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Onboarding New Users for Initial Creation of Photo Book in Mobile Application

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Abstract

Photography holds great significance by capturing memories and sharing stories. Today, the average user has around 2,000 photos on their smartphone, many of which go unnoticed. Once Upon is a mobile application launched in 2017, where users can create photo books to collect their memories in a physical book. Observations and previous data from Once Upon show that new users encounter certain challenges when creating their first photo book with the application. This has sparked interest in exploring how onboarding can be used to help new users. Onboarding is a broad term that includes introducing users to a new product or service.

This study followed the Design Thinking process to create a prototype of an onboarding process that facilitates understanding for new users how to get started with creating their first photo book using the Once Upon mobile application. In the first phase, *Empathize*, research methods were conducted to identify how users interact with the Once Upon mobile application. The data was further analyzed in order to narrow down the topic and define the problems in the *Define* phase, employing methods such as personas, user flow diagrams and mind mapping. Subsequently, ideas began to be generated in the next phase, *Ideate*, where How Might We statements were formulated. These were utilized in two workshops for brainstorming, and then contributed to the initial sketching of different design proposals. The last two phases, *Prototype* and *Test*, were performed iteratively to produce prototypes and test them with usability testing.

It was observed that new users experienced some challenges when creating a photo book for the first time in the application. Among other things, they lacked inspiration, looked in the wrong place for certain functions or did not know how to start from scratch. With this, the focus was placed on the onboarding flow being about introducing users to creating their first photo book with the Once Upon mobile application. Different strategies and types of onboarding had been analyzed, and then some that were deemed suitable for the application were chosen to proceed with. During the tests of the prototypes, a flow was finally chosen that the participants appreciated the most. The result contributed to helping new users get started and get inspired to create their first photo book with the Once Upon mobile application, through the creation of a design proposal of an onboarding process.

Keywords
Onboarding, User experience, Photo book, Usability, Interaction design

Sammanfattning

Fotografi har stor betydelse genom att fånga minnen och dela berättelser. Idag har den genomsnittlige användaren omkring 2 000 foton på sin smartphone, varav många går obemärkta förbi. Once Upon är en mobilapplikation som lanserades 2017, där användare kan skapa fotoböcker för att på så sätt samla sina minnen i en fysisk bok. Observationer och tidigare data från Once Upon visar att nya användare stöter på vissa utmaningar när de skapar sin första fotobok med applikationen. Detta har väckt intresse för att utforska hur onboarding kan användas för att hjälpa nya användare. Onboarding är ett brett begrepp som innefattar att introducera användare till en ny produkt eller tjänst.

Denna studie följde Design Thinking-processen för att skapa en prototyp av en onboardingprocess som underlättar förståelsen för nya användare hur man kommer igång med att skapa sin första fotobok i Once Upon mobilapplikationen. I den första fasen, *Empathize*, genomfördes forskningsmetoder för att identifiera hur användare interagerar med mobilapplikationen Once Upon. Datan analyserades vidare för att i *Define*-fasen smalna av ämnet och definiera problemen med hjälp av metoder som personas, user flow-diagram och mind mapping. Därefter började idéer genereras i nästa fas, *Ideate*, där How Might We-frågeställningar formulerades. Dessa användes vid två workshops för brainstorming, och bidrog sedan till att börja skissa olika designförslag. De sista två faserna, *Prototype* och *Test*, utfördes iterativt för att ta fram prototyper och testa dessa med genom användbarhetstester.

Det observerades att nya användare upplevde en del utmaningar när de skulle skapa en fotobok för första gången i applikationen. Bland annat att de saknade inspiration, letade på fel ställe för vissa funktioner eller inte visste hur de skulle komma igång. Med detta lades fokuset på att onboardingflödet skulle handla om att introducera användarna inför att skapa sin första fotobok med Once Upon mobilapplikationen. Olika strategier och typer av onboarding hade analyserats, och därefter valdes några som ansågs lämpliga för applikationen att gå vidare med. Vid testerna av prototyperna valdes slutligen ett flöde som deltagarna uppskattade mest. Resultatet bidrog till att hjälpa nya användare att komma igång och få inspiration till att skapa sin första fotobok med Once Upon mobilapplikationen. Resultatet bidrog till att hjälpa nya användare att komma igång och bli inspirerade att skapa sin första fotobok med mobilappen Once Upon, genom framtagandet av ett designförslag för en onboardingprocess.

Nyckelord
Onboarding, Användarupplevelse, Fotobok, Användbarhet, Interaktionsdesign

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1 Introduction

The importance of photography is significant, as it provides people to capture memories, share their stories and record historical events [1]. Annually, an estimated 1.81 trillion photos are taken globally, which equals 57,000 photos every second [2]. Nowadays, most people take photos with their smartphones. In 2015, the typical user had an average of 630 photos on their mobile device. That has increased for 2023, where the typical user now has around 2,000 photos. A considerable number of photos exist within the mobile device, often unnoticed. Having photos digitally serves as a reliable backup, but on occasions spent in the company of others, a physical photo book is even more enjoyable [3].

Once Upon is a mobile application where users can create photo books. The idea of Once Upon was born after the founder Lina Andersson realized that despite all the photos she had on her phone, her third child did not have a single photo book [4]. Then the process started and in the fall of 2016 the application began to be developed, which was then launched in 2017. Information derived from Once Upon's data indicated that new users of the Once Upon application encountered challenges in creating their first photo book. That indicated that most instances of user defection occur primarily after the creation of the first initial spreads.

Embarking on a new experience, whether it involves exploring a new place or using an application for the first time, can be both exciting and discouraging. The challenge lies in ensuring that someone feels welcome and guided in this uncharted territory. Hosting a party parallels the process of developing an application with social components. It involves thoughtful consideration of the guests and the anticipation of the proceedings when they arrive [5, pp. 43–44]. Ensuring that guests feel a desire to attend, followed by feeling welcome and comfortable in the new environment, is of great importance. Furthermore, when creating an application the importance of welcoming the users and forming a positive first impression is significant, in order to establish a relationship between the user and the application. However, keeping the relationship with new users requires more than a warm welcome. It calls for helping users to discover value in what the application offers them. This process is called *Onboarding*.

The purpose of onboarding is to help new users get started with the application or product [5, p. 70]. All users engage in this process with the application, and accordingly the design is of great importance [6, pp. 9–10]. It may be perceived that the onboarding process only concerns initiating users to start using the product, but its importance is more significant than that [7]. The customer's relationship with the product and the company is formed in this process. By helping the users understand and experience the value of the product might increase the chances that they will continue using it. The goal of the onboarding process is to prepare customers for a long-term relationship with the product from the beginning. However, onboarding will not cover up a bad design [8].

Onboarding is the main concept of this thesis, where the Once Upon mobile application has been examined in order to investigate how new users can be introduced to creating their first photo book in the application. The aim was to reach out to potential users to understand how they interact with the application and identify potential challenges. The outcome of this study is a design proposal of an onboarding process for the Once Upon mobile application, with enhanced comprehension of the application for new users.

1.1 Objective

The aim of this study is to create a prototype of an onboarding process designed to assist new users in the initial stages of creating their first photo book using the Once Upon mobile application. This involves examining how new users interact with the application during the creation of a photo book to identify any challenges. The objective contributed to the formulation of two research questions, focusing on the Once Upon mobile application.

RQ1: How do new users interact with the Once Upon mobile application, and what are their needs and pain points?

RQ2: How can an onboarding process be designed for the Once Upon mobile application to facilitate for new users how to get started with creating their first photo book?

1.2 Limitations

This study had a one semester time limitation, so the entire Once Upon mobile application was not examined. Therefore, the focus of this study has been on the stage just after signing in to the application, the stage called “the first critical spreads” by the One Upon team. Once Upon is also available as a web application, but for this project, only the mobile application was examined. Furthermore, there are many different ways to create an onboarding for a mobile application. This project will therefore identify and analyze some of these that have been found well suited for this particular purpose.

2 Background

In this section, the collaboration partner of this master's thesis, Once Upon[1] company, is presented as well as data from previous studies at Once Upon.

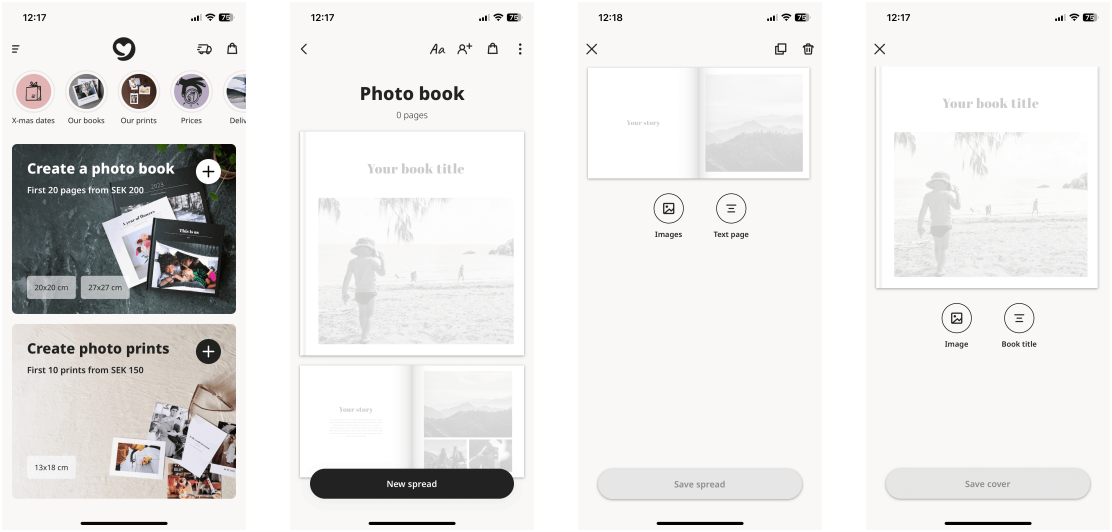
2.1 Once Upon

Once Upon mobile application was first launched in 2017. The purpose of the application is to help users to collect memories in a simple, stylish and sustainable way. According to Once Upon company, creating a photo book should be simple. Within their company, they engage in creating hypotheses about the expected outcomes in their work. In their pursuit for simplicity, they hypothesized that extensive tutorials and onboarding might imply that the product is overly advanced. They see this as evidence of a deficiency in their user experience (UX). The pursuit of simplicity has contributed to them avoiding working with onboarding, rather than examining it more closely. This has further contributed to them wanting to examine the UX of the onboarding process and investigate how this can be improved. The target group for Once Upon is very broad. They often mention today's parents as their target group, but the ages and their technical skills can vary. When a new user has downloaded Once Upon on their mobile and created an account, they are greeted by a start page, see Figure 2.1a. The user can then click on ”Create a photo book” and will enter the process of creating their own photo book and is presented an overview, see Figure 2.1b. To continue, Figure 2.1c shows the page where the user creates a new spread and Figure 2.1d is showing the page where the user can create the cover of the photo book.

2.2 Previous Research From Once Upon

Once Upon team has previously collected data from users of their application. This was done by an online survey sent out to users who had previously placed order at Once Upon. In total, the study received 840 responses. This data includes information about who their users are, how they experience the mobile application and the web application, as well as how satisfied they are as a customer. The data is divided into ”First-time customers” and ”Returning customers”. The following is a selection of what is considered relevant for this project.

[1] https://onceupon.photo/sv-se



(a) Landing page after creating an account.

(b) First page when creating a photo book.

(c) Creating a new spread.

(d) Creating the cover page

Figure 2.1: Screenshots from Once Upon mobile application (v. 4.4.2) [9].

2.2.1 First-Time Customers

Issues reported that first-time customers have when using the mobile app are:

- Struggling to understand how to use the app.
- Not seeing the first, automatically generated spread in the book view and not being able to remove/edit the spread.

Users' free-text comments show that first-time users overlook or fail at using some of the existing features. First-time customers using the mobile app fail at:

- Moving images from one spread to another.
- Moving a spread to another location in the book.
- Adding image captions
- Previewing their book(s)

2.2.2 Returning Customers

Users' free-text comments show that returning users overlook or fail at using some of the existing features. Returning users using the mobile app fail at:

- Adding image captions
- Creating a full-bleed layout across two pages

3 Theoretical Framework

This section contains the theoretical parts that are considered necessary for this study. Important concepts, such as *user experience*, *onboarding* and *first impression* are described, as well as *Design Thinking* which is the overall methodology used in the study. Furthermore, the majority of the research methods used and how they can be applied are described.

3.1 User Experience

User experience (UX) is about the user's interaction with a product [10]. This signifies that an application should possess a user-friendly interface, ensuring ease of comprehension, and for the navigation to be intuitive. Applying a proficient UX is crucial for acquiring new users and retaining existing ones, as it encourages users to interact with the product repeatedly. Conversely, a deficient UX may frustrate users, leading to errors and potentially prompting them to choose an alternative product. To achieve an exemplary UX, a requirement is that users should understand the design and achieve their purposes without difficulty [11]. Furthermore, simplicity and elegance are something that contribute to a smooth experience for the user.

3.2 Onboarding

Imagine starting a new job with no introduction on how to accomplish the work tasks. Most likely, that may lead to more difficulties and maybe leave after not that long [12]. Onboarding is about guiding and introducing individuals to something new. It is a well-known process in terms of new employees at a company and is the key to help the new employee succeed with its work. Onboarding includes the introduction of users to a new product or service and the process can be called *Product Onboarding* or *User Onboarding*. The processes are similar but have some differences. User onboarding is slightly broader and is more about UX, while product onboarding is more directed towards product experiences. It is about introducing to new users how the product works, how to navigate and how the core features of the product are supposed to be used [13, 14].

Onboarding can be useful in a mobile application to guide new users or introduce new features, but depending on the complexity of the app, the onboarding should not be too extensive. Joyce explains in the article [12] that they recommend spending more resources on the user interface (UI) instead of creating onboarding if it is possible. If the UX has flaws, it should not be hidden by more onboarding [8]. It requires that the application has a solid UX before the onboarding begins to develop further. Some reasons are that the interaction cost is higher [12]. More attention and effort may be required from users in an onboarding flow, and there is no guarantee that user performance will improve.

So, when can onboarding be necessary in a mobile application? In order to learn a new application, new users need time, but often a minimal amount of time. Many applications should prioritize allowing new users to learn the interface through usage, making the onboarding flow unnecessary. However, there are also some situations where onboarding is useful in a mobile application. For example, the application may contain important functions that are unique to it or are unfamiliar for the user given from typical standard UI patterns [12]. Testing the application on new users is an effective way to assess if they encounter difficulty understanding it. If this is the case, it may be considered to investigate whether something can be changed in the design to make it simpler. If not, an onboarding process is something that can be tested to see if it solves the problems. If it would facilitate the users more, it might be worth adding an onboarding to the UI.

3.2.1 Onboarding Components

An excellent way to use onboarding is to make users experience ”successful moments”, rather than performing different steps aimed at the business [6, p. 13]. In order to achieve this, different types of components, elements and/or strategies can be used. Common concepts within onboarding are feature promotion, customization and instructions [12].

Feature Promotion

Providing users with information about the application's functionalities can be achieved through feature based onboarding [12, 15, 16]. Feature promotion onboarding presents the value of the application and introduces the core features to the user. This can also be perceived as marketing and can instead be presented on the app store page. This type of onboarding should be avoided at first launch, as users usually have a reason for downloading the application. An exception to this is if a new function has been introduced or is advanced, but should be kept as brief as possible to avoid overwhelming new users when getting started. It is also beneficial to allow users the option to close this, enabling users who are familiar with the application to get started right away. Additionally, it allows users who prefer to explore the application themselves to do so immediately.

