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Optimizing Multi-Stakeholder User Onboarding

A holistic approach to onboarding through user-centered design

Master's thesis in Computer science and engineering

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CHALMERS UNIVERSITY OF TECHNOLOGY
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Abstract

Traditional approaches to enhancing software onboarding typically focus on individual user journeys, yet complex systems often require coordinating multiple stakeholders through interconnected processes. Through Wint, an automated accounting software platform, this thesis takes a holistic approach to the onboarding context, employing a research-through-design methodology to explore both the fundamental and specific issues of Wint's onboarding. The research examines how the multitude of stakeholders, including end-users, employees, external partners, and third-party integrations, influence the critical onboarding process.

Following an iterative design process including extensive interviews, thematic analysis, prototyping, and a co-design workshop, this thesis presents multiple design artifacts to optimize various parts of Wint's onboarding. One concept regarding integrating a customer self-service learning platform was further analyzed and tested through a refined prototype, with independent participants unaffiliated with the organization. The identified friction points can be generalized in the context of onboarding multi-stakeholder systems beyond accounting software. Furthermore, the research addresses common design patterns in onboarding scenarios and metrics to evaluate and guide onboarding improvement.

The findings are presented as design artifacts, user testing results, and an extensive discussion culminating in general recommendations and insights for future attempts to improve digital service onboarding. Overall, the findings suggest improvements to internal employee workflows and customer interactions within the platform, expanding to reduce strain throughout the customer life cycle. Finally, possibilities for future work are identified and discussed.

Keywords: User Onboarding, Multi-stakeholder onboarding, interaction design, HCI, user experience, co-design

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Timothy Nilsson, Axel Söderberg, Gothenburg, 2025-06-19

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Introduction

For any service, an appropriate onboarding process is crucial for providing users with the required knowledge, whilst also providing the service provider with all the information needed to deliver the service successfully. This procedure may take on many different forms depending on the context, ranging from reading simple instructions to rigorous and time-consuming tasks spanning minutes or even days. Regardless, it is the common goal of both users and service providers to achieve a sufficient level of proficiency and ensure the future satisfactory usage of the service.

One such process is that of Wint, an automated accounting service software [1]. Wint's current onboarding system is mostly digitized, however, not all actions are performed within the same platform. The current process includes multiple steps with external stakeholders, uncertainty regarding task completion, and highly variable tasks depending on the user. This creates a complex state, which is further exacerbated by an additional degree of correctness given the legal nature of many of the tasks. While others have analyzed user onboarding, little research exists on efficient practices regarding stakeholder communication, long-term impact, and optimization of the process in general. We aim to contribute by exploring the following research questions:

- Which design patterns best support the visualization and streamlining of multi-stakeholder integration processes?
- What optimization opportunities exist in the onboarding process to reduce stakeholder time investment throughout the entire customer lifecycle?
- What metrics effectively capture value creation and realization across different stakeholder groups during the platform onboarding process?

Through investigating these questions, we hope to provide insight into the process of designing and evaluating onboarding systems and reach conclusions applicable to a broader community, both academic and service owners.

2

Background

Wint [1] is a Swedish fintech company specializing in automated accounting and financial services for businesses. They offer digital solutions to streamline financial management, including bookkeeping automation, invoice processing, and financial reporting. What distinguishes Wint from conventional automated bookkeeping platforms is its service-oriented business model rather than a purely software-based approach. This approach requires stronger communication between the organization and its customers to build meaningful relationships while also maintaining the software's usability and reliability. Consequently, the onboarding process assumes critical importance as the foundational mechanism through which customers are effectively integrated into the Wint ecosystem.

This section describes the current state of Wint's user onboarding process, the different stakeholders involved, and other prerequisites crucial to understanding the breadth of the problem. User onboarding refers to the process of introducing a user to a new product or service [2], see section 3.2.

2.1 Different stakeholders at Wint

Stakeholders in Wint's platform can be categorized into three categories. Each of these stakeholders has a different purpose and role when it comes to the onboarding of Wint's platform, and interacts with different interfaces. This section explains the most crucial parts to understanding the context of each stakeholder.

2.1.1 Customers

The primary stakeholder is naturally the user/customer paying to use the platform to automate their bookkeeping. This is a highly varied group, some knowledgeable about bookkeeping requirements and others not at all. Most are smaller companies with few employees, but larger companies are present as well. Customers primarily use the Wint application, the interface from which they will use the Wint service, as their medium for the onboarding.

2.1.2 Wint

Secondary stakeholders include Wint and its employees. They play an integral part in the onboarding process, ensuring the users are satisfied with the platform, and communicating with external stakeholders to ensure the required access is provided to the Wint platform.

Employees at Wint have access to an internal tool that manages all customer tickets and provides support where needed. This application is used for handling most actions regarding customers and is the primary interface Wint uses throughout the whole customer life cycle.

2.1.3 External

External stakeholders include all other parties that are not an active part of the Wint platform but whose services are required to make it fully operational. These include different banks, authorities such as Skatteverket, and related service providers such as a credit card service. These all have external tooling, systems, and integrations that customers and Wint can access at multiple stages of the onboarding process.

2.2 Current User Onboarding at Wint

Wint is a bookkeeping service that aims to help customers automate their bookkeeping, giving them more time to spend on their actual business. However, to get started with automating their bookkeeping with Wint, the user needs to familiarize themselves with several components to effectively use the application and complete tasks for the service to be operational.

In this section, what onboarding currently entails at Wint and the specifics of each component are discussed in more detail. We focus on the essential elements of the process, without delving into every complexity. The main phases are pre-onboarding and onboarding, which eventually reach the less-defined post-onboarding stage.

2.2.1 Pre-Onboarding

Pre-onboarding at Wint refers to the initial period between customer signup and service activation, which allows Wint to gather information vital to set up their services. This includes questions about the customer's previous bookkeeping, what kind of business the customer conducts, and what services they intend to use on the Wint platform. Once these prerequisites are understood, customers may access the application, and Wint provides the relevant tasks for the primary onboarding.

2.2.2 Onboarding

The onboarding phase focuses on getting customers fully operational with Wint's platform. Upon first visiting the platform, users are prompted with a welcoming guide that directs them on how to navigate the application, how to create new

support requests if any issues arise, and, most importantly, where their to-do list is located. Wint's to-do list keeps users on track by showing them what needs to be done next. While it's especially helpful during the initial onboarding process, it continues to be valuable throughout the user journey by flagging any tasks or issues that need attention. The onboarding tasks in the to-do list employ a ticket system, which means that every item in the to-do list is essentially a ticket containing key information and instructions. Users can either follow the instructions directly or ask Wint for help or clarification about the task. The ticket acts as a thread where Wint and the customer can have an ongoing dialogue when needed.

Due to the complexity of an automated bookkeeping service, familiarizing the user with the platform is not the only goal of Wint's onboarding. Wint needs permission and access from other external stakeholders to handle a customer's entire bookkeeping. These permissions are given outside of Wint's platform, further complicating the ability to provide support and communication between the customer, Wint, and the respective external party.

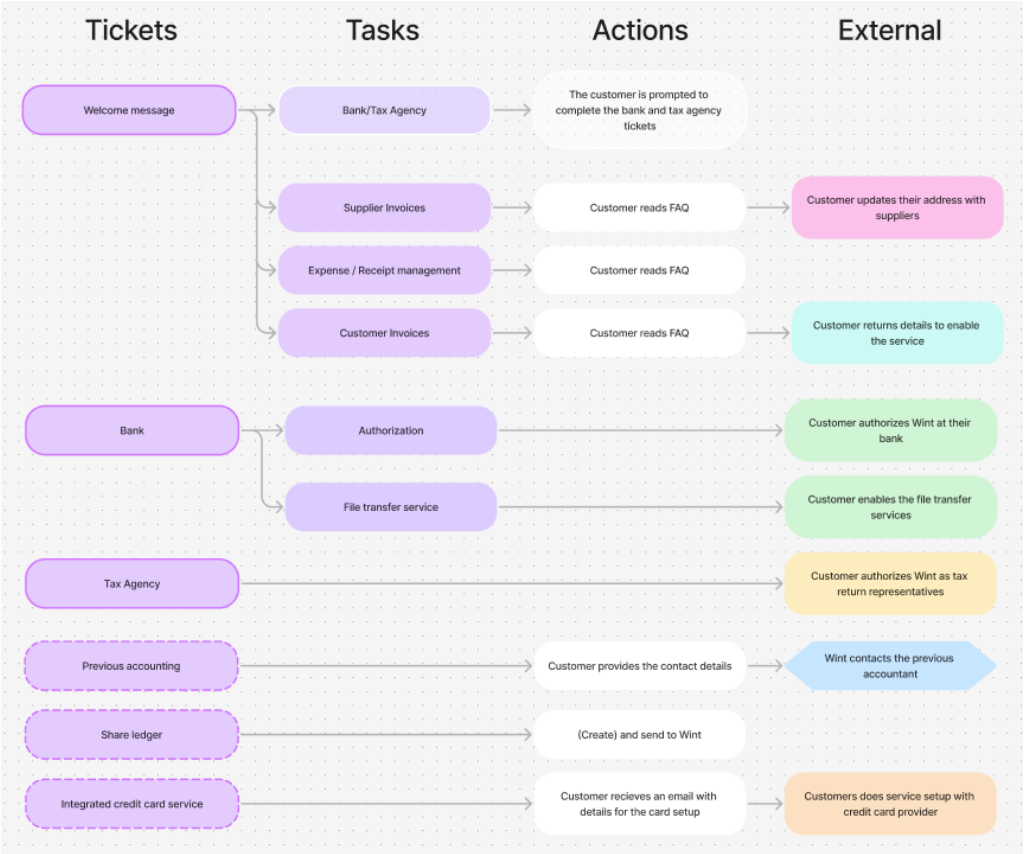


Figure 2.1: Overview of user onboarding tasks structure as presented through the Wint web application

The first ticket is less of a task and more of a welcoming message, greeting the user and informing them about the Wint platform and the other steps to get started. The first step prompts the user to complete the different tickets that are vital for the service to work, giving Wint access to manage and access their bank transaction

and government tax data. The other steps relate to features or general information the user should know about. Wint provides a link to an external Frequently Asked Questions page to aid in the first steps, see Figure 2.2. Depending on what a customer needs or wants, a few additional tickets might be opened as well, including the setup of an integrated card service or providing specific information required for certain types of organizations.

Figure 2.2: External frequently asked questions page, featuring a search bar, and categories in turn containing several articles

It should be noted that many of the tasks create longer chains of sub-tasks and additional actions depending on multiple factors. For example, the bank integrations might include extensive instructions for actions that the customer has to complete with their respective banks' systems, which Wint has to verify once or multiple times if incomplete. The complexity of these integrations varies significantly between different banking institutions, as each bank has its own technical requirements and verification processes.

2.2.3 Post-onboarding

Once a new customer has completed all the tasks related to the onboarding process, the customer can be considered done and ready to operate the platform. However, newer customers will naturally have more questions than those who have used the service longer, and as such, a given interval after the main process is of importance to understand the effects of the primary onboarding over time. In case Wint experiences a customer repeatedly relying on further support, especially regarding subjects covered in the original process, they might initiate a re-onboarding. Wint will then aid the customer through and repeat the learning tasks of the primary process again

to help them get on track with the service. A customer typically continues to automate transactions for around six to nine months before reaching a level where they continuously use the service without notable external intervention.

3

Theory

This chapter lists all the theoretical frameworks relevant to our research and aims to establish a foundation for understanding user onboarding and how it is set up. We begin by defining key concepts used in the field of human-computer interaction that will be used as a basis for how we approach our research. Next, we explore the intricacies of user onboarding and how multiple stakeholders add another layer of complexity in the onboarding context.

3.1 Human-computer Interaction

Studies of the dynamic environment of interaction between human actors and different embodiments of computer systems, known as human-computer interaction (HCI), have been a recognized field of study since the 1980s [3]. The field discusses how to create efficient, user-friendly, and accessible interfaces, which is highly relevant when investigating a digital user onboarding process. The principles and methodologies taught in HCI can be used in the context of user onboarding to improve the user experience and ensure a smooth onboarding process.

3.1.1 Mental model theories

Several different theories seek to explain how users interpret and learn a system, and how this influences user actions and behaviors. The influential *mental models* theory, first presented by Norman [4] in 1983, describes user interaction through their mental model of the system. If a system greatly diverges from the users' expectations and experiences, this will impair or delay user learning or experience due to the user having to relearn things already familiar or discovering new means for achieving their goals [4]. Sweller presents the *cognitive load theory* [5] which stresses the need for interfaces to be clear and direct, lest risk overloading the cognitive limitation, decreasing efficient learning. Pirolli and Card [6] propose the *information foraging theory*, which suggests that users will seek out and forage for information and learning opportunities of the system, as long as the system allows for a safe and cognitively comfortable exploration.

A predominant theme in these models is the reduction of **cognitive load** [5]. User interfaces should be designed with this in mind, especially in the context of learning and users being new to a system. On the other hand, one should be careful hiding or

limiting information to a degree that instead creates significant problems of *excise*, cognitive and physical effort not directly part in achieving the user's goal [7]. Such problems include extensive navigation, poor defaults in forms or interfaces, and overly frequent confirmations [7].

3.1.2 Design patterns

In broad terms, design patterns are replicable and testable solutions to common design problems [8]. These methods help the user familiarize themselves with an interface and know what to expect from the interactions, which contributes to reducing the cognitive load [5]. One can identify design patterns on many different levels, ranging from larger structures such as navigation down to individual components of an interface [9].

Related to onboarding, there are a number of prominent design patterns that can commonly be found in different types of applications. For example, interface tours guide the user systematically through an interface with annotations or tooltips, promoting relevant features when required [10]. Checklist or task-based onboarding increases engagement through small, achievable goals [11] and gives a straightforward way to measure progress [12].

3.1.3 Computer-supported cooperative work

Software or computer interfaces that are intended to accommodate the collaboration of multiple users can collectively be called *groupware* [3]. They may range from asynchronous text messaging to real-time collaborative meetings [13], with each implementation bringing unique challenges to their specific contexts.

In groupware that relies on the action of multiple users, Dix [3] describes the importance of *awareness* of other users' actions to keep multiple involved parties up to speed and ensure trust and efficiency. In the context where a set of actions, tasks, or events is expected, status trackers and progress updates are two proposed solutions [14]. The status tracker follows a *pull* approach, where the user accesses the information at will [14]. Comparatively, the progress update pattern delivers the information directly to the user through some medium, a *push*-approach [14]. When designing interfaces with requirements for such artifacts, one should make conscious decisions about what suits the user best. Furthermore, tasks themselves must be easy to understand and well structured to reduce cognitive load [13] and indicate when they are considered done [15].

3.1.4 Gamification

Gamification broadly refers to the application of design patterns and strategies associated with games onto other contexts [16] to increase engagement or otherwise enhance the user experience [17]. Chou [18] describes 79 different patterns, such as *achievements*, *step-by-step tutorials*, *quest lists*, or *progress bars*. These can help give users or players a sense of progress and encourage further learning or task completion, empowering users through a sense of accomplishment [18].

3.1.5 Prototyping

Prototypes are ways to communicate, evaluate, and develop ideas [19], and an essential part of the design process [20]. Prototyping allows the probing of potential solutions without needing a significant time, monetary, or other resource investment. The tradeoff is that the limitations of a prototype will not fully capture the problem context, a characteristic of wicked problems [21]. Prototypes are often categorized as either low- or high-fidelity: the former are rough, less detailed variants focusing on concepts, while the latter are more polished, realistic, and often interactive [22]. Both have strengths and weaknesses that make them more suitable for different contexts, and there is no universal rule governing their usage; however, low-fidelity prototypes might be utilized frequently in the earlier stages when a problem or solutions are not yet fully understood, and high-fidelity prototypes take a larger presence in later stages [22].

3.2 User Onboarding

Onboarding is a term with various interpretations, but it is mainly associated with employee onboarding, which describes the process by which a new employee becomes an integrated part of an organization [23]. User Onboarding instead focuses on users and familiarizing them with a new product or service [2]. Defining precisely what this entails is difficult since every product or service is different. For financial services, some regulations and laws need to be integrated into the User Onboarding, adding another layer of complexity [24]. An example of these regulations is Know-Your-Customer (KYC), which states that the company is required to confirm the identity of the customers, i.e, ensuring that their users and their financial intents are legitimate [25].

User onboarding aims to effectively introduce a user to a product or service to a point where they become proficient [26]. This also includes ensuring that the users feel satisfied and integrated with the product or service.

3.2.1 Types and Elements of Onboarding Processes

The user onboarding process can take many forms based on the company's product or service. The complexity of the services or products and the user's individual needs create different requirements to satisfy or goals to achieve. The different types of onboarding can be categorized as follows:

- **Self-service onboarding**: This refers to an onboarding process where users themselves self-learn about the service or product; commonly through navigating video tutorials, FAQs, manuals, or other forms of documentation [2]. This strategy is common for physical products that often come with a simple manual or a get-started guide. Self-service onboarding effectively cuts costs by reducing the need for an expert to teach about the service and instead supporting independent learning [27].

- **Interactive guided onboarding**: Guided onboarding is a form of User onboarding where users get an interactive walkthrough of a service through the application itself. Additionally, the interactive walkthrough can be complemented with annotated instructions [28] to clarify possible actions or functionality. When done well, a benefit of this approach is that the users get hands-on experience with the application, which helps build the user's mental model [4] and promotes learning [29]. This approach aligns with a psychological phenomenon known as the IKEA effect [30], which suggests that when users actively engage with and achieve something within a product, they feel a sense of pride and become more emotionally attached to it, as a result.

3.2.2 Metrics and Key Performance Indicators

To effectively evaluate the success of user onboarding processes, it may be of interest for organizations to establish metrics and key performance indicators (KPIs). Kaplan and Norton [31] emphasize in their Balanced Scorecard framework the need for organizations to broaden their view of measurement, looking beyond standard financial metrics and also including customer perspectives. Therefore, it is important to define metrics and KPIs that can be used to evaluate how well a user onboarding process performs and ensure that users fully grasp the product and how to efficiently utilize it [12].

- **Onboarding Engagement**: For onboarding processes that consist of a set of tasks the user needs to complete, organizations may benefit from a KPI that measures how quickly a user goes through the assigned tasks. Userlane provides a user onboarding experience guide from the industry, where they list a couple of relevant KPIs [12]. One is looking at the average time for users to complete all tasks, which gives insights into how well the user understands the given tasks and how motivated and quickly they can complete them [12].
- **Time-To-Value**: Time-to-value is a widely mentioned metric in research in the context of user onboarding [12], [32], [33]. This metric is used to determine the time it takes for a new user from sign-up to their first achievement. It can be used to identify flaws in your initial onboarding process and to optimize it, which means you decrease the time it takes for your customer to start using your software. This can also mean that less time is spent on support, lowering costs overall.
- **Feature Adoption**: Another metric introduced by Userlane is feature adoption [12]. The metric is used to get a better understanding of how many users are using a specific feature. This can be an interesting metric if you recently released a new feature and want to know how it is being perceived. This metric can be divided into the following KPIs:
  - Feature Announcement Efficacy (number of users who adopted your new feature divided by the total number of active users) [12]
  - Time for Adoption (Average time from feature announcement to adoption) [12]

- Duration of Adoption (number of times users use the new features at different points in time) [12]

Another metric often used at companies offering software as a service is churn rate, which measures the number of customers who cancel their subscription.

3.2.3 Multi-Stakeholder Considerations

Freeman and Reed [34] defined stakeholders in 1983 as any identifiable group or individual who can influence or be influenced by the achievement of an organization's objectives. In complex software applications, multiple stakeholders are often involved, who also need to be taken into account [35]. However, most current research conducted on user onboarding commonly only discusses its importance to end users. The stakeholder(s) who host or own the onboarding process may experience issues themselves, and it is highly valuable to address these to improve the experience [24].

In financial services, relevant stakeholders can include customers, employees, banks, and government regulators. Designing onboarding processes for multiple stakeholders is a challenging task itself, mainly due to the variety of requirements each stakeholder has [36]. Therefore, when designing a user onboarding process, it is essential that all stakeholders are considered and that a reasonable effort is made to please all.

