Improving the user experience of delayed baggage associated with air travels

An interaction design study on how to identify user pain points and design based on them.

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Delay Information Message, see *Chapter 7. Final Design and Evaluation*

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Abstract

The project *Improving the user experience of delayed baggage associated with air travels* was conducted at the Interaction Design department at Chalmers University of Technology as a master's thesis by Louise Henriksson and Annie Rehnberg. The project is a cooperation with SAS - Scandinavian Airline System.

Today, a traveler must go through a long, time consuming, manual process when they notice that their baggage is delayed. This is something that contradicts SAS' vision, which is that they want to make life easier for travelers in Scandinavia (SAS, 2019a). The fact that travelers themselves are the ones that have to report the delayed baggage, and not the other way around, is something that suggests that the responsibility lies on the traveler, thus creating a bad user experience. Therefore the purpose of this project is to research how the experience with delayed baggage at airports is today and how it can be improved by defining a set of guidelines. The aim was also to identify the travelers' pain points and see if negative emotions could be reversed, thus creating a rich experience. The research question for this project was:

Based on user pain points, what design guidelines should be considered to improve the user experience for delayed baggage tracking and reporting, associated with air travels?

The project followed the structure of a double diamond approach, containing methods which gathered both user insights and technical constraints. Two personality types emerged, one that wants information about the delay as soon as possible and one that wants to stay unaware during the flight but receive the information immediately after landing.

The project resulted in a list of requirements, six pain points, an interactive prototype for a mobile app and a set of six guidelines. To confirm the guidelines, three sets of usability tests were performed. They revealed that, even when designing based on the guidelines, the traveler still experiences negative emotions when they find out about the delay. However, after continuing in the interface, they start to feel more in control and excited again. This implies the emotions were reversed and that the prototype could create a rich memorable experience.

Acknowledgments

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1. Introduction

This project was conducted at Chalmers University of Technology and is a master thesis within the Interaction Design and Technologies program in collaboration with SAS - Scandinavian Airlines Systems. The scope of the thesis was to investigate how the negative emotions associated with delayed baggage can be reversed and thus enhance the user experience. The aim was to identify the pain points related to baggage reporting and tracking with the goal of developing a set of guidelines that soles these pain points. The project also aspires to develop a high-fidelity prototype that incorporates the pain points. This was performed using a double diamond process with a user-centred approach focusing on emotions.

1.1 Background

SAS is an airline company with the vision of making life easier for travelers in Scandinavia (SAS, 2019a). SAS hardly ever loses baggage, but some bags arrive delayed (L. Rauch, personal communication, September 21, 2018). If the baggage is not on the belt upon arrival, a traveler currently must wait for a customer service agent at the arrival service and then go through a manual process to initiate baggage tracing (L. Rauch, personal communication, September 21, 2018). The fact that travelers themselves are the ones that have to report the delayed baggage, and not the other way around, is something that suggests that the responsibility lies on the traveler, thus creating a bad user experience. This is something that contradicts with SAS' vision. However, once reported, SAS does their best to find and deliver the bag as fast as possible (SAS, 2019b).

When filing a delayed baggage report at the arrival service in the arrival hall of the airport, the traveler receives information about where the baggage was last scanned, which implies that SAS already has access to the data needed to locate baggage. This master's thesis will investigate if there is a way of making the process of reporting delayed baggage less time consuming, or if it can be eliminated entirely so that the travelers do not have to think about it at all.

Another part of the delayed baggage experience is when the traveler file a claim for compensation for expenses due to their delayed baggage. This area will also be investigated in this thesis, to see if this can be made more seamlessly.

1.2 Research question

The research problem is that the reporting of delayed baggage is currently manual and time-consuming and requires the traveler to do a lot of work. Furthermore, it does not keep the traveler updated with the latest status. Another related issue is the hassle with getting eventual compensation for expenses made, due to the delayed baggage. These are all factors that contribute to a negative experience. This led to the following research question:

Based on user pain points, what design guidelines should be considered to improve the user experience for delayed baggage tracking and reporting, associated with air travels?

1.3 Delimitations

In agreement with SAS, the developed design was adapted for smartphones and no other device. The project was of a free, explorative nature, with few technical constraints from developers. This meant that the result would be a concept vision, rather than a finished product for immediate implementation. The main focus was on the experience related to functionality and interaction, rather than visual design, even though the expected result would include a look-and-feel graphical interface.

The study primarily focused on delayed baggage for outbound flights, as this often results in more issues for the traveler, especially regarding compensation. Furthermore, the project solely focused on enhancing the experience with delayed baggage for the traveler, and not on reducing the number of baggage that is delayed.

2. Literature Review

In a study conducted by Alsyouf, Humaid & Al Kamali (2014), statistics are presented of the total number of mishandled baggage at airports. They also bring up several situations that can cause this issue. These are partly based on the baggage handling systems (BHS) at airports: how the system is designed, technical failures, errors in the loading and off-loading areas, human errors and lack of strict policies for bag shapes, delayed flights, short connections, and staff regulations. They also claim that the passengers themselves can be of cause when checking in the bag last minute, overfilling bags and keeping baggage tags from previous flights (Alsyouf, 2014). Their study later takes up several ways to improve the mishandled baggage situations. Many of the causes stated by Alysof et al. (2014) for mishandled baggage is agreed upon by SAS, which is presented in chapter 4.1. However, the results of the study relate more to the backend of the baggage handling system and ways to improve processes and systems. They do not bring up how the experience for the traveler can be improved based on their suggestions nor how the passenger can be informed when baggage does go astray. Mishra & Mishra (2010) reflects on this and argue that another contributing factor why baggage is mishandled is due to human factors and a failure to scan baggage manually and thus the whereabout status is not accurate. They further explain how RFID (Radio-frequency identification) is beneficial and how the usage of this technology can improve baggage handling and tracking. By attaching RFID technology to baggage, its location can be tracked, and notifications can be sent out if it is delivered to the wrong terminal or flight. These factors will lead to a better and faster delivery of mishandled baggage which will, in itself, lead to a better passenger service (Mishra & Mishra, 2010). They touch upon the aim of this master thesis when they claim that the use of RFID will "set passenger's mind at ease". However, their study has a more business perspective and does not bring up the travelers perspective and suggestions to improve their experience.