An example of how this can be used in a mobile application is to provide visual clues, through highlights for instance [12]. This example is not as useful when first launching the application, but it can be helpful for introducing existing users to the new features that are released. Furthermore, a first-look tour can be considered as a feature promotion onboarding, as it wants to communicate the value of the application for the new user rather than explaining how to use it [17].

Customization

It is common for applications to request user data in order to customize its user's experience [12]. This, for example, by letting each user customize their own content or visual design in the application. If this is something that makes sense to the business and is considered to help users achieve value with the application, then this is something worth including [16]. However,

when it comes to letting users customize their experience the saying “less is more” is valid and if the customization does not provide value, it is unnecessary. Some parts of customization do not belong in the onboarding [12]. When it comes to visual-design customization, it can be difficult for users to decide how they prefer the application to look before using it.

Content customization may be more appropriate when it comes to initial application onboarding. This may involve allowing the user to select their primary goal or role with the application. The aim is to understand and present the most relevant features of the application to respective users [12, 16]. An example could be that in a language-learning app, the choice of a language and identification around the skill can be essential for the application’s usability. The prompt that users can customize their experience should be brief and the reason for collecting data and how it will be used should be explained. Where and why the data is collected should be explained as well as how it will be used.

Instructions

The purpose of instructional onboarding is to educate users on the usage of an interface and should be the main part of the onboarding [12, 16]. However, it is important to note that this should be used to enhance the user’s learning experience by complementing well-designed interfaces. There are several different forms of instructional onboarding, but regardless of the form, these should be optional, brief and only highlight the minimum of what the users need in order to use the application. Following are some examples,

- **Deck-of-cards tutorials**: When the application is launched, these are often presented immediately [12]. Instructions are given for how to use the interface through deck-or-cards format. These strain the user’s memory and tend to make the interface in simpler mobile applications appear more complicated than it is. A highly visible Skip option should be included, and the cards should focus on what is most necessary for the user. Furthermore, the cards should focus on one concept each.

- **Instructional overlays**: This type of instructional onboarding is about showing users where important functions are in the user interface and what the results of them are. Ensure that the content of instructional overlays is timely (like first encounter of a function for the user) and is unobtrusive. When a user is attempting to complete a task for the first time, this type of onboarding is an excellent choice. As the user progresses, additional information is provided as needed.

- **Interactive walkthroughs**: For an application that can be perceived as somewhat more complex, where the user requires additional instructions to understand the new design or environment, interactive walkthroughs are effective to use. They are about letting users learn by doing and are perceived more like a training session than a tutorial. Usually, these walkthroughs involve the user performing tasks or making certain choices through the process [18].

- **Tooltips / Popup tips**: These are brief and informative user-triggered messages that pro-

vide additional information to the user about an element or function in the application [19, 16]. If the user needs more help or clarification, that information is just a click away. Tooltips are mainly limited to computer screens, but popup tips are a sister element that are more common on touchscreen devices. If the information is necessary for the user in order to complete a task, then it should be presented on the screen. If not, the information can be placed inside a tip.

- **Lightboxes**: These can also be called a ”pop-up” or a ”modal”, and is a message in the application where the rest of the screen is dimmed or darkened to highlight the content [16]. For important messages where a confirmation is required, this type of message is the best.

3.3 First Impression

The expression *”Never Judge A Book by Its Cover”* means that no one should judge someone just by the outside appearance, because it does not indicate the full value [20]. However, this is something individuals do, as the first impression is something that affects users' perception of people, products and applications [21]. Before a user buys or starts using a product, the first impression is formed [22]. Based on a user's first impression of an application, the perception is influenced by its credibility, usability and aesthetics [21]. Knowing what users appreciate is something that might be difficult to know, unless them being asked. Investigating users' first impression of the design through tests is something that is considered important. The first seconds that the user interacts with the design can be decisive in determining whether the design meets the requirements. Studies have shown that users form their first impression very quickly when looking at an application or website [23, pp. 115–126][24, pp. 31–40]. This will contribute to first time users deciding if they want to continue use the application or not [25, 26]. Although a decision in such short time may sound harshly, it is usually the time where the UX is shaped, and users perceive how user-friendly the application is. The importance of first impression is confirmed by the fact that about one of four users will discontinue using a mobile application after just one single use [8].

3.4 Nielsen's 10 Heuristics

Nielsen's 10 usability heuristics are a set of general principles in interaction design for evaluating and improving the user interface of digital products and systems [27]. These are called heuristics as they are not specific guidelines, but more broad rules of thumb for usability. Introduced by Jakob Nielsen and Rolf Molich in 1990, these heuristics are widely used in the field of usability and UX design [28]. The ten heuristics that are known today were refined by Nielsen in 1994.

Nielsen's 10 usability heuristics are as follows,

1. **Visibility of system status**: Users should be informed about what is happening in the system by providing clear feedback

2. **Match between system and real world**: The system should be designed to align with users' expectations by using their language, incorporating familiar words, phrases, and concepts, and presenting information in an order that is natural and logical.

3. **User control and freedom**: Provide users with an "emergency exit" that allows them to quickly and easily undo actions or exit undesirable states.

4. **Consistency and standards**: Ensure consistency throughout the application, aligning with established conventions and industry standards to minimize user confusion.

5. **Error prevention**: Prioritize on preventing errors before they happen. It is important to have effective error messages, but more important to prevent the occurrence of problems.

6. **Recognition rather than recall**: Making the UX simplified by making everything visible and easily accessible, reducing the need for users to recall information or actions.

7. **Flexibility and efficiency of use**: Design the system to cater both beginners and experts. Offering intuitive navigation for beginners while providing shortcuts for experienced users.

8. **Aesthetic and minimalist design**: Eliminating irrelevant information and enhancing the visual appearance to simplify the interface by prioritizing content.

9. **Help users recognize, diagnose, and recover from errors**: Use plain language in error messages to clearly indicate the problem and help the user know how to proceed when interruptions occur.

10. **Help and documentation**: The need for additional explanations within the system should be minimized. Comprehensive documentation and help guides should still be provided to assist users in completing their tasks when necessary.

3.5 Design Thinking

Design thinking is an iterative process focused on the comprehensive understanding of user needs and generating innovative solutions [29]. The process is illustrated in Figure 3.1. Design thinking contains six phases: *Empathize*, *Define*, *Ideate*, *Prototype*, *Test* and *Implement*. The *Implement* phase was not conducted for this thesis and is therefore not explained.

Empathize: This phase focuses on conducting information from the users, with the goal to empathize with the users and their perspective by gathering enough data. This involves research methods such as user surveys, interviews or observations to develop a sense of empathy for the target users.

Define: After gathering data in the *Empathize* phase, this phase focuses on compiling the data from the users and identifying possible problem areas and opportunities for improvement.

Ideate: Ideation is a creative phase where ideas are generated. This involves brainstorming and sketching ideas based on the user needs that were identified in the Define-phase.

Prototype: Following the generation of creative ideas during the *Ideate* phase, the subsequent step involves creating prototypes based on the ideas. This involves all from paper prototypes to interactive mock-ups.

Test: The prototypes are tested during the process, in order to get feedback from users. The purpose is to investigate whether the needs of the users are being met and how to proceed.

Figure 3.1: Illustration of the design thinking process, based on a model by Nielsen Norman Group [29].

3.6 Research Methods

The study followed the design thinking process, which is explained in Section *3.5 Design Thinking*. This process includes different phases, each incorporating research methods to collect relevant data.

3.6.1 Online Survey

A survey is well-written questions that are asked to users, and is one of the most common research methods [30, pp. 105–108]. A strength of this method is that it is possible to get a large number of responses from different types of users. Creating a survey does not require advanced tools. It can be easily constructed using already existing online tools or with paper and pencil. Conducting a survey is one of the easiest methods to use and contributes to relatively quickly understanding the ”big picture” of what is being investigated. People are considered to offer a higher incentive to participate in other research methods compared to surveys. Thus, a major challenge when it comes to surveys is to ensure a sufficient response rate.

The survey questions are significant in a survey [30, pp. 119–120]. The questions must be well-written, unbiased, and through pilot testing examine whether they answer what is requested. Survey questions are either structured as *open-ended questions* or *closed-ended questions*. Open-ended questions give the respondents flexibility in their answers, which can result in better understanding. However, the questions can lead to answers that do not help further, and therefore it is important that they are formulated carefully. The answers also require a more complex data analysis, which is also why the wording is important. Closed-ended questions can be defined as two different types, where the difference is that one has ordered response categories and the

other does not. Ordered response is about using a number of answers where the answer options follow a logical order, for example likert scale questions where the user can choose between, for instance, one to five. Usually the respondent can only choose one answer option. Unordered response, in contrast, allows for choices without a logical order.

3.6.2 Usability Testing

Usability testing is a research method with the purpose of researching an interface, to find out how to improve it and confirm what in the design is working [30, pp. 263–265]. It usually involves having users, representative of the target audience, performing tasks relevant to the intended use of early prototypes or functional versions of an interface. Usability testing is a broad term including testing paper prototypes, screen layouts with no or some functionality or even already launched software. The screen layouts are usually for mobile devices and desktops, in their various forms. The common goal of the various approaches to usability testing is to enhance the quality of an interface by identifying its flaws. An interface flaw can be explained as some component that a majority of the users find confusing or misleading. However, it is as important to identify successful aspects of the interface, in order to maintain those features.

Typically, the facilitator leads the participant through the usability testing process by providing instructions, answering questions and asking follow-up questions to the participant [31]. The number of participants in usability testing can vary depending on the project size and budget constraints. For projects with a limited budget, two users may be enough, while others may require more. However, it has been tested that the optimal number of users for usability testing for most projects is five people, and that the tests should be as small as the study can afford [32, 33]. Thus, Nielsen recommends using five participants.

3.6.3 Heuristic Evaluation

A heuristic evaluation is a research method used to identify problems with the design of a user interface, UI [34, 35]. In order to conduct a heuristic evaluation, a team of evaluators are assembled and a set of recognized usability principles or heuristics are defined. Moran and Gordon [34] recommend using Jakob Nielsen's 10 usability heuristics to perform the evaluation, as they are based on an understanding of human behavior, psychology, and information processing. They are described in Section *3.4 Nielsen's 10 Heuristics*. Thereafter, each evaluator independently evaluates the interface and focuses on each heuristic at a time while taking notes. When all evaluators are done, the findings are compiled in order to discuss and understand the identified issues.

Nielsen states that a heuristic evaluation by only one evaluator might be difficult, but it has been shown that different people find different problems [35]. This makes it possible to get more out of this method if it is performed by several evaluators. The evaluation should ideally be conducted by three to five people, where the same interface is evaluated by them all [34]. The evaluation is a valuable tool for identifying usability problems and enhancing the UX. It does not replace user research, but serves as a helpful complement.

3.6.4 Persona

A persona can be explained as a fictional presentation of a typical user of the product, described as if it is a real person [36]. The persona should include information about its needs, challenges, goals and personal background, such as age, gender, occupation. It does not have to include every detail of the fictional person's life, instead focus on the characteristics that influence the design and the problem. User research should be the base for the creation of a persona that represents the target user of the product [36].

3.6.5 User Flow Diagram

User Flow Diagrams can be used to develop the UX [37]. It describes how a user can integrate with the website or application through a step-by-step visualization of a task or goal with the product. The purpose of a user flow diagram within UX is to investigate how the interaction in the product can be optimized after user needs have been defined. It visually shows relationships between the functionality of the website or application. Furthermore, the user flow diagram also helps with explaining how the product works and where different functions are located. Understanding how a user interacts with a product helps improve the UX [38]. Before the user flow diagram is created, it should be defined what the user will accomplish [37].

Common flowchart symbols in a user flow diagram are as follows,

- **Oval**: It symbolizes the start or endpoint.
- **Rectangle**: This symbol is the most frequently used symbol. It symbolizes the steps.
- **Diamond**: This symbolizes a decision in the flow diagram. Typically, the flow diagram is split using arrows.
- **Arrow**: It symbolizes the flow direction and is, as the rectangle, a frequently used symbol in a user flow diagram.

An example of a user flow diagram can look like is shown in figure 3.2.

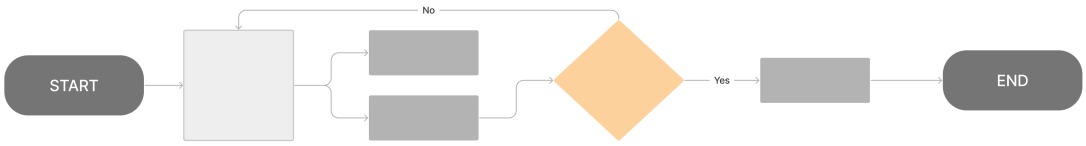


Figure 3.2: Example of a user flow diagram.

3.6.6 Mind Mapping

Mind mapping is an easy method for brainstorming or gathering ideas or data in an organic way, without thinking about order and structure. It offers an opportunity to visually organize all ideas, which contributes to improving analyzing data [39]. The foundation of a mind map is a central topic where the data is built around it, by making topics and subtopics as branches [40, 41]. When the central topic has been defined, the first-level topics are being added. These can be seen as topics that relate to the central topic. These are then expanded through subtopics and so on. This can be expanded as much as desired by adding more branches for each topic and subtopic. It is recommended to use keywords in a mind map instead of longer sentences. This helps to ensure that important information is not lost among all the words. It is also seen as helpful by adding images, illustrations or icons in the mind map.

An example of how a mind map can look like is shown in figure 3.3.

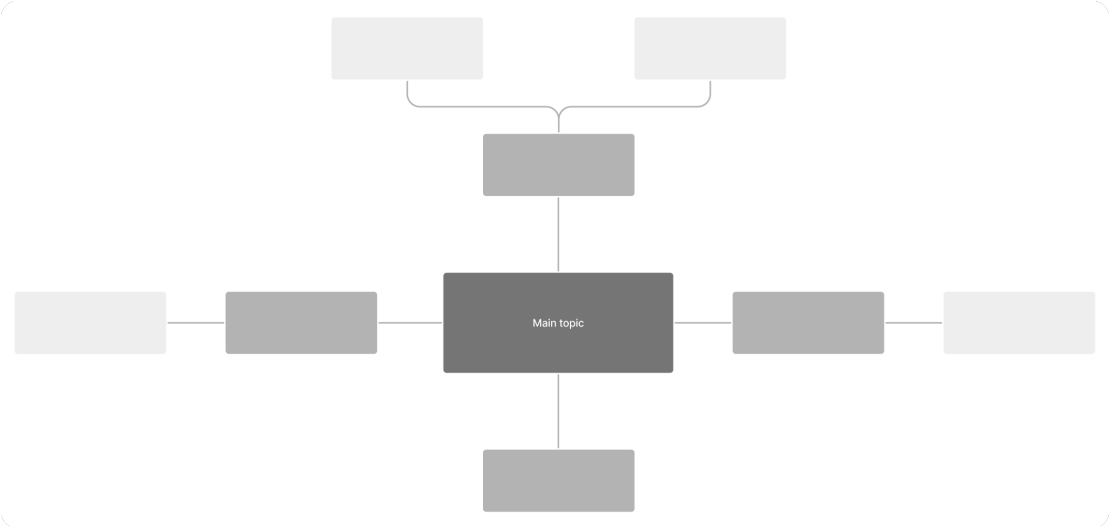


Figure 3.3: Example of a mind map.