3.2.4 Emergence of AI

As digital products become more sophisticated, artificial intelligence (AI) is continuously being explored for many applications and could potentially be used to enhance user onboarding. According to recent research, AI enables various digital platforms to create real-time personalization and adaptive learning paths [37]. Therefore, AI can be used within user onboarding to create a tailored onboarding experience, based on how the user interacts with the product or service.

Another application where AI can be used to improve user onboarding is with conversational agents, more commonly known as chatbots. Conversational agents can act as a first line of support, assessing users' needs, answering simple questions, and directing more complex issues to appropriate human support channels [38]. This can significantly reduce the amount of human input required in the onboarding process while also giving users access to an easily accessible support system that is available at all times. However, for a chatbot to appear human and be able to respond appropriately to any given situation, sufficient training data is required [39]. This limitation might make it less appealing for companies to incorporate this as a part of user onboarding due to the commitment required to prepare and train an advanced conversational agent.

4

Methodology

This chapter outlines the methodological foundation of the project and introduces relevant design philosophies and frameworks found in Human-Computer Interaction. Additionally, several suitable data collection and evaluation methods and tools are explained.

4.1 Research through design

The practice of Research through Design (RtD) is a common approach in the studies of HCI and presents a process of generating knowledge through design activities and courses of action [40]. It commonly produces prototypes or design artifacts from an iterative process, which in turn leads to the possibility of observing and gaining new insight not previously accessible. This helps tackle the unpredictable issues inherent to wicked problems [21], which are characterized by an inability to be understood until approached by solutions. Effectively, this manifests as the iterative development and evaluation of prototypes and solutions that frame the whole of the project.

While RtD practices may help identify and address the unique challenges of the problem at hand, one should also note that this limits the suitability for drawing general conclusions on digital onboarding as a whole [41]. Furthermore, there is inherently no concrete adaptation of the framework. Hence, the adaptation of other theories will contribute to a more holistic and nuanced view and clarify more tangible practices.

4.2 User-centered Design

Initially developed in the 1970s, the methodology of user-centered design (UCD) combines methods to understand and develop in reference to the user needs [42]. Much like RtD, UCD aligns with the value of iterative design and development, further emphasizing the need for good evaluation. Since the success of the project is heavily dependent on user satisfaction, it is vital that this is fully embraced in the process, and the methods chosen expand upon this vision.

There are multiple established concrete methods to involve users in the design process, which should be carefully chosen to aid in the continued development. Factors

such as time, cost, and availability must be considered. While some methods, such as field studies, can be perceived as of high practical importance, they are often costly, which disfavors them compared to quicker or, in other measures, less expensive alternatives [43].

4.3 Co-design

Co-design refers to the act of involving multiple stakeholders in the design process, not limited to those who have experience with design [44]. Similar to UCD, the goal is to design for end-users, but instead of the designer acting as the expert in every step of the process, co-design shifts the focus to designing with users rather than for them.

When following co-design, the user plays an active role in the design process and can be seen as a co-designer if their expertise and interest are sufficient [44]. The researcher instead focuses on facilitating the creative process by providing tools for ideation and expression. The role of designer, commonly the same person as the researcher role, still maintains responsibility for giving form to the ideas through their professional expertise, but with an emphasis on the co-designing users' input [44].

4.4 Double Diamond Design Process

The double diamond design process is structured into the four distinct phases of discover, define, develop, and deliver [45]. This structure guides the project forward, ensuring we exhaust possibilities and potential solutions whilst converging on problem definitions and deliverable artifacts.

- **Discover**: Gather information and build an understanding of the problem space without any assumption of the concrete issues.
- **Define**: Converge, specify, and state what the problem(s) are.
- **Develop**: Explore different possible solutions to the stated problem(s), creating prototypes or other means to be able to evaluate.
- **Deliver**: Evaluate the suggested solutions, rejecting those that are deemed bad and continuing with those that prove good.

4.5 Data Collection & Evaluation Methods

Evaluation and inclusion of user assessment is a core principle for making well-advised decisions and, in turn, increasing user value [3], [43], [45]. The following section outlines various data collection and evaluation methods that can be strategically selected and combined to support the user-centered design process.

4.5.1 Interviews

As a cornerstone of qualitative research, interviews provide direct access to users' thoughts, experiences, and needs through structured dialogue [46]. Interviews can take a multitude of different forms, such as structured formats with predetermined questions, semi-structured approaches that combine prepared questions with flexible follow-ups, or unstructured conversational methods [46]. One major strength, notably for the less rigid variants, is the ability to probe further into discussed topics. This may lead to the acknowledgment of issues unbeknownst to the interviewer [3], especially useful in the earlier *discover* phases. It should be noted that data generated from less structured formats might be more complex to measure or compare in contrast to more rigid, structured approaches [3].

Furthermore, it is crucial to consider potential bias that might appear when conducting all types of interviews. For example, social desirability [47] is one such bias widely researched in the healthcare sector. Although the financial sector differs from healthcare, it may still be relevant to discuss the potential social desirability bias that some interview questions might have. For instance, some users may feel inclined to present themselves as more knowledgeable about sensitive topics surrounding finance than they are, potentially obscuring real challenges. Therefore, it is highly relevant to ensure the participants' integrity and privacy are protected and to be transparent about how their responses will be used [47].

4.5.2 Observations

There are many different approaches to observations, each with distinct methodological considerations. Many of these approaches raise ethical implications that must be addressed, while others may introduce biases that impact the quality of the produced data. For example, nonparticipating observation in which the user is unaware of the observer, or forms of eavesdropping, might produce valuable insight and the most true-to-nature behavior of users, but raise many ethical concerns [48]. *Complete observer* [48] or *fly-on-the-wall* [49] approaches inform the participants of the planned or ongoing observation, but with no intervention throughout. This provides good potential for a rewarding observation, while ethical concerns can be adequately managed.

4.5.3 Thematic Analysis

Thematic analysis is a research method used to identify patterns or themes from qualitative data gathered from other methods, such as interviews or questionnaires [50]. To conduct a thematic analysis, a set of specific steps needs to be followed. Braun and Clarke [50] describes how the first step is to deepen one's understanding of the data by reading, taking notes, and starting to conceptualize potential codes. This stage is vital to ensure that subsequent steps are successful. After a solid foundation has been laid, the next step is to generate the initial codes that will serve as concise building blocks to ease the process of identifying themes in the final stages through isolating fragments and statements in the data [50]. The final stages involve identi-

fying and defining common themes overarching the codes, which hopefully results in a better understanding of differences, similarities, and other characteristics within a large data set [50].

4.5.4 Cognitive Walkthrough

A Cognitive Walkthrough (CW) is an evaluation method used to find pain points and struggles a user might experience while navigating an interface [51]. Unlike traditional user testing, CW is performed by domain experts who examine specific tasks and determine whether users can successfully navigate through the interface to accomplish their goals [51]. The strength of CW is that it enables designers to get a better understanding of their interface without having to perform time-consuming user tests.

4.5.5 Questionnaires

Questionnaires are a data collection method used in survey research that can gather quantitative, qualitative, or mixed-method responses from participants [52]. They are beneficial when the researcher aims to receive feedback and opinions from a large sample size, and when the expected responses fit into the more rigid structure [3]. Questionnaires are also commonly used in later stages of the design process, for example, as a form of evaluation to get a better understanding of users' needs and experiences [3].

4.5.6 A/B testing

A/B testing is a form of evaluation method for comparing two different versions of an application and measuring which one performs best with the help of a relevant heuristic [53]. A set of users is randomly selected to test either version A or version B of a specific section of the user onboarding. To identify which version better meets users goals, heuristics such as completion time, task success rate, or the frequency of errors can be employed [54]. By analyzing how the users interact with the different versions, it should become clear if there is a significant difference between them [53].

4.5.7 Heuristic evaluation

Performing heuristic evaluations serves as a quick and very inexpensive option to identify issues. The method has an expert or knowledgeable person analyze an interface, state opinions, and identify potential problems [55]. Usually, this is done based on established heuristics, e.g, Nielsen's 10 usability heuristics for user interface design [56]:

1. Visibility of System Status
2. Match Between the System and the Real World
3. User Control and Freedom
4. Consistency and Standards

5. Error Prevention
6. Recognition Rather than Recall
7. Flexibility and Efficiency of Use
8. Aesthetic and Minimalist Design
9. Help Users Recognize, Diagnose, and Recover from Errors
10. Help and Documentation

While the method can give valuable feedback, it should be noted that the lack of user involvement signifies it might not directly address the issues users are actually experiencing. Nielsen and Molich [55] notes that the results are much more reliable if multiple evaluators independently perform the evaluation, preferably three to five. However, more than five evaluators usually provide diminishing returns as most issues will be identified repeatedly without many new discoveries [55].

4.5.8 Personas

Dix [3] states that within human-computer interaction, it is vital to understand the user. Therefore, a method such as Personas can be utilized to relate and create fictional characters representing a real user [57]. Typically, the method involves specifying an example person with their goals, intentions, and to the context important characteristics [58]. The power of personas is that they act as an example benchmark of the target audience, thus making it easier to experiment and evaluate throughout the design process without the need for a real, suitable representative [59].

4.5.9 Crazy 8's

Crazy 8's is a brainstorming method where designers spend eight minutes generating eight different ideas that could be potential solutions to a specific challenge [60]. This technique serves as a practical starting point for addressing problems or challenges by kick-starting the ideation process. It helps designers generate a wide range of possible solutions in a short time frame. The sketches do not need to be polished or detailed; they simply need to convey an idea [60]. The goal is to rapidly explore multiple alternatives to a challenge rather than refining a single solution, with the strict time limit preventing designers from becoming overly attached to their initial ideas.

5

Process

The following is an overview of the project's execution, from the initial research and requirements to the final case study and user tests. The user-centered design and research through design philosophies are central throughout, guiding the general approach. In practice, this shows through the iterative development of prototypes and an overall alignment with the double diamond process.

5.1 Literature review

As an initial step in our process, surveying the existing research and resources regarding the different topics laid a solid theoretical foundation for both understanding and approaching our upcoming efforts. In addition to the valuable insights produced by previous studies, these findings helped identify gaps and articulate the subject, which would lead us to specify our research questions. Furthermore, the methodology and underlying theory helped rationalize our planned process and justify future design decisions.

5.2 Initial evaluation & requirement gathering

A comprehensive understanding of the domain and any surrounding influences was needed to properly address the challenges of the current onboarding. As such, extensive effort was put into understanding the different elements of the onboarding process, together with opinions and experiences regarding the current state as described in the subsequent steps.

5.2.1 Interviews

A total of six unstructured interviews were carried out during the define and requirement-gathering phase. These sessions involved expert Wint employees engaged in different aspects of onboarding, with the aim of acquiring deeper insight into how they perceive and experience the current process.

Initially, the interviews were designed to follow a semi-structured format. Still, as the meetings progressed, it became evident that allowing employees to speak freely about their thoughts yielded better results than having them answer structured,

open-ended questions. However, most of the interviews conducted discussed the following questions:

- What is your general impression of the onboarding process with new customers?
- What do you find most difficult during the process?
- How does the communication with external stakeholders work, for example, banks, third-party partners, and Skatteverket?
- Are there any specific stages where customers often get stuck?

The collected interview data allowed us to perform a thematic analysis to further our understanding of Wint's onboarding process's strengths and weaknesses.

5.2.2 Thematic analysis

After the interviews were conducted, we performed a thematic analysis of the interview transcripts and notations. Initially, this data was scattered and unstructured, and to address this, the data was cleaned up and organized into a comprehensible format before any further analysis. This process was completed promptly after the interviews were completed, while the conversations were still fresh in our minds.

Once the data was clarified and comprehensible, initial codes were generated that conveyed a clear and identifiable thought or statement. The codes were then used to identify initial themes and patterns in the data, and we grouped them into the following overlapping themes:

- Bank difficulties
- Suggestions for improvement
- General issues
- Other

These initial themes made the next step of reviewing and defining more specific themes easier since we had upwards of a hundred different codes generated from the notes. Finally, we were able to identify fourteen final themes from our data under the four major categories:

- Bank issues
  - Confidentiality issues
  - Desire for a coherent bank contact
  - Differences between banks
  - Bank authorization issues
- Suggestions

  - The need for Wint to be better visibly integrated into the customer journey
  - Onboarding philosophies and strategies
- Difficulties
  - Issues with bookkeeping transition
  - Platform issues
  - Supplier invoice issues
  - Differences between customer groups
  - Workflow issues
  - Troublesome users
  - Customer knowledge gap
  - Communication between Wint and stakeholders
- Other

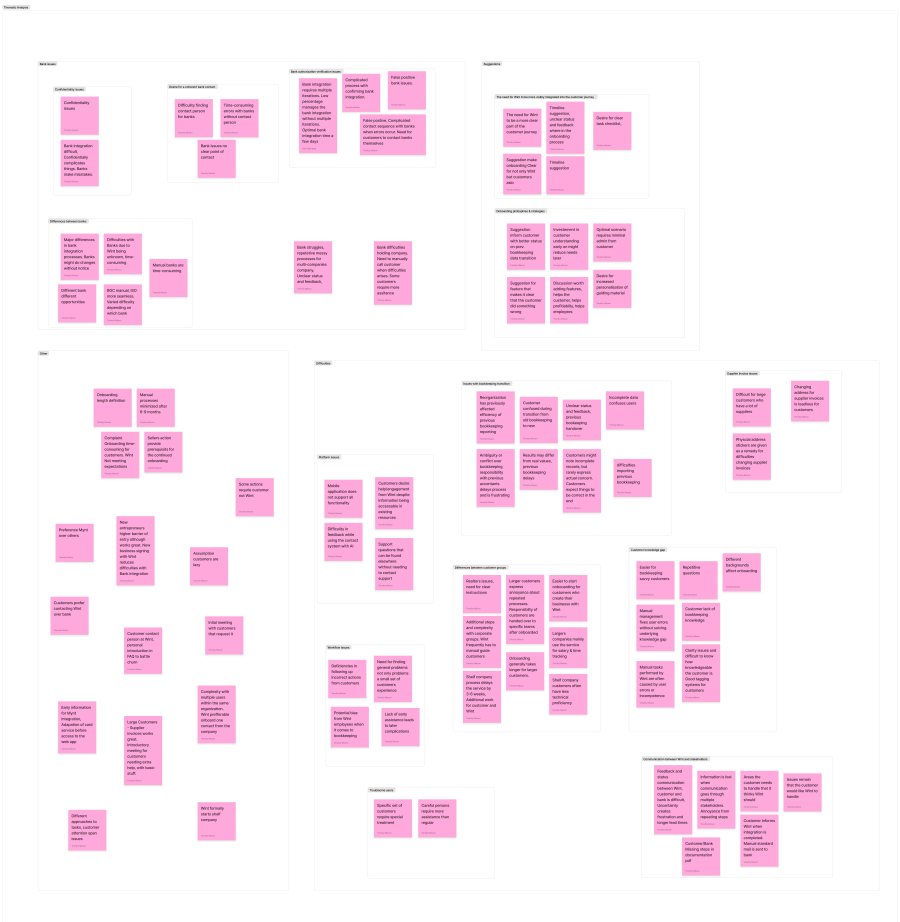


Figure 5.1: Visualization of the thematic analysis data points and categorization process.

5.2.3 Customer questionnaire

In addition to the interviews done with Wint, a questionnaire was sent out by email to customers who had recently been onboarded. Compared to the interviews, the questionnaire was more quantitative and less extensive to encourage responding and not overload or daunt customers. The questions' features were catered to fit the customer's perspective, and response options varied between linear scales and free text. The questionnaire protocol can be found in the appendix B.

A few considerations were made to accommodate the customers' context. Responding to the questionnaire was voluntary and anonymous, and a brief definition of onboarding was included to clarify for users what part of the process was regarded.

However, with a very low response rate on the questionnaire, it was largely disregarded in favor of the extensive information from the interviews.

5.3 Ideation

After deepening our understanding of the onboarding situation and context, we started ideating about different aspects of the thematic analysis. This phase led to the development of several early concepts and low-fidelity prototypes, which helped us narrow down the solution space and specify the suitability of different approaches.

5.3.1 Crazy 8

As a first step in our ideation process, we conducted a Crazy 8 exercise to generate rapid ideas addressing the identified themes. This exercise built upon the stakeholder insights gathered during our research phase and allowed us to explore potential solutions for the onboarding challenges. Due to the time-constrained nature of Crazy 8, the generated concepts touched on various aspects of the onboarding process, some being more radical and not necessarily connected to our findings. The purpose of using this method as a starting point is to start thinking about potential solutions and opening up discussions that might lead to more defined solutions as presented in later sections. Notably, we found significant overlap between several concepts generated during the Crazy 8 session and our thematic analysis findings, with multiple ideas converging on the need for progress tracking, timeline visualization, or to-do functionality to address the multi-stakeholder onboarding challenges.

5.3.2 Mood board

To establish a visual direction for our design solutions, we created a mood board collecting interface examples and design patterns from existing solutions to progress trackers, timelines, and checklists/to-dos used in established software today. The mood board served as a reference point to spark inspiration and discussion on how we could incorporate this into Wint's existing platform in the internal software Wint employees use as well as the web application the customers use daily.

Our visual research focused on existing design and can be summarized into the following categories:

- **Progress tracking timelines:** Solutions featuring horizontal and vertical timeline designs with connected nodes, status indicators, and interactive elements showing progression through multi-stage processes

- **Task management interfaces:** Examples of priority-based task organization systems utilizing color-coding and visual hierarchies to distinguish completion status and importance.

- **Customer dashboards:** Interfaces that present progress overviews designed for external users, balancing comprehensive information with simplified visualization techniques.

- **Educational onboarding sequences:** Interactive tutorial elements from SaaS applications and digital game environments, focusing on progressive educational components that introduce functionality contextually. Additionally, we analyzed logistical tracking interfaces to understand effective methods of visualizing progression through sequential processes

5.4 Prototyping

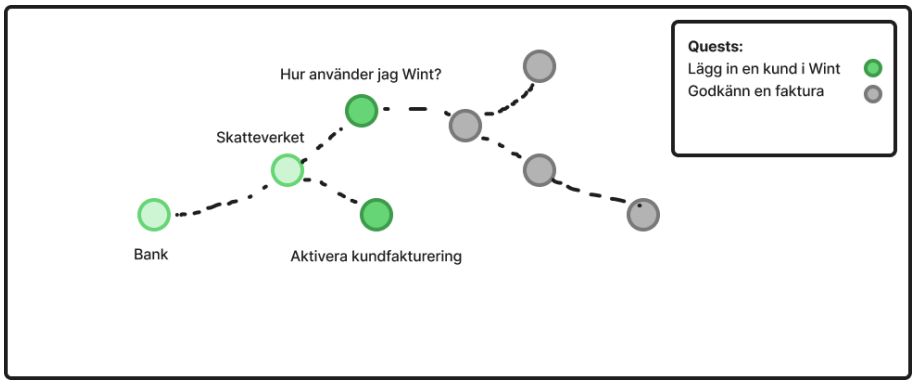
Following the insights from the thematic analysis, rapid ideation and continuation of earlier identified solutions led to the development of multiple concepts. The main goal of prototyping was to explore potential directions for solutions that solve or remedy the underlying problems discovered during the thematic analysis. The complexity and dependencies of these problems led the prototypes to address multiple issues, often through the different stakeholders' perspectives.