In the report, *Delayed Baggage Trends and Options for Compensating Passengers,* Dr. Gerald Dillingham (2012) presents reasons for delayed baggage and ways of compensating the traveler. Dillingham (2012) suggests three ways of compensating passengers for delayed baggage and other types of mishandling such as damaged or lost baggage. These options are:
1. Compensate travelers for justifiable expenses that are found to be necessary.
2. Give a refund of the baggage expense that was paid by the traveler when the baggage was checked in.
3. Set a specific rate for compensation based on delivery length. The longer the baggage is gone, the higher the compensation.

Dillingham's report (2012) gives a broad overview of different ways compensation can be given, however, it does not go into more detail than what is presented in the paragraph above. The report focuses more on the business and economic factor of compensation, rather than the experience and how the traveler can request and follow the status of their claim. This is one of the primary ways this master thesis will differ from Dillingham's report.

The few related studies done on the topic, and none focusing on the passengers' experience, suggest that further studies are needed in order to design for the experience of delayed baggage. This study, therefore, fills a gap in the research field of delayed baggage by focusing on the effects delayed baggage have on passengers, and thus expanding the study horizon. Further, this study is the first study that investigates how the negative emotions caused by this issue can be reversed.

3. Theoretical Framework

The theoretical framework includes theory related to the scope and research aim. It consists of the following four topics: *Design Practices, Design Guidelines,* an explanation of the measurements *Validity and Reliability* as well as *Related Work.*

The theory presented in this chapter have been gathered through analytical reading. Björk & Räisänen (2003) describe several guidelines for formal writing in their book Academic Writing, one being how to perform an analytical reading. The authors suggest reading texts at least twice. The first time to grasp the essence of the text, and the second time to thoroughly examine the text and its construction. Björk & Räisänen (2003) further proposes that when summarizing a text, it is important to incorporate the controlling idea of the initial text. When writing an academic report, Hannington & Martin (2012) argues that a literature review is a valuable tool. The method consists of reading and integrating literature that relates to the theme of the paper. Hannington and Martin (2012) agrees with Björk & Räisänen (2003) that analytical reading is performed to capture the essence of the text, and furthermore suggests that the reader should try to connect research from different sources to get a higher understanding.

Hannington & Martin (2012) claim that the internet is a good source for literature, as it offers an enormous amount of information. However, the authors further state that the reader should be careful and ensure that the selected source is reliable and that the collected information is suitable.

3.1 Design Practises

This project has followed the practice of researching through design. This means that the research question has a general formulation but is partially answered through a design concept developed for a more specific situation (Gaver, 2012), in this case for SAS. Furthermore, the project followed an additional number of selected design practices. These were *Double Diamond, User Centered Design, Agile UX, Social Research, Designing for Rich Experiences,* and *Universal Design,* which are all described in detail below. Double Diamond is further described in the *Methodology* chapter as this was the main structure of the project and each method was divided following the double diamond approach.

User-Centered Design (UCD) was one of the building blocks for the project, as the users were constantly in focus, either through interviews, workshops or user tests. The Agile UX approach was chosen to ensure the process was effective and keeping a high pace. As this thesis followed the UCD approach, a social research was appropriate as this brings up how to find, approach and talk to users. As the discovery of delayed baggage was expected to be associated with strong negative emotions, designing for rich experiences was also researched to see if the users´ emotions could be reversed.

3.1.1 User-Centered Design

The name *User-Centered Design* (UCD) refers to the people that will use a product or system i.e. the users. UCD revolves around them, or as the C hints, puts them in the

center of the process. The D stands for the design or the creation of the user experience (Vredenburg, 2002). It is also said that the D could stand for discovery, definition, development, and delivery, which are the building blocks of a Double Diamond process (Design Council, 2019) an approach described in more detail in chapter 4. UCD can be used throughout a multidisciplinary team and is based on a set of specialized methods that let the team gain user input that can later be interpreted into a design. The process revolves around three main steps, understanding the user's activities and designing and evaluating the design activities (Vredenburg, 2002). This means that the research team should first understand who the users are, what type of activities they currently perform, in what context, and what activities they might perform in the future. The research team later design concepts which are based on the findings from the first step and evaluate them in an iterative process involving the users (Vredenburg, 2002).

A User-centered design process is divided into four main stages:

1. Understand who the users are and who the competitors are.
2. Develop concepts based on user findings and design for their goals.
3. Prototype with users iteratively
4. Evaluate the product against the user's expectations to ensure that they reach their goals and understand the products.

Using the UCD approach has proven to be successful and companies have developed products with high customer satisfaction (Vredenburg, 2002). By involving real users in the process, the research team can assure that the products will be understandable and thus people will buy or use it (Vredenburg, 2002). Vredenburg (2002) further states that people will select things that they know they will understand. For this reason, usability is arguably a critical part of the UCD approach.