4 Methodology

This study followed the design thinking methodology, using the first five phases *Empathize*, *Define*, *Ideate*, *Prototype*, and *Test*, described in Section 3.5 Design Thinking. Figure 4.1 shows the different phases with the research methods used in each phase. Since this is an iterative process, the phases have been used repeatedly, allowing for continuous refinement and improvement.

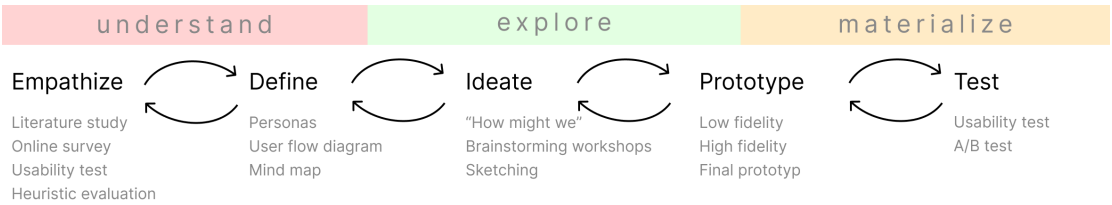


Figure 4.1: Illustration of how design thinking process have been used, based on a model by Nielsen Norman Group [29].

4.1 Empathize

The *Empathize* phase began with a literature study, aimed at gathering information for the theoretical section of the report and gaining knowledge for the subsequently designed online survey and usability test. The online survey was constructed to collect data on users' previous experiences of creating a customized product and their opinions regarding onboarding strategies. Additionally, usability testing and two heuristic evaluations were carried out during this phase.

4.1.1 Literature Study

To find relevant articles and books for the literature study, various scholarly resources were consulted, including Umeå University Library, Google Scholar, and Nielsen Norman Group. Specific keywords that were used when searching were *'onboarding'*, *'onboarding studies'*, *'onboarding app'*, *'first impression'*, *'product onboarding'*, *'user onboarding'*, *'user experience'*, *'onboarding mobile app'*. The findings of the literature study are mainly presented in Chapter *3 Theoretical Framework*, but also in other relevant sections throughout this report.

4.1.2 Online Survey

An online survey was created using Google Forms and shared on social channels, including LinkedIn and Facebook, to reach respondents. The survey was initially drafted, then reviewed by a user researcher at Once Upon. After incorporating feedback, the questions were revised, and a pilot test was conducted to ensure the survey would fulfill its purpose and goals. The survey was presented in English, with participants given the option to respond in both English and

Swedish. The questions can be found in Appendix A. Questions about respondents' past experiences were open-ended, while the question about appreciated features when creating products were closed-ended, offering predefined options. Respondents also had the option to provide their own responses. The survey targeted individuals who had previously created a customized product (such as a photo book, clothing, or home decor) using an online service.

The purpose of the survey was to gather data from users' perspectives on various onboarding components and methodologies, as well as their experiences of creating a customized product with an online service. The goal was to enhance the process of problem identification, drawing on previous research from Once Upon, as presented in Section *2.2 Previous Research From Once Upon*. The survey received a total of 14 responses.

4.1.3 Usability Testing of Once Upon Mobile Application

A usability test was designed to reveal how new users interact with Once Upon mobile application and understand their first impressions of the application. The test was performed by five participants with no prior experience of the application. The test script underwent multiple revisions, starting with the creation of a first draft that was then reviewed by a user researcher at Once Upon. After receiving feedback, the test was refined, and a pilot test was conducted to ensure it would effectively achieve its goals. The goal was to identify any challenges users faced in locating specific functions and to gain a deeper understanding of how new users' interacts with the interface. The test included tasks related to the Once Upon mobile application and was concluded with open-ended questions. It was conducted in Swedish through physical meetings. The script, tasks, and questions can be found in Appendix B. The findings from the test contributed to answering the first research question, see RQ1 in Section *1.1 Objective*.

In order to spare participants from the necessity of creating an account with their personal email, a temporary email was generated using a ten-minute email [1]. Participants were required to download the application onto their own phones, with the purpose of ensuring their comfort with the navigation environment. After some introductory questions, participants were given the task of creating a photo book. During this process, observations were made regarding the functions utilized by the participants. Additional tasks were thereafter assigned based on the user's actions during photo book creation. Tasks included in Appendix B were omitted to avoid repetition for the participants. Only tasks related to functions missed during the initial creation were asked before the final questions. Each test session lasted approximately 20 minutes, during which notes were taken while participants answered questions and performed tasks.

[1] https://10minemail.com/en

4.1.4 Heuristic Evaluation

Two heuristic evaluations were conducted with the aim of providing valuable insights into usability and contributed to inspiration and ideas for improvements for Once Upon. The mobile applications evaluated were **Popsa**[2] and **Journi Print**[3]. These applications, like Once Upon, allow users to create customized products, making them relevant to this study. Additionally, both Popsa and Journi Print offer the creation of photo books, and this specific task was evaluated in each application. The evaluation focused on the parts relevant to onboarding and the usage of the applications as a new user, using Nielsen's 10 heuristics as described in Section *3.4 Nielsen's 10 Heuristics*. When conducting the two evaluations, a workbook provided by Nielsen Norman Group served as inspiration [42]. During the evaluations, general observations for each heuristic were documented. The observations included issues as well as aspects considered enjoyable and satisfactory about the application. The result contributed to answering RQ2, see Section *1.1 Objective*.

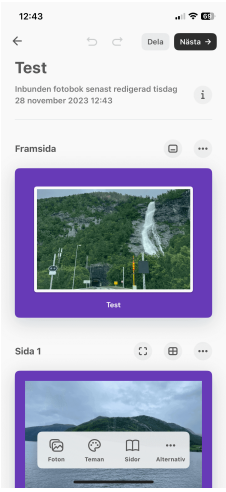


Figure 4.2: Screenshot from Popsa mobile application (v. 8.21.0) [43]

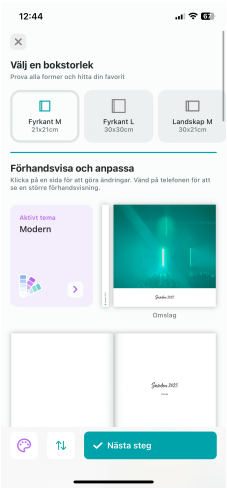


Figure 4.3: Screenshot from Journi Print mobile application (v. 1.69.0) [44]

4.2 Define

The literature study, survey responses, and usability testing of the Once Upon mobile application contributed to identifying problem areas and areas of improvement. The goal of the *Define* phase was to define the target users and identify problems by creating personas, a user flow diagram, and a mind map.

[2]https://popsa.com/
[3]https://www.journiapp.com/sv

4.2.1 Personas

The results from the online survey and usability testing gave valuable insight into the Once Upon user base. Additionally, discussions with Once Upon about the target group were made in order to further define the target users. By compiling and analyzing the results, the typical users could be defined through the creation of three different personas.The purpose of creating personas was to establish a clear understanding of the typical user and the needs, desire and knowledge they got. Working with personas opens the possibility of using them as a point of reference through the development process. The personas ensured continuous involvement of the target users in later research methods and subsequently in the creation of prototypes. Each persona represented a fictional person who could be a user of the Once Upon mobile application. They include personal information, characteristics, interests and hobbies, goals and dreams, pain points and a biography.

4.2.2 User Flow Diagram

A user flow diagram was produced to map how a user can create a photo book for the first time with the Once Upon mobile application. It was limited to the flow between the user creating an account and adding their book to the cart. It includes all the functions and where the user can find them. A user can create a photo book in many different ways, using their choices of functions and in their own order. Therefore, the user flow diagram includes all features and does not have to be done in a specific order. The user flow diagram was created by analyzing the Once Upon mobile application and identifying where the functions were placed.

4.2.3 Mind Mapping

A mind map was created with the aim of identifying overall difficulties for new users when using the Once Upon mobile application for the first time. To achieve this, the results from usability testing were analyzed to investigate the problems participants encountered when using the application. It took into account the functions they had difficulty finding and the errors they made while performing tasks. Furthermore, the online survey was examined, specifically focusing on respondents' previous experiences with Once Upon. This provided a solid foundation for creating the mind map. Building the mind map started by defining a general topic placed in the center of the map. From the collected data, short sentences and words related to the general subject were analyzed and arranged into groups that formed branches outgoing from the general topic in the center of the map. These branches were then further built on with additional details, and to clarify certain functionality it was also chosen to include images from the application.

4.3 Ideate

The *Ideate* phase began by formulating *"How Might We"* (HMW) statements, which were derived from the problem and improvement areas identified by users in the previous phase. Thereafter, various ideas were generated during two brainstorming workshops involving different participants. The outcomes of these two workshops were then summarized, and some sketches were

created to carry forward when creating the prototypes.

4.3.1 ”How Might We” Statements

HMW statements are used to generate creative ideas and solutions to problems. Their formulation centers on understanding users' problems and needs, rather than directly solving the problem [45, 46]. Given from the problems and difficulties that users experienced in the *Empathize* phase, and the mind map that was created in the *Define* phase to summarize this, see Section *5.2.3 Mind Mapping*, four HMW statements were created. These statements were questions with the aim of generating ideas for potential solutions. Initially, numerous questions were generated to explore various aspects of the issues that were examined in this study. These questions underwent several rounds of revision to ensure accurate formulation, as the wording of HMW questions is a crucial aspect. The goal of HMW was to contribute to the idea generation of different solutions or suggestions for improvements that would benefit this study.

4.3.2 Brainstorming Workshops

Two workshops were conducted, with the purpose of brainstorming ideas together with individuals possessing different skills. The first workshop involved the product designers of Once Upon to gather their thoughts and ideas. The second workshop was conducted with last year students from the Master of Science in Interaction Technology & Design program (ID) at Umeå University to utilize their knowledge and expertise and to collect ideas from individuals not associated with the Once Upon team. Both workshops were based on the four HMW statements that were created, see Section *5.3.1 ”How Might We” Statements*. They were conducted digitally using the tool Miro[4] and each workshop lasted approximately 45 minutes.

Product Designers at Once Upon

A total of five product designers from Once Upon participated in the workshop. The workshop started by the participants writing a short introduction about themselves. After that, a HMW statement was given where the participants had to generate ideas and thoughts in eight minutes by writing them on sticky notes in the Miro workspace. This was repeated for each HMW statement. Figure 4.4 provides an overview of the workspace from the workshop in Miro.

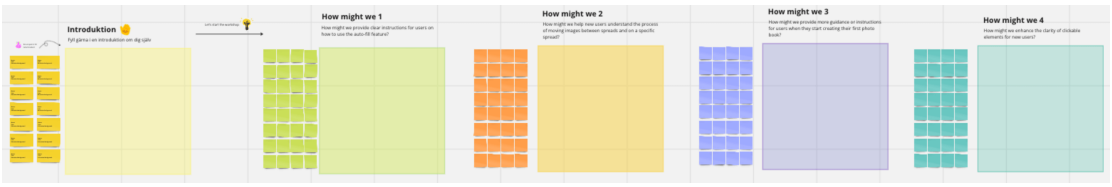


Figure 4.4: Overview of workspace in Miro from workshop with Once Upon product designers.

[4]https://miro.com/

Interaction Technology and Design Students

A total of five Interaction Technology and Design students participated in the workshop. It began with the participants writing a short introduction about themselves. Unlike the workshop for product designers, the user flow diagram was thereafter introduced, see Section *5.2.2 User Flow Diagram*, for the students to provide them with a more comprehensive understanding of the application and its functionalities. Before each HMW statement a brief introduction to the identified problems was presented. Then, the participants were assigned the task of generating ideas and thoughts in eight minutes by writing them on sticky notes in the Miro workspace. Figure 4.5 shows an overview of the workspace from the workshop in Miro. This process was repeated for each HMW question.

Figure 4.5: Overview of workspace in Miro from workshop with last year students from the Master of Science in Interaction Technology and Design program.

4.3.3 Sketching

The ideas generated in the two workshops served as the foundation for initiating the sketching of ideas before moving on to create prototypes. This involved expressing thoughts and suggestions based on the results so far through written text and sketches. Sketching is a valuable approach to first attack the design problems in UX [47]. The sketches were made using paper and pencil and resulted in three concepts of how a new user could get started with their first photo book using the Once Upon mobile application. Three concepts of sketches were chosen to proceed with to continue producing prototypes through digital tools. They were build using different components described in Section *3.2.1 Onboarding Components*, and from the result in the online survey, see Section *5.1.1 Online Survey*. Results from the usability testing of the current Once Upon mobile application, see Section *5.1.2 Usability Test of Once Upon Mobile Application*, also contributed to these concepts.

4.4 Prototype

This phase began with the creation of low-fidelity (lo-fi) prototypes based on the sketches and ideas from the *Ideate* phase. These prototypes were tested and refined during the creation process, leading to the creation of a high-fidelity (hi-fi) prototype. The software program used for both the lo-fi and hi-fi prototypes was Sketch[5]. Sketch is the primary tool Once Upon employs in product design, containing all graphics, components and elements. Therefore it was a natural choice to use Sketch for creating the prototypes.

[5]https://www.sketch.com/

4.4.1 Low-Fidelity Prototype

After choosing three concepts from the sketches and analyzing the generated ideas, the subsequent step was to create lo-fi prototypes. By creating the three concepts chosen when sketching, the lo-fi prototypes were created for how a user could get started with their initial photobook using the Once Upon mobile application. In addition to the three concepts, a proposal was drawn up on how the overview view could be changed. In Once Upon today, there is a blank new spread for the user to click on directly.

4.4.2 High-Fidelity Prototype

After performing usability testing on the three lo-fi concepts, the results were analyzed and a concept was chosen based on the participants' opinions, see Section *4.5.1 Usability Testing of Low-Fidelity Prototype*. Changes were made based on the users' experiences with the lo-fi prototype. When working on hi-fi prototype, the result from the two workshops, see Section *5.3.2 Brainstorm Workshops*, were further analyzed to iteratively work with how the content and design could look on the prototypes. The Once Upon graphical profile was applied using the help of the components provided in Sketch. Unlike the lo-fi prototypes, hi-fi prototypes look more like the final product [48].

4.5 Test

The lo-fi and hi-fi prototypes were tested on users for evaluation during the process. The purpose of the tests was to determine which solutions worked best and if they had solved the identified problems. Firstly, usability testing was conducted on the three concepts of lo-fi prototypes. The result contributed to one concept of an hi-fi prototype, which was finally tested with usability testing to gather the users' opinions about the design and content. The findings contributed to answering the second research question, see RQ2 in Section *1.1 Objective*.

4.5.1 Usability Testing of Low-Fidelity Prototype

Three different concepts of lo-fi prototypes were produced for how a user can get started when creating their first photo book using the Once Upon mobile application. In order to examine how the three concepts were appreciated by the users, a usability test was constructed. The first draft of the test was reviewed by a product designer at Once Upon, and thereafter underwent some revisions based on the feedback. A pilot test was then conducted before four usability tests were performed. The participants were potential users of different ages. The purpose of the test was to see how users perceived the three concepts of the lo-fi prototypes, as well as to investigate which one was the most appreciated.

