryman argues that it is impossible to know when a point of saturation has been reached, the rule of thumb being that the broader the scope of the research the larger the sample size (Bryman, 2016, p.416). As this thesis focusses on the UX of relatives in the age range 35-65 years, analyzing from the three Joy in use Factors it is quite a narrow study. Considering the scope, the sample size is still on the lower side in terms of reaching data saturation, which is a reliability issue for result of the UX-evaluation.

The method applied for data processing in the design process was conducting the interpretation session. The interpretation session heightens validity of the analysis, as multiple people are analyzing the data, and own biases is countered by the other people who processes the data. The reliability of the results of this study is also a point of discussion. The evaluation design was from a mixed method approach to heighten the reliability. As the subjective nature of qualitative research was strengthen by embedding quantitative data points for a basis of comparison.

As the onboarding is implemented and data on user behavior will be collected, it will be of high interest to analyze the use of the onboarding components in a non-test scenario. This will indicate the usability of the onboarding system, but surveys or

post-onboarding interviews would have to be initiated to explore the UX. This is the nature of UX; it is highly qualitative. Another approach to evaluating the effect the OBS had on user experience, would be a comparative evaluation from the same UX-parameters. By having to different OBS, one developed from user-centered design and one developed from another framework or solely from common UX-patterns, could reveal more insights on the effect of the different OBS components. This wold aid in answering the problem statement, as the comparative quality could produce a more valid evaluation.

## 6.2. Discussion of user centered design methods

Design concerned with having the user and their practice as focal point, argue that spending time on researching users, inquiring data on practice and context, results in better solutions. This includes design theories as Design Thinking, Contextual Design, User-centered design, interaction design and so forth. By returning to the users throughout the process, the theory is that we counter our own biases and ensure designing for their practice and not our selves.

"If I had asked people what they wanted, they would have said fasters horses" this famous quote on design, attributed to the inventor Henry Ford, sums up the counter argument for user-centered design. People have a practice, they will have opinions on what they want, but user-driven design, doesn't always lead to good design. Users often don't have a articulated understanding of their practice and the available technology (Holtzblatt & Beyer, 2016, p. 242). User-driven or co-design along with the users, can have the opposed effect of innovative design, if it is too reliant on the explicit request of the users. This study didn't use the methods of participatory design, such as workshops or co-design activities, but relied on the immersion into a set practice, using the data a tool. Avoiding letting user data dictate design, but using it as a tool via design models, resulted in a positive user experience, however not all onboarding components proved to be relevant.

The evaluation of the onboarding system points to the fact that users were supported in their practice and got familiar with the application. This was the aim on the onboarding system, indicating that designing from the chosen design method both enhanced the user experience and resulted in a well design solution. However, as the evaluation showed, there were onboarding components that were redundant to the users in the test-scenario. As users weren't forced to create a profile before exploring the application, shows that the OBS supports different users' intentions. But whether this component should be kept or not, is not clear yet, as the contextual profile initiation weren't used. None of the users initiated profile creation from other than *Mysite*, but the exploration phase of the design process also illuminated that different users have different behaviors. Therefore, there is the possibility that future users

would in fact chose to initiate profile creation contextually, rather than from the call-to-action button on My-site. This is definitely a reliability issue of the research, relating to the sample size, having more users would give more reliable data.

### 6.2.1 Survival bias in user-centered design

The user-centered design theories, revolves around the users who are willing to participate. The inquiry gains insights on the demographic, their practice and context of that set practice. From this data, the designers analyze and create system-requirements based on the participants wants and needs. As a participant it requires you to set time off to participate, to be interviewed and so on. This thesis focusses on a vulnerable group in society, a group who are relatives to people suffering from mental-illness, and actually have a 24% chance of getting sick themselves ('Pårørende belastning', n.d.).This means it does require a certain degree of energy surplus to participate in a design process. For the case of this study, participants had to reach out to and contact via email or social media if they were able to participate. This is already an indicator of having surplus energy, furthermore approximately half of the relatives who reached out, wouldn't participate when they got familiar with the extent of the inquiry or they cancelled. The relatives who ended up participating, had all been relatives for a longer period and expressed an understanding of being a relative that indicated that they had gone through the process and stress of standing in the immediate crisis when becoming a relative.