3.1.2 Agile UX

An agile work approach has been used within the software development field since the beginning of the 2000s and is today a well-known term within the field (Sharp, 2011). Now that many teams are multidisciplinary, UX designers also need to absorb this approach. Agile UX, therefore, combines techniques and processes from interaction design with agile methods, allowing UX designers to follow the software development work pace (Sharp, 2011). An agile approach is often divided into sprints of two weeks and the details are specified before each sprint so that the software team can start the development (Sharp, 2011). The designers need to take the same approach and changes might happen after each sprint. However, user research is typically a process that takes longer time to perform. Therefore, if it is a shorter research project, the user research can be done alongside the technical development process, otherwise, it can be conducted before the project begins and be called iteration zero (Sharp, 2011).

It is important for the agile development to have continuous iterations and deliveries of design features when the first iteration starts and not deliver the whole design up front (Sharp, 2011). Figure 3.1 below illustrates the parallel agile work process for software developers and interaction designers. In cycle 0, it is important that the whole team understands the vision for the product. This can be achieved by some work up front such as understanding the scope of the project, the product itself and the general design

language, both how it should technically work and the UX design (Sharp, 2011). The designers are working in three different cycles at a time; evaluating the outcome from the previous cycle, designing for the next and answering questions about the design that is being implemented in the current ongoing design (Sharp, 2011). The testing is streamlined since the designer can test outcomes from previous iterations and hypotheses for the next one in one session, and therefore save time. Another advantage is that the designer will receive real time feedback from the users which can make the designer aware of any changes that need to be done in an early stage (Sharp, 2011).
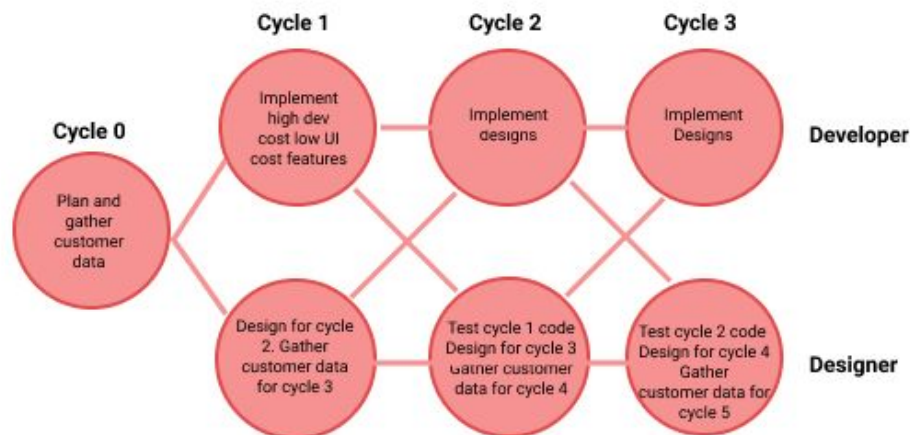
Figure 3.1: The parallel agile working process for a multidisciplinary team. Authors' own copyright.

3.1.3 Social Research

Social research is research done with individuals within a society and is performed, for instance, because a service needs to be evaluated or when developing something new (Wadsworth, 2016). Social research can be done by anyone with a reason to ask questions and is based on a fundamental reason to understand something or a situation (Wadsworth, 2016). Everyday research such as, what to wear, what to eat for dinner and even findings from experiences can also be seen as social research (Wadsworth, 2016).

According to Wadsworth (2016) good research starts with a genuine desire to find something out. However, it does not mean that the researcher needs to be unbiased beforehand. In fact, it can be beneficial to have some sort of idea of what the desired result could be by identifying what is known and to state a hypothesis (Wadsworth, 2016). This approach raises more questions about facts that initially are not known, and a knowledge of where the research part should end (Wadsworth, 2016). It is also a good idea to think about why the research should be made and if it is needed at the beginning of the project (Wadsworth, 2016).

It is important to consider who the different stakeholders for the research are: who is performing the research, and who is being researched? An ethical dilemma that may arise is that the researched person might feel misunderstood when there is one group performing the research and another group that takes part of the results and comes up

with solutions based on the findings (Wadsworth, 2016). Another ethical dilemma that might occur is the fact that the researched person might feel uncomfortable with expressing critique based on their values when they do not have all the facts (May, 2011). Therefore, it is important to be clear about what the research is for and clarify the factors that the questions are based on (May, 2011). This is to make the result as good as possible and help the researched group reach their goals or to create value for them (Wadsworth, 2016).

Social research can be both quantitative and qualitative and should have a predefined step-by-step plan on how to reach the purpose of the project but still be flexible enough to allow for changes. It should also have a research question with a clear focus and a clearly stated purpose and context (Wadsworth, 2016). Many methodologies and techniques exist within the field of *Social Research.* This includes methods such as surveys, personal interviews, group interviews, observations, evaluation, action research and community study. A selection of these methods was used in this project and are described under the methodology chapter.

3.1.4 Designing for Rich Experiences

A rich experience is both pleasant and memorable and can be defined as a mixture of both positive and negative emotions such as joyful terror before riding a rollercoaster (Fokkinga & Desmet, 2013). In Fokkinga and Desmets (2013) paper about *Ten Ways to design for disgust, sadness, and other enjoyments* they present a framework to design for a rich experience. The framework consists of three parts: *Emotion selection,* of which a negative emotion is selected that the product or interaction will evoke, *Emotion elicitation,* where the designer evokes a desired negative emotion, and the *Emotion reversal,* where the designer creates a protective frame and reverses the negative emotion into a pleasant one, see figure 3.2 below.
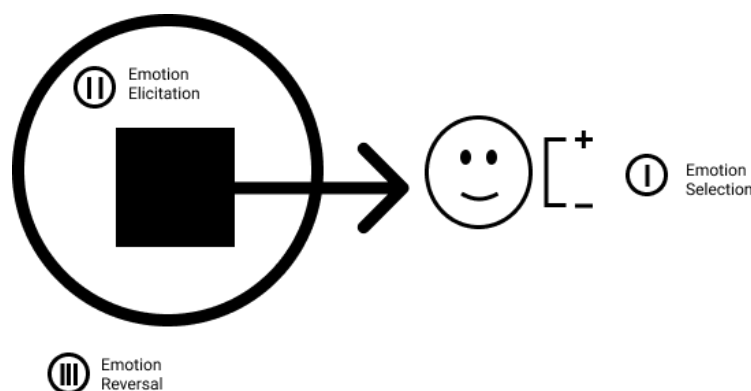
Figure 3.2: Design approach for a rich experience. Authors' own copyright.