After the introductory questions, the participant had the opportunity to test the three concepts and provide feedback. The concepts were presented to participants in random order to ensure an unbiased first impression and ensure their prior experience to be unaffected. Each test session lasted approximately 20 minutes, during which notes were taken while participants performed

the tasks and answered questions. The tests were conducted both in person and remote, depending on the participants location. The participants were presented the concepts on a computer screen with the opportunity to express where to click, either in person or via screen sharing during remote sessions. The script, tasks and questions are presented in Appendix E.

4.5.2 Usability Testing of High-Fidelity Prototype

Following the results obtained from the usability test of the lo-fi prototypes, one concept was selected for the creation of a hi-fi prototype, see Section *4.5.1 Usability Testing of Low-Fidelity Prototype*. After a hi-fi prototype was produced, it was tested with usability testing. Like the previous usability testing carried out in this study, a first draft was created and the test was reviewed by a user researcher at Once Upon. It was revised after feedback and then a pilot test was preceded before five usability tests were performed on potential users of different ages. The purpose of this test was to examine how the participants perceived the content and design of the content.

The participant was given the opportunity to go through the flow of the hi-fi prototype. Afterwards, questions were asked about their feelings, opinions and how the hi-fi prototype was perceived. Each test session lasted approximately five to ten minutes and was conducted in person. The participants were presented the prototype on a computer screen with the opportunity to express where to click. The script, tasks and questions can be read in Appendix F.

5 Results

The results of the study across all phases of the design thinking process are presented in this section. *Empathize* resulted in the collection of users' past experiences and interaction with the current Once Upon mobile application. Two similar applications were evaluated, to identify key points based on Nielsen's 10 heuristics, as described in Section *3.4 Nielsen's 10 Heuristics*. The *Define* phase involved defining the users, identifying challenges and mapping the process of creating a photo book for the first time with the application. Ideas were generated in the *Ideate* phase, contributing to the creation of prototypes. These prototypes underwent iterative creation, testing and refinement in the last two phases *Prototype* and *Test*.

5.1 Empathize

This section contains the result of the research methods used in the *Empathize* phase. This includes an online survey, usability testing of the current Once Upon mobile application and heuristic evaluation on two applications.

5.1.1 Online Survey

The user data of the 14 respondents is presented in Table 5.1. All respondents had previously created customized products using an online service. Examples of items they had created include a photo book, photo calendar, clothes, and home decor. The applications they had used and what was found helpful are presented in Table 5.2, while applications where they encountered challenges are presented in Table 5.3. Additionally, respondents provided examples of other general applications they found easy to understand or challenging when used for the first time. This data was collected to help the Once Upon team to gain insights into other applications to consider in future work. It is presented in Appendix A in Section *A.2 Results*.

Table 5.1: User data of respondents in the usability test.

Age		**Gender**		**Lives**	
20-29	28.6%	Female	57.1%	Sweden	85.7%
30-39	7.1%	Male	42.9%	UK	7.1%
50+	14.3%			Kosovo	7.1%

Table 5.2: Applications with motivations of why they were found helpful.

Application	**Motivation**
Once Upon	Easy to get different designs on how the images could be placed. For example, one large image or three small ones. Also easy to make headlines with subtitles. The preview of the book was found helpful. It was considered smooth when putting in the pictures, everything is even and organized.
Önskefoto	On the web application, guides / snap-to-grid functionality was considered helpful. In general, libraries over page layout, sorted by number of images, and being able to customize a lot were appreciated.
Funky Pigeon	Photo upload and image quality checker was seen as helpful. Also the different styles, templates or layouts.
Tailor Store	Web application was found very helpful and supportive throughout the process. It was seen as very structured with step by step instructions.
Hat Store	The Hat Stores website worked fine for one user's needs and found the process very intuitive. The service immediately showed what to do.
Desenio	Easy to understand with a good layout.
Moonpig	Easy to use.

Table 5.3: Applications with motivations of why they were found difficult.

Application	**Motivation**
Once Upon	Difficult to add captions to the images, and the auto layout was not enjoyable. Additionally, it was found frustrating when placing one portrait photo on one page and one landscape photo on the other page, the portrait photo automatically assumes the same height as the landscape photo, resulting in appearing very small.
Önskefoto	Placing images correctly and getting the file format right was found challenging. Users had to crop images for desired sizes manually, leading to skewed images occasionally and size variation. Users preferred automatic fitting by default, with the option to crop and adjust afterwards. It was not possible to place images freehand on the mobile application. Only templates could be used.
Funky Pigeon	Hard to navigate.

One question in the survey presented the respondents with various examples, asking them to choose the option(s) they would appreciate when creating a customized product with a new online service for the first time. The most popular choice was *"Pop-up with tips"* selected by over 80%, followed by *"Animations on relevant functions to show where they are"* with 67% and *"Text guides"* with 58%. The detailed results are presented in Table 5.4.

Table 5.4: Result of the multiple choice question regarding onboarding methods

Choice	**Votes**	**Percentage**
Pop-up with tips	10	83.3%
Animations on relevant functions to show where they are	8	66.7%
Text guides	7	58.3%
Video tutorials	6	41.7%
Product overview that shows a briefing of the functions in the application	6	41.7%
Nothing, I want to learn all by myself	3	8.3%
Mandatory tasks before start	1	8.3%
Other: It needs to be an option to have the "help"	1	8.3%
Other: Hovering over functions shows what they do, kind of like in Photoshop	1	8.3%

Many respondents emphasized the importance of a simple and intuitive process, saying that the service should be self-explanatory within the first few seconds. There was also a request for the ability to download images into a library for further use, such as when creating a photo book. Additionally, one proposed allowing users to test the application by performing tasks to identify potential challenges or issues.

5.1.2 Usability Test of Once Upon Mobile Application

The five usability tests of the current Once Upon mobile application provided valuable insights into how new users interact and experience the application, aiming to identify potential challenges and issues. User data of the participants is shown in Table 5.5.

Table 5.5: User data of participants in the usability testing of the current Once Upon mobile application.

Age	**Gender**	**Children**
22	Female	No
23	Female	No
24	Male	No
48	Female	Yes
53	Female	Yes

The participants were required to register with a temporary email and then proceed to the first page of the application. When asked about their thoughts on the page, they expressed clarity regarding the navigation for creating a photo book. However, some felt that the layout was a bit boring and suggested that prices and other product information should be more accessible. They said that they directly looked at ”Create photo book” and not at the clickable circles at the top of the page, see screenshots in Section *2.1 Once Upon* in Figure 2.1a. One participant found it distracting that a 20% discount took up the most space on the page. Also, that the horizontal scrollbar of the clickable circles was a bit unclear, suggesting using a different color for improving visibility.

All participants immediately understood how to proceed with creating the photo book from the first page. One participant perceived that there were two options to get started: either clicking on the *Plus* button or selecting the size of the book from the interface, which contained information about the available sizes. However, it was not possible to choose the desired size of the book on this page. When the participants entered the first page to begin creating the photo book, they were asked what their impressions were. Slightly different answers were given. Two participants believed that the *New spread* button was the initial step, with one expressing uncertainty about how to get started. That participant considered that it was not possible to click anywhere else but only on the buttons and at the top of the menu. One participant could not decide whether they liked the various layouts presented, as it could be perceived as unclear. The participant further noted that buttons without current functionality should be disabled until they can be used in the photo book, such as *Aa* on the top bar that only changes headings if they exist in the book.

After this, the participants were asked to create a photo book in the application. During this task, they were asked to explain their actions, what they were seeking, and what they were trying to accomplish. In total, 16 functions were observed throughout the photo book creation process. The number of features identified varied between the participants, but 8 of these features were identified by all of them, while one feature remained undetected by the participants. This result is presented in Table 5.6. Based on the functions the participant did not find themselves during

the creation of the photo book, those functions were then given as a task.

It was concluded that all participants misunderstood how to create a book title. They attempted to click on the cover to create the title, but this action led them into their image picker for choosing the cover image. Additionally, the autofill function was perceived as challenging to find and understand how to use. Other issues were also documented, contributing to the analysis of challenges faced by new users in the current application. The result gave good insights in how new users interact with the Once Upon mobile application and answered the first research question, see Section *1.1 Objective*. The script, questions and tasks can be read in Appendix B.

Table 5.6: Result of what functions participants found in the Once Upon mobile application during the usability test.

Functions	**Votes**	**Percentage**
Create book title	5	100%
Picture on the first page	5	100%
Add pictures on the spread	5	100%
Change the layout of the spread	5	100%
Create new spread	5	100%
Change the photo book to black	5	100%
Create a text page	5	100%
Make an image that fills an entire page	4	80%
Date on text pages	4	80%
Change the order of the images in a spread	3	60%
Add a caption under any image	2	40%
Copy a spread to the photo book	1	20%
Preview of the book	1	20%
Change the order of the spreads in the book	1	20%
Autofill of images	0	0%

5.1.3 Heuristic Evaluation

The heuristic evaluation followed Nielsen's 10 heuristics, explained in Section *3.4 Nielsen's 10 Heuristics*, and was conducted on the mobile applications Popsa and Journi Print. Some key points were also compiled based on these evaluations which were further considered in this thesis project.

Popsa

1. **Visibility of system status**: The interface is fairly clear but could be improved. Changing the color of the photo book through the *Themes* button can be unclear, and there is a potential mix-up with background color changes in the preview with the same icon.

2. **Match between system and real world**: Popsa uses clear language, both regarding text and icons on the main menu down the middle. Not so long sentences and phrases when the user sits and creates his product. This is positive and contributes to creating a user-friendly experience. However, the *Themes* button is somewhat unclear, as it can be difficult for the user to understand what it contains.

3. **User control and freedom**: This was observed and well used. There are clear back buttons up the middle. This makes it easy for the user to undo their action.

4. **Consistency and standards**: The action and the resulting outcome of the *Themes* button differs depending on the view, which can confuse the user. The buttons should be more consistent in their action and result.

5. **Error prevention**: The design warns the user before risky actions are performed. It is not perceived that it is easy to run into problems that cannot be solved in a simple way.

6. **Recognition rather than recall**: It was observed that some functions cannot be found in the view where the pages of the photo book can be edited. It requires the user to click on the three dots, either in the navigation menu at the bottom, or above a page. This can be difficult for the user to understand. Further, to create a page, images have to be added directly. Perhaps the user actually wants to move or change the images that already exist, or that a text page is wanted, then it is unnecessary to have to insert images on the new page.

7. **Flexibility and efficiency of use**: The interfaces in Popsa work well for both beginners and more experienced users. Several features are visible on the 'Edit Page', which is great for beginners. The function to save the images under the image icon button is a function that may not be found directly. It can be considered a bit more hidden for beginners, but a good feature for those who are more experienced.

8. **Aesthetic and minimalist design**: The photo book gets a strong color when it is created and can be seen as visually disturbing. When creating the content of the photo book, the focus is otherwise on the pages, which is good. The buttons are in light and dark gray

colors and do not stand out that way, but put the content in focus.

9. **Help users recognize, diagnose, and recover from errors**: Popsa helps its users to recover from errors. By clicking on ”delete photo book” and getting a pop up in the middle of the screen, *Delete* is in red text not bold, while *Cancel* is bold in blue text. Where it says *“Are you sure you want to remove this design?”* is highlighted in bold. This helps the user understand the impact of what is happening and provides the option to cancel. A recommendation for improvement is when asking if the user is sure to delete their design, instead use, for example, ”Photo book”.

10. **Help and documentation**: It was observed that in the view when the user has selected a design (for example photo book) there is no documentation on how to continue. There are occasional pop-ups explaining that certain features exist, which is good. It is possible to find information about the product such as product specifications, delivery and other info. Furthermore, there are also various pictures and films as inspiration, which can contribute to help.

Journi Print

1. **Visibility of system status**: It was observed that getting started is easy, but there are things that could be clarified in the app. Since the app automatically inserts lots of elements and chooses a theme, it is a lot of work for the user.

2. **Match between system and real world**: Journi Print uses simple words and language that is easy to understand. However, the user must understand that they have to click on the buttons to find the functions.

3. **User control and freedom**: It was observed that there is no possibility for the user to undo an action. This could contribute to a fear of destroying their design.

4. **Consistency and standards**: It was observed that Journi Print uses the same icon (a color palette) on the overview view to change the design of the book, as inside a page to change the background. An improvement could be to change the color palette icon inside a page to a brush or pencil, to symbolize color.

5. **Error prevention**: As mentioned, there is no possibility for the user to undo an action. This means that if something goes wrong, the user can feel insecure and this can contribute to a worse user experience. An example of this is clicking on *Remove entire page* inside a page does not provide any help to the user through a message like *”Are you sure”*.

6. **Recognition rather than recall**: In the overview of the creation, it requires the user to remember where all the functions are located. The user has to remember it all, which can be difficult for beginners. This could be simplified by perhaps moving some functions to the overview, as almost nothing can be done there.

7. **Flexibility and efficiency of use**: It was observed that almost all functions are hidden,

which may contribute to difficulties for new users to work with their photo book. Users are required to directly insert an amount of images and give the book a name to get started. This helps new users get started easily. However, because the functions are so hidden, it can make it difficult for them to redo the book from what is automatically generated by the app.

8. **Aesthetic and minimalist design**: Since many functions are hidden, nothing superfluous was observed. However, the application contains many functions. For example, there are many different themes to choose from, as well as other functions regarding the design of the book. It can feel like a lot of choices to make.

9. **Help users recognize, diagnose, and recover from errors**: It was observed that the application does not help users to recover from errors when creating the photo book. If the user accidentally deleted something they regret, no help is provided. The user should get more help to recover from errors. For example, a pop-up that removes an entire page, a back button or something else that makes it easy to regret.

10. **Help and documentation**: When the user clicks on the ”Themes” or color palette icon, there are descriptive texts for what happens and how to do it. This is considered to help users understand how to do and what is happening. No pop-ups or tooltips have been observed.

Key Points

Based on the heuristic evaluations of Popsa and Journi Print some general key points insights were derived. Firstly, UX and usability should be a priority by ensuring that the application is using a clear language and offers user control and freedom. The evaluations showed the differences in how an *Undo* button can make the user feel more secure and comfortable with the application. That can also give the user confidence in testing more functions.

When the application is used by a new user, the interface should be easy to understand. However, it is also important to ensure that it is suitable for more experienced users as well. Some features may be more hidden, which may not be necessary for beginners learning the interface. An experienced user knows where functions are and with an application like maintaining consistency in the design and functionality will also make it easy for the user to understand, beginner or experienced. The design of the application should be aesthetically pleasing and minimalist. The content and tasks should be highlighted. Creating a simple and intuitive interface will contribute to minimizing the learning curve.

Further, it is important to prevent errors from happening to the user in the application. By that, to also prioritize that if an error occurs they get guidance, such as confirmations and warnings, to help them from making critical errors. Provide helpful resources for users to learn and explore features, like tooltips and documentation.

5.2 Define

This section contains the result of the research methods used in the *Define* phase. This includes three personas, a user flow diagram and mind mapping.

5.2.1 Personas

In order to define the users, three personas were created. They are presented in Figure 5.1. Bigger format of the personas are presented in Appendix C.

(a) Persona 1 (b) Persona 2 (c) Persona 3

Figure 5.1: The three personas created to define the target users of Once Upon.