This results in a high chance of skewed data, as the relatives who are still in rehabilitating or even in dehabiliatation phases of their life changing, aren't included in the sample. Though there is a high chance of this being the case, the purpose of an onboarding system is not the actual value of the application. Getting familiar setting up profile is important, especially for the first-hand experience, but it is mainly a business goal, to ensure users stay or chose the product. Therefore, I will argue that the survival bias, though prominent, doesn't have a critical effect on the design. Considering survival bias in a general sense for user-centered design, the fact of the matter is that it could have an essential effect on design solutions. Taking into considerations that design processes that relies on user-participation, are likely to be influenced by survival bias, makes the solution usable for the applicable participants, but could leave out a relevant group of users, as they are not represented in the participant sample.

### 6.2.2 User experience and privacy concerns

Lastly, I will discuss the relevance of clarifying intent behind data gathering for the user. The reviewed literature on designing, improving and evaluating OBS didn't point to the issue of gathering users' data. However, an important component of OBS is getting users to sign up for the service, solution or platform, typically with an email

address and an array of personal data (Cascaes Cardoso, 2017, p. 264). This data is used for different purposes, such as direct marketing, customization of content, recommender systems, statistics for user behavior analysis etc.(Acquisti et al., 2017, p. 2). Studies have shown that users' level of concern regarding their personal information is rising (Zviran, 2008, p. 97), but companies who are transparent about the use of personal information and information gathering, are perceived by users to be more trustworthy (Vitale et al., 2018, p. 380). This effects users' decision making and experience, as it is shown that increased transparency and intent led to users disclosing more personal information (Sinha & Swearingen, 2002, p. 830; Zviran, 2008, p. 381). In a review of the studies conducted on pertaining users' privacy and security decision-making, it was found that user interfaces that nudges users into giving their information, has shown that transparency is more redundant, as the nudging effects impairs the users' awareness of the information exchange (Acquisti et al., 2017, p. 3).

The onboarding components that gathered user data in this study's OBS, wasn't designed to nudge, but to be transparent about the use of their personal information. There is however evidence of the design nudging unintentionally, as some users didn't notice they accepted the gathering of personal data. Those instances are examples of the issue that Acquisti et al. found: That nudging effects, intended or not, impairs the users' awareness of the information exchange (Acquisti et al., 2017, pp. 37-39). This means that designing with the aim to reduce friction and hassle, can result in a nudging UX-design.

When asked about gathering their data, the data reveals that the users' privacy concerns were low. The users were willing to give their information and expect the data that they give will benefit them, as it will customize the content of the application. As the research on the privacy matter showed, it builds trust to be transparent when collecting personal data. However, three out of four users didn't read this information, but unconcernedly accepted the information exchange. One user stated, when asked to give his location "everyone knows where I am anyways". This points to the fact, that there is a tendency for us as users to be less critical about our personal data, as it is inevitable for us to give the data when using digital services. Nevertheless, based on the trust or low level of privacy concern that the users' behavior indicated, the transparency elements should be kept in the OBS design, so it is available to establish trust for users who have higher levels of concern for privacy.

## 7. Conclusion

Developing an onboarding system from the user-centered design theory: contextual design, resulted in a positive user experience evaluation. Though users didn't make use of the component contextual profile initiation, it supported different user behaviors, letting users explore the application before signing up. The component contextual data gathering clearly reduced friction for the users and they found purpose in the information that was gathered. However, the onboarding component Hints, created more friction than use. Although we have designed from a user-centered design theory, not all solutions incorporated into the design, proved useful in the onboarding experience. The overall user experience was however deemed as a good experience by the users. Their statements and behavior were consistent with their quantitative assessment of their experience, pointing to the fact, that they had a good experience and got familiar with both features and navigation of the application.

As the purpose of this thesis is to contribute to the approach in which we develop onboarding systems, the fact that the result is an onboarding system in which two out of three onboarding components were used and not skipped or a contribution to friction, indicates, that the user-centered approach is beneficial for the users in their onboarding experience.