Prototypes 5.2a-d aim to solve the following points identified from the thematic analysis:

- The need for Wint to be better visibly integrated into the customer journey

- Onboarding philosophies and strategies

- Communication between Wint and stakeholders



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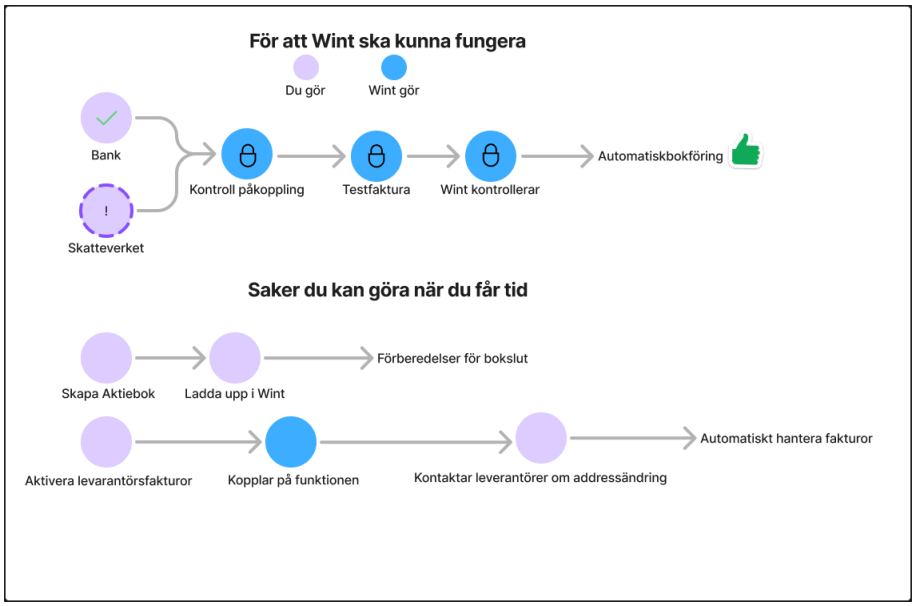
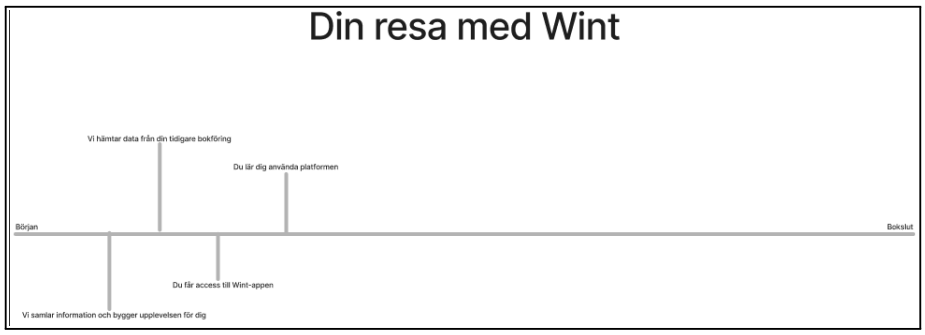


(b)

Figure 5.2: Early low-fidelity prototypes of user timelines (part 1)



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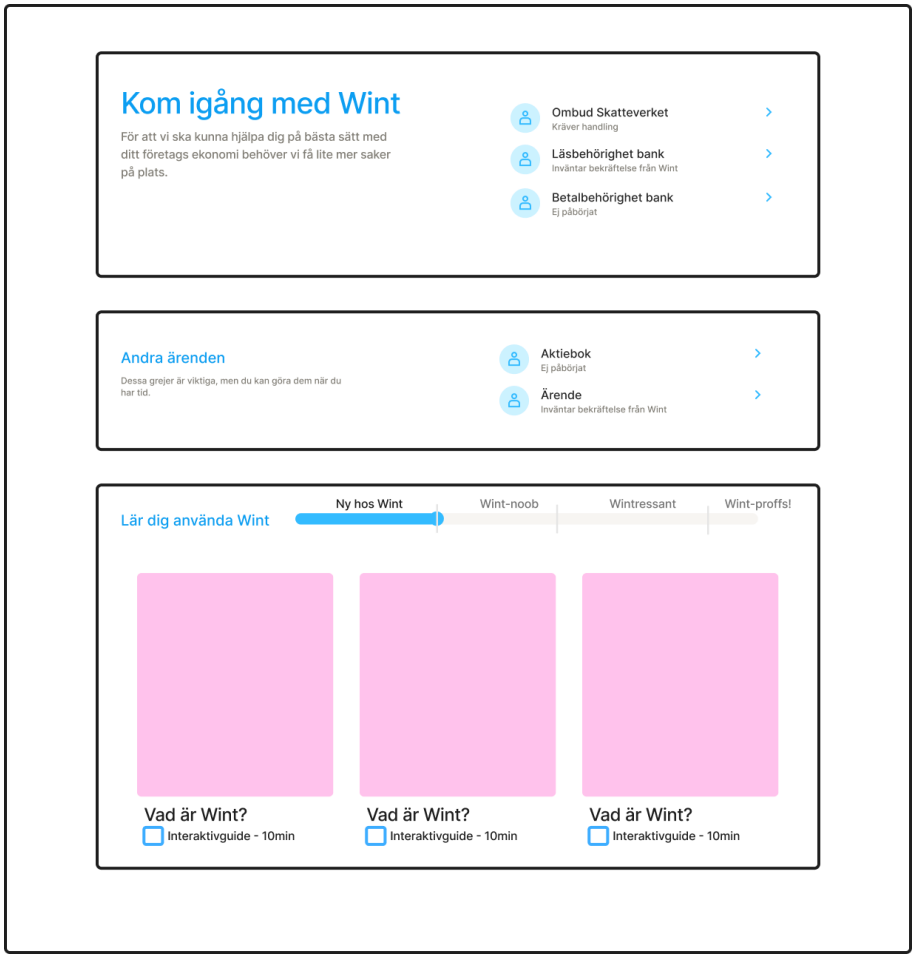


(d)

Figure 5.2: Early low-fidelity prototypes of user timelines (part 2)

Figure 5.2 shows a sample of early iterations of timeline alternatives for the user view. Commonly, these aimed to address the lack of transparency of the process, while keeping the current stage or status clear. Artifact (a) explored a gamified approach with a playful take on tasks and platform-specific accomplishments. Artifact (b) sought to address the stakeholder responsibility and visibility of tasks, and artifact (c) took a more holistic approach to the user journey. Artifact (d) explored the idea of a more coherent onboarding view, including learning elements and tasks priority

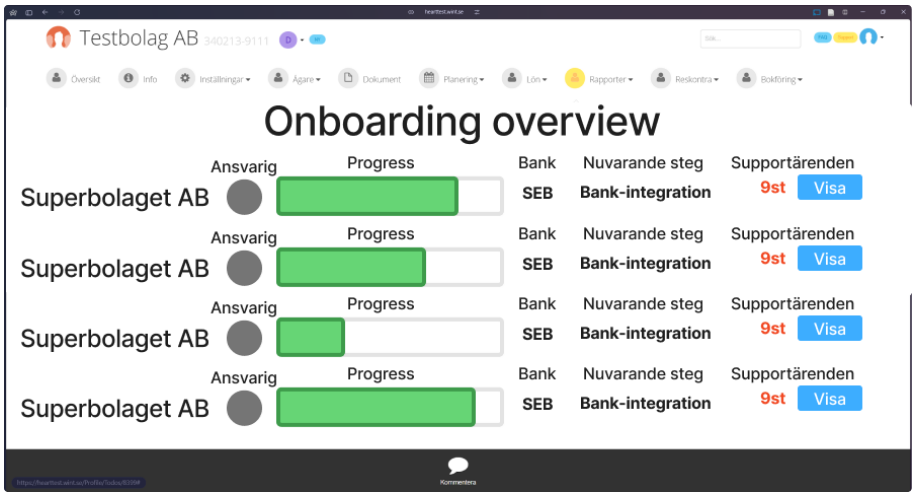
separation.

A couple of the prototypes included concepts focused on tutorial sections integrated within the platform from a customer perspective. As noted in our thematic analysis, a lot of the multi-stakeholder challenges stem from customers' confusion about the timeline and to-do items. Customers are often unsure about what specific actions to take in each step of the process and, therefore, ask repetitive questions due to a lack of clear information about their progression through the onboarding journey. Hence, we wanted to explore how integrating a learning platform inside the web application might look. Furthermore, the idea sparked thoughts about continuous learning throughout the customer journey, to reduce the need for support later on.

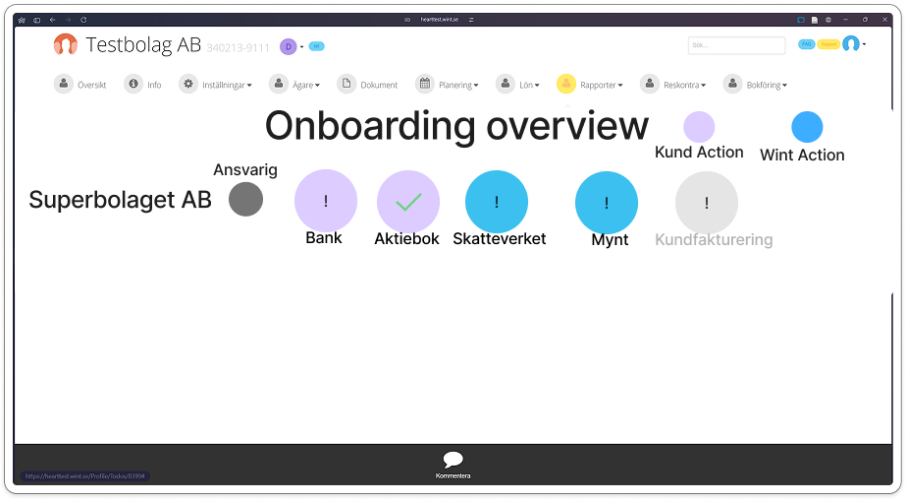
Prototype 5.3 proposes an early design to tackle the key customer knowledge gap revealed in the thematic analysis. It demonstrates a concept of having a learning platform in the Wint application, where users can view tutorials concerning the platform.

Figure 5.3: Low-fidelity prototype of integrated learning tool

Lastly, multiple concepts targeting the internal application interface were explored as well. These drew upon the aforementioned concepts, but were placed in the context of the Wint employees. Therefore, they aim to address issues concerning Wint and external stakeholders, and the Wint employees' internal workflows.



(a)



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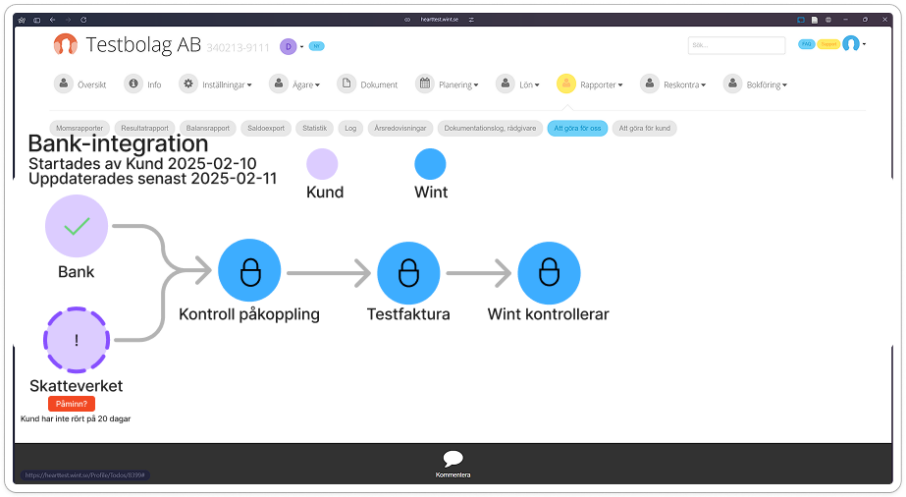

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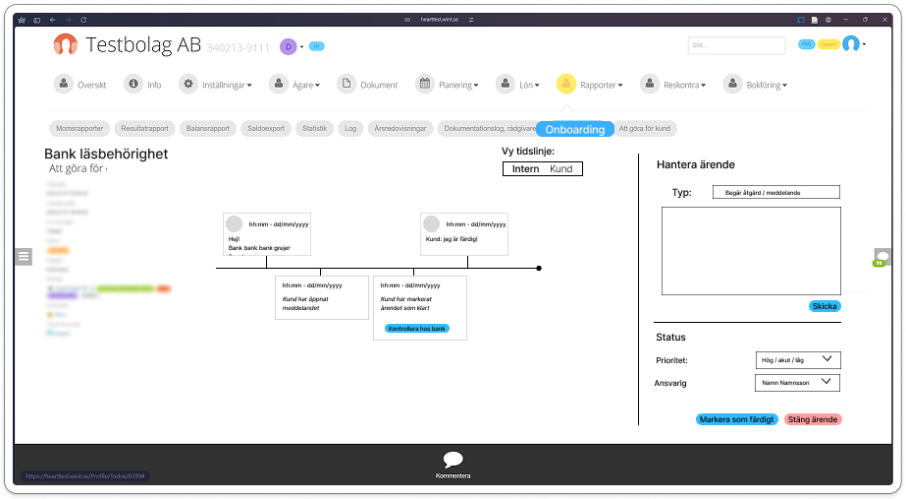
Figure 5.4: Low-fidelity prototypes of internal tools (part 1)



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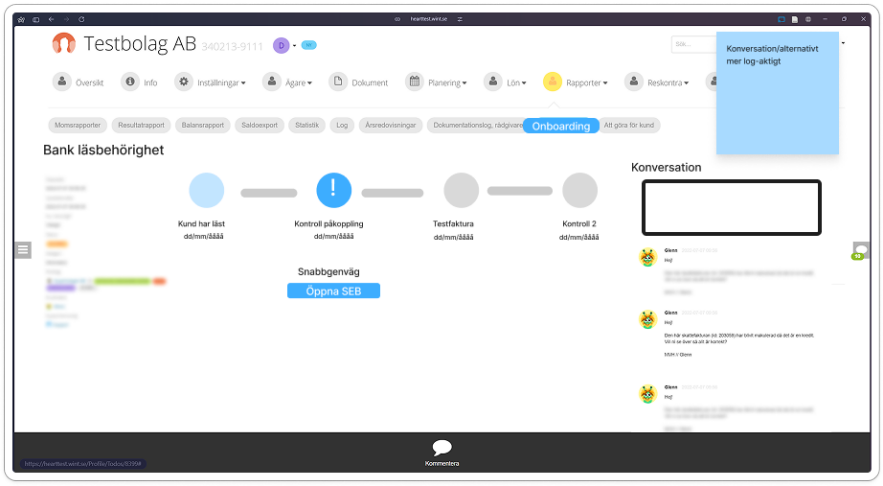

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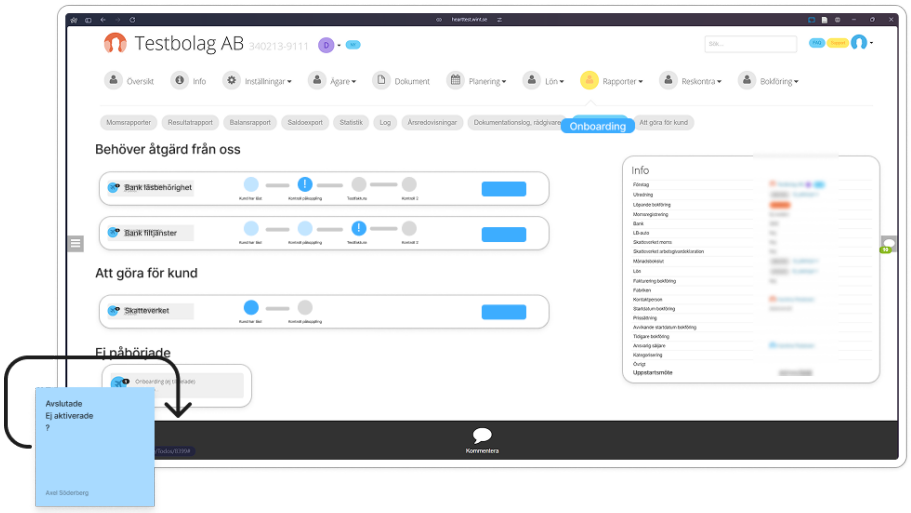

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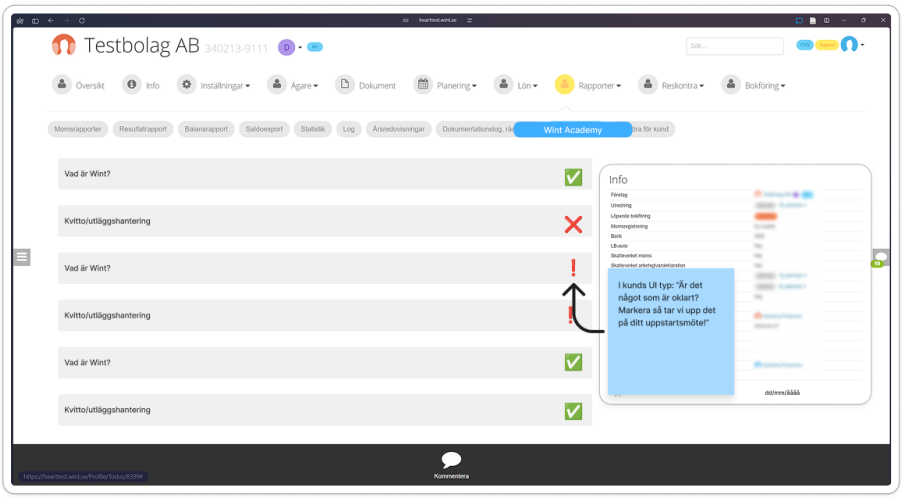
Figure 5.4: Low-fidelity prototypes of internal tools (part 2)



(g)

Figure 5.4: Low-fidelity prototypes of internal tools (part 3)

5.4a and 5.4b are overviews of multiple and one specific customer. 5.4c through 5.4f are different attempts at a task specific view. Finally, 5.4g represents a view to track progress in the customer learning view.

5.4.1 Feedback session

The first iteration of prototypes was in the form of low or mixed-fidelity prototypes, and their goal was to convey a potential solution without going into too much detail about how an exact solution would look. To determine which initial prototypes had the most potential for further development into high-fidelity prototypes, a feedback session was conducted with an expert employee from Wint. The employee is heavily involved in the onboarding process and has also played a significant role in improving and refining the onboarding process previously. Therefore, with the employee's help, we could greatly condense the number of prototypes down to fewer, more concise concepts.

The timeline elements got overall positive feedback, with an emphasis on the combined stakeholder view with a transparent process and unambiguous indication of who is responsible for the current step, as seen in figure 5.2c and figure 5.4c. Likewise, the user onboarding overview, figure 5.2d, was identified as an improvement for the user. The learning platform concept in figure 5.3 was praised and expanded upon, with suggestions to include directed help elements throughout the application. A few of the concepts were disfavored, for example, the gamification approach from figure 5.2a or the internal view seen in figure 5.4d.

5.4.2 Developing high-fidelity prototypes

Following the feedback from the feedback session, concepts were refined and processed as we continued developing prototypes in Figma, transforming them from

low-fidelity concepts into high-fidelity designs with greater detail and functionality. These prototypes are presented as part of the results in chapter 6.

Compared to the low-fidelity prototypes, these designs were more closely integrated into the existing Wint interfaces and conveyed the concepts in greater detail. We developed multiple design variations for many of the artifacts that would then be evaluated in a workshop. These varied in terms of concept alterations and minor interface details to better help identify potentially important design elements.

5.5 Co-design evaluation workshop

When the prototypes were deemed ready, we invited Wint employees to participate in a workshop. In this workshop, the employees were allowed to give their input and expert feedback to improve and iterate on the prototypes.

In preparation for the workshop, all polished high-fidelity prototypes were printed on paper to make it easier for multiple people to view them at once. The prototypes were also available in digital form, and flows were set in Figma if participants wanted to get a deeper understanding of how they were connected.

During the workshop, participants could give us feedback verbally while also discussing the design choices and how they could be improved. Quantitative data was also gathered, where the participants could paste color-coded stickers onto designs. The color-coded stickers were used to receive feedback in the following forms:

- Green: Positive feedback on both design and concept
- Yellow: Partially positive feedback - either the design or concept needs refinement
- Red: Negative feedback on both design and concept

Most of the time, the color-coded stickers were supported by motivations, which we also wrote down while conducting the workshop. Participants were also instructed to only give feedback on the designs or concepts they had a pronounced opinion on, rather than being forced to vote with a color-coded sticker on every design. Additionally, some of the participants decided to place their stickers on specific parts of the design, where they noted a particular element of the design rather than the whole concept. In these instances, they gave verbal feedback along with the sticker. In total, 18 employees from Wint participated in the workshop.