Persona 1

Emma Andersson from Örnsköldsvik, Sweden, is a patient 28-year-old preschool teacher and a family-loving mother. She loves creating memories with her family and then capturing them through photography. She enjoys nature and has an active lifestyle. In addition, Emma has an interest in interior design with a dream of buying a villa to renovate into her dream home.

Persona 2

Lena Nilsson is a confident 45-year-old pediatric nurse from Umeå, Sweden. She and her family love to travel and she also loves spending time with their dog. Lena is not that creative or technical, but still likes to create photo albums and calendars about her family. Her dream is to visit the beautiful nature of Norway and she is always focused on her children's well-being.

Persona 3

David Eriksson is a 55-year-old man from Stockholm, Sweden. He is a devoted husband, father of two and dreams of grandchildren. His passions include photography, cooking and investing. David and his wife enjoy traveling and capturing memories through photography. Something that he often encounters are technical challenges with new applications and tools. Despite his challenges, he likes to learn new things, which does not stop him from experimenting.

5.2.2 User Flow Diagram

A user flow diagram was created in order to define how a user can create a photo book in Once Upon mobile application, which is shown in Figure 5.2. The figure is also presented in Appendix D in a larger format. A user can create their photo book in all different orders and ways, which is why all the functions are included in the user flow diagram. The flow begins from the left with a pink, rounded rectangle that symbolizes the start and has an arrow pointing to “Create account”, which is the first step a user needs to take to create a photo book in the application. The squares, which are of a lighter color, symbolize different pages that a user can navigate to. The rectangles connected to a square symbolize functions available on that page. Certain functionality is hidden from the user until other actions are performed. For instance, for the user to change the photo book to black, there must be a book title or image on the front cover. The diamonds symbolize the actions the user must have taken to access that type of functionality. The user flow diagram then ends on the pink rounded rectangle on the right.

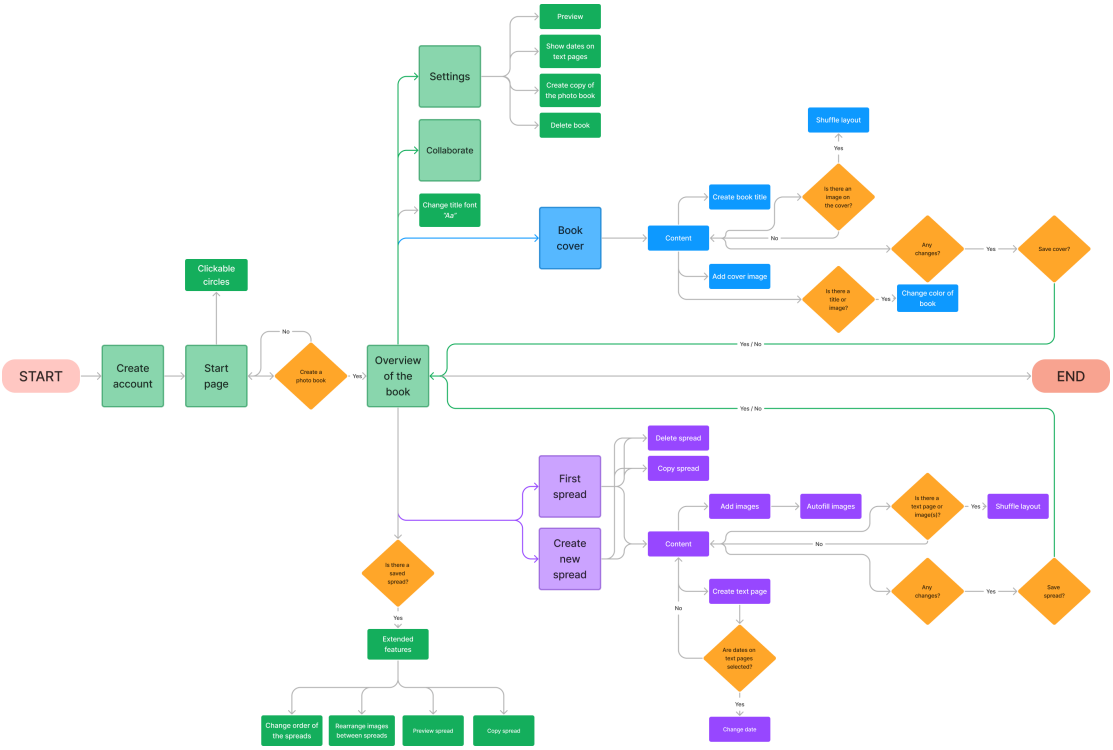


Figure 5.2: User flow diagram of how a user can create a photo book.

5.2.3 Mind Mapping

A mind map was created in order to categorize and summarize the difficulties that users encounter when using the Once Upon mobile application, see Figure 5.3. The main topic of the map is ”Challenges with the Once Upon mobile application for new users”. Five branches were made as subtopics, containing the main challenges for new users in the Once Upon mobile application. Branches were then added for each subtopic, defining the challenges. It was also chosen to include some images from the mobile application in the mind map, in order to clarify the functions in question, where to find them and how they work.

Figure 5.3: Mind map of challenges faced by new users in the Once Upon mobile application.

5.3 Ideate

The following is the result of the research methods used in the *Ideate* phase. This includes ”How Might We” statements, workshops and sketching.

5.3.1 ”How Might We” Statements

Four *How Might We* (HMW) statements were created. They were based on the problems that were summarized in the mind map given from the result of the previous research methods. These are as follows,

HMW1: How might we provide clear instructions for users on how to use the auto-fill feature?

HMW2: How might we help new users understand the process of moving images between spreads and on a specific spread?

HMW3: How might we provide more guidance or instructions for users when they start creating their first photo book?

HMW4: How might we enhance the clarity of clickable elements for new users?

5.3.2 Brainstorm Workshops

Two workshops were conducted based on the four HMW statements presented Section *5.3.1 ”How Might We” Statements*. One with product designers at Once upon and one with last year students from the Master of Science in Interaction Technology and Design program at Umeå University. The generated ideas were analyzed and summarized, and the result for each HMW statement from both workshops is presented in Table 5.7, 5.8, 5.9 and 5.10.

Table 5.7: Summarise of the results from the workshops, from HMW1: How might we provide clear instructions for users on how to use the auto-fill feature?.

Product Designers at Once Upon	**Students**
Two buttons in book view: one for creating a new spread and another for multiple spreads/images, or change the name on the button to *Choose images*.	Change the name of the button to *Choose images*, or *New spread/Autofill*. Or to, Separate the steps, let the user select all the images for the book first.
Give the information in image picker by a guided takeover, hint or a redesign to focus more on selection of images.	Guidance by an instruction video before start or an info text somewhere to inform how to use it.

Table 5.8: Summarise of the results from the workshops, from HMW2: How might we help new users understand the process of moving images between spreads and on a specific spread?

Product Designers at Once Upon	**Students**
A specific mode for moving spreads, triggered by a specific button.	Enhance clearance about how to move images or spreads. Keeping the chosen shuffle option, but ensuring the possibility to move images within that layout.
Drag-and-drop. activating a bigger view of the current page. When dragging an image to the opposite page it in turn grows to easier place the image.	Separate the process, where the user only can move images. Or use drag-and-drop to move images.
A guided takeover when editing a spread, by "forcing" the user to use the function. Or a tutorial showing what and how to do it, letting users' try themselves after.	Show in a short animated video how to use the main page and the functions it contains, or have a pop-up the first time.

Table 5.9: Summarise of the results from the workshops, from HMW3: How might we provide more guidance or instructions for users when they start creating their first photo book?

Product Designers at Once Upon	**Students**
A short step-by-step for the creating process, or an optional onboarding for a new user. While hints during the journey may be suitable for all users.	Video or text instructions in a few steps. Could be pop-ups, a step-by-step guide or animated examples.
Should a first spread be shown before the cover is made? Maybe focus on one thing at a time.	A help symbol on each page with instructions about how to do it, or feedback after each action the user does in the process.
Lead the user through the creation of the cover, then their first spread.	Separate the flow in different steps, for example creating the cover first.

Table 5.10: Summarise of the results from the workshops, from HMW4: How might we enhance the clarity of clickable elements for new users?

Product Designers at Once Upon	**Students**
Ensure uniformity to maintain recognition and be consistent. Have the same appearance across different locations for users to easily recognize and identify familiar elements.	Make clickable elements either blink briefly within a specific time period, pop, apply shading, or add border effects to enhance their visibility and interaction.
Use more soft animations and transitions based on context, micro animations to draw the eye. Encourage the right click at the right time through e.g. animation.	Be consistent using a clear clickable design. Avoid using gray on everything that is clickable.
Trigger multiple buttons/selections with a single button in first mode.	Guidance of where to click, help page, a pop up tutorial/guide

5.3.3 Sketching

Based on all previous results, various sketches began to be drawn up. These were worked on iteratively and the result gave three different concepts that were chosen to proceed with, see Figure 5.4. The sketches are based on onboarding theory and include various components and elements as mentioned in Section *3.2.1 Onboarding Components*. The three concepts are further explained in Section *5.4.1 Low-Fidelity Prototype*, where these sketches were developed into the creation of low-fidelity prototypes.

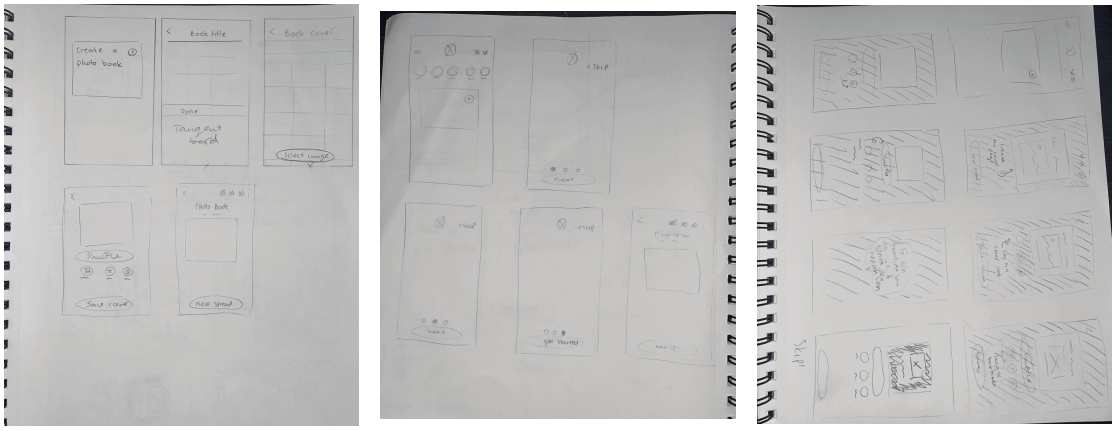


Figure 5.4: Sketches of three concepts.

5.4 Prototype and Test

During the last two phases of the design thinking process, *Prototype* and *Test* prototypes were created and tested. The two phases were executed iteratively, initially involving the creation and testing of lo-fi prototypes, followed by the creation and testing of hi-fi prototypes.

5.4.1 Low-Fidelity Prototype

Three different concepts of lo-fi prototypes were produced to illustrate various approaches how a user can get started with creating their photo book. The concepts were based on the sketches drawn in *Ideate* phase, see Section *5.3.3 Sketching* The process begins after the user creates an account and then clicks on *Create a photo book*. This page is shown in Section *2.1 Once Upon* in Figure 2.1a. All concepts developed are based on the results from previously conducted research methods, as well as components described in Section *3.2.1 Onboarding Components*.

When creating lo-fi, other parts of the user flow have also been investigated. Among other things, on the overview page there has been a question about whether an empty spread should be displayed from the beginning or not. This is something that was discussed during tests of the prototypes. In all three concepts, an empty spread has not been included, with the aim of investigating how users think it feels without it.

Concept 1

The first concept of lo-fi prototypes was created to investigate how users feel about starting with the cover page as an introduction, see Figure 5.5. All participants of the usability test of the current Once Upon mobile application made the mistake when trying to create the book title. They clicked on the book instead of clicking on the *title* button. When a user clicks on the book's front cover, they go directly into the image picker and can select the image for the cover page. The idea with this concept was that it could make it easier for the user to add the book title and cover image first. Further, that the user gets a successful moment at the beginning of the creation to understand how the result could be. Further, when conducting the two heuristic evaluations on Popsa and Journi Print, it was noticed that this was a common way to start with the photo book. Therefore, it felt interesting to create a concept in a similar way in order to test it with the users.

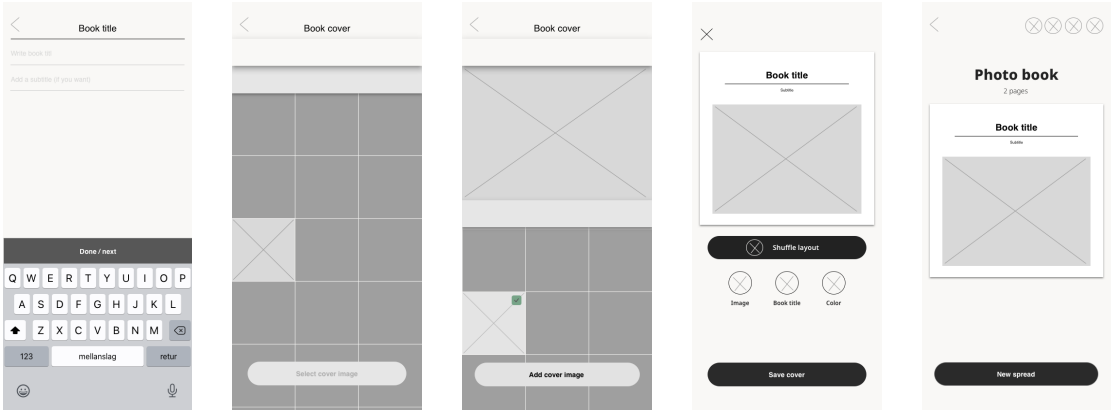


Figure 5.5: Lo-fi prototype concept 1.

Concept 2

The second concept is presented in Figure 5.6 and is based on the deck-of-cards process. In the survey, there were several users who had appreciated video tutorials and/or text guides. Having the user go through these slides before they start creating the photo book was one way to give them that. In the usability tests of the current application, see the results in Section *5.1.2 Usability Test of Once Upon Mobile Application*, all participants said they wanted more inspiration or introduction for getting started. These slides, containing images, videos or text, could thus provide inspiration and suggestions to the user on how the book could look.

When this concept was produced, the focus was not on the content of the different slides, but more on the feeling this would give to a new user. When the usability test was carried out, the participant was asked what information would have been good to know here. There were some suggestions for the slide written on each slide as a small proposal, but how it would be presented or the level of detail was not included here.

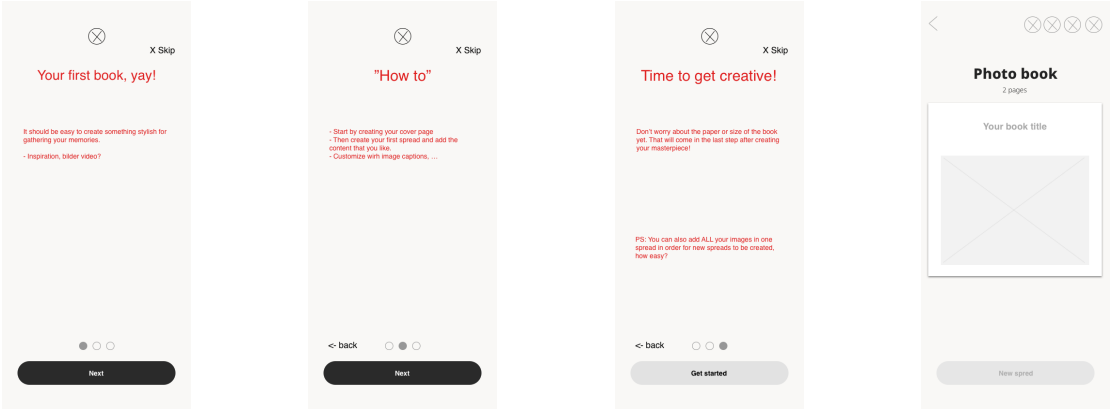


Figure 5.6: Lo-fi prototype concept 2.