Both the evolution and the design process could have benefitted from a larger sample size, as it would have enhanced the validity of the evaluation. The design process especially, are likely to be influenced by survival bias. As the evaluation of the user experience wasn't comparative, it reduces the reliability as it only evaluated from the users experience with one way of interacting with the application. The implementation of a mixed method approach does however benefit the data, as the quantitative aspects, validated the qualitative analysis of answers and behavior. A larger sample size and means of participants would counter survival bias and could have increased the likelihood of data saturation. This goes for both the design activities involving participants and the user experience evaluation.

The analysis and discussion showed that users weren't aware of the data gathering in several instances. The contextual data gathering reduced friction, but at the same time, decreased the users' awareness of consent and transparency of privacy. This proposes the discussion of when good user experience design and intentions, becomes a nudging interface. The onboarding component was designed to support users' intentions and actions, which it showed to do, but might have contributed to impair the users' awareness of information exchange.

As the onboarding system is implemented on the Hjælp til Pårørende application, it provides us with an exciting opportunity to investigate this question further. Analyzing user behavior with the onboarding system and conducting user-interview, exploring their attitudes towards the contextual gathering. There is also a need for a more general exploration of the development of onboarding systems and privacy concerns. As onboarding and personal data gathering becomes more and more prominent, we need to investigate the implications of impaired user-awareness in relation to this subject, without compromising the importance of user experience.

# 8. Bibliography

Acquisti, A., Adjerid, I., Balebako, R., Brandimarte, L., Cranor, L., Komanduri, S., Leon, P.,

Sadeh, N., Schaub, F., Sleeper, M., Wang, Y., & Wilson, S. (2017). Nudges for Privacy

and Security: Understanding and Assisting Users' Choices Online. *ACM Computing

Surveys*, *50*(3), 1–41. https://doi.org/10.1145/3054926

Brenner, W., & Uebernickel, F. (2016). *Design Thinking for Innovation: Research and Prac-

tice* (1st ed. 2016). Springer International Publishing AG.

https://doi.org/10.1007/978-3-319-26100-3

Brown, T., Katz, B., & Brown, T. (2009). *Change by design: How design thinking transforms

organizations and inspires innovation /* (1. ed.). Harper Business.

Bryman, A. (2016). *Social research methods /* (5. edition.). Oxford University Press.

Carlgren, L., Elmquist, M., & Rauth, I. (2014). Design Thinking: Exploring Values and Effects

from an Innovation Capability Perspective. *The Design Journal*, *17*(3), 403–423.

https://doi.org/10.2752/175630614X13982745783000

Carroll, J., & Carrithers, C. (1984). Training wheels in a user interface. *Communications of

the ACM*, *27*(8), 800–806. https://doi.org/10.1145/358198.358218

Carroll, J. M. (2014). Creating Minimalist Instruction. *International Journal of Designs for

Learning*, *5*(2). https://doi.org/10.14434/ijdl.v5i2.12887

Cascaes Cardoso, M. (2017). *The Onboarding Effect: Leveraging User Engagement and Re-

tention in Crowdsourcing Platforms*. 263–267.

https://doi.org/10.1145/3027063.3027128

Chenail, R. J. (2011). Ten steps for conceptualizing and conducting qualitative research stud-

ies in a pragmatically curious manner. *Qualitative Report*, *16*(6), 1713-.

Experience, W. L. in R.-B. U. (n.d.). *Mobile-App Onboarding: An Analysis of Components and Techniques*. Nielsen Norman Group. Retrieved 10 February 2021, from https://www.nngroup.com/articles/mobile-app-onboarding/

Holtzblatt, K., & Beyer, H. (2016). *Contextual Design: Design for Life*. Elsevier Science, Elsevier Science & Technology.

Jaspers, M. W. M. (2006). *The Think Aloud Method and User Interface Design* (pp. 597–602).

Justus J Randolph. (2009). A Guide to Writing the Dissertation Literature Review. *Practical Assessment, Research & Evaluation*, *14*(13), 1–13.

Liedtka, J. (2014). Innovative ways companies are using design thinking. *Strategy & Leadership*, *42*(2), 40–45. https://doi.org/10.1108/SL-01-2014-0004

Lim, Y.-K., Stolterman, E., & Tenenberg, J. (2008). The anatomy of prototypes: Prototypes as filters, prototypes as manifestations of design ideas. *ACM Transactions on Computer-Human Interaction*, *15*(2), 1–27. https://doi.org/10.1145/1375761.1375762

Löwgren, J., & Stolterman, E. (2007). *Thoughtful Interaction Design: A Design Perspective on Information Technology*. MIT Press.