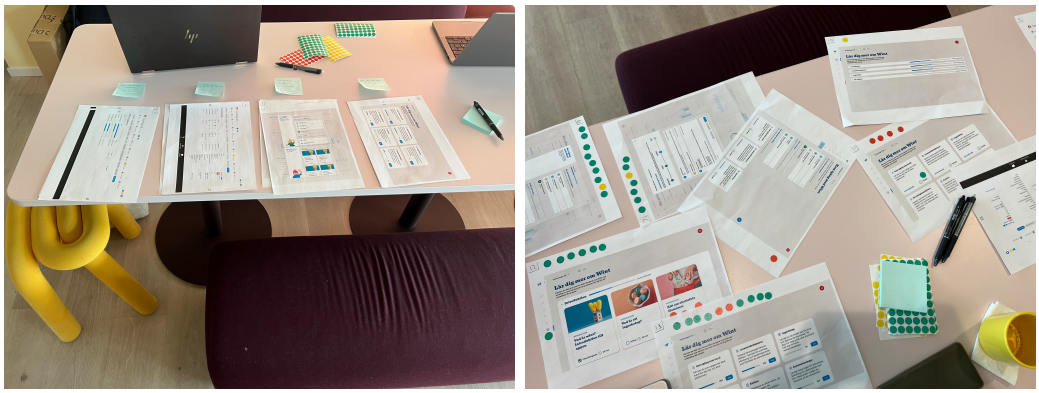


Figure 5.5: Workshop before and after

5.6 Case study

Our previous findings told of promising changes and concepts to improve the general onboarding process. Yet in the case of the potential improvements targeting customer interfaces, the impact of these was still largely obscured by the fact that these had not been in contact with the actual users. Therefore, it was decided to develop one of the workshop prototypes further to evaluate the concept in a more realistic scenario. Through analyzing the notes taken along with the color-coded stickers, with considerations of feasibility and the available time, the integrated learning platform concept derived from the workshop artifacts was chosen as a case study for further development.

An interactive high-fidelity prototype was developed to perform comprehensive user tests. The final results of the case study can be found in the Results chapter of the report, specifically in 6.1.4. The case study focused on integrating a learning platform into the existing Wint platform to evaluate potential benefits or pitfalls. The learning platform concept was expanded to include additional features conceived during the workshop, including pop-up functionality to encourage more user engagement with the learning platform.

The prototype was developed as a part of the existing codebase for the Wint application, but separate from the production environment.

5.7 Case study user test

A user test was performed as a form of final evaluation for the case study. The user test was conducted outside the Wint organization and focused on evaluating whether the concepts of the integrated learning platform showed tangible benefits that would justify their implementation. The assessment, therefore, sought to determine if independent users also backed up the perceived benefits conveyed in the workshop with no prior experience with the platform.

The test also sought to compare the proposed solution and the existing solution with the external learning site through an independent A/B test. Due to the complexity

of the Wint platform, the test was divided into an introductory phase to introduce the platform and a second phase aimed at exploring the newly implemented pop-up functionality.

5.7.1 Demographics of participants

Due to Wint being primarily a bookkeeping service, all participants were asked before the user test if they had any previous bookkeeping experience. This demographic data point enabled us to investigate further if the previous experience had a significant connection to how easy or hard it was to perform the tasks asked during the user test. Out of 15 participants, 12 answered yes to having previous experiences with bookkeeping, and 3 responded with no.

A majority of the participants were young adults aged 20-30, primarily fellow students on campus. Apart from bookkeeping experience, all participants had experience with complex web application interfaces.

5.7.2 Phase 1

The first phase aimed to introduce participants to the platform while also letting them try out both versions of finding information: the internal learning platform and the current external one. Before participants began with the test, they were first introduced to the various ways information and help could be found within the interface. To mitigate potential order effects, we implemented a counterbalanced design where participants were randomly assigned to one of two conditions. Approximately half the participants were exposed to the internal learning platform first, followed by the external platform, while the remaining participants experienced the platforms in the reverse order. This balanced approach ensured that any differences in evaluation were not attributable to the sequence of platform exposure.

After a proper introduction to all the tools that the participants had at their disposal, the participants were given a simple task in which they were required to find the answer to a question related to the Wint platform that could be found in either version of the learning platform. While the participants attempted to locate the answer to the question, observations were documented regarding their behavioral patterns and interactions.

Finally, at the end of the phase, when the participant had found the information and completed the task, some questions were asked about their experience and feelings about their approach.

- After experiencing both approaches to accessing help information (integrated within the application and as a separate external website), which approach did you find more effective for your workflow? Please explain the reasoning behind your choice
- Under what circumstances might you prefer to use the other approach?

5.7.3 Phase 2

The second phase was the A/B test, where participants either tested performing a simple task in the interface with or without a help notice. They were divided evenly into the following groups

- X: No help notice
- Y: With help notice

The task was the same for all participants; the only differentiation was the presence or absence of the pop-up help. The task was to remove a sent invoice inside the application. After the task was performed, some questions were asked to evaluate their experience. The questions differed slightly depending on which group the participant belonged to.

- On a scale of 1-5 (higher is more difficult), how would you rate the overall difficulty of completing task 2?
- (Y) If you utilized the help notice, did it work as you expected? If not, what did you expect? Did the help notice make it easier for you to complete the task?
- (X) How did you experience finding the information required to complete the task?
- (X) (Show the Y version) Would you have preferred this solution?

5.7.4 Pilot test

A pilot test was performed to test our proposed user test. The pilot test was mostly successful, with one minor deviation being that after the participant completed phase 1 and was about to start phase 2, the integrated FAQ page was already present on the screen. Therefore, since the information was readily available, the participant read up on the information about how to perform phase 2 and its task. Hence, a decision was made to alter the user test so that after phase 1 is completed, the test is reset to the start page to prepare for phase 2. An additional effect from the pilot test was not giving the participant all the information about each task in the beginning, but rather delivering it incrementally as each task was completed.

6

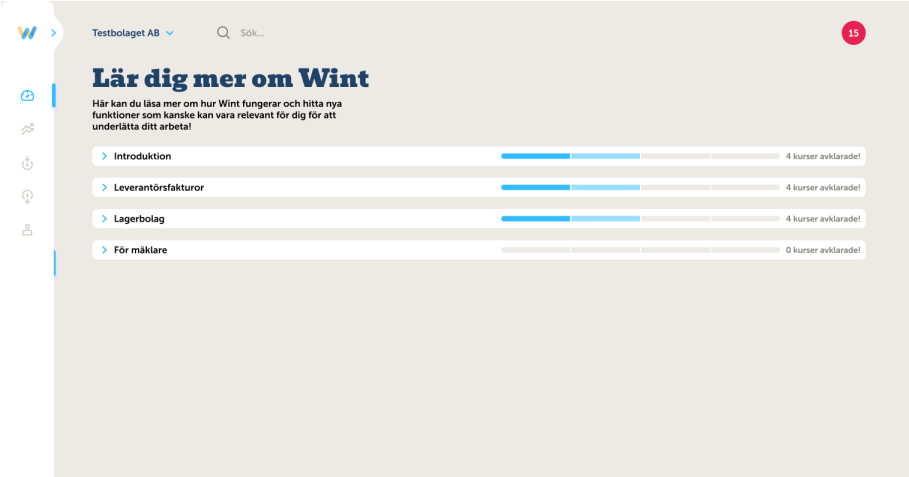
Results

This chapter presents our results as various high-fidelity prototypes of different concepts and solutions and their evaluations during the co-design workshop. Additionally, the case study, a further developed prototype of one concept, is presented together with the findings from its user evaluation.

6.1 High-fidelity prototypes

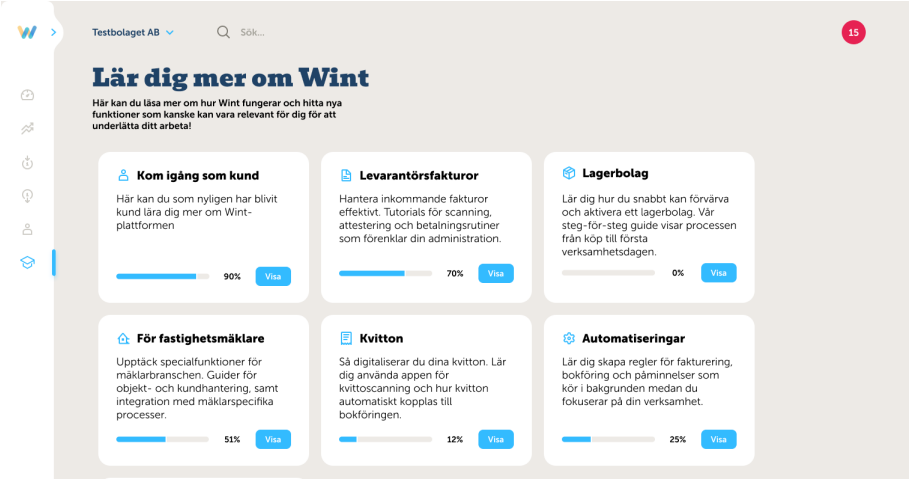
The ideation and prototyping stages culminated in a few different concepts shown through various user interface artifacts. The following high-fidelity prototypes were created as potential solutions to previously identified issues and areas of improvement and evaluated with Wint employees at the workshop event. Key comments are provided at the end of each subsection to summarize workshop feedback on the prototypes.

6.1.1 Integrated user learning platform

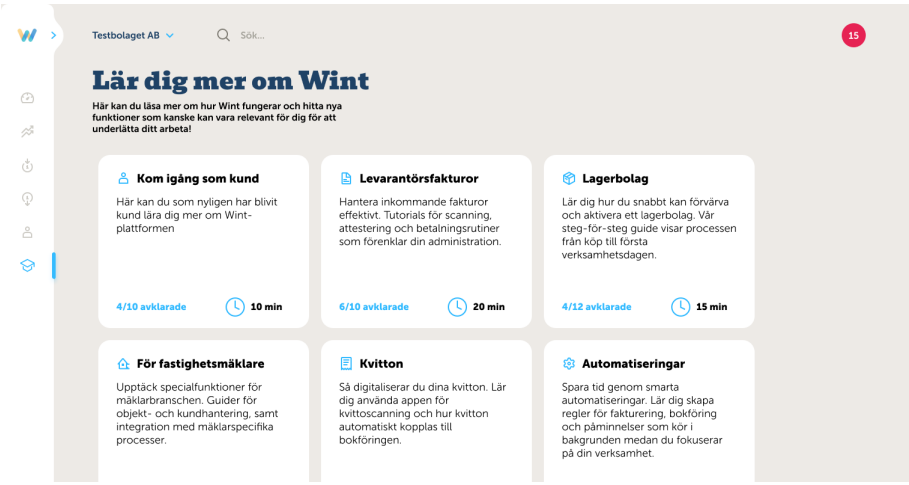


(a) Alternative A

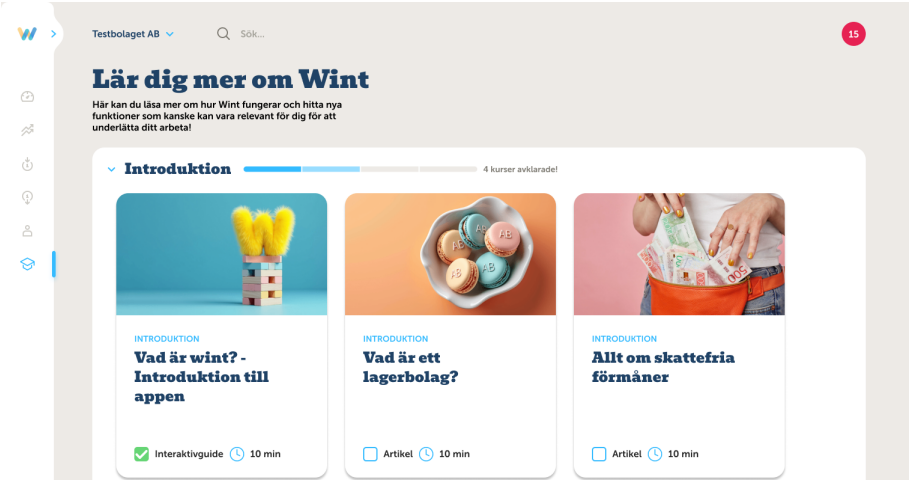
Figure 6.1: Design alternatives for an integrated user learning platform (part 1)



(b) Alternative B



(c) Alternative C



(d) Alternative D

Figure 6.1: Design alternatives for an integrated user learning platform (part 2)

The existing FAQ page with a few extensions was proposed as a dedicated page within the user platform to promote learning and reduce strain on manual support. A few alternatives showed different design details, yet all entail the same major concept.

- Alternative A: a collapsible list view of content categories, with a progress bar indicating progress of the category. The progress bar could also hint at started but unfinished tasks, as shown by the transparent blue on the element.

- Alternative B: a card-based grid of the categories, with similarities to the external FAQ as seen in figure 2.2. Notably, these featured a duration element, which would indicate the approximate time required to go through the category learning material.

- Alternative C: a combined collapsible list view of the categories, with cards for each article. The cards, in addition to the time approximation element, also displayed the format of the resource, such as "article" or "interactive guide".

- Alternative D: card view of categories as in alternative B, but with a progress bar and a button for each category.

	Alt. A	**Alt. B**	**Alt. C**	**Alt. D**
Green	0	1	7	8
Yellow	1	0	0	0
Red	0	4	4	2

Table 6.1: Participant evaluation results using color-coded stickers: Green = Yes (approval), Yellow = Good idea but needs refinement, Red = Not viable/unsuitable approach

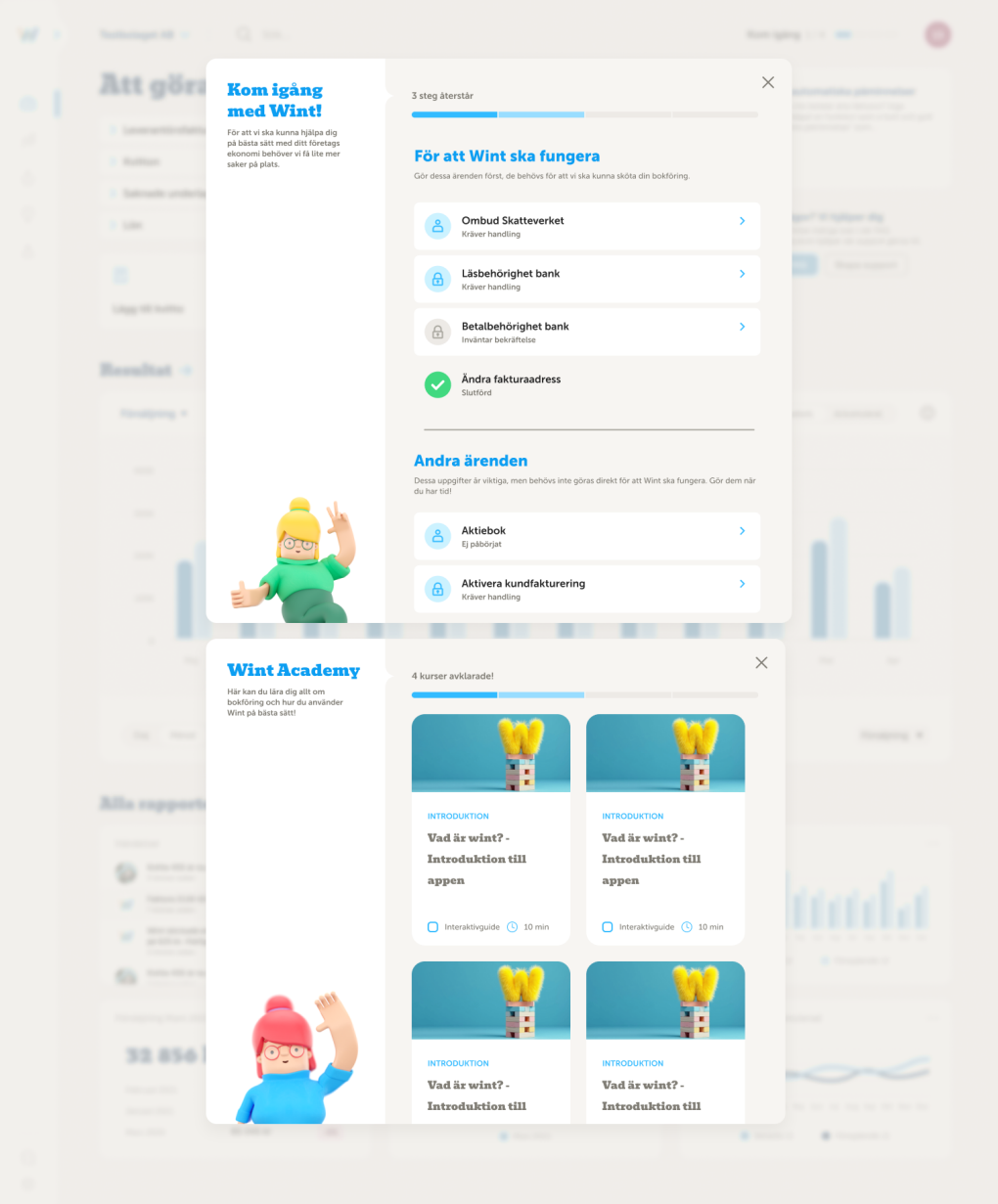
Key participant comments:

- **Alternative B**: Participants noted confusion and annoyance over the task duration component, and that it cannot be trusted. Additionally, one person noted that the design was difficult to understand at a quick glance.

- **Alternative C**: Positive feedback received on overall concept, emphasizing adding the integrated learning platform as a separate tab on the existing sidebar. The negative feedback was mostly on the specifics of the design rather than the concept.

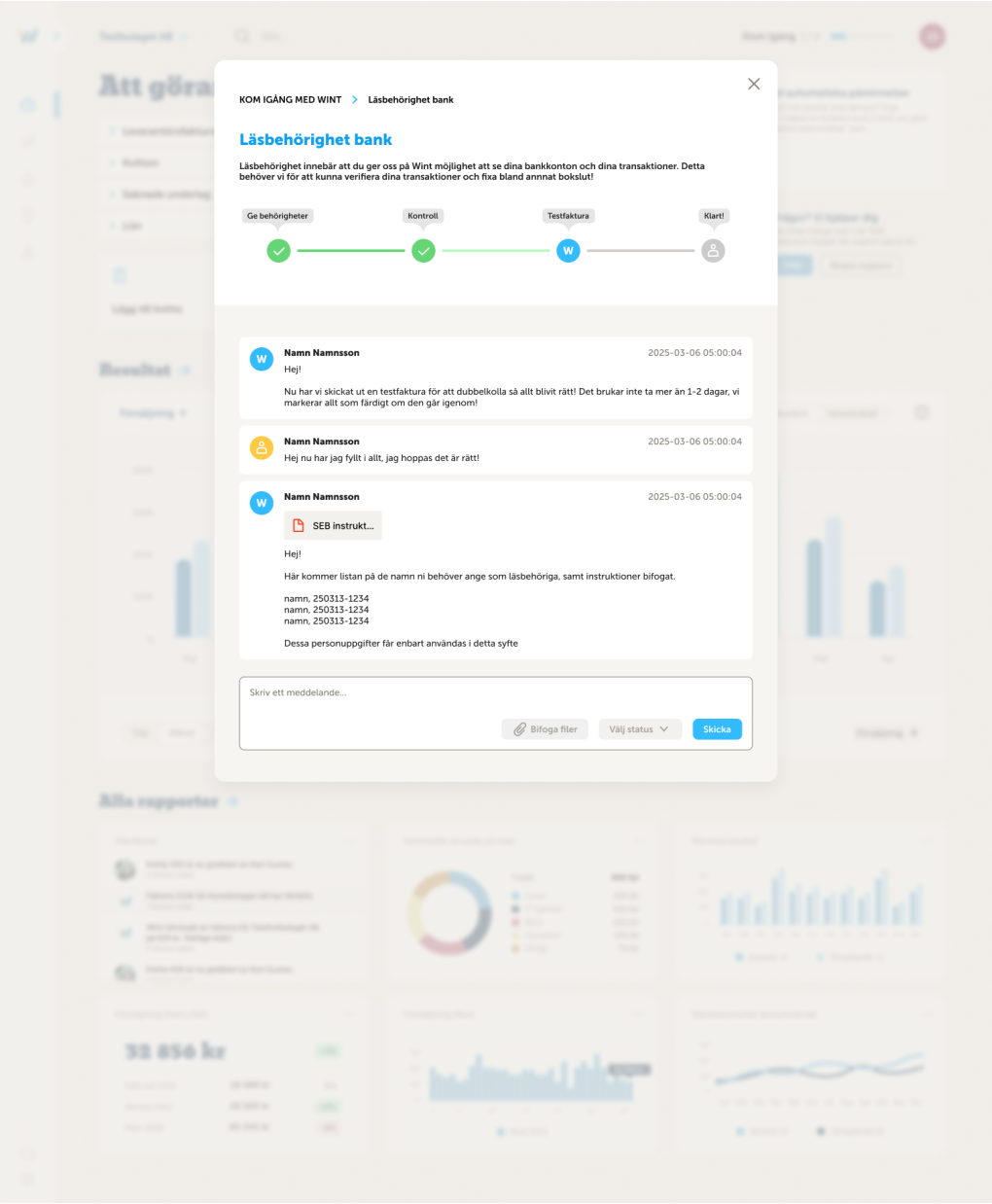
- **Alternative D**: Most comments and discussions were about the progress bar's introduction, with most liking the idea of a progress bar.