A protective frame refers to an actual frame, which works as mental protection between the users and the unpleasant effect of the negative emotion, thus letting the users enjoy the pleasant aspect of the product or interaction. There are four different protective frames identified by Fokkinga and Desmet (2013):

- Detachment frame: When working with this frame, the designers can present a representation of the negative emotion. This could be graphics, movies, stories, audio recording or symbolic representation.
- Safety-zone frame: The designers are distancing the users from the negative stimulus and keeping them in the "safe zone". Here, the users are interacting with the real negative stimulus but from a distance.
- Control frame: The designers are increasing the level of control that the users have, to deal with the negative stimulus. The designers could, for instance, give the users an option and choice to abandon the negative situation at any time.
- Perspective frame: Providing the users with a perspective of the negative stimulus or situation and provide knowledge of how it can be turned into a specific profit or positive emotion instead and make the users feel good about themselves.

Two examples of rich experiences that Fokkinga & Desmet (2013) mention are:
- *The challenging* - an experience mixing frustration and satisfaction. The user is given a problem that they find engaging and motivated to solve. This is often combined with the control frame.
- *The thrilling* - an experience that contains both fright and joy. This leads to excitement and creates an adrenaline rush and leads to the feeling of being alive. Often combined with control-, safety-zone- or detachment frame.

3.2 Design Guidelines

The following design guidelines were of importance during the design and development work for this thesis: *Transient Posture, Designing for mobile, Gestalt laws* and *Accessibility.*

As travelers often are on the go, and the thesis would result in a mobile app interface, the transient posture was explored along with design guidelines for mobile devices. The gestalt laws were studied as they were proven to be of importance later in the design phase. Since travelers could be anyone, accessibility was also studied and applied.

Another important aspect to consider when designing a digital interface, are ethical considerations (Cooper et al., 2014). Two of these considerations are to avoid inflicting personal or psychological harm for the user. A sign of psychological harm is inflicting confusion and frustration in the user (Cooper et al., 2014.)

3.2.1 Transient Posture

Systems that have only one main function, with some controls to manipulate it, are said to be of Transient Posture (Cooper et al., 2014). Transient systems are often used for short periods of time or when the user needs to perform a specific task. This means that the users don't have to familiarize themselves with it and advance into intermediate or expert users. Cooper et al. (2014) suggest that systems with a transient posture should use clear language and tell the users what functionality each element in the system has. It is very typical to find big buttons with understandable labels in a transient application (Cooper et. al., 2014).

The transient application should use controls that are proportionally large compared to the screen real estate that the application consumes. Big and bold graphics visually aid the user to navigate and to understand what is of importance (Cooper et. al., 2014). Since a transient application is not used very often, the user might remain an intermediate user and therefore needs guidance. Thus, the application can have instructions built into the interface. One example is to use a bigger button and label it with exactly what it does, such as, "setup user preferences" instead of just labeling the button "setup". Feedback should be given direct and related to the action to avoid confusion. An example could be to visually show that the system is loading or processing (Cooper et. al., 2014).

There is a number of design guidelines listed by Cooper et. al. (2014) that says that an interface should:
- Be simple: Few buttons, colors to highlight things.
- Be clear: What links and buttons do.
- Have clear navigation.
- Be quick: Simple interactions with the icons.
- Have large icons: Big buttons.
- Have pliancy: Buttons should look clickable.
- Use colors to highlights important features.

Smartphones are usually of transient nature since they have smaller screens, are handheld and used on the go. However, many mobile interfaces today share attributes with both transient and sovereign applications (document centered interfaces used for a longer period of time (Cooper et. al., 2014) and are therefore called Standalone posture (Cooper et. al., 2014). Many applications utilize the screen's full size and have toolbars placed at the top or bottom. Still, the application can be transient due to the self-explanatory interface. Since the applications are handheld and on-the-go, it implies that they are of temporary nature and only used for a short period of time (Cooper et. al., 2014).

3.2.2 Designing for Mobile

Cooper et al. (2014) state that there are three mobile form factors: Handhelds, Tablets and Mini-tablets. This study will cover handheld phones. Cooper et al. (2014) state some characteristics that are specific for smartphones:
- Navigation takes a large percent of the space.
- Tactile opportunities through vibration.
- Sensory possibilities such as rotation, location, light.
- No keyboard or mouse, which means no keyboard shortcuts, tooltips or left and right click with a mouse.
- Direct manipulation with fingers. Direct interaction with the screen will also cause occlusion, as the user covers certain parts of the screen.

As stated in the list above, there are different gestures that can be performed on a mobile app (Cooper et al., 2014). These are:
- *Single tap*: Usually used to select, activate or toggle between states.
- *Tap and hold:* can be used to open a pop-up. However, Cooper et al. (2014) suggest not to use this as it is not well known for many users.