Mackenzie, N., & Knipe, S. (2006). Research dilemmas: Paradigms, methods and methodology. *Issues in Educational Research*, *16*(2), 193–205.

Mahmoud-Jouini, S. B., Midler, C., & Silberzahn, P. (2016). Contributions of Design Thinking to Project Management in an Innovation Context. *Project Management Journal*, *47*(2), 144–156. https://doi.org/10.1002/pmj.21577

Nicolini, D. (2013). *Practice theory, work, and organization: An introduction /*. University Press.

Pårørende belastning. (n.d.). *Bedre Psykiatri*. Retrieved 6 May 2021, from https://bedrepsykiatri.dk/viden/paaroerende-belastning/

Petersen, F., Thomsen, L., Mirza-Babaei, P., & Drachen, A. (2017). *Evaluating the Onboard-*

*ing Phase of Free-toPlay Mobile Games: A Mixed-Method Approach*. 377–388.

https://doi.org/10.1145/3116595.3125499

Pian, Y., Lu, Y., Huang, Y., & Bittencourt, I. I. (2020). *A Gamified Solution to the Cold-Start*

*Problem of Intelligent Tutoring System* (pp. 376–381). Springer International Pub-

lishing. https://doi.org/10.1007/978-3-030-52240-7_68

Product Development & Management Association, Luchs, M., Swan, S., & Griffin, A. (2016).

*Design thinking: New product development essentials from the PDMA* (1st edition).

Wiley.

Renz, J., Staubitz, T., Pollack, J., & Meinel, C. (2014). *IMPROVING THE ONBOARDING USER*

*EXPERIENCE IN MOOCS.*.

Saffer, D. (2010). *Designing for interaction: Creating innovative applications and devices /*

(2. ed.). New Riders.

Sharp, H., Preece, J., & Rogers, Y. (2019). *Interaction Design: Beyond Human-Computer In-*

*teraction* (5th ed.). Wiley.

Simon, H. A. (1981). *The Sciences of the Artificial.* (Second edition.). The MIT Press.

Sinha, R., & Swearingen, K. (2002). *The role of transparency in recommender systems*. 830–

831. https://doi.org/10.1145/506443.506619

Strahm, B., Gray, C. M., & Vorvoreanu, M. (2018). *Generating Mobile Application Onboard-*

*ing Insights Through Minimalist Instruction*. 361–372.

https://doi.org/10.1145/3196709.3196727

van den Haak, M., De Jong, M., & Jan Schellens, P. (2003). Retrospective vs. concurrent

think-aloud protocols: Testing the usability of an online library catalogue. *Behaviour*

*& Information Technology*, *22*(5), 339–351.

https://doi.org/10.1080/0044929031000

Vermeeren, A., Law, E., Roto, V., Obrist, M., Hoonhout, J., & Väänänen-Vainio-Mattila, K.

(2010). *User experience evaluation methods: Current state and development needs*.

521–530. https://doi.org/10.1145/1868914.1868973

Vitale, J., Tonkin, M., Herse, S., Ojha, S., Clark, J., Williams, M.-A., Wang, X., & Judge, W.

(2018). *Be More Transparent and Users Will Like You: A Robot Privacy and User Ex-

perience Design Experiment*. 379–387. https://doi.org/10.1145/3171221.3171269

Wilson, K. M., Helton, W. S., & Wiggins, M. W. (2013). Cognitive engineering. *Wiley Interdis-

ciplinary Reviews. Cognitive Science*, *4*(1), 17–31. https://doi.org/10.1002/wcs.1204

Zichermann, G., & Cunningham, C. (2011). *Gamification by Design: Implementing Game Me-

chanics in Web and Mobile Apps.* O'Reilly Media.

Zviran, M. (2008). User's Perspectives on Privacy in Web-Based Applications. *The Journal of

Computer Information Systems*, *48*(4), 97–105.

https://doi.org/10.1080/08874417.2008.11646039