6.1.2 Dedicated user onboarding view



(a) Overview

Figure 6.2: Dedicated user onboarding view (overview)



(b) Task detail view

Figure 6.2: Dedicated user onboarding view (task detail)

This concept aimed to provide a collective interface for the first onboarding tasks, with a more detailed view of individual tasks. This would open as a modal from a dedicated button in the main application.

- The overview features two main elements, each with a sidebar to the left giving some quick information about their purpose. The first is a list of the first onboarding tasks, divided by priority. Task items in the list indicate their status through different icons and colors. Below this is an adaptation of the integrated learning platform, with a card view of select articles.
- The task detail view is opened from any task in the list, and is specific to

each task. The example features a bank connection task, which includes the task description, a timeline, and a standard support chat thread. The timeline shows progress and, importantly, who has responsibility for the current step. The support chat accompanies this with more information regarding the task and status.

	Overview	Task detail view
Green	8	6
Yellow	1	1
Red	0	0

Table 6.2: Participant evaluation results for dedicated user onboarding view

Key participant comments:

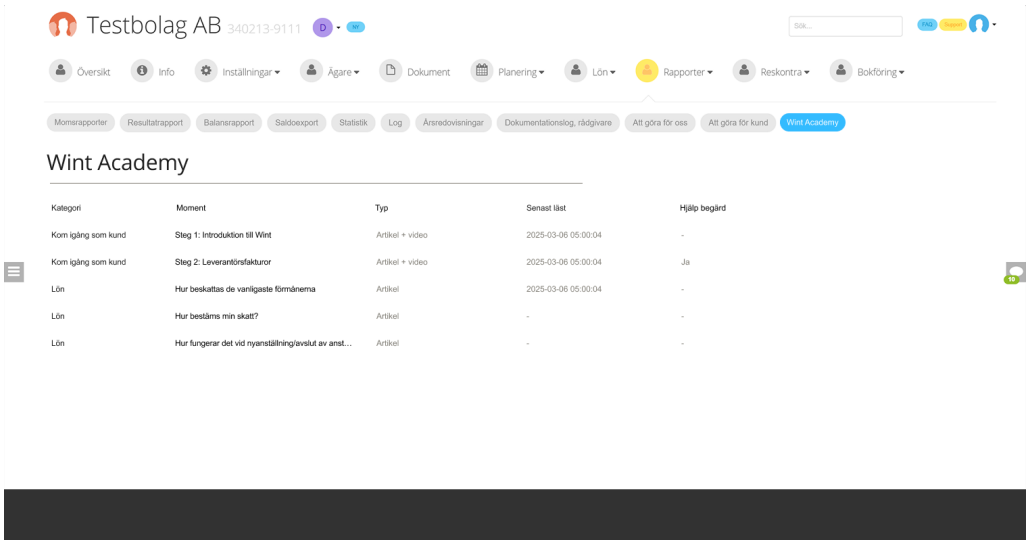
- Overview: Overall positive comments about both the concept and design, most discussions were about how much information should be displayed.

- Task detail view: Everyone agreed that the overarching concept was good. Discussions and thoughts were discussed on how users would experience different levels of task and information transparency.

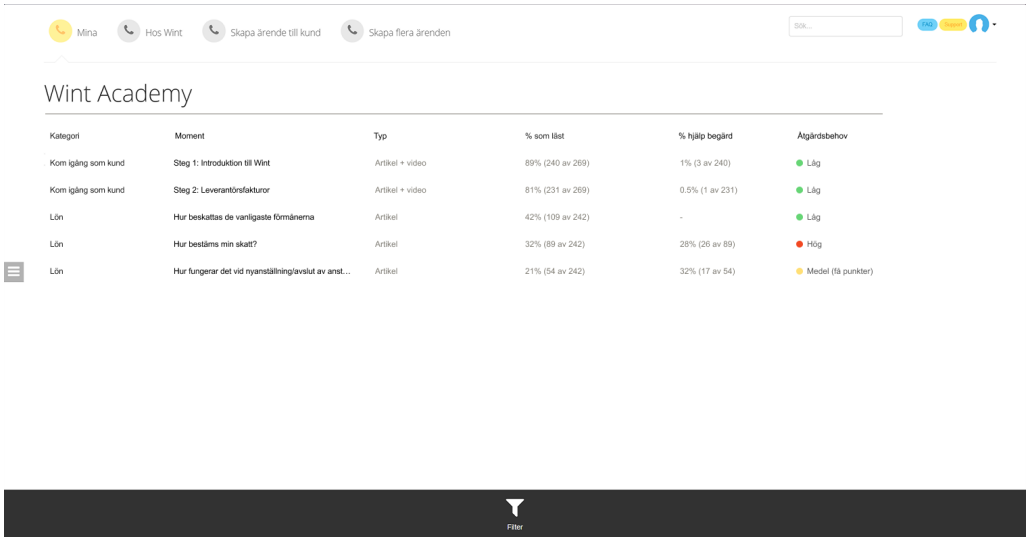
6.1.3 Internal user knowledge tracking tools

To complement the user learning platform, a corresponding tool in the internal application used by Wint was proposed. The intended tooling was to track user knowledge to understand what learning material a customer has and has not accessed, to give better support, and to understand user behavior.

The artifacts show two different views, one showing the details of a specific customer and one global overview, showing the status of all customers. The intention is to track and understand which articles and materials might not get used or would require clarification, leading to data-driven decisions.



(a) Specific customer learning overview



(b) Global learning resource monitoring

Figure 6.3: Two different possibilities for internal customer knowledge tracking

- A customer-specific view was designed to monitor any new customers' utilization of the learning resources. The proposed view lists all resources, displaying when/if they were accessed, etc.
- Another proposed view was a global overview of all customer resource utilization. The example data used in the prototype included percentages of customers who had accessed and percentages of those who had requested access regarding the subject. To further give concrete examples of potential usage, a hypothetical ranking was added as the last column to show which resources needed attention the most.

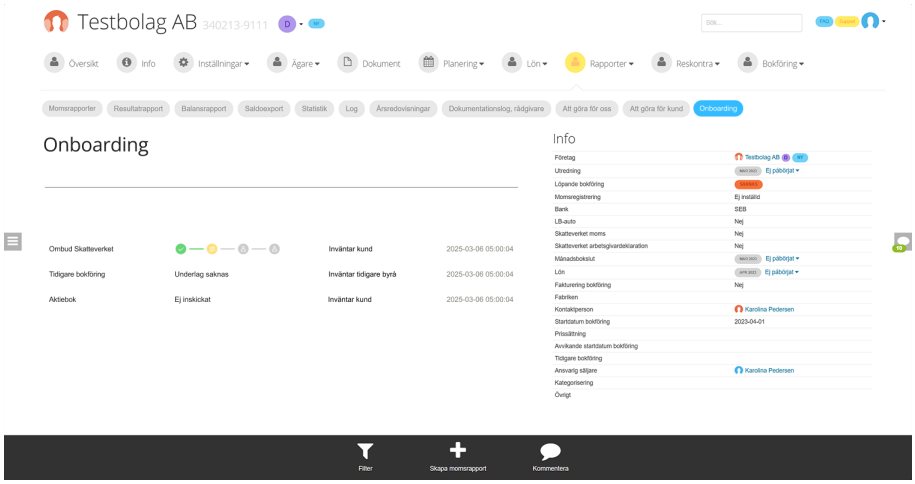
	Alt. A	Alt. B
Green	3	4
Yellow	4	2
Red	0	1

Table 6.3: Participant evaluation results for internal customer knowledge tracking tools

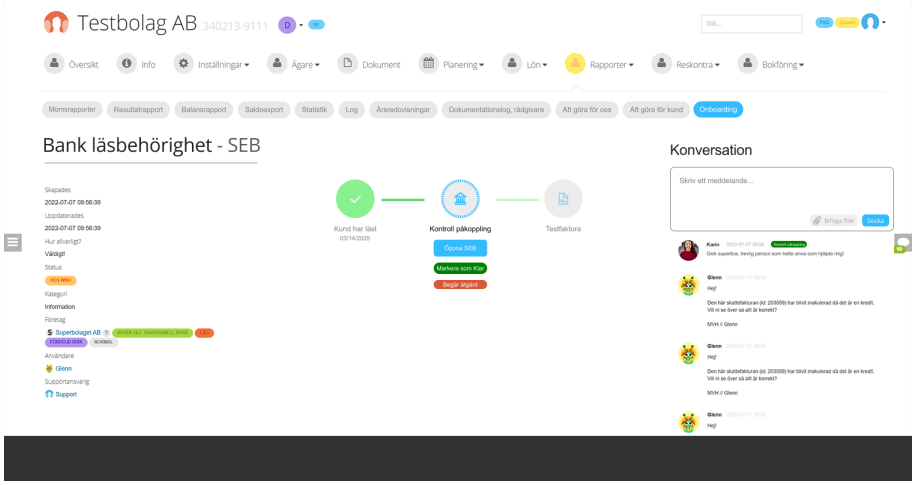
Key participant comments:

- Alternative A & B: Mixed feelings about the concept. Experts noted that it was good for a data-driven approach and to find customers who are struggling early. Comments were made about the necessity of this, and that it also might just lead to more support than they can handle.

6.1.4 Internal customer onboarding view



(a) Overview



(b) Task detail example

Figure 6.4: Internal customer onboarding view

Accompanying the dedicated customer onboarding view, an internal monitoring of the same tasks was proposed. These would aid Wint employees through quick actions and overviews for each customer, sharing elements such as the timeline with the customer view to clarify required and pending actions.

- The overview lists the onboarding tasks along with their current status and task-relevant elements such as the timeline. Additionally, some miscellaneous information was presented to show the potential usage of something similar with the space available.
- The task detail example is similar to its customer view counterpart, featuring a timeline and a chat conversation. The notable feature in this prototype is the *quick action* button, further explained under the current task in the timeline.

	Overview	**Task detail**
Green	7	4
Yellow	0	0
Red	0	0

Table 6.4: Expert evaluation results for internal customer onboarding view

Key expert comments:

- Overview: Very positive feedback, multiple participants mentioned that a quick overview would help them significantly. One person noted that this would be especially useful if a customer calls, and that you can get a quick overview of what is going on and where the user is in their onboarding journey.
- Task detail example: Overall positive, nice addition, and makes it easier to do everything inside the internal tool instead of operating several different spreadsheets and documents.

6.2 Integrated learning platform & case study

The learning platform prototype is incorporated in the Wint application as an item in the navigation sidebar. Navigating to this page brings you to the learning platform as seen in Figure 6.5. This page serves as the home page of the learning platform, showing topical information, informing about newly added articles or tutorials, along with some popular articles the user might want to view. On the left side of the page are all the available categories, which serve as quick actions that the user can press to navigate to a specific set of tutorials or articles they are interested in.

Upon visiting a specific category, all available articles are listed. Interacting with any particular article, the user can view the article content as can be seen in Figure 6.7a.

The ability to create pop-up prompts was added as an extension of the platform across the whole application. These could show up when a user navigates to a page for the first time, or tries to perform an action that requires the user to be

knowledgeable before performing. In this pop-up, the user can either press the learn more button to navigate to the corresponding article or choose to close the pop-up, and in turn tell the application that they know what they are doing. Therefore, the pop-up does not need to show up an additional time. An example of the design of the pop-up can be seen in Figure 6.8

This feature aims to encourage the usage of the learning platform by targeting specific problems when they are the most relevant to the user, reducing the cognitive overhead for users while simultaneously decreasing the volume of repetitive support inquiries. By providing timely, context-specific assistance, users can efficiently resolve common issues independently, thereby minimizing redundant questions to the support team that could have been easily addressed through self-service resources.

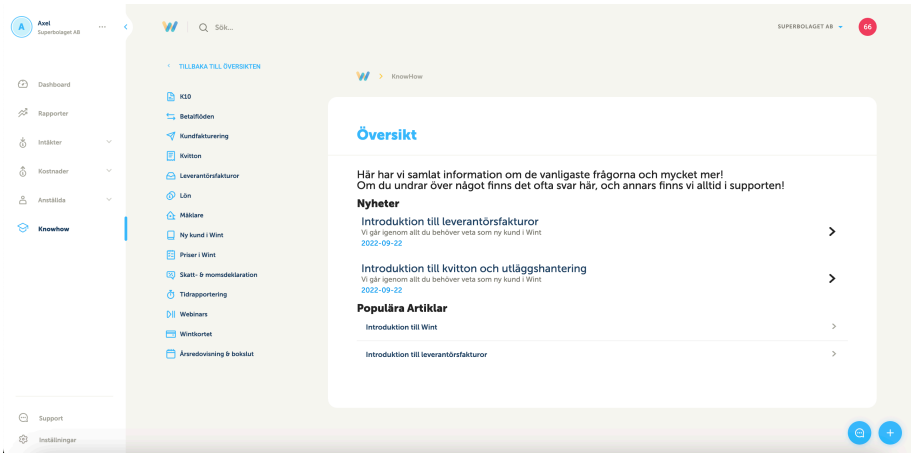


Figure 6.5: Overview page for the integrated learning platform

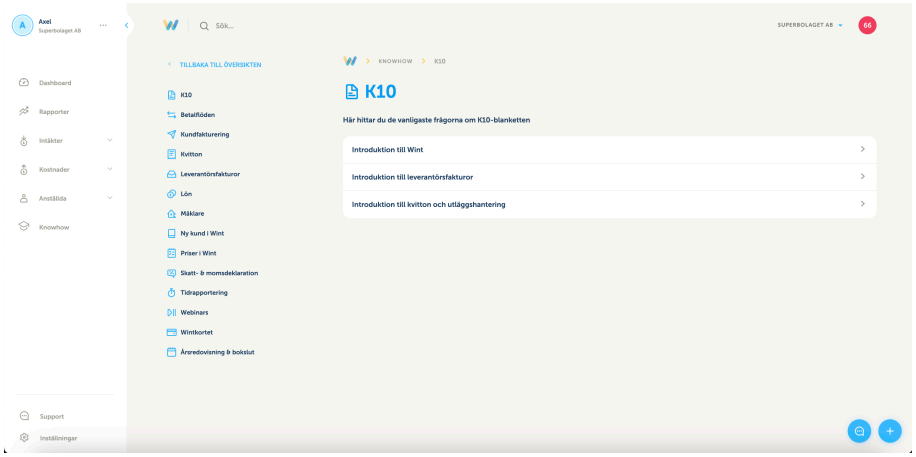
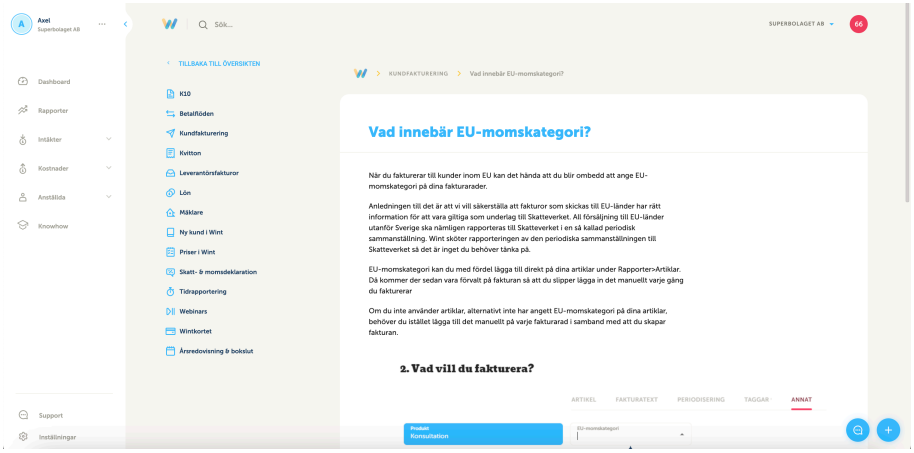


Figure 6.6: Category page for selecting an article



(a) Article content example

(b) Similar articles element, located below article

Figure 6.7: Article page

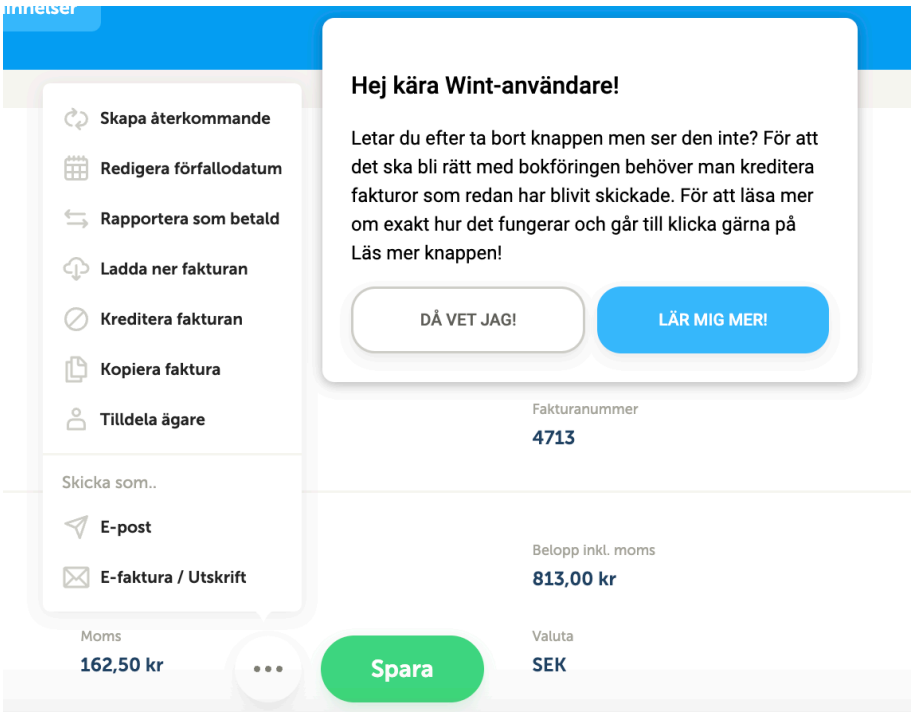


Figure 6.8: Example pop-up used in User Test

6.3 User tests

The following section includes the results of the A/B think-aloud user tests performed on the integrated learning platform case.

6.3.1 Phase 1 results

Here are the results for all of the user tests for phase 1. Phase 1 aimed to introduce the participants to two different ways to learn about the platform, either through internal or external means. Participants tested both versions, alternating the order to avoid potential biases. A majority of participants (12 of 15) preferred the integrated learning platforms over the current external solution (3 of 15). The views of the few participants who preferred the current external version can be summarized as follows:

Key notes and comments:

- **Familiarity**: One user in particular noted that it feels more natural to seek assistance outside the main application
- **Navigation clarity**: The main consensus of the users who preferred external was that it would be easier for their workflow to have a separate tab open where they can find information. One also added that even though there is always the possibility to right-click and open the integrated learning platform in a new tab, emphasizing that it is not ideal.

Subsequently, the majority who expressed a bias towards the integrated platform had the following motivations:

- **Workflow consistency**: Generally better for when you want quick information, participants noted that they do not wish to spend time looking elsewhere for information, and hence disrupt their workflow.
- **Convenience**: General consensus that it is convenient to have everything in the same place and application.
- **Contextual relevance**: Users prefer accessing feature information without leaving the application. One participant suggested enhancing this approach by adding interface buttons that directly route users from help articles to the described features.