Concept 3

The third concept is presented in Figure 5.7 and is based on interactive walkthroughs with tasks. By the user performing these tasks, a ”successful moment” is quickly fulfilled, which is important in onboarding as described in Section *3.2.1 Onboarding Components*. By guiding the user through tasks and thus helping them create the cover page, the process feels easy to learn. Using this method can make users perceive the application as more complex than it is. Therefore, it was important to test this through usability testing to examine the users' experience.

The result of the online survey at the beginning of the study, see Section *5.1.1 Online Survey*, showed that several respondents did not appreciate mandatory tasks. Therefore, it was important that a *skip* button was included, so that those who want to skip the introduction can do so. Further, if mandatory task were to be used, they should be short. The target group of Once Upon is very large. All from younger, very technical users to older and more non-technical users. The information is concise with the aim that it should suit both less technical users and more technical users, to avoid users perceiving it as excessive and annoying.

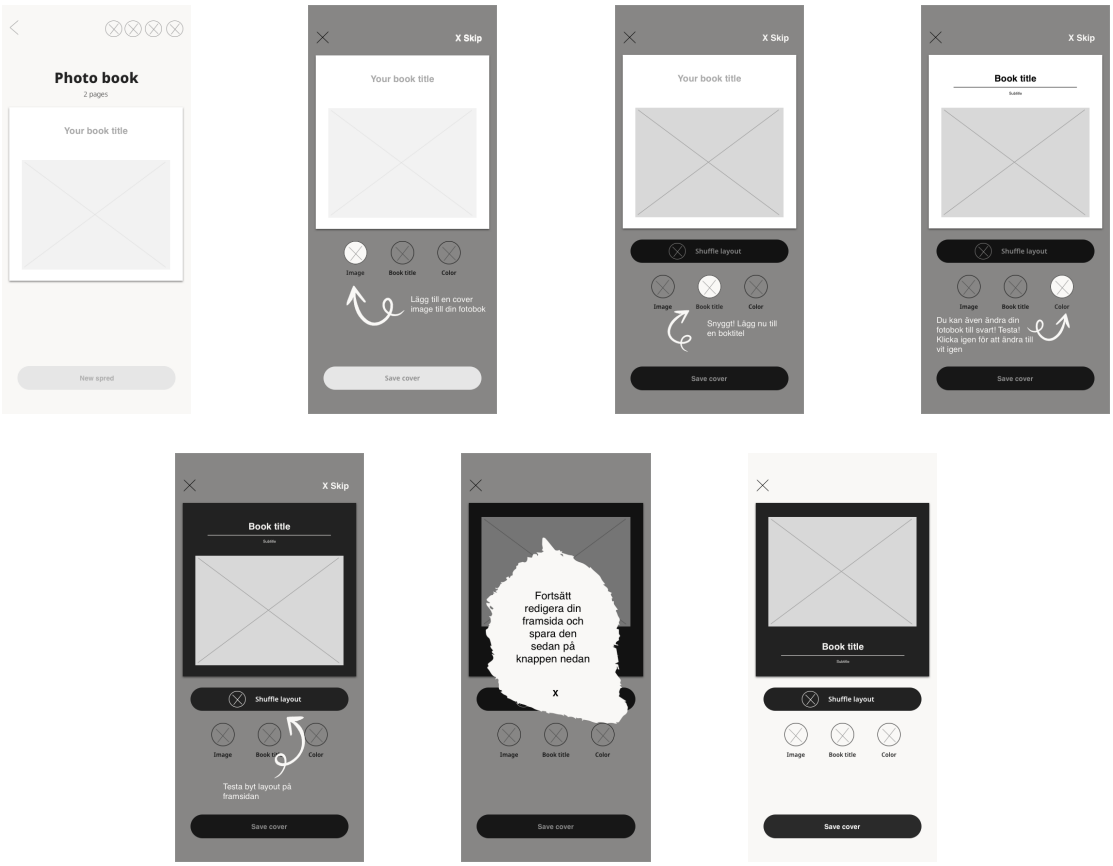


Figure 5.7: Lo-fi prototype concept 3.

5.4.2 Usability Test of Low-Fidelity Prototype

User data of the participants is shown in Table 5.11. The questions and tasks from the usability test are presented in Appendix E.

Table 5.11: User data of participants in the usability test of lo-fi prototype.

Age	**Gender**	**Children**
25	Male	No
24	Male	No
51	Male	Yes
53	Female	Yes

Initially, the participants were asked how they wanted the first step to be in order to start creating a photo book. Two participants expressed a desire for some kind of introduction to make it clear how to get started. Examples could be to get a few introductory steps or an overall information to understand what lies ahead. The participants felt that inspiration and an overall ”how it can be done” would be important to know before creating the photo book. Then the three concepts of lo-fi were tested, see Section *5.4.1 Low-Fidelity Prototype*. In order for all concepts to be a first impression for a participant, the prototypes were presented in random order.

Concept 1 was the least popular among the participants. It was not difficult or bad in any way, but the other two concepts were considered clearer and more helpful. There were some suggestions for improvements, such as showing a preview of the book on the page where the user can add a cover image, to give an indication of how the book will look. Furthermore, suggestions were given about templates that one could choose in one of the steps, as well as the possibility of not having to add a cover image directly but being able to choose *Skip for later*. Suggestions on how the book should look were also requested. If the option to choose templates existed, one user felt that it would be a good step to have at the beginning and work from that. It gives an indication of which image fits best on the cover page. When the cover page was ready, the participants understood that to create a new spread they should click on *Save cover*. However, one participant pointed out that the steps should be as few as possible. If an image is selected and the cover page feels ready, the participant felt that it was unnecessary to click save to move on from there.

Concept 2 was most appreciated by the participants. They clearly understood the flow, how to skip it and gave good suggestions on what the three slides could contain. They found it easy to get started with the photo book by getting this kind of introduction and inspiration. The content of the slides was not wanted for too much text, but the participants gave suggestions for short videos, images or a combination of text and image. This was to provide a self-explanatory introduction that did not require much time. The participants considered that this method could be suitable for different target groups, as there were few steps and easy to skip. It was desired

to be able to return to these slides or the information that was there. This is to facilitate the creation and that the users should not have to memorize everything that is there. It also helps to provide inspiration and guidance during the process. One participant suggested a *help* button containing that information.

The participants had slightly divided opinions about concept 3. One participant did not appreciate this, and thought concept 2 felt more modern and had a better flow. Furthermore, it was considered more stylish by taking one step at a time, like concept 1 and 2. Other participants felt that this was neat, simple and easy to use. No one felt that the application could be perceived as difficult through this way of onboarding. It was pointed out that it could be difficult for the user to know what they want the cover page to look like. The participants suggested a pop-up explaining that this can be edited later, or a small button under *Save Cover* that says the participant can proceed to the next step without creating a cover. The participants asked the question whether it is possible to click the buttons again afterwards and how to go back. It is also important that the user can try his hand and not be served everything. One participant thought that this concept could be merged with concept 2. That one of the slides could contain an image, video or interactive test in this way to give the user understanding and an overview.

In addition to the three concepts, the overview page was also discussed, where a proposal had been created without showing an empty spread. The reason for this was to see if it would be perceived as easier when the user starts the process of creating the photo book. The participants understood that they should click on the cover page to start creating their photo book, but the majority preferred that there was an empty spread. One participant thought that it looked cleaner without an empty spread, while others spontaneously thought it was nice to have a spread to see some suggestions. Furthermore, it was pointed out that some users may not want to start with the front, which opens up the possibility of starting in other ways.

All sketches guided the user to start creating the front of the book, which the participants felt was logical and natural. However, it was pointed out that the choice of image is not always clear at the beginning and that it is also important to be able to do it later. Some may not have decided what the book will look like, which can make it difficult to choose beforehand. Furthermore, it was considered important to get a preview of how the book looks with the one selected on the cover page, to see which image and text fit best. Other general comments from various participants were that a desire for the ability to select images to add to an album in the application, instead of having to go through their camera roll each time. It is also important to be able to see how the result of the book turned out with a preview, and that it should be easy to see all the spreads of the book during creation.

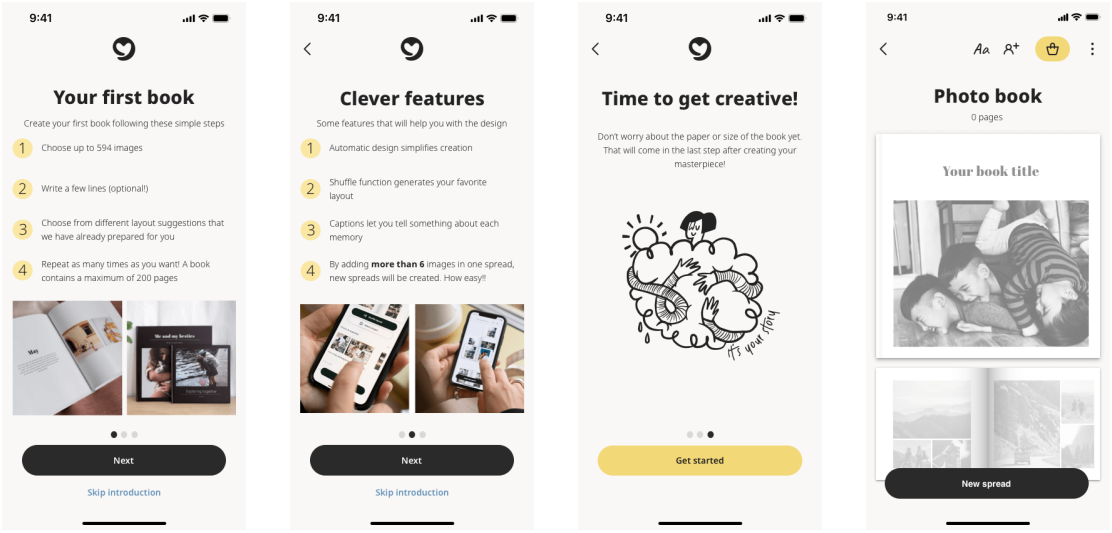
5.4.3 High-Fidelity Prototype

Concept 2 was perceived as the most appreciated by the participants of the three lo-fi concepts, and was therefore chosen to proceed with creation of the hi-fi prototype. Concept 3was to some extent appreciated, where participants liked the type of introduction where the suggestion was given to have it as part of the second concept. By the user creating an account and choosing to

click on *"Create a photo book"*, three slides should come up as an introduction before the actual creation. The hi-fi prototype that was produced is shown in Figure 5.8. The page that the user is greeted with after this introduction, see Figure 5.8d, has been chosen not to change due to results from testing the lo-fi prototypes, see Section 5.4.1.

The results from the lo-fi tests also contributed to various changes to the design and components of the prototypes. Some changes are as follows,

- The appearance of the small circles. They are smaller and the circles that are not filled in are filled in gray instead of only having a black border with white inside. This element was on the Once Upon website, so it was chosen to change for consistency.
- Moved *Skip* to below the *Next* button. It was also removed on the last slide as it does not fulfill any function there.
- The content has been based on the information found in the app store.
- The *Back* button was relocated from the lower left corner to an arrow in the left corners on slides 2 and 3, to allow the user to go back and read the information again. It was chosen not to be included on the first slide, to clarify that it only takes the user between the different slides and not to other places in the application
- Images to inspire the user and give an indication of how the book might look.



(a) Slide 1. (b) Slide 2. (c) Slide 3. (d) Creation page.

Figure 5.8: Hi-fi prototypes.

This type of onboarding can be used to introduce users to other ways, such as introducing all users to bigger features or updates that are released in the application. Suggestions of a prototype on how this could look are presented in Figure 5.9.

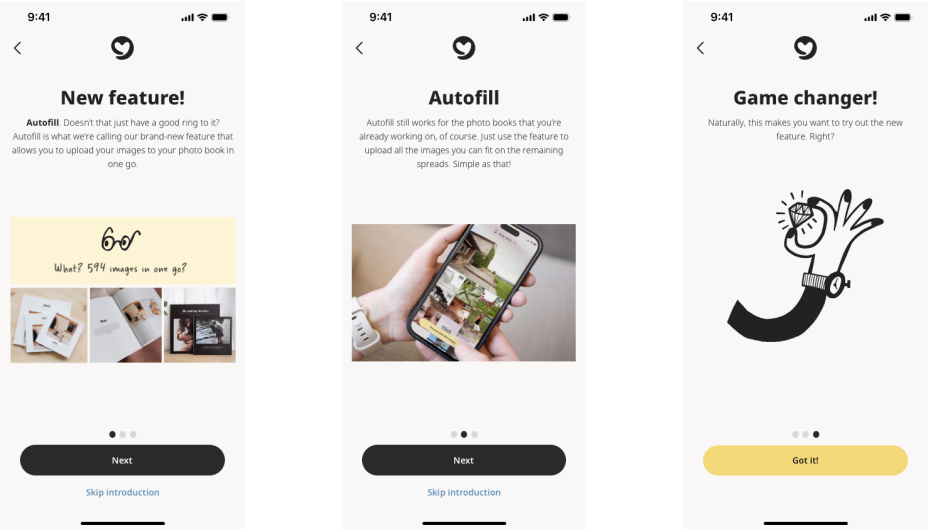


Figure 5.9: Hi-fi prototype of introducing a function.

5.4.4 Usability Test of High-Fidelity Prototype

User data of the participants is shown in Table 5.12. The questions and tasks from the usability test are presented in Appendix E.

Table 5.12: User data of participants in the usability test of hi-fi prototype.

Age	**Gender**	**Children**
24	Male	No
48	Female	Yes

The participants were first asked to interact with the hi-fi prototype on a computer. After this, questions were asked to investigate how the participants felt about the flow of the prototype, the design and the content. Both participants found it neat and easy to understand how to navigate further. It was also pointed out that having the option to skip is appreciated. Additionally, it was not considered too much or bothersome for a user as it was only three slides. The participants found it beneficial to have inspiration on these slides, but one would have liked a short video on difficult functions or similar to understand more. The participant pointed out that it can be difficult to read how a function works, but easier to understand through a short video.

Furthermore, one participant expressed that the current content on the slide was sufficient. However, there was a desire for larger images to enhance inspiration. The other participant shared a similar opinion, but wished for more suggestions on book appearance, including sizes. It was also inquired about pricing, as it was considered as important. In the end, participants were asked to rate, on a scale from one to five, how helpful they thought this type of introduction could be before a user when creating their first photo book, and both provided a rating of four.