- *Drag:* Can be used to scroll, move or control (slide, paint).
- *Swipe:* The direction of the swipe is used for different actions:
  - Up and down: Swiping in a list, that causes the list to keep sliding in the direction the swipe was made.
  - Left and right: Can be used to open a *drawer* (vertical navigation list) or to swipe in a carousel. Apple uses the left and right swipe to move forward and backward. Android uses left swipe to delete tabs in the Chrome browser.
- *Pinch:* Used to zoom out and in.
- *Rotate:* Used to rotate an object, Cooper et al. (2014) suggest this gesture is difficult to perform.
- *Multifinger swipes:* Should not be used according to Cooper et al. (2014)

Cooper et al. (2014) also state a couple of design patterns when it comes to handheld mobile design. A selected collection is presented below:
- Stacks: The layout of mobile applications are often structured as stacks, with content areas organized as a vertical grid or list.
- Carousels: Allows the user to navigate through the left and right swiping. The carousel often has a start and stop, meaning that it does not go all the way around.
- Orientation: A mobile device allows for both portrait and landscape layout. According to Cooper et al. (2014), many applications only allow for portrait orientation.
- Navigation: Mobile applications often use a bar with tabs as the main navigation option. The bar has at the most room for five navigation options. If there are more options available the system could use a tab carousel instead, which allows the user to swipe through the tab menu. Another option is to use a drawer.

3.2.3 Gestalt Laws

The Gestalt laws were first formulated by a group of German psychologists in 1912 (Ware, 2012, p.181). Gestalt is a German word for pattern and the Gestalt laws the understanding and explanation of how patterns are perceived (Ware, 2012, p.181). Even though this discovery was done a long time ago, it is still valid today due to the clear description of the phenomena. The Gestalt laws consist of eight laws that can be translated into commonly used design principles for displaying information in an intuitive way (Ware, 2012, p.181). These are *Proximity, Similarity, Connectedness, Continuity, Symmetry, Closure, Relative Size*, and *Common Fate*. However, relative size and common fate relates to objects in movement (Ware, 2012) and are not described in this section.

Proximity: The law that provides the most powerful pattern recognition and organizing principle is *Spatial Proximity*. This is also the most useful law when designing as it is based on the theory that objects close to each other are grouped. Glyphs and symbols that represent similar information should be placed close together (Ware, 2012).

Similarity: The second law is *Similarity* which translated which patterns that are grouped based on their shape (Ware, 2012). This is used when distinguishing different groups from each other. It is also a useful technique when designing an interface, as it allows

the user to easily focus on one pattern at a time. Rows and columns should be coded using colors, textures or glyphs when designing a grid layout (Ware, 2012).

Connectedness: This is the most powerful grouping mechanism and is easier to spot than proximity, color, size or shape since it connects elements together using lines (Ware, 2012).

Continuity: It is much easier to spot which elements are connected with smooth continuous contours than straight lines with abrupt directional changes (Ware, 2012).

Symmetry: Symmetrical lines are seen as a whole, more than if the lines would be parallel, thus the symmetry can be a powerful principle to convey the meaning of a pattern. It can be applied when comparing data from the same origin at two different time dates by placing the data vertically (Ware, 2012).

Closure and Common Region: An object that lies behind another object tends to be seen as a complete form even though parts are not visible. Regions can emerge when it is enclosed by a closed contour. This has been proven to be a stronger grouping principle than proximity because there is a tendency to determine if the information is inside or outside the region (Ware, 2012).

Figure and Ground: Figures are seen as objects on the foreground and the ground is seen as lying behind the figure (Ware, 2012).

3.2.4 Accessibility

Accessibility implies that everyone should be able to use a graphical interface and access the information provided and achieve a specific goal despite any physical, cognitive or sensory abilities (European Telecommunications Standards Institute, 2018)(ISO, 2011). Therefore, an interface should accommodate for many different use cases and this chapter presents accessibility guidelines stated in EN 301 549 (European Telecommunications Standards Institute, 2018). Guidelines that feature functionality outside of the master's thesis' scope are not explained, for more information about these, read the EN 301 549 report on Accessibility requirements for ICT products and services (European Telecommunications Standards Institute, 2018).

According to the European Telecommunications Standards Institute (2018), an interface should not only rely on visual information but provide an option to operate the interface with non-visual access. To enable a functionality, non-visual access could be provided by either audio, tactile form or speech. Where the users have limited vision, the system should provide visual modes of operation such as magnification, reduction of the required field of vision. Usage of contrast, brightness and intensity can help users with limited vision (European Telecommunications Standards Institute, 2018). Non-visual usage access should also be provided.

A graphical interface should furthermore not require the user to have a perception of color. The interface should therefore not only rely on color coordination but use other methods to distinguish items or functionality (European Telecommunications Standards

Institute, 2018). This could be the usage of different glyphs that are differentiated through size and shape (Ware, 2012).

European Telecommunications Standards Institute (2018) further states that features of the interface require fine manipulation, those features should be provided additional methods of manipulation. Limited reach can also limit users from operating an interface. With free-standing or installed interfaces, every operational feature should be within reach for all users, by strategically placing them in range. The user's cognition should not be overlooked as well. Users with limited cognition will need simpler and easy to use features that follow a logical flow and intuitive hierarchies. It is important to use clear language, adjustable timings, error indications and suggestions to guide the users. If the interface provides features adapted with accessibility in mind it should be possible to maintain their privacy. Users with photosensitivity might be triggered if the interface includes flashes. Provide one mode of the interface to operate in a way that minimizes the potential of triggering photosensitive seizures by limiting the number of flashes per second.