6.3.2 Phase 2 results

The results from phase 2 consist of questions regarding the perceived difficulty rating asked to participants about their experience using the platform during the two different tasks. Perceived difficulty was rated on a scale of 1-5, higher being more difficult.

Participants were divided into two equal groups: one received contextual help notice pop-ups to guide their task completion, while the other group proceeded without

this assistance. The following are the results of subsequent groups and how they experienced the user test.

	Task 1 Difficulty	Test Version	Task 2 Difficulty	Difference
Participant 1	2	Y	3	1
Participant 2	1	X	2	1
Participant 3	2	Y	3	1
Participant 4	1	X	3	2
Participant 5	1	Y	1	0
Participant 6	2	X	5	3
Participant 7	1	Y	1	0
Participant 8	1	X	3	2
Participant 9	1	Y	2	1
Participant 10	3	X	4	1
Participant 11	1	Y	5	4
Participant 12	1	X	2	1
Participant 13	1	Y	1	0
Participant 14	2	X	2	0
Participant 15	1	Y	4	3

Table 6.5: Participants perceived difficulty of tasks

As shown in Figure 6.9, participants experienced an increase in difficulty from Task 1 to Task 2, regardless of the test version. However, the magnitude of this increase varied between versions:

Version X (No help notice): The average difficulty increased from 1.57 to 3.00 (difference: 1.43) Version Y (With help notice): The average difficulty increased from 1.25 to 2.50 (difference: 1.25)

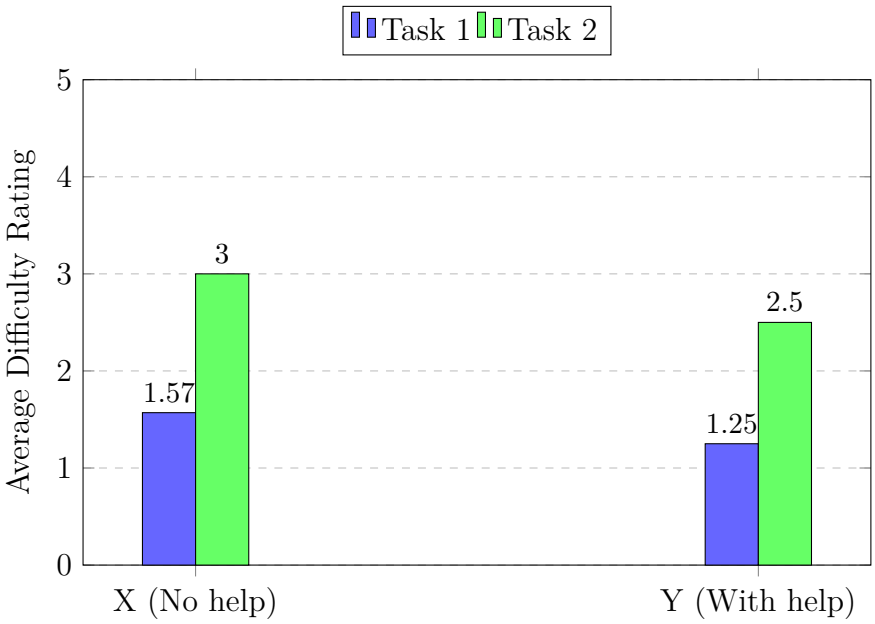


Figure 6.9: Average task difficulty by version and task

This suggests that the help notice in Version Y may have slightly mitigated the perceived difficulty increase between tasks, although both versions showed a similar trend.

Difficulty Change Patterns: The distribution of perceived difficulty between tasks 1 and 2 reveals differences between the test versions. Comparing only the relative difference, the potential biases from the absolute difficulty reporting from participants are eliminated.

- In Version X (No help), 85.71% of participants (6 out of 7) found Task 2 harder than Task 1. 14.29% of Version X participants (1 out of 7) rated the tasks equally difficult
- In Version Y (With help), 62.50% of participants (5 out of 8) found Task 2 harder than Task 1. 37.50% of Version Y participants (3 out of 8) rated the tasks equally difficult
- No participants in either version found Task 2 easier than Task 1

This distribution suggests that the help notice may have positively affected some participants' experience, enabling them to maintain their perceived difficulty level despite the increased task complexity.

7

Discussion

This chapter critically discusses the project and aims to answer the thesis's research questions. By analyzing different aspects of the process, this discussion identifies opportunities for improvement and proposes recommendations for future research and development.

7.1 Process considerations & reflections

Throughout the project, multiple discoveries, considerations, and other insights altered the direction taken to increase the possibility of reaching extensive and verifiable results. These decisions were predominantly driven by input from the various stakeholders, in addition to other realizations relating to the context of the research questions.

The complexity of managing multiple stakeholders shapes the project, influencing many decisions throughout the process. One prevalent example of this was problems with the different bank integrations, which were a major contributor to negative experiences for both customer users and Wint employees. In terms of pure value for everyone involved, direct solutions to these would likely have yielded positive results; however, it would be difficult to tackle the core issues as they exist in systems unreachable to us. This led to the effort instead being centered on solving the extended issues through creating visibility and expectation management, reducing cognitive load, and contextualizing delays.

While both the customer and employee systems were possible for us to alter, some important differences made us initially target our efforts more toward the internal, Wint employee perspective. Firstly, the onboarding is essentially a one-shot operation for customers, while for Wint, the process is done repeatedly. As such, improvements to their workflow would be comparatively easier to measure with even a limited number of users. Secondly, the initial evaluation revealed that customers differed significantly in both their understanding of the process and the time it took them to complete it, which could lead to unreliable conclusions without a large sample size. Finally, the proximity to Wint employees and alignment of interest to improve the product allowed for a broader tool-set of methods and more time to be invested with this stakeholder, compared to paying customers who do not have a direct interest in improving a process no longer relevant to them.

Considering this, however, it should be said that the prototypes and later stages of the project do not predominantly concern internal tools or solutions. On the contrary, the case study instead focuses on the user interface for the customer. The feedback from the workshop gave good grounds for continuing with the customer-centered designs, comparatively more so than the internal-view prototypes. Furthermore, it could be motivated by the general pattern identified throughout the project that knowledgeable customers decrease the required effort not only for the customer but also for the other stakeholders due to reduced need for support and more efficient communication overall.

7.2 Case study

The conducted case study plays a major role in evaluating our findings and, to a lesser degree, validating the more speculative conclusions reached, which remain less extensively tested. The following section will review decisions made and potential shortcomings identified before, during, and after, as well as provide commentary on the results.

7.2.1 Choice of case & development

Our choice for the case study was the integrated learning platform, which was mainly chosen due to two important considerations. Firstly, the prototype had to be relatively easy and quick to implement. This would ensure we had the proper time to both develop and evaluate it, while leaving some margin for error and potential obstacles. Secondly, when tested, the concept had to provide measurable results directly or within a short time frame.

An alternative was the customer onboarding overview. It is apparent that it connects to the user experience and onboarding and includes all the identified stakeholders. Moreover, it strongly connects to multiple issues recognized from the thematic analysis and earlier feedback.

The decision not to develop a case on the customer onboarding overview is mainly due to the difficulties related to evaluation. To get the best result in such a case, it would be necessary to go through an entire onboarding process with a new customer willing to test the proposed concepts. Additionally, it would also be more challenging from a development perspective. Since we would be testing on new customers, it would require our solution to be more robust than a simple case, specifically developed to try out concepts. This would have been very time-consuming and therefore not feasible for the scope of our project.

Another alternative was to focus our efforts on the internal tooling and related suggestions. In this case, we would have plenty of real users to test with on Wint, and in comparison to any direct customer-related case, the potential time taken away from regular business activities would be less severe. While they seemed promising, a few reasons spoke against these cases. Firstly, the ideas had already been evaluated further than the other cases throughout the earlier parts of the project. As such,

we anticipated that the result would most likely support earlier findings without providing as much new insight. Secondly, many of the possible cases would still be reliant on some feature implementation in the customer application, which would increase development time and, nevertheless, require customer evaluation.

7.2.2 Learning Platform Enhancements

There are things that we did not have the time to implement or evaluate surrounding the learning platform concept. For example, a large part of the integrated learning platform was the potential to gather user data regarding its usage. This would help Wint continuously improve the learning resources through data-driven decisions, enabling specialized support and targeted actions towards unique customers. While we speculate this could have contributed significantly to improving the onboarding process over time, the effort to implement the whole supporting system for this would have been too great.

Data about user engagement with and time spent in articles could be collected to populate an internal view similar to Figure 6.3 that could be used to evaluate and identify which learning resources are most and least effective. With these statistics, informed decisions can be made to improve the learning platform and its resources further, in turn making it more likely that the customer engages in the learning platform and receives the benefits mentioned earlier.

With more time, we would have liked to explore the potential of tailored personal learning platforms. In the current implementation, all users see identical content regardless of their specific needs or business context. For example, if a customer runs a software consultancy business and wants to learn more about the platform, there is no reason for a category explaining the details of features only applicable to realtors.

During early prototyping of the integrated learning platform, there were discussions about incorporating gamification aspects into the platform. The idea would be that gamification could further motivate users to engage in their learning path and reward users accordingly. One aspect that could be linked to gamification is the presence of the progress bar that can be seen in one of the high fidelity prototypes of the integrated learning platform in Figure 6.1a. Previous research indicates that progress bars significantly enhance students' self-directed learning management capabilities [61]. This feature was incorporated specifically to improve motivation and enable learners to visualize better and control their educational journey. However, due to the time constraints and a few additional reasons further explained in section 7.3, such a system was never explored.

7.2.3 User testing

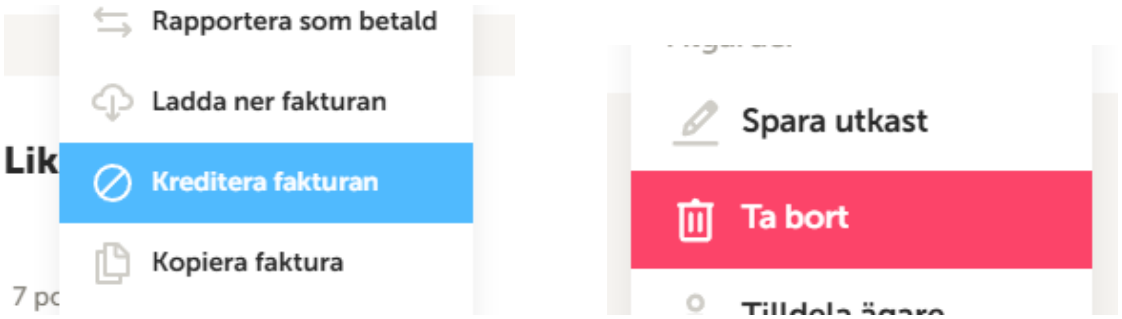
A key principle for a good user test is accurately representing the user, including their context and any prerequisites they might have. However, our user test did not primarily target existing Wint customers due to multiple different reasons. Firstly, customers had previously been difficult to reach, which we recognized would lead to

much more effort being put into finding or scheduling testers that could have been spent performing actual tests. Customers' dispersed locality and the limited time frame of the thesis would further exaggerate this problem. Secondly, despite having the proper motivation and domain knowledge from being entrepreneurs, there are no specific traits unique to Wint's customers that were important to capture in the test. As such, anyone who could potentially be a future Wint customer would be a suitable candidate. Moreover, performing tests with people without previously acquired preferences could have other benefits, such as more objective responses.

There are potential shortcomings with testers outside the primary stakeholders. Unfamiliarity with the application could lead to testers focusing more on the platform as a whole or elements not relevant to the test itself. Additionally, we note that while applicable in our case, this is by no means a universal rule regarding tests related to onboarding or the context of Wint.

The tests were actively shaped to address the known issues. For example, the phase one questions had the user find information that would not require any deeper understanding of bookkeeping or domain language. For the second phase, we chose a problem that has a simple solution once known, yet could be confusing for first-time users. Furthermore, the tasks and phases were structured such that the users would be introduced to the platform and the help resources that would be needed to complete the upcoming tasks. We hypothesized that this would lead to differences between participants with and without prior bookkeeping experience. Despite this, we found no significant difference between the two, and the perceived difficulty was similar.

Finally, a few miscellaneous observations were made during the tests. One intention with the two phases was to utilize phase 1 to familiarize participants with the available FAQ and information resources. We hypothesized that this would make the participants inclined to look for help there when faced with the final task. However, no participant did so, and most found the correct option on their own after a while if they did not have or utilize the help notice. They often attributed their completion to the icon in the list. While not as clear as, e.g, the trashcan symbol for removing the invoice in phase 2's task 1, participants claim it was the only sensible option icon-wise. Additionally, while not present in our test case, we identify that conscious color choices could hint at different functionality, as shown again in the first invoice task.



(a) Stop icon considered useful by participants (b) Color indicating different functionality

Figure 7.1: Visual cues in invoice removal

7.3 Design patterns & prototype elements

Throughout the design process of this project, we aimed to investigate different design elements and their characteristics, strengths, and weaknesses. In the following section, we will discuss a few noteworthy examples of such elements, how they might affect different aspects of the user experience, and their correlation to optimizing onboarding.

7.3.1 Progress bars and timelines

A frequently seen element in both our prototypes and in onboarding or task completion in general, we made certain observations regarding progress bars and timelines. Both elements give the user some expectation or estimation of the progress toward full completion of the task or process. This is the intention, but may also have adverse side effects, which warp the user experience. One notable example is the integrated learning platform, which originally proposed a progress bar for the user to generally interpret which resources they had previously accessed and learned, and encouraged further learning to complete a certain chapter. On the other hand, it could be misleading to see learning resources as linearly completed tasks, and users should be encouraged to revisit them when needed. Furthermore, not all material is relevant to every user, and following the philosophy of reducing cognitive load, users should not spend their efforts on tasks to complete a progress bar, but rather on the actual tasks they are trying to achieve.

In the context of tasks with multiple parties involved, we found a major strength in not only communicating progress, but primarily responsibility and expectations. The timeline or progress bar acts as a supporting view to announce who is expected to act without leaving the context frame. We found this true for all involved stakeholders, and hence it was a recurring element in both Wint's internal and the customers' view.

In general, we find progress bars and timelines to be appropriate design elements in an onboarding context. However, their usage should be well understood, and if implemented without proper consideration, they might confuse or otherwise negatively impact the user experience. It should be noted that this conclusion is drawn mainly

from earlier feedback on the prototypes, and further exploration and evaluation of different approaches to these elements would be appropriate.

7.3.2 Hints and feature cues

Tested as part of the integrated learning platform, the pop-up hint raised many interesting observations. Our user test found the solution promising as a concept, but controversial in its presentation and appearance in the interface.

Some testers had an inherent dislike of the pop-up and closed the modal without reading or considering it. Previous research has found similar signs of disapproval, which explains how the pop-up element should be used with care [62].

While we opted for a non-modal alert-style hint close to the user action area, alternatives and small changes could have improved the situation. For instance, adding a small delay, allowing users to understand the primary information before the pop-up is shown, gives a less intrusive or annoying user experience [63]. Some testers said they would prefer even more discreet options, such as hiding the information behind a subtle button only shown on hover.

Outside of the case study, the artifacts similar to pop-ups were often found in onboarding contexts. Usually these were implemented in a structured, linear progression, commonly as interactive guided onboarding described in 3.2.

7.3.3 Quick actions

As part of general optimizations to the onboarding workflow, primarily for the Wint employees, we found *quick actions* to be a promising feature to reduce excise and lower lead times. We define quick actions as recurring context-specific routines reduced to the least possible effort for the user. In practice, this could mean buttons to load and prepare a common message for an onboarding customer, load or send an email to another stakeholder, or any other repeated sequence that is currently done manually.

While promising in theory, there are a few issues to address directly. Firstly, there is a natural trade-off between the time spent to automate such tasks and the perceived benefit, and not all tasks will be worth the upfront investment. Secondly, many tasks will still require some degree of manual review or input, and quick actions should not give rise to new issues because of the action's design. Thirdly, such actions are less flexible in case of change, and if they require frequent updating, they might hinder the workflow more than they help.

Despite these reasons, we received mainly positive feedback on such examples in our prototypes. We highlight the importance of context, but with confidence that under the right circumstances, such systems can be a useful part in improving other onboarding processes as well.

7.4 Measuring onboarding success

Starting the thesis, we set out to define general metrics regarding onboarding success and effects. These would be important tools to understand the impact and evaluation of any potential improvements. However, we found many aspects throughout that added complexity, and made narrowing down useful KPI:s difficult.

A common element in different metrics is time, and the duration for something to happen or be completed. In the case of Wint's onboarding, we investigated the time to complete each initial onboarding task and the total. However, we found that the durations varied too much, and dependency on external factors and stakeholders made these largely obsolete. Perhaps with a considerable sample size, some trends could be identified, but this was not relevant to Wint's situation.

Following this, it was understood that the interest in measuring user performance in the initial parts of the onboarding process was not the direct results, but rather the implications further on in the customer life-cycle. For example, could there be any correlation between early customer behavior and future events, such as churn or overall satisfaction with the service? Could investing more time in a customer early on reduce the need for support later?

As we generally identified the need for a larger time frame for valuable insight, we did not dig deeper regarding metrics and KPIs for general onboarding evaluation. Instead, we underline the importance of context-specific understanding and measurements and encourage long-term analysis of any collected data. We note that these are speculative recommendations based mainly on our understanding and the need for future research on onboarding metrics.

Finally, although stakeholder experiences cannot be quantified as discrete, measurable metrics, they have proven to be the primary driver for enhancing and directing onboarding improvements. Both employees and customers have a hands-on understanding of the process and the different parts, and importantly, get an overarching perception of the larger complexity. Typically, customers, who are the end users, go through the onboarding process only once, offering a steady flow of fresh perspectives. In contrast, employees, who serve as service owners, build a more profound understanding over time through repeated exposure to various cases and iterations. These evolving insights lead to practical improvements and more meaningful value creation by continuously addressing current challenges and adapting to real-world situations.

7.5 Workshop & final prototypes insights

In this section, we will discuss the motivation behind our workshop artifacts and how they were designed to solve some of the identified multi-stakeholder onboarding challenges. Additionally, we discuss the methodology and approach, as well as potential issues with the workshop itself.

7.5.1 Methodology

The co-design workshop conducted to gather insight on the developed prototypes gave valuable results, yet there are a few considerations to address regarding the results produced and the methods used.

Using colored dots to express and record user opinions has positive and negative aspects. On one hand, it provides feedback as an intuitive medium and in a quantitative manner, which makes it easy to compare between prototypes. On the other hand, it might be limiting to more nuanced opinions, which is why we encouraged users to motivate their responses. In hindsight, it would have been beneficial to have some separation between feedback on concept and design. There were several instances where participants put colored stickers purely based on their opinion concerning one of the aspects. Therefore, as interviewers, it was essential to ensure that we noted what each sticker meant, depending on what they said verbally. In these cases, it would have been more feasible to have different colored stickers for the two aspects or even a different approach altogether.

Another issue was the potential biases and influences of others since the dots previously placed by earlier and concurrent participants were visible. This might have skewed results as participants might prefer not to challenge claims, and studies show test participants often reinforce existing opinions rather than expressing their unique takes [64].

One should also note that since discussion was encouraged, from both our side and the participants, unintended cues and inclinations might have led both our and the user's perception to conform to our considered renderings of the solutions. As such, we might have missed out on feedback or suggestions valuable to the designs. However, avoiding any form of explanation regarding the presented material might instead have led to misunderstandings or inadequate feedback, which could have been reasoned and discussed. Overall, we deem the workshop a successful element of our process and the method fitting for the situation.

7.5.2 Integrated learning platform

In the workshop, four different alternatives to the integrated learning platform were presented. The reason behind designing alternatives rather than different types of concepts connected to integrated learning was due to our fixation on bringing the external learning platform into the application. This focus stemmed from themes identified in the interviews, indicating a persistent knowledge gap among customers and uncertainty about whether customers were engaging with the information provided in the external platform. Therefore, the question to be answered in the workshop was not only whether they liked the concept of bringing the external learning platform into the actual application, but also an emphasis on how it should be implemented and the design choices concerning it. The motivations and execution of the integrated learning platform are discussed more extensively in section 7.1 about our Case study.