6 Discussion

This study followed the Design Thinking methodology and the five phases of the process: *Empathize*, *Define*, *Ideate*, *Prototype*, and *Test*. Initially, the scope of the work was extensive, aiming to understand the concept of onboarding and how it could be applied to the Once Upon mobile application. Onboarding is a broad concept, contributing to the significance of the *Empathize* phase in determining the study's direction. After conducting a literature study, the online survey served as a first step in exploring users' past experiences with creating a customized product. The results provided insights into what users find helpful and challenging, offering a foundation for understanding their preferences and values in this type of application. The survey received a total of 14 responses, which was fewer than expected as the hope was to get at least twice as many. The survey was shared on several social channels and groups, but still failed to collect more responses. Despite this, the collected data was considered valuable for understanding the users and their needs. However, more answers would have given a more validating result.

Usability testing of the Once Upon mobile application was then conducted, a crucial step in this study. The execution of these tests provided essential insights into how new users interact with the application, contributing significantly to the delineation and understanding of users' needs and pain points. Given that Once Upon is an established mobile application launched in 2017, this was a necessary research method to use early in the study to understand the users' and their perception of the application. Considering the extensive target group of the Once Upon mobile application, careful consideration was given in selecting which participants to recruit for the initial usability testing and subsequent tests of the prototypes. It was chosen to have five participants during usability testing, aligning with Nielsen's recommendation of using five participants [32]. It was chosen to include adults of various age ranges, where the youngest participant was 23 and the oldest 53 among all tests. Additionally, the Once Upon mobile application is used all over the world, but usability testing was only performed on Swedish citizens. This also contributes to the results of the study, as it only takes into account their view of the application.

Through the performance of usability testing on participants who had no prior experience of the Once Upon mobile application, it was concluded that new users encountered challenges in the application and found opportunities for improvement in terms of user experience (UX). The literature study highlighted the importance of onboarding not hiding mistakes in the design, which contributed to the study also touching on that topic. The result revealed challenges that new users encountered in the application. Additionally, the previous survey conducted by a product designer at Once Upon, see Section *2.2 Previous Research From Once Upon*, agreed with the results regarding the users' challenges and problems they encountered when creating their first photo book. This allowed the results of usability testing to be validated and could then be analyzed to understand how new users interact with the application.

Furthermore, the study progressed by conducting a heuristic evaluation on two mobile applications. These applications were selected in collaboration with the external supervisor to ensure that the evaluation was conducted on applications relevant for the Once Upon company. The choice to carry out this research method was because the external partner considered it interesting to investigate how similar applications work. This evaluation was therefore considered a type of competitor analysis. Conducting a heuristic evaluation gives the best results by having a group of three to five people evaluate the same thing, as described in Section *3.6.3 Heuristic Evaluation*. Each person often discovers different aspects, resulting in the group gathering more information and obtaining a more comprehensive result. In this study, the evaluations were performed by one person. Although a group gets out more data, this was considered necessary to collect information to move forward with knowledge about similar mobile applications like Once Upon. It provided an understanding of how other applications work and the features that can exist in these types of applications.

After the users were defined and the problems further identified in the *Define* phase, the study moved on to idea generation in *Ideate*. Initially, *How Might We* (HMW) statements were created which in turn were used during the two workshops that were carried out afterwards. These contributed a lot with ideas and suggestions on how to continue the study. However, some of the generated ideas addressed UX or the design of functionality, which fell outside the study's predefined limitations. Therefore, the result needed to be analyzed using previous data in order for the study to keep the same direction and not be too broad. The same applies to the previous usability testing of the current Once Upon mobile application, where the participants pointed out things that were outside the scope of the study. Despite this, all the data has been compiled for potential further analysis and action by the Once Upon company. The second HMW statement, see HMW2 in Section *5.3.1 "How Might We" Statements*, was chosen to be excluded for later research methods. The Once Upon company began working on this, making it irrelevant to this study.

When performing the last research method in *Ideate*, sketching, the final choice was made regarding the direction and limitations of the study. Consideration was given to developing various tooltips in the application to help the user see where certain functions are located. This was chosen to be deprioritized, as it already exists to some extent in the current application and did not show during usability testing to contribute to the users' challenges. The focus shifted to helping new users get introduced to the creation process rather than getting help through the entire process. The online survey contributed to some extent to the concepts, as it investigated the users' opinions of a certain type of onboarding. However, the literature study was the determining factor, as it can be difficult for users to know how different components can work. In previous research methods, the participants had given valuable suggestions and ideas. Everything from changing buttons to clarify, to using video tutorials to show users the value of the application. According to the online survey, the use of video tutorials was one of the more appreciated methods, and was also mentioned during the usability testing. However, it was decided to limit their inclusion in this study due to time constraints and lack of expertise.

The decision was then made to transform the three sketch concepts into low-fidelity (lo-fi) pro-

totypes to facilitate usability testing. Four usability tests were performed on the prototypes to determine which concept was most appreciated, which resulted in concept 2, see Section *5.4.1 Low-Fidelity Prototype*. More tests could be made, in order to gather more information from users. Once the most appreciated concept was chosen, it was created as a high-fidelity (hi-fi) prototype. The lo-fi prototype of the chosen concept did not include various design proposals of how the content could be presented. If there was more time, that would have been created as the next step, in order to test on users regarding how they perceive the content before creating the final hi-fi prototype. Additionally, a product designer at Once Upon performed a "*First impression*" test during which new users utilized the Once Upon mobile application for the first time and provided feedback. One participant considered that the application description in the App Store is more explanatory than using it once downloaded. This contributed to the description in the App Store being read through and laid the foundation for what the various slides in the hi-fi prototype would contain. During the usability testing of lo-fi prototypes, two participants gave the suggestion of a *Help* button in order to come back to the information provided on the slides. This was a great suggestion noted, but was chosen not to proceed with in this study.

Moreover, the study resulted in a hi-fi prototype based on an onboarding component called deck-or-cards, see Section *3.2.1 Onboarding Components*. It was investigated whether an empty spread would appear or not, when examining the lo-fi prototypes. Users appreciated that there were several options to begin creating the photo book, while they felt that starting with the front page was logical. Therefore, it was chosen not to change when creating the hi-fi prototype. The chosen type of onboarding can be used in other ways, for instance introducing a new update och feature. This was considered while creating the hi-fi prototype and an example of how this could be presented on slides were created. This is outside the scope of the study, but was chosen to be added to support the use of this type of onboarding. The idea that it could be used when launching new features was rejected, as some users create a book per year or a few books per year. This contributes to the fact that if many features are released in one year, there may be many slides to go through to present this. Hence this was broadened and given the possibility that it could be used for major updates.

Finally, usability testing was performed on the hi-fi prototype to investigate what new users thought of them with two users, however, more tests would have been desirable. The number of participants may vary, as mentioned in Section *3.6.2 Usability Testing*, so the decision was made accordingly. It was chosen not to test the prototype of using this type of onboarding for introducing a new feature or update, as that was not the objective of this study. They were created as a concept to support the choice of onboarding and show that it can be used in more ways. However, since this has not been tested, it is not possible to say how well it would have worked.

For this study, it was well-suited to follow the Design Thinking methodology. The five phases and the chosen research methods helped shape the study to achieve the objective. However, there are other research methods that could have been useful. For example, interviews could have been carried out at the beginning instead of a survey, to collect more detailed information. To generate ideas, other brainstorming methods could also have been used, such as crazy 8, to

contribute ideas in the form of sketches and not only in the form of text. Additionally, it would have been beneficial to perform A/B testing on the hi-fi prototype. A group of participants could test creating a photo book using the Once Upon mobile application without an introduction, much like in the first usability testing in the Empathize phase. Then another group could have performed the same task, but to be introduced to the final onboarding flow that was created in this study before the creation. This could have helped to validate and strengthen the result even more.

7 Conclusion

The aim of this study was to investigate how new users interact with the Once Upon mobile application to understand their needs and pain points. Additionally, the study aimed to explore the concept of onboarding its potential in the application. The results of the initial usability testing of the current Once Upon mobile application indicated that new users face challenges in understanding how to get started with the creation of their first photo book. The online survey also gave valuable insights in users' experiences. Based on this, the conclusion could be drawn that the application would benefit from providing new users with more guidance to ensure comprehension.

In addition to participants pointing out a lack of inspiration, identified pain points in the interface included users having difficulty understanding how to get started. They felt confused about what the book could look like and what functions were available to use. There was a request for more customisation of the book, which is something that Once Upon has chosen to abstain from. Additionally, certain challenges in the interface were identified, which are more related to user experience than the objective of this study. Among other things, the literature study resulted in the understanding that onboarding should not be developed to hide mistakes in the design, thus becoming an important factor in this study. Users found it difficult to understand certain clickable elements, such as adding a title to the book where they clicked incorrectly. Other features, such as autofill and moving images between and on spreads, were also identified.

After addressing the first research question on how new users interact and understanding their needs and pain points, the production of sketches and then prototypes could begin. Based on the results of the prototypes, the conclusion could further prove that new users are in need of a better introduction. Continuing, the prototypes were appreciated by new users who felt that it contributed to a better understanding and gave more inspiration. The resulting high-fidelity prototype in this study is one example of how this can be made.

8 Future work

The concept of onboarding was investigated in this study, with the aim of creating a prototype of an interface suitable for the Once Upon mobile application. The focus was on comprehending how new users interact with the application, leading to the conclusion that new users require more introduction. The concepts of low-fidelity (lo-fi) prototypes were grounded in speculations drawn from the initial research methods performed at the beginning of the project. This was based on their perceived suitability for this type of application. The three concepts were all appreciated by the participants, and resulted in the selection of one concept that was later developed as a high-fidelity (hi-fi) prototype. To ensure that these concepts are the most suitable for the application, more testing should be conducted to investigate the design choices. The final hi-fi prototype underwent a round of usability testing, but due to time constraints, only a small test could be carried out with a few participants. To evaluate the prototype and ensure that it fulfills its purpose, it requires more testing. It would be interesting to perform A/B testing to investigate the difference between new users being introduced with the hi-fi prototype produced, in comparison to without.

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Appendix A Online Survey

This appendix contains the questions from the online survey conducted at the beginning of the study. Firstly, the survey questions are introduced, followed by some results that were considered unnecessary in the results section.

A.1 Questions

Following is the script and questions from the online survey constructed in Google Forms.

A.1.1 Introduction

My name is Ida Aavik and I am studying Master of Science in Interaction Technology and Design at Umeå University. I am currently in my last semester and during this fall I am working on my master thesis in collaboration with Once Upon. Once Upon is an application where you can create photo books digitally to compile your memories. This thesis project is about examining the user experience of Once Upon in order to find areas of improvement that will benefit the users, mainly the first-time users, to easily understand how to use the application.

This survey is aimed at people of all ages who have created a customized product (such as a photo book, clothes or home decor) with an online service. Participating in this survey is completely anonymous, the answers cannot be linked to an individual level. It is voluntary to participate. The final result will be compiled and used for further work with the thesis project.

The survey takes maximum 10 minutes to answer, I really appreciate your participation. If you are more comfortable answering in Swedish, that is fine too.

- Have you ever created a customized product (such as a photo book, clothes or home decor) with an online service?
  - Yes
- What kind(s) of products have you created? / tried to create?
- What application(s) did you use?
- What application(s) did you find easy to get started with?
- Are there any design elements you remember in the application(s) that you found helpful?
- What application(s) did you find difficult or confusing to get started with?

- Are there any design elements you remember in the application(s) that you found annoying or confusing?

A.1.2 Enjoyable and Confusing Experiences

Think back to a first-time user experience you found particularly enjoyable or smooth.

- Can you give an example(s) of any kind of application(s) that you found easy to understand the first time you used it?
- What did you appreciate about the way the new app/service was presented/explained to you?

Think back to a first-time user experience you found particularly confusing or difficult.

- Can you give an example(s) of any kind of application(s) that you found confusing and difficult to understand the first time you used it?
- What did you find confusing and difficult about the way the new app/service was presented/explained to you?

A.1.3 Appreciated features when creating product(s) + comments

Onboarding methods

- Which of the following do you like/appreciate when creating a customized product in a new online service for the first time? *Multiple option question.*
  - Video tutorials
  - Pop-up with tips help
  - Animations on relevant functions to show where they are
  - Mandatory tasks before start
  - Product overview that shows a briefing of the functions in the application
  - Text guides
  - Nothing, I want to learn all by myself
  - *Other*
- Do you have anything you would like to add about creating a customized product with an online service?

A.1.4 User Information

- Have you ever created a photo book with Once Upon?

- If yes, was the user experience like as a first-time Once Upon user?
- Gender
- Age
- Where do you live?
- Do you have children?
- Do you agree that your answers will be used as a basis for this study? Your answers are anonymous and cannot be linked to you as an individual.

A.2 Results

This section includes the result from which the respondents of the survey gave examples of general applications that they found easy respective difficult to understand is shown in Table A.1 and A.2.

Table A.1: General applications with motivations of why they were easy to understand.

Application(s)	**Motivation**
Ryde	Easy few steps before the application creates customer value.
Excel	Is very intuitive and has good help functions.
Spotify, Youtube	Stylish, simple and straightforward design, clear in what to do and how to use the application. Not a lot of extra features.
Tabs	Not too many buttons and functions on the first page. This can be overwhelming at first. However, it is something that can be effective once you get used to the program.
CSN	You never find what you are looking for so you always ends up on their website instead.
Swish	There were not that many buttons to click on and that made it easy to understand. Stylish, simple and straightforward design.
Duolingo, Slack, Trello, Tinder, WhatsApp	One user stated the following as helpful design elements for these applications: Clarity, Visuals, Step-by-Step Instructions, Use Cases, Benefits and Value Proposition, Interactive Demos, Frequently Asked Questions (FAQs), Support and Help Resources, User Testimonials and so on.

Table A.2: General applications with motivations of why they were found difficult to understand.

Application(s)	**Motivation**
Paint 3D	A bit hard to navigate in the application and unclear icons.
PayPal	Did not understand how to transfer the money, which is the whole point of the application.
Discord, Reddit, Facebook	Difficult to understand the functions and layout.
LinkedIn	There are different (hidden) ways to get to the different pages.
Figma	Overly Complex Menus, Inconsistent User Interfaces, Hidden Navigation, Small Clickable Elements, Intrusive Ads and Pop-ups, Unclear Error Messages, Complex Forms, Unresponsive Design, Misleading UI Elements.

Appendix B Usability Test of the Once Upon Mobile Application

The script, questions and tasks from the first usability tests of the current Once Upon mobile application is presented in this appendix.

B.1 Introduction

Hej! Innan vi börjar vill jag tacka dig för att du vill vara med och delta i detta test. Jag heter Ida Aavik och läser Civilingenjörsprogrammet i Interaktion och design vid Umeå universitet. Jag är just nu inne på min sista termin och under hösten arbetar jag med mitt examensarbete i samarbete med Once Upon. Once Upon är en applikation där du kan skapa fotoböcker digitalt för att sammanställa dina minnen. Det är den som du ska få testa här idag. Det är helt frivilligt att delta i denna intervju. Dina svar kommer att vara anonyma och kommer inte att kunna kopplas till dig som individ. Dock kommer svaren sammanställas och användas vidare under mitt examensarbete. Du kan även välja att avbryta när du vill.

B.2 User Information

Innan vi börjar skulle jag vilja ställa några frågor om dig.

- Kön
- Ålder
- Har du barn?
- Har du skapat en fotobok med Once Upon förut?
- Är du okej med att dina svar kommer att användas som underlag för denna studie? Dina svar är anonyma och kan inte kopplas till dig som individ.