3.3 Validity and Reliability

When gathering data from interviews and other user study methods, there are two critical factors according to Mälardalen University (2014) - *validity* and *reliability.* Validity is a measurement of how well the collected data reflects what was intended to be measured. Reliability is a measurement of the quality of the measurement. That is, if it is a coincidence that the result turned out the way it did, or if the same result would be obtained when repeating the study again. A result of high validity and reliability can be applied to more people than those who participated in the study (Mälardalen University, 2014).

4. Benchmark of Airline Systems & Related Services

To gain a greater perspective on the topic of delayed baggage, a brief benchmark was conducted. The current system for reporting delayed baggage at SAS was researched and also how other airlines have approached the issues. These were Lufthansa and Qatar Airways and their current solutions. When examining the current situation and how SAS and other airlines handle it, it became apparent that the delayed baggage experience need a lot of improvement. By exploring the mobile apps of Lufthansa & Qatar Airways, both of which provide their travelers with baggage tracking functionality (Lufthansa, n.d) (Qatar Airways, 2019), an insight to what could be possible could be gained.

In addition to this, the benchmark extended beyond the airline industry and included a logistic company, *PostNord.* PostNord was studied to see how their tracking of packages looks like and what functionality was included in their app. Furthermore, a brief description of the SAS design guidelines is also described in this section, as these would be of importance later when creating a concept and design.

4.1 Current Delayed Baggage Situation

"95% of all *delayed* bags are found and retrieved within 24 hours" (J. Henriksson, personal communication, January 22, 2019). In a meeting with SAS' Product Manager J. Henriksson (personal communication, January 22, 2019), he states that there are five main reasons for delayed baggage:

1. Short connection times: The baggage could miss their transfer due to short connection time between flights.
2. Size of the airport: A larger airport will result in longer transportation time between aircrafts.
3. Weather: Can cause aircraft to be delayed and connection time shortened which can lead to the baggage being left behind.
4. Cross Airline Travels: Sometimes the travel is made with two or more airlines, which could eventuate that the connection is missed due to different rules and time estimates.
5. Customs: At some airports, the baggage needs to be taken through customs and checked out. In combination with shorter connection time, this can result in the baggage not being loaded onto the airplane.

However, new regulations are under implementation at airports under the new IATA-753 (International Air Transport Association). In 2018, the IATA resolution 753 was initialized which includes regulations of how baggage tracking should be improved. According to the IATA-753 regulation, every airline needs to have four scanning points for every flight with connections (IATA, 2019). These are *Baggage drop-off, Baggage loading into aircraft*, *In between connecting flights* and *Arrival*. Every scanned location is stored in a database called *World Tracer*. This will help when tracking delayed baggage as the most common reason why baggage is delayed is that it went astray between scanning stations (J. Henriksson, personal communication, January 22, 2019).

When SAS knows to 100% that a baggage is delayed, the passenger gets a link sent to them by email (M. Pascotto, personal communication, January 23, 2019). However, it is not certain that the passenger the passenger will get a message if it is cross-airline travel. Then they can either follow the link and report the delayed baggage online, or they can go to a service agent at the airport. Either way, the passenger has to fill in information about the baggage and their contact information. They also need to prove that the baggage is theirs by typing in their booking number and full name. Even though the digital solution is available, many customers still choose to go to a service desk since this will provide them with more information about their lost baggage. The digital interface does not provide the traveler with detailed information about where the baggage is located as World Tracer only provides information that is not user friendly (Pascotto. M, personal communication, 23 January 2019).

"The status is written in cryptic code, with abbreviations. You need to parse the data and translate it into human language."
- M. Pascotto (personal communication, January 23, 2019)

After the baggage has been reported, a personal PIR (Property Irregularity Report) number is created, which is a unique code that helps trace the delayed baggage. The system does not keep the traveler updated on the status of their case which results in many phone calls to customer service and thus long telephone queues are created.

"The customer just wants a confirmation that someone is still looking for their bag"
- A. Petrini (personal communication, January 22, 2019)

When a baggage has been delayed, the traveler is also able to buy any necessities that they believe are of importance for them, such as toiletries, within a reasonable amount. The reasonable amount is unique to every traveler depending on the situation an duration of the delay. When the traveler is back home from the trip they can file a claim which will provide them with compensation for any expenses made due to the delayed bag. This is done through SAS website and the traveler needs to scan in their receipts and fill in their bank information.

"You might think that we know where the bags are, but we don't. We don't have a 100% knowledge of where the bag is."
- M. Pascotto (personal communication, January 23, 2019)

From the meetings with SAS, it became clear that the exact knowledge of the whereabouts of a baggage is not 100% available today, due to limited tracking possibilities and lack of scanning points. It is not possible to get perfect traceability, even though the IATA resolution states that baggage needs to be scanned at specific touch points, as this is not followed by every airport yet. On the other hand, it was expressed during the meetings that SAS has a flawless capacity of tracing baggage in Norway, thus the aimed result for the master's thesis could be tested there first.

4.2 Lufthansa's Interface of Baggage Status

The German airway company Lufthansa provides a digital solution to revisit the baggage receipt and view the baggage status immediately after the baggage has been dropped off at a check-in counter. In the event of missing or delayed baggage, the receipt will be used to locate it and is stored locally in the Lufthansa application (Lufthansa, n.d).

The Lufthansa app allows the traveler to get status updates about their baggage whenever they want and push notifications are sent out saying what baggage carousel it is being loaded on. If the baggage is not loaded on the carousel, the traveler will get a notification saying that it is delayed and receive a link to report their delayed baggage, either online or in the app (Lufthansa, n.d). However, Lufthansa does not specify when this notification is sent out, that is, if it is sent out before going to the carousel or earlier on the plane. Lufthansa also recommends that the traveler stays at the airport until they have gotten a confirmation that the report has been successfully transmitted. But they do not specify how long that will take.