In hindsight, more time should have been spent exploring options for a learning

platform rather than immediately determining that integrating the learning platform was the best way to tackle the customer knowledge gap issue. This premature narrowing of focus limited our exploration of potentially more innovative solutions that might have better addressed the underlying challenges. An example of this was presented when we did the user test for the integrated case study. One of the users who preferred the external platform asked why the tab button was not simply a link to the external platform. Ideally, these scenarios would have been thoroughly explored and tested on real users, providing more comprehensive data to guide our design decisions. The constraints of time and resources limited our ability to pursue multiple parallel solutions and validate them through extensive user testing. Instead, we had to prioritize a single approach based on our initial interview findings and stakeholder insights.

7.5.3 Internal user knowledge tracking tools

The internal user knowledge tracking tools are meant to complement the proposed integrated learning platform, where the company would garner statistics about users' learning behavior. The statistics would then be used to make informed decisions about improving the platform.

While investigating the onboarding process, specifically how users seek information about platform usage, we questioned whether existing users actually engage with the content in the external platform. Since the external platform operates independently from the internal platform, there is no mechanism to generate data or establish connections regarding which users are accessing specific information. Hence, with the introduction of our proposed integrated learning platform, it would be possible to answer the aforementioned questions. Therefore, we designed this view for the internal tool where employees can see how well the content performs and if any action is to be taken. Our vision was to connect this in some way to make it possible to generate data about each support ticket and see if it was related to any of the content that is currently available. In the context of user onboarding and optimizing multi-stakeholder communication, this design aims to minimize the amount of underperforming learning content while providing the company with tools to improve the learning platform and continuously enhance self-service resources.

Additionally, with the details view of a customer, the goal is for employees to understand what the user comprehends more easily. For example, if a user creates a support ticket asking "How do I send an invoice?", the employee handling the ticket can easily check if the user has accessed any of the self-service resources related to invoices and address the ticket accordingly. If there are numerous instances where users have studied the information surrounding a topic and still ask questions, that will also raise flags indicating that the information provided in the self-service resource may be insufficient.

During the workshop, the reception of the concept was mixed. Some participants liked the idea of making data-driven decisions; conversely, others were concerned it would lead to more time spent on support, maintaining the system, and consuming resources they do not have. This raises a valid concern that such a solution might

direct resources toward improving content without necessarily increasing customer engagement with that content. To comprehensively evaluate the benefits of integrating the learning platform, prolonged support data would be required. In the long term, collected data might reveal that most users prefer to inquire about issues as they arise, having limited intention or motivation to learn about the platform independently. However, from our interviews with employees, we found that many customer inquiries concern simple, repetitive matters that are time-consuming to address repeatedly, and which customers could more efficiently learn to handle independently through proper educational resources. Therefore, we hope that a feature like this could, in the long term, lead to fewer repetitive questions and an increase in customers' motivation to learn about the platform.

7.5.4 Dedicated user onboarding view

The dedicated user onboarding view received positive critique and was well-received by participants. Multiple Wint employees believed that customers would benefit from a more straightforward overview of where a user is in the onboarding process. This would make it easier for the users to follow their user journey and help Wint employees maintain a medium for communicating the process, reducing unnecessary support issues regarding statuses.

Additionally, when we initially investigated the Wint platform, it was hard to identify what tasks were explicitly related to onboarding and the importance of each task. The idea behind the proposed designs is to make it easier for users to determine what they should do next while also providing a suitable reason why. Additionally, the designs also aimed to reduce the cognitive load for new Wint users by only presenting the onboarding tasks with the highest priority.

7.5.4.1 Overview design

The idea of an overview was perceived well during the workshop, discussions mainly concerned how the information should be presented and how users might experience different levels of task and information transparency. This relates to what we discussed in previous sections about cognitive load. We want to present users with enough information to understand the onboarding process better and make informed decisions based on it. However, it is important to make sure not to overwhelm the user, since that may lead to adverse effects and further confusion. Therefore, we received comments during the workshop noting that it might be too much to include the learning platform information at the bottom, and that it might be worth considering introducing it later during the onboarding. Furthermore, similar feedback was provided regarding the information about lower priority tasks under "Andra ärenden/Other Issues". Workshop participants questioned whether it was necessary to include this information and potentially overload the user if these tasks were urgent. The feedback is valid and would have been worth exploring if time and the scope of the project were not limitations.

7.5.4.2 Task detail view

For the task detail view, the intention was to be more transparent to the user about the process to avoid communication issues and clarify responsibility allocation - to make visible who did what (the company or user), who needs to take action right now, and the current status of each task. This visibility into task ownership and responsibility helps prevent confusion about each step concerning the specific onboarding task.

The hardest problem to tackle when designing for transparency is thinking about what an adequate level of transparency is. From our low-fidelity prototypes in 5.3.2, it is apparent that multiple designs were considered, each with different levels of transparency. Determining the optimal design approach represents a wicked problem rather than a challenge with a straightforward solution, with preferences for transparency likely differing significantly among different customers. One user might prefer to know every intricate detail of what is occurring in the background, while another might prefer the service to work without any significant insights. Additional information in every step might overload these latter types of users. To simplify our process, we based this on the opinions of Wint employees, as their substantial accumulated experience regarding recurring user inquiries, and can identify which information exchanges hold the highest value in customer-company interactions.

7.5.5 Internal customer onboarding view

To complement the new dedicated user onboarding view, Wint employees needed a better way to track the user onboarding process. Therefore, an internal customer onboarding view was also proposed to supplement the internal tooling, allowing employees to get an overview and take quick actions concerning specific tasks. To address multi-stakeholder onboarding comprehensively, our solution needed to enhance processes for both external users and internal team members. This addition was designed to alleviate employees' operational challenges when managing customer onboarding workflows.

7.5.5.1 Overview

The overview was designed as a specific tab in the internal tool where employees could get a glance at what is going on in the onboarding process for a particular customer. The goal was to reduce the time spent scrolling through long support tickets to understand where a customer is in the process. In the workshop, one participant noted that this sort of solution would be very beneficial in scenarios where a customer calls with a specific problem. The ability to quickly visualize the customer's current position in the process and their progress on individual tasks would significantly enhance both the efficiency and quality of support provided.

7.5.5.2 Task detail example

The task detail view aims to provide a task-by-task overview and serve as a management tool where employees can perform certain quick actions related to the specific

task.

From our thematic analysis, it was apparent that a lot of the internal tasks related to onboarding are still managed through a variety of spreadsheets and other tools. To make it easier for everyone involved, this proposed solution will serve as a centralized management tool that eliminates the need for external tools and spreadsheets and enables everyone, no matter what team, to access the same information concerning the customers. In the current version, teams have their own separate ways to handle their specific area of onboarding, whether it is external spreadsheets or some alternate tooling. This fragmentation of processes and information across different systems creates significant barriers to cross-team collaboration. As a result, comprehensively tracking a customer's journey through the entire onboarding process becomes challenging, with visibility gaps occurring at handoff points between teams. Our proposed design aims to eliminate the barrier, thus enabling smoother transitions between teams and easier collaboration overall, since they will have access to the same information in a common tool. Additionally, a robust system would reduce the issues introduced by manual mistakes when information or statuses regarding customers are not updated in said spreadsheets.

Additionally, the task timeline in the task detail view can be connected to the same task in the customer view. This means that if an employee performs a task, for example, confirming that an invoice has been sent, immediate feedback through the task timeline is shown in the customer view as well. This enables seamless workflow and provides real-time transparency to customers about their onboarding progress. Such synchronization eliminates communication delays and reduces the need for customers to request status updates, as they can directly observe when actions have been completed on their behalf. This bidirectional visibility supports the multi-stakeholder context by ensuring all parties can access the same current information, facilitating more efficient coordination throughout the onboarding process.

7.6 Future work

We recognize multiple areas of interest for future and continued work. Some as direct consequences of our process, others are more general to help verify or disfavor our findings in other contexts.

First of all, extension of the current case study with the aforementioned internal view and framework for data-driven decisions would help reach a more conclusive answer to the research questions. For the user interface, a more thorough investigation of the learning platform features and more applications for the help suggestion pop-up could be done. Perhaps most importantly, the solution would have to be tested over a more extended period to prove if it could help reduce the need for manual support throughout the customer's early life cycle.

The alternatives considered for the case study were primarily disregarded due to constraints and limitations of the project. In our findings, these ideas most likely would improve the onboarding experience and could tackle aspects that the integrated learning platform did not. These are, however, still very tied to the Wint

environment and would need to be done in the same context as this thesis.

Regarding the user tests performed for the case study, the test results might not fully represent the actual user experience. To fully grasp the impact of our proposed changes, we suggest more extensive testing with actual Wint customers to be a suitable continuation of the project.

As a final note, the key takeaways and general findings presented in this paper are believed to hold value in other multi-stakeholder onboarding contexts. A number of resources and various literature support this claim, yet this is only a narrow view of one specific context. Further investigation and research are needed to verify these claims, and until then, they should be held with a healthy skepticism.

8

Conclusion

The thesis set out to answer three interlacing research questions regarding onboarding improvements. More specifically, questions concerning design patterns, optimization opportunities, and metrics to measure efficiency in the context of multi-stakeholder user onboarding.

The early stage of the project aimed to deepen knowledge on previous efforts through a survey of research and material regarding the subject. This was followed by an extensive phase of understanding the current onboarding state, stakeholder perspectives, and more through interviews with Wint employees. These insights were summarized in a thematic analysis, giving clear statements of the issues to solve. With this knowledge, iterations of prototypes and evaluation were made, starting with rapid ideation and low-fidelity prototypes evaluated with a key Wint employee. Later, these concepts were refined, building into high-fidelity prototypes presented at a co-design workshop in which Wint employees participated directly in the evaluation and design process. Following this, a detailed case study further analyzed one of the proposed solutions, with considerable user tests giving valuable insights.

8.1 Addressing the Research Questions

This section presents the conclusions drawn from our research findings and analysis, organized according to our three research questions.

8.1.1 Which design patterns best support the visualization and streamlining of multi-stakeholder integration processes?

Several prominent design patterns were identified in Wint's onboarding and similar contexts. Three major categories were the most relevant to this study and are summarized below.

Firstly, timeline and progress bar elements were frequently found to be useful artifacts for helping scope progress, indicating statuses and expectations, and clarifying responsibility. These are appropriate for creating cognitively low-demanding interfaces for general and specific tasks, not only for the service user but also for all stakeholders.

Secondly, different forms of feature cues and hints, such as pop-ups, interactive guides, or alerts, were found to be useful but delicate elements. These can give users personalized and conscious information, especially useful for introducing new features in bite-sized pieces when relevant. However, the implementation of these must be done carefully so as not to disrupt or otherwise annoy the user.

Finally, quick action tools such as buttons, predefined messages, and automated routines were found to be a promising concept. In the appropriate scenarios, these could reduce repetitive manual labor, leading to faster lead times and improved consistency. However, these remain untested in practice and are very specific to their own environments.

8.1.2 What optimization opportunities exist within the onboarding process to reduce stakeholder time investment throughout the entire customer lifecycle?

Our research identified several optimization opportunities to reduce the time investment for relevant stakeholders significantly. The proposed solutions related to internal workflows were specifically designed to make it easier for employees to access and manage relevant customer information, track progress, and identify bottlenecks in the same tool. This reduction in administrative overhead aimed to allow employees to spend their time on more vital value-adding activities rather than unnecessary manual work.

Integrating learning resources directly within the application is considered a substantial optimization strategy. From our thematic analysis, it was clear that employees spent significant time answering simple questions that the customer could easily have answered themselves. During our research period, most of the self-learning resources were located on an external page outside of the main application, requiring users to navigate away from their workflow to find information. Therefore, a design to integrate the self learning resources was implemented and evaluated. Through the user test, participants consistently preferred embedded help resources over external documentation. Thus, eliminating the cognitive overhead and context switching that occurs when users must navigate between separate systems to find information.

Additionally, the user test evaluated contextual guidance through help notices. The help notices were designed to minimize the time users spend on difficult tasks, intending to reduce the number of support tickets customers open for challenging procedures in the future. The user test demonstrated a preference for the help notices, but further testing and work are needed to ensure the perceived benefits are realized.

8.1.3 What metrics effectively capture value creation and realization across different stakeholder groups during the platform onboarding process?

A key finding was the importance of maintaining a broad, long-term perspective on performance to understand and improve the onboarding process. While the specific metrics and KPIs may vary depending on the scale, content, and stakeholders involved, short-term and narrow measurements were identified as less beneficial. In the case of Wint, different factors and possible compositions varied too much to prove stable indicators.

While proper KPIs help identify pure data trends and evidence, it was understood throughout the project that perhaps the most essential resources are the user experiences from all stakeholder parties. Employees involved continuously in the process, and recently onboarded customers, hold valuable and tangible insights. Especially in a complex scenario, like that of Wint, it can be difficult to grasp the whole picture and delve deeper into underlying issues without the expanded insight of actual usage.

8.2 Key takeaways and recommendations

We present a few overarching insights as a summary of this thesis's findings, process, and discussion. These aim to serve as general recommendations for future endeavors within a similar context of onboarding research or improvements.

Onboarding sets the stage for the whole customer life-cycle
An onboarding process might be confined by a number of tasks, actions, or other boundaries, but the implications extend throughout the entire customer journey. Investing time or support initially will reduce future need for such, and it should be considered how early efforts might benefit multiple future aspects, such as manual support needs, user experience, and churn.

Focus resources on controllable processes
While it can be tempting to try to resolve all pain points of a user onboarding, avoid wasting time attempting to optimize elements beyond your control, as in our case, the external bank integrations. Instead, direct efforts toward your domain, such as internal workflows and customer communication. Our research demonstrated that focusing on optimizing processes under your control is of greater value than attempting to optimize external systems, as such attempts often lead to wasted effort and limited results. Importantly, this does not mean ignoring or disregarding such issues, but rather maintaining a healthy relation to the holistic problem space and its limitations.

Improving internal workflows yields customer benefits
Investing time in improving the internal workflows and processes also generates significant advantages for customers. Our research revealed that when organizations listen to their employees and implement their feedback on operational improvements, it directly enhances the customer experience. Improving internal communication and

optimizing workflows enables better resolution of customer issues, making it easier to hand off between departments and ensuring consistent information is provided for all. These improvements can lead to fewer errors and more time spent on delivering value to the customers rather than battling with internal workflows.

Facilitate the ability for customers to solve issues independently
Customers need to be able to request support when needed, however, such a feature may often become congested with questions that have simple answers. Explore and understand which means are suitable to get users to answer their questions, reducing the need for manual support while creating potent and knowledgeable customers. Therefore, make information about the application or service easily accessible to the customer and support their preferred way of learning.

Reduce cognitive overhead through cohesive and collected resources
Minimizing the number of different tasks, interfaces, or other elements helps keep a tidy and collective mental state. Promptly, only provide users with the necessary information for the current context of the onboarding. Higher priority tasks should be highlighted, and consider delaying non-urgent tasks in order not to overwhelm users. Additionally, users should not have to disrupt their workflow by contextual switching. Help documentation and solution guides should be embedded directly within the application where users need them, rather than requiring navigation to external resources.

Improve communication through clearly stating expectations, statuses, and time-frames
Uncertain statements regarding the onboarding state can cause confusion and frustration for all involved parties. A suitable level of transparency and truthful framing of processes reduces the need for unnecessary inquiries regarding task completion and helps everyone involved understand who is expected to act in any given state.

8.3 Summary

This thesis has examined various approaches to improving multi-stakeholder user onboarding, offering several insights into effective design strategies. These include design patterns, onboarding metrics, and general methods for enhancing efficiency. The research employed a research-through-design and user-centered design methodology, incorporating interviews, iterative prototype development, and user testing. Conducted within the context of the bookkeeping service Wint, the study highlights the need for future work to validate and extend the findings in other settings and through longer-term evaluation.

Bibliography

[1] Wint, *Wint: Enklare företagande med automatiserad bokföring*, https://www.wint.se/, [Online; accessed 8-May-2025], 2024.

[2] M. Cascaes Cardoso, "User Onboarding Design in Citizen Science: A Path to Grow Engagement and Participation," English, ISBN: 9798834015765, Ph.D. University of Maryland, College Park, United States – Maryland, 2022. [Online]. Available: https://www.proquest.com/docview/2681508619/abstract/C752BE7BD42648CAPQ/1 (visited on 01/31/2025).

[3] A. Dix, Ed., *Human-computer interaction*, en, 3rd ed. Harlow, England ; New York: Pearson/Prentice-Hall, 2004, ISBN: 978-0-13-046109-4.

[4] D. A. Norman, "Some observations on mental models," in *Mental models*, Psychology Press, 2014, pp. 15–22.

[5] J. Sweller, "Cognitive load during problem solving: Effects on learning," *Cognitive science*, vol. 12, no. 2, pp. 257–285, 1988.

[6] P. Pirolli and S. Card, "Information foraging," *Psychological Review*, vol. 106, pp. 643–675, Oct. 1999. DOI: 10.1037/0033-295X.106.4.643.

[7] A. Cooper, R. Reimann, D. Cronin, C. Noessel, J. Csizmadi, and D. LeMoine, *About face: the essentials of interaction design*, en, Fourth edition. Indianapolis, Indiana: Wiley, 2014, ISBN: 978-1-118-76657-6.

[8] H. Javahery, D. Sinnig, A. Seffah, and P. Forbrig, "Pattern-based ui design: Adding rigor with user and context variables," in *International Workshop on Task Models and Diagrams for User Interface Design*, vol. 4385, Oct. 2006, pp. 97–108, ISBN: 978-3-540-70815-5. DOI: 10.1007/978-3-540-70816-2_8.

[9] M. Van Welie and G. C. Van der Veer, "Pattern languages in interaction design: Structure and organization," in *Proceedings of interact*, Citeseer, vol. 3, 2003, pp. 1–5.

[10] V. Dhanoa, A. Hinterreiter, V. Fediuk, N. Elmqvist, E. Gröller, and M. Streit, "D-Tour: Semi-Automatic Generation of Interactive Guided Tours for Visualization Dashboard Onboarding," *IEEE Transactions on Visualization and Computer Graphics*, vol. 31, no. 1, pp. 721–731, Jan. 2025, Conference Name: IEEE Transactions on Visualization and Computer Graphics, ISSN: 1941-0506. DOI: 10.1109/TVCG.2024.3456347. [Online]. Available: https://ieeexplore.ieee.org/abstract/document/10678807 (visited on 02/17/2025).

[11] E. Locke and G. Latham, "Building a practically useful theory of goal setting and task motivation: A 35-year odyssey," *American Psychologist - AMER PSYCHOL*, vol. 57, pp. 705–717, Sep. 2002. DOI: 10.1037/0003-066X.57.9.705.

[12] Userlane, *User onboarding experience guidebook*, 2021. [Online]. Available: https://www.userlane.com/wp-content/uploads/2021/02/User-Onboarding-Experience-Guidebook.pdf.

[13] C. A. Ellis, S. J. Gibbs, and G. Rein, "Groupware: Some issues and experiences," en, *Communications of the ACM*, vol. 34, no. 1, pp. 39–58, Jan. 1991, ISSN: 0001-0782, 1557-7317. DOI: 10.1145/99977.99987. [Online]. Available: https://dl.acm.org/doi/10.1145/99977.99987 (visited on 01/29/2025).

[14] M. Rosala, *Status Trackers and Progress Updates: 16 Design Guidelines*, en, Feb. 2019. [Online]. Available: https://www.nngroup.com/articles/status-tracker-progress-update/ (visited on 01/29/2025).

[15] GOV.UK Design System team, *Task list*, en. [Online]. Available: https://design-system.service.gov.uk/components/task-list/ (visited on 01/29/2025).

[16] I. Caponetto, J. Earp, M. Ott, *et al.*, "Gamification and education: A literature review," in *European conference on games based learning*, vol. 1, 2014, p. 50.

[17] L. C. Wood and T. Reiners, "Gamification," in *Encyclopedia of Information Science and Technology, Third Edition*, IGI global, 2015, pp. 3039–3047.