B.3 Creating a Photo Book

Tack. Nu går vi vidare till nästa del av intervjun. För att kunna skapa en fotobok med Once Upon på din mobil måste du ha appen nedladdad. Du ska därför få börja med att ladda ner den.

Vidare för att skapa en fotobok i appen måste man ha ett konto. Jag kommer nu ge dig en temporär epost och lösenord som du ska använda för att att tillfälligt skapa ett konto. Gå in i

appen, och välj att skapa ett konto med epost.

- Perfekt. Nu när du har loggat in ska du få ta dig till startsidan.
- Vad känner du om första vyn? / Vad förväntade du dig?
- Tycker du det är tydligt vad man kan göra på denna vyn?

Perfekt. Då ska vi gå vidare till skapandet. I detta test ska du få skapa en fotobok, utföra några uppgifter samt svara på frågor kring det. Jag skulle vilja att du tänker högt, och berättar för mig varför du väljer att trycka på en viss knapp eller göra något på ett visst sätt. Samtidigt som du berättar hur du tänker utföra uppgiften är du välkommen att klicka i appen.

- Toppen. Då börjar vi med första uppgiften. Påminner igen om att komma ihåg att tänka högt, och berätta varför du gör som du gör för att utföra uppgiften. Här vill jag att du ska skapa din första fotobok. Hur gör du då?
- Vad ser du på denna vy?
- Vad är din känsla av att detta är det första man möts av?
- Du ska nu få fortsätta skapa fotoboken. Klicka runt, lägg in bilder och annat som du hittar i appen. Berätta gärna vad du söker efter, vad du gör och vad du tycker om hur det blev.

B.4 Tasks

Snyggt jobbat. I appen finns det även fler funktioner utöver de som du använde. Jag tänkte låta dig få testa dom också.

- Hur skulle du skapa en boktitel?
- Hur skulle du lägga till en bild på första sidan?
- Hur skulle du lägga till bilder på ett uppslag?
- Hur skulle du göra för att ändra på layouten på uppslaget? / Göra så en bild fyller en hel sida?
- Hur skulle du skapa ett nytt uppslag?
- Hur skulle du skapa en bildtext på valfri bild?
- Fotoboken går att ändra färg till svart. Hur skulle du göra detta?
- Hur skulle du ändra typsnitt på rubrikerna?
- Hur skulle du kopiera ett uppslag till samma fotobok?
- Hur skulle du ändra ordningen på bilderna i ett uppslag?

- Hur skulle du skapa en textsida på uppslaget?
- Hur skulle du göra för att se en förhandsvisning av boken?
- Hur skulle du byta ordningen på uppslagen i boken?
- Hur skulle du göra för att autofylla boken med alla bilder du vill ha i fotoboken?

B.5 General Questions to Conclude

Bra jobbat, det var alla uppgifter som jag ville att du skulle utföra. Nu tänkte jag ställa några frågor om utförandet innan vi avslutar.

- Vad tyckte du var enklast att göra?
- Vad tyckte du var svårast?
- Fanns det något du saknade när du skapade din fotobok?
- Har du något du vill tillägga om appen, Once Upon eller något annat som du tänkt på under intervjun?

Stort tack för ditt deltagande.

Appendix C Personas

This appendix presents larger figures of the the three personas, created in the *Define* phase of this study, and is shown in Figure C.1, C.2 and C.3.

Figure C.1: Persona 1.

Maria Nilsson

Age	45 years old
Family status	Married with two kids, aged 16 and 14
Housing	Live in a terraced house with her family and a dog
Location	Umeå, Sweden
Occupation	Pediatric nurse

Bio

Lena Nilsson is a confident 45-year-old pediatric nurse from Umeå, Sweden. She and her family love to travel and she also loves spending time with their dog. Lena is not that creative or technical, but still likes to create photo albums and calendars about her family. Her dream is to visit the beautiful nature of Norway and she's always focused on her children's well-being.

Characteristics

- Kind and helpful
- Very caring for other people
- Confident and doesn't care what others think
- Not very creative

Interests and hobbies

- Travel with her family
- Doing activities with the dog
- Does photo albums of the families travels
- Creates photo calendars of the family to the kids grandparents

Goals & dreams

- Have always wanted to travel to Norway to experience the nature
- To always have a good relationship with the children

Pain points

- Not very technical and can perceive technology as a challenge at times.

Figure C.2: Persona 2.

David Eriksson

Age	55 years old
Family status	Married with 2 children, 26 and 24 years old
Housing	Lives in a villa with his wife
Location	Stockholm, Sweden
Occupation	Store manager at their local Ica

Bio

David Eriksson, is a 55-year-old from Stockholm. He is a devoted husband, father of two and dreams of grandchildren. His passions include photography, cooking and investing. David and his wife enjoy traveling and capturing memories through photography. Something that he often encounters are technical challenges with new applications and tools. Even so, he likes to learn new things, so that doesn't stop him from experimenting.

Characteristics

- Curious, likes to try new things
- Very passionate about what he loves
- Driven and ambitious

Interests and hobbies

- Photography
- Passion for cooking
- Investments, such as stocks and bonds

Goals & dreams

- Have grandchildren
- Travel with his wife to new places and taking photos

Pain points

- Can struggle with the technique sometimes, especially new apps and digital tools

Figure C.3: Persona 3.

Appendix D User Flow Diagram

This appendix presents a larger figure of the user flow diagram, created in the *Define* phase of this study and is shown in Figure D.1.

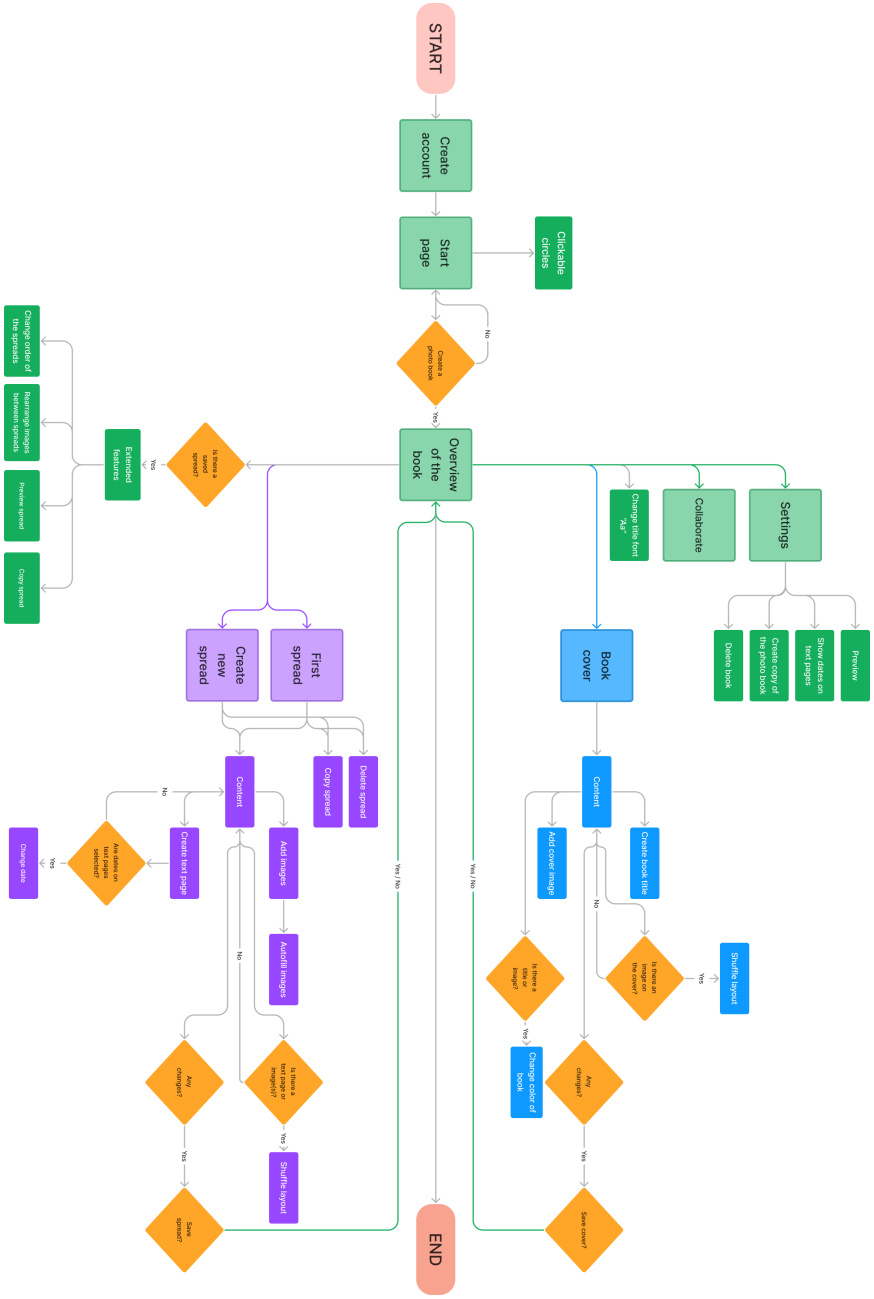

Figure D.1: User flow diagram of how a user can create a photo book.

Appendix E Usability Test of Low - Fidelity Prototypes

This section presents the script, questions and tasks from the usability test of the lo-fi prototypes. Three concept of how a user could get started were created. These are called Concept 1, Concept 2 and Concept 3.

E.1 Introduction

Hej! Innan vi börjar vill jag tacka dig för att du vill vara med och delta i detta test. Jag heter Ida Aavik och läser Civilingenjörsprogrammet i Interaktion och design vid Umeå universitet. Jag är just nu inne på min sista termin och under hösten arbetar jag med mitt examensarbete i samarbete med Once Upon. Once Upon är en applikation där du kan skapa fotoböcker digitalt för att sammanställa dina minnen. Det du ska få testa idag är olika skisser på hur en ny användare kan komma igång med att skapa sin första fotobok. Det är helt frivilligt att delta i detta test. Dina svar kommer att vara anonyma och kommer inte att kunna kopplas till dig som individ. Dock kommer svaren sammanställas och användas vidare under mitt examensarbete. Du kan även välja att avbryta när du vill.

E.2 User Information

- Kön
- Ålder
- Vart bor du?
- Har du barn?
- Har du skapat en fotobok med Once Upon förut?
- Är du okej med att dina svar kommer att användas som underlag för denna studie? Dina svar är anonyma och kan inte kopplas till dig som individ.

E.3 Introducing Questions

Nu går vi vidare till lite mer inledande frågor innan du ska få testa skisserna.

- Säg att du skulle ladda ner en app med målet att skapa en fotobok. Hur hade du velat att

första steget var för att börja skapa boken?

- Vad vore viktigt för dig att veta om produkten innan du börjar skapa den?

Tack! Nu ska vi gå vidare till skisserna. Dessa är i tidigt skede och kommer att utvecklas mer under projektets gång. Målet är att du ska bilda dig en uppfattning om hur de ser ut och hur det får dig att känna.

E.4 Concept 1

När man har loggat in i Once Upon-appen kommer man till denna vy. Börja med att klicka på skapa en fotobok.

- Förstår du vad du gör vid detta steg?
- Sedan skulle jag vilja att du väljer en cover image. Hur gör du då?
- Du har nu skapat framsidan av boken. Hur skulle du gå vidare för att skapa dina första uppslag?
- *När du ska komma igång kommer du först till denna vy denna vy.*
  - *Vad är dina åsikter kring dem?*
  - *Saknar du något på vyn?*
  - *Upplever du det tydligt vad nästa steg är?*
- Vad tycker du om detta sätt med att komma igång att skapa fotoboken?
- Var det någon information som du saknade i början som du hade velat få före första steget?

E.5 Concept 2

Tack. Då går vi till nästa skiss, som börjar på samma sätt.

- Hur skulle du gå vidare?
- Vart skulle du klicka för att hoppa över denna introduktion?
- När du klickat dig igenom dessa 3 ”sliders”, hur skulle du börja skapa fotoboken här?
- Vad är din generella åsikt om att detta kommer upp innan du börjar skapa fotoboken själv?
- Är det något du saknar på dessa slides eller något med ni undrar över kring bokskapandet? Vad tycker du bör finnas med på dessa slides?
- Hur var din upplevelse av detta sätt att komma igång? Hur får det dig att känna inför att

börja skapa fotoboken?

- *Därefter kommer du till denna vy denna vy.*
  - *Vad är dina åsikter kring dem?*
  - *Saknar du något på vyn?*
  - *Upplever du det tydligt vad nästa steg är?*

E.6 Concept 3

Och nu till den sista skissen.

- *När du ska komma igång kommer du först till denna vy denna vy.*
  - *Vad är dina åsikter kring dem?*
  - *Saknar du något på vyn?*
  - *Upplever du det tydligt vad nästa steg är?*
- Hur skulle du gå tillväga för varje uppgift som visas på skissen?
- Hur skulle du göra för att hoppa över dessa uppgifter?
- Denna skiss använder sig av “uppgifter” för att tydligt vägleda användaren, vad ger det dig för känsla kring appen?
- Vad hade du tyckt varit relevant att utföra som uppgift på denna sida?

E.7 General Questions to Conclude

Tack! Innan vi avlsutar skulle jag vilja ställa några sista frågor till dig

- Som du märkte styrde alla skisser dig mot att börja skapa framsidan av boken. Hur kändes det?
- Finns det något du saknar på skisserna som du anser hade kunnat hjälpa dig mer att komma igång och börja skapa fotoboken?
- Vilket sätt att komma igång tyckte du mest om och varför?
- Vilket sätt att komma igång tyckte du minst om och varför?

Appendix F Usability Test of High - Fidelity Prototypes

This section presents the script, questions and tasks from the usability test of the hi-fi prototypes.

F.1 Introduction

Hej! Innan vi börjar vill jag tacka dig för att du vill vara med och delta i detta test. Jag heter Ida Aavik och läser Civilingenjörsprogrammet i Interaktion och design vid Umeå universitet. Jag är just nu inne på min sista termin och under hösten arbetar jag med mitt examensarbete i samarbete med Once Upon. Once Upon är en applikation där du kan skapa fotoböcker digitalt för att sammanställa dina minnen. Du ska få testa en prototyp av hur en ny användare kan introduceras för att sedan skapa din första fotobok.

Det är helt frivilligt att delta i detta test. Dina svar kommer att vara anonyma och kommer inte att kunna kopplas till dig som individ. Dock kommer svaren sammanställas och användas vidare under mitt examensarbete. Du kan även välja att avbryta när du vill.

F.2 User Information

Innan vi börjar skulle jag vilja ställa några frågor om dig.

- Kön
- Ålder
- Vart bor du?
- Har du barn?
- Har du skapat en fotobok med Once Upon förut?
- Är du okej med att dina svar kommer att användas som underlag för denna studie? Dina svar är anonyma och kan inte kopplas till dig som individ.

F.3 High-Fidelity prototype

Du ska nu få klicka igenom en prototyp som är skapad. Du är välkommen att läsa eller tänka högt. Efter det kommer jag ställa lite avslutande frågor om prototypen och dina åsikter.

- Vad var din generella känsla av att klicka igenom dessa sidor innan du kommer igång med skapandet?
- Vad tycker du om innehållet på de tre sidorna?
- Enligt dig på en skala 1-5, hur hjälpsam hade du tyckt att denna typ av introudtion fanns med innan en användare kan skapa sin första fotobok?
- Har du något övrigt som du vill tillägga?