Figure 4.1: Interface of Lufthansa's digital baggage receipt (Lufthansa, n.d). Reprinted with permission
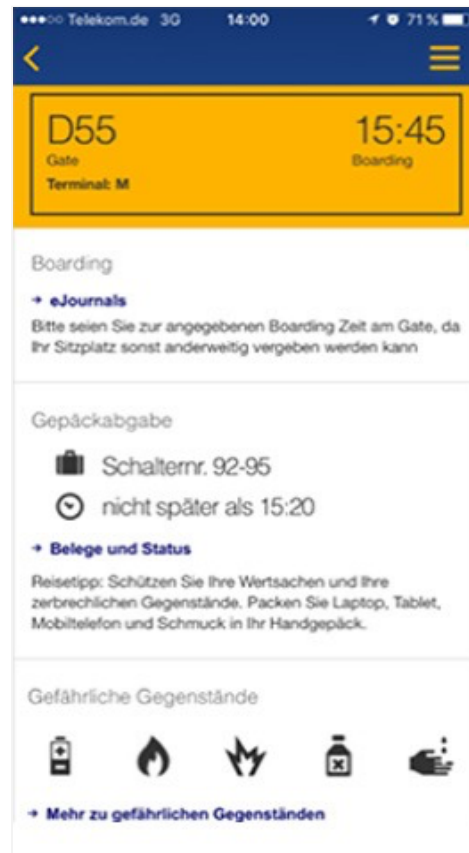
Figure 4.2: Graphical Interface with baggage information (Lufthansa, n.d). Reprinted with permission.

Showed in the image above, figure 4.1, is a digital baggage receipt with information about a passenger's baggage, with a link labeled *Gepäckstatus prüfen (check baggage status)*. If that link is followed, more information about the receipt is shown, figure 4.2.

Links are also provided in this view to report the delayed baggage. This application does not provide any way to file for any claims within the app. One interesting feature that is included within the app is the choice of status subscription, i.e. what type of notification that should be sent to the traveler, see figure 4.3.
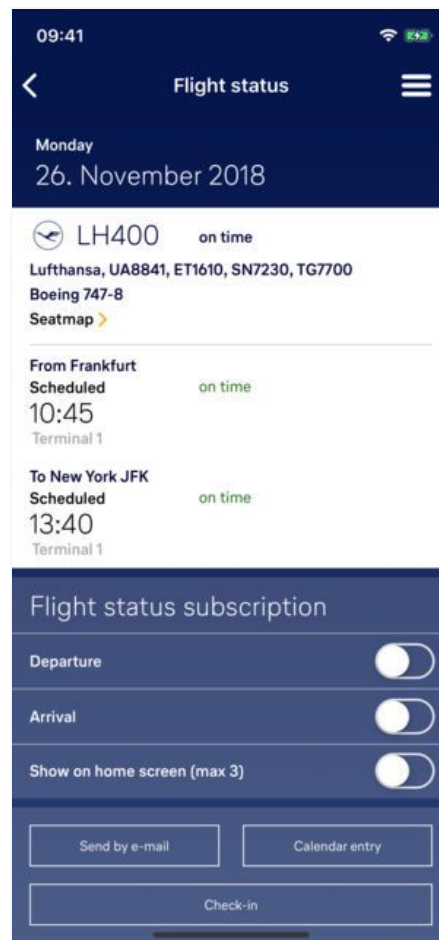
Figure 4.3: Notification selection (Lufthansa, n.d). Reprinted with permission

4.3 Qatar Airways' Interface for Delayed Baggage

Qatar Airways was ranked the second-best airline in 2018 Skytrax ranking (South China Morning Post, 2018) and claim that less than 1% of their baggage is delayed or lost (Qatar Airways, 2019). The airline offers a service that helps travelers track their baggage, both through their web page and through their app. The traveler can turn on notifications in the app, which sends a message every time the bag status has been updated. The traveler can see if their baggage has been successfully loaded onto the aircraft, or as in figure 4.4 if the bag was not loaded on the plane, with information about what plane it will be sent with instead. Even though the user will receive a notification, they will still have to go to the service desk at the airport and file a report. The traveler will then receive a number for tracking the status of their bag which they can use on the website (Qatar Airways, 2019).
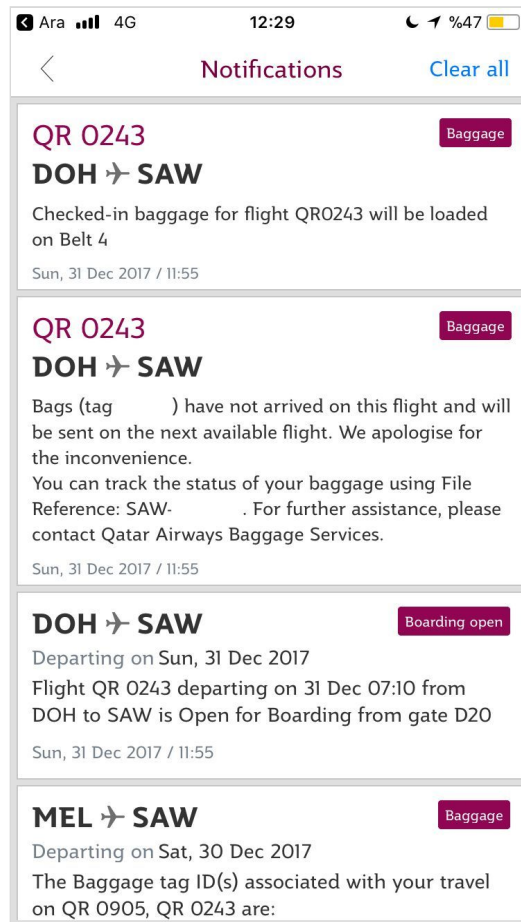
Figure 4.4: Example of a notification flow regarding baggage status, sent through Qatar Airways app (ISTFLYER, 2018). Reprinted with permission.