[18] Y.-k. Chou, *Actionable gamification: Beyond points, badges, and leaderboards*. Packt Publishing Ltd, 2019.

[19] S. Kurniawan, "Interaction design: Beyond human–computer interaction by preece, sharp and rogers (2001), isbn 0471492787," *Universal Access in the Information Society*, vol. 3, pp. 289–289, 2004.

[20] Y.-K. Lim, E. Stolterman, and J. Tenenberg, "The anatomy of prototypes: Prototypes as filters, prototypes as manifestations of design ideas," *ACM Trans. Comput.-Hum. Interact.*, vol. 15, no. 2, Jul. 2008, ISSN: 1073-0516. DOI: 10.1145/1375761.1375762. [Online]. Available: https://doi.org/10.1145/1375761.1375762.

[21] H. W. J. Rittel and M. M. Webber, "Dilemmas in a general theory of planning," en, *Policy Sciences*, vol. 4, no. 2, pp. 155–169, Jun. 1973, ISSN: 1573-0891. DOI: 10.1007/BF01405730. [Online]. Available: https://doi.org/10.1007/BF01405730 (visited on 01/27/2025).

[22] Y. Rogers, H. Sharp, and J. Preece, *Interaction Design: beyond human-computer interaction*, en. Indianapolis: John Wiley and Sons, 2023, ISBN: 978-1-119-90109-9.

[23] T. N. Bauer, "Organizational socialization: The effective onboarding of new employees," en, in *APA Handbook of Industrial and Organizational Psychology, Vol. 3: Maintaining, Expanding, and Contracting the Organization*, S. Zedeck, Ed., American Psychological Association, 2011, pp. 51–64. DOI: 10.1037/12171-002. [Online]. Available: https://www.researchgate.net/publication/285000696_Organizational_socialization_The_effective_onboarding_of_new_employees.

[24] T. Aamer and F. Milani, "Improving Digital Onboarding Processes for Financial Services - A Multivocal Literature Review," en, *Baltic Journal of Modern Computing*, vol. 11, no. 4, 2023, ISSN: 22558950. DOI: 10.22364/bjmc.2023.11.4.06. [Online]. Available: http://www.bjmc.lu.lv/fileadmin/user_

upload/lu_portal/projekti/bjmc/Contents/11_4_06_Aamer1.pdf (visited on 01/23/2025).

[25] K. Elliott, K. Coopamootoo, E. Curran, *et al.*, "Know Your Customer: Balancing Innovation and Regulation for Financial Inclusion," *Data & Policy*, vol. 4, e34, 2022, arXiv:2112.09767 [cs], ISSN: 2632-3249. DOI: 10.1017/dap.2022.23. [Online]. Available: http://arxiv.org/abs/2112.09767 (visited on 01/27/2025).

[26] F. Carlèn, "An investigation in how to increase the activation of new customers using design," M.S. thesis, Chalmers University of Technology, 2017.

[27] P. Chintale, "Designing a secure self-onboarding system for internet customers using google cloud saas framework," *Indonesian Journal of Applied Research (IJAR)*, p. 10, Apr. 2020.

[28] C. Stoiber, C. Walchshofer, M. Pohl, *et al.*, *Comparative Evaluations of Visualization Onboarding Methods*, arXiv:2203.15418 [cs], Jul. 2022. DOI: 10.48550/arXiv.2203.15418. [Online]. Available: http://arxiv.org/abs/2203.15418 (visited on 01/27/2025).

[29] L. S. Vygotsky, *Mind in society: The development of higher psychological processes*. Harvard university press, 1978, vol. 86.

[30] D. M. M. I. Norton and D. Ariely, "The ikea effect: When labor leads to love," *Journal of Consumer Psychology*, vol. 22, no. 3, pp. 453–460, 2012. DOI: 10.1016/j.jcps.2011.08.002.

[31] R. S. Kaplan and D. P. Norton, *The Balanced Scorecard: Translating Strategy into Action*. Boston, MA: Harvard Business Press, 1996, ISBN: 978-0875846514.

[32] Wernerson, Nora and Söderblom Carlsson, Erik, "Increasing user engagement and feature discoverability through user onboarding in business-to-business applications," M.S. thesis, Lund University, 2019.

[33] C. N. Batumani, "Improving Service Quality through Customer Onboarding in a SaaS Company," en, M.S. thesis, Metropolia University of Applied Sciences, 2023. [Online]. Available: https://urn.fi/URN:NBN:fi:amk-2023091525881.

[34] R. E. Freeman and D. L. Reed, "Stockholders and stakeholders: A new perspective on corporate governance," *California Management Review*, vol. 25, no. 3, pp. 91–92, 1983.

[35] T. S. Nguyen, S. Mohamed, and K. Panuwatwanich, "Stakeholder management in complex project: Review of contemporary literature," *Journal of Engineering, Project, and Production Management*, vol. 8, Jun. 2018. DOI: 10.32738/JEPPM.201807.0003.

[36] M. P. Craven, A. R. Lang, and J. L. Martin, "Developing mhealth apps with researchers: Multi-stakeholder design considerations," in *Design, User Experience, and Usability: User Experience Design for Everyday Life Applications and Services*, ser. Lecture Notes in Computer Science, A. Marcus, Ed., vol. 8519, Springer, 2014, pp. 15–24. DOI: 10.1007/978-3-319-07635-5_2. [Online]. Available: http://link.springer.com/chapter/10.1007/978-3-319-07635-5_2.

[37] Bangar Raju Cherukuri, "AI-powered personalization: How machine learning is shaping the future of user experience," en, *International Journal of Science*

and Research Archive, vol. 12, no. 1, pp. 3111–3126, Jun. 2024, ISSN: 25828185. DOI: 10.30574/ijsra.2024.12.1.0961. [Online]. Available: https://ijsra.net/node/5962 (visited on 01/28/2025).

[38] A. Alnefaie, S. Singh, B. Kocaballi, and M. Prasad, "An Overview of Conversational Agent: Applications, Challenges and Future Directions:" en, in *Proceedings of the 17th International Conference on Web Information Systems and Technologies*, Online Streaming, — Select a Country —: SCITEPRESS - Science and Technology Publications, 2021, pp. 388–396, ISBN: 978-989-758-536-4. DOI: 10.5220/0010708600003058. [Online]. Available: https://www.scitepress.org/DigitalLibrary/Link.aspx?doi=10.5220/0010708600003058 (visited on 01/28/2025).

[39] M. Nuruzzaman and O. K. Hussain, "A Survey on Chatbot Implementation in Customer Service Industry through Deep Neural Networks," in *2018 IEEE 15th International Conference on e-Business Engineering (ICEBE)*, Oct. 2018, pp. 54–61. DOI: 10.1109/ICEBE.2018.00019. [Online]. Available: https://ieeexplore.ieee.org/document/8592630/?arnumber=8592630 (visited on 01/28/2025).

[40] P. Stappers and E. Giaccardi, "Research through design," in *The Encyclopedia of Human-Computer Interaction, 2nd Ed.* Interaction Design Foundation - IxDF, 2024, Accessed: 2024-10-29. [Online]. Available: https://www.interaction-design.org/literature/book/the-encyclopedia-of-human-computer-interaction-2nd-ed/research-through-design.

[41] W. Gaver, "What should we expect from research through design?" In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, ser. CHI '12, Austin, Texas, USA: Association for Computing Machinery, 2012, pp. 937–946, ISBN: 9781450310154. DOI: 10.1145/2207676.2208538. [Online]. Available: https://doi.org/10.1145/2207676.2208538.

[42] Interaction Design Foundation - IxDF, *What is User Centered Design (UCD)?* Accessed: 2025-01-27, 2025. [Online]. Available: https://www.interaction-design.org/literature/topics/user-centered-design.

[43] K. Vredenburg, J.-Y. Mao, P. W. Smith, and T. Carey, "A survey of user-centered design practice," in *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, ser. CHI '02, Minneapolis, Minnesota, USA: Association for Computing Machinery, 2002, pp. 471–478, ISBN: 1581134533. DOI: 10.1145/503376.503460. [Online]. Available: https://doi.org/10.1145/503376.503460.

[44] E. B.-N. Sanders and P. J. Stappers, "Co-creation and the new landscapes of design," *CoDesign*, vol. 4, no. 1, pp. 5–18, Mar. 2008, Publisher: Taylor & Francis _eprint: https://doi.org/10.1080/15710880701875068, ISSN: 1571-0882. DOI: 10.1080/15710880701875068. [Online]. Available: https://doi.org/10.1080/15710880701875068 (visited on 03/10/2025).

[45] Design Council, *The Double Diamond: A Universally Accepted Depiction of the Design Process*, 2005. [Online]. Available: https://www.designcouncil.org.uk.

[46] H. Alshenqeeti, "Interviewing as a Data Collection Method: A Critical Review," en, *English Linguistics Research*, vol. 3, no. 1, p39, Mar. 2014, ISSN:

1927-6036, 1927-6028. DOI: 10.5430/elr.v3n1p39. [Online]. Available: http://www.sciedu.ca/journal/index.php/elr/article/view/4081 (visited on 01/28/2025).

[47] J. P. Bispo Júnior, "Social desirability bias in qualitative health research," *Revista de Saúde Pública*, vol. 56, p. 101, Dec. 2022. DOI: 10.11606/s1518-8787.2022056004164.

[48] L. Baker, "Observation: A complex research method," *Library trends*, vol. 55, no. 1, pp. 171–189, 2006. (visited on 01/30/2025).

[49] Think Design Collaborative, *Fly On The Wall*, en-US. [Online]. Available: https://think.design/user-design-research/fly-on-the-wall/ (visited on 01/30/2025).

[50] V. Braun and V. Clarke, "Using thematic analysis in psychology," *Qualitative Research in Psychology*, vol. 3, no. 2, pp. 77–101, Jan. 2006, Publisher: Routledge _eprint: https://www.tandfonline.com/doi/pdf/10.1191/1478088706qp063oa, ISSN: 1478-0887. DOI: 10.1191/1478088706qp063oa. [Online]. Available: https://www.tandfonline.com/doi/abs/10.1191/1478088706qp063oa (visited on 01/30/2025).

[51] C. Lewis and C. Wharton, "Chapter 30 - cognitive walkthroughs," in *Handbook of Human-Computer Interaction (Second Edition)*, M. G. Helander, T. K. Landauer, and P. V. Prabhu, Eds., Second Edition, Amsterdam: North-Holland, 1997, pp. 717–732, ISBN: 978-0-444-81862-1. DOI: https://doi.org/10.1016/B978-044481862-1.50096-0. [Online]. Available: https://www.sciencedirect.com/science/article/pii/B9780444818621500960.

[52] J. Ponto, "Understanding and Evaluating Survey Research," *Journal of the Advanced Practitioner in Oncology*, vol. 6, no. 2, pp. 168–171, 2015, ISSN: 2150-0878. [Online]. Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4601897/ (visited on 01/30/2025).

[53] P. Galdas, "Revisiting bias in qualitative research: Reflections on its relationship with funding and impact," *International Journal of Qualitative Methods*, vol. 16, no. 1, p. 1 609 406 917 748 992, 2017. DOI: 10.1177/1609406917748992. eprint: https://doi.org/10.1177/1609406917748992. [Online]. Available: https://doi.org/10.1177/1609406917748992.

[54] J. Nielsen, *Usability Metrics*, en, Jan. 2001. [Online]. Available: https://www.nngroup.com/articles/usability-metrics/ (visited on 02/06/2025).

[55] J. Nielsen and R. Molich, "Heuristic evaluation of user interfaces," en, in *Proceedings of the SIGCHI conference on Human factors in computing systems Empowering people - CHI '90*, Seattle, Washington, United States: ACM Press, 1990, pp. 249–256, ISBN: 978-0-201-50932-8. DOI: 10.1145/97243.97281. [Online]. Available: http://portal.acm.org/citation.cfm?doid=97243.97281 (visited on 01/30/2025).

[56] J. Neilsen, *10 Usability Heuristics for User Interface Design*, en, Jan. 2024. [Online]. Available: https://www.nngroup.com/articles/ten-usability-heuristics/ (visited on 01/30/2025).

[57] J. An, H. Kwak, S. Jung, J. Salminen, M. Admad, and B. Jansen, "Imaginary People Representing Real Numbers: Generating Personas from Online Social Media Data," en, *ACM Transactions on the Web*, vol. 12, no. 4, pp. 1–26, Nov.

2018, ISSN: 1559-1131, 1559-114X. DOI: 10.1145/3265986. [Online]. Available: https://dl.acm.org/doi/10.1145/3265986 (visited on 02/07/2025).

[58] Y.-n. Chang, Y.-k. Lim, and E. Stolterman, "Personas: From theory to practices," in *Proceedings of the 5th Nordic Conference on Human-Computer Interaction: Building Bridges*, ser. NordiCHI '08, Lund, Sweden: Association for Computing Machinery, 2008, pp. 439–442, ISBN: 9781595937049. DOI: 10.1145/1463160.1463214. [Online]. Available: https://doi.org/10.1145/1463160.1463214.

[59] J. Grudin and J. Pruitt, "Personas, participatory design and product development: An infrastructure for engagement," in *PDC*, 2002, pp. 144–152.

[60] Google, *Crazy 8s - design sprint kit*, https://designsprintkit.withgoogle.com/methodology/phase3-sketch/crazy-8s, Accessed: 2025-03-06, 2023.

[61] K. Bovermann, J. Weidlich, and T. Bastiaens, "Online learning readiness and attitudes towards gaming in gamified online learning a mixed methods case study," *International Journal of Educational Technology in Higher Education*, vol. 15, no. 1, p. 27, Jul. 2018, ISSN: 2365-9440. DOI: 10.1186/s41239-018-0107-0. [Online]. Available: https://doi.org/10.1186/s41239-018-0107-0 (visited on 04/23/2025).

[62] G. S. Bahr and R. A. Ford, "How and why pop-ups dont work: Pop-up prompted eye movements, user affect and decision making," *Computers in Human Behavior*, vol. 27, no. 2, pp. 776–783, 2011, Web 2.0 in Travel and Tourism: Empowering and Changing the Role of Travelers, ISSN: 0747-5632. DOI: https://doi.org/10.1016/j.chb.2010.10.030. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S0747563210003286.

[63] A. Kaley, *Popups: 10 Problematic Trends and Alternatives*, en, Jun. 2019. [Online]. Available: https://www.nngroup.com/articles/popups/ (visited on 04/29/2025).

[64] S. Dow, J. Fortuna, D. Schwartz, B. Altringer, D. Schwartz, and S. Klemmer, "Prototyping dynamics: Sharing multiple designs improves exploration, group rapport, and results," in *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, ser. CHI '11, Vancouver, BC, Canada: Association for Computing Machinery, 2011, pp. 2807–2816, ISBN: 9781450302289. DOI: 10.1145/1978942.1979359. [Online]. Available: https://doi.org/10.1145/1978942.1979359.

A

User test protocol

User test protocol

Setup

Participant: The test is designed for 1 testing user at a time.

Administrator 1: Instructs the participant, asks questions, and helps the user if necessary or appropriate.

Administrator 2: Records user behaviour and answers.

Requirements: 1 computer for the user to perform the tests. 1 computer to record participant results and behaviour. 1 printed sheet with task instructions.

Test

Introduction: Thank the user for choosing to participate. Briefly explain the context, the purpose of the test, and the application.

Inform the user of their rights and explain how the data will be used. Note that the data is anonymous. Encourage them to think aloud and explain their thought process throughout the test.

Phase 1

Before: Quick introduction of available support features. Show them support FAB *and* FAQ tab.

A: External FAQ -> Integrated FAQ

B: Integrated FAQ -> External FAQ

During: Annotate user actions and behavior.

After: Ask and annotate users' answers to the following questions

- After experiencing both approaches to accessing help information (integrated within the application and as a separate external website), which approach did you find more effective for your workflow? Please explain the reasoning behind your choice

Phase 2

Before: Explain the expected task to be completed and inform the user, and hand over the required information.

X: No help notice

Y: With help notice

During: Annotate user actions and behavior. Between tasks 1 and 2, ask and annotate users' answers to the following question:

- "On a scale of 1-5 (higher is more difficult), how would you rate the overall difficulty of completing task 1?"

After: Ask and annotate users' answers to the following questions

- "On a scale of 1-5 (higher is more difficult), how would you rate the overall difficulty of completing task 2?"
- (Y) If you utilized the help notice, did it work as you expected? If not, what did you expect? Did the help notice make it easier for you to complete the task?
- (X) How did you experience finding the information required to complete the task?
- (X) (Show the Y version) Would you have preferred this solution?

Finalize: Ask if there are any additional comments or questions from the user. Thank the user for their participation

Phase 1: find information

Task 1

Find a suitable answer to the question:
“To whom should I send my invoice if I am selling an app on the App Store?”

Task 2

Find a suitable answer to the question:
“You're working from your home office and want to buy coffee. Can you put it on the company?”

Phase 2: invoices

Task 1

You have an unsent draft for a customer invoice no longer needed.

Objective: Remove the unsent customer invoice:

ID (nummer):

Customer:

Customer invoices can be found under Intäkter -> Kundfakturor

Task 2

You have previously sent an invoice to a customer, but the invoice was issued incorrectly due to a misunderstanding, and you want to completely remove it.

Objective: Remove the sent customer invoice:

ID (nummer):

Customer:

Customer invoices can be found under Intäkter -> Kundfakturor

B

Interview questions

- Hur länge har du jobbat på Wint?
- Hur mycket tid uppskattar du att du lägger på att onboarda nya användare?
- Vad är din generella uppfattning om onboardingen med nya kunder?

  Vad funkar bra, dåligt?
- Finns det några specifika moment där kunder ofta fastnar?
- Vad upplever du som jobbigast under processen?

  Är det något som tar mycket tid?

  Svårt att få kunder att förstå vad de ska göra?
- Upplever du att det är stor variation mellan olika kunder?
- Hur ser kommunikationen ut med externa parter, exempelvis banker, korttjänsten och skatteverket osv?
- Vilken feedback får ni från kunderna om onboarding-processen?

C

Customer Questionnaire

Startade ni ert aktiebolag med Wint?

- Ja, startade med Wint
- Nej, hade företaget sen innan
- Annat

Vem hanterade er bokföring innan ni började använda Wint?

- Jag själv
- Extern bokföringsbyrå
- Anställd ekonomiansvarig
- Annan bokföringstjänst
- Ingen tidigare bokföring

Vad är ditt generella intryck av onboardingen på Wint?
(1-10)

Beroende på vilken form ditt företag har och vilka funktioner ni efterfrågat kan processen se lite olika ut. Vilka av följande funktioner eller delar har ni aktiverat/fullföljt?

- Tidigare bokföring
- Aktiebok
- Wintkortet (Mynt)
- Kundfakturering
- Lön

Hur tydliga var instruktionerna under onboarding-processen?
Mycket otydliga - Jag förstod inte vad som förväntades 1-5 *Mycket tydliga - Jag kunde enkelt följa alla instruktioner*

Fanns det någon information som saknades eller som var otydlig?

Hur skulle du betygsätta supporten från Wint under onboarding-processen?
(1-10)

Hur upplevde du mängden information som presenterades under onboarding-processen?
Mycket överväldigande 1-5 *Mycket hanterbar*

Hur enkelt var det att hålla reda på alla steg som behövde genomföras?
Mycket svårt 1-5 *Mycket enkelt*

Hur lång tid uppskattar du att det tog för dig att känna dig bekväm med Wint's system och dess funktioner?

- Mindre än 2 veckor
- 3-4 veckor
- 1-2 månader
- 3-6 månader
- 6+ månader
- Känner mig fortfarande inte trygg i att det jag gör blir rätt direkt

När du stötte på problem under uppstarten med Wint, vad är det första du vanligtvis gör för att hitta en lösning?

- Kontaktade supporten direkt via kontaktformuläret som finns i Wint
- Appen
- Sökte i Wints kunskapsbas exempelvis i Frequently Asked Questions (FAQ)
- Försökte lösa problemet på egen hand
- Annat

Hur enkelt var det att följa status på uppgifter efter att ha skickat in eller uppdaterat information?
Svårt, otydligt 1-5 *Enkelt, tydligt*

Var det något moment ni upplevde som extra svårt?

Har ni något övrigt att tillägga?