4.4 PostNord's tracking app

PostNord is a Swedish/Danish company and the main supplier of logistics and postal service within the Nordic region (PostNord, n.d., a). PostNord provides a way for their customers to get a status update about where their package is, as well as how, when and where it will be delivered. On their website (PostNord, n.d, b), they say that a package will be added automatically to the app, however, this is not always the case and a tracking ID needs to be manually typed in in order to get the information. The app also highlights information about which store it will be delivered to and that a digital avi is available within the app. PostNord (n.d, b) says that their customers no longer need to wonder where their package is or when it will arrive. It is also possible to identify oneself using Bank-ID so that the customers do not have to bring their ID to the store, and manage returns directly within the app (PostNord, n.d, b).

In the PostNord app, the user can enter the tracking number of the package and will see the current location of the package as well as the travel path it has made, see figure 4.5. The user can also see a map of the best way to get to the pickup store as well as between which hours the store is open, see figure 4.6. The app also gives alternatives to change notification frequency.

Figure 4.5: PostNord's app shows the travel path of a package (PostNord, 2019). Reprinted with permission.
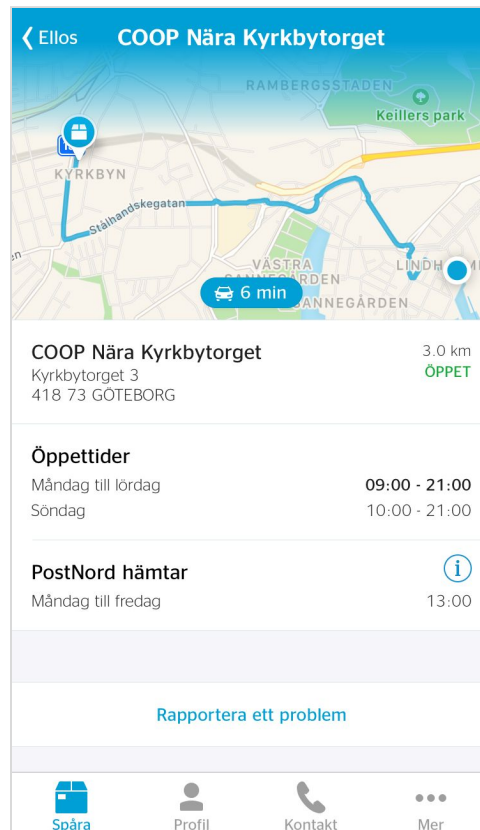
Figure 4.6: PostNord's app shows a map of the travel route to the pickup location (PostNord, 2019). Reprinted with permission.

4.5 SAS Design System

SAS has several brand guidelines for their responsive website, collected in a comprehensive Sketch file. These guidelines consist of instructions on how to design at SAS, such as typography, color schemes, different components, and widgets. However, this is currently not used in their mobile app, but since this is the latest design created by SAS, it is what this project will follow.

SAS uses a font called ScandinavianNew, see figure 4.7, which is utilized in regular, bold and black thickness. All of the colors they use are visualized in figure 4.8, the main colors are blue and gray and the guidelines also present accent colors such as red, brown and green.

Figure 4.7: Example of the font Scandinavian. Reprinted with permission.
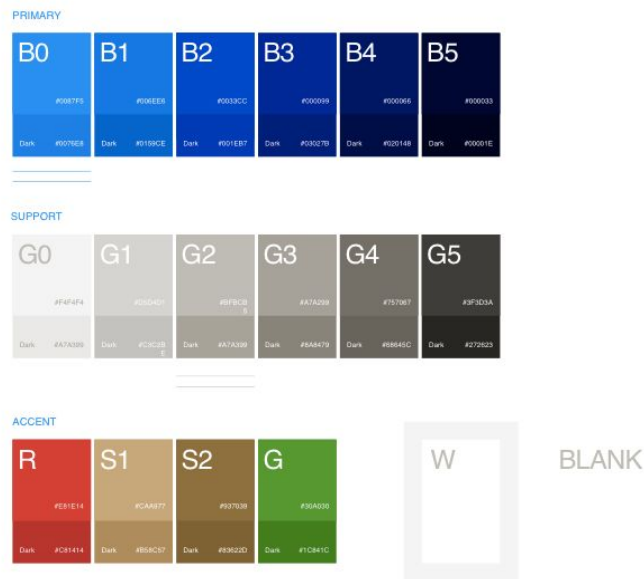
Figure 4.8: Color schemes used by SAS. Reprinted with permission.

5. Methodology

The thesis followed a methodological process that has been taught during the master's program in Interaction Design and Technologies. The process also followed the methodology of the Double Diamond. As suggested by the Design Council (2019) this process consists of four phases: *Discover, Define, Develop* and *Deliver*. Every phase is equally important.

5.1 Phase Zero

Based on the agile UX approach, phase zero should be included. This phase includes all the theoretical work done prior to user involvement such as literature review and market analysis. (Sharp, 2011). Methods used were stakeholder map and user journey mapping.

5.1.1 Stakeholder Maps

It is crucial to identify stakeholders at the beginning of a project (Hanington & Martin, 2012). This can be done speculatively in the beginning and later, as the project progress, be more detailed and defined. A stakeholder map is a visual aid that communicates key players of a user-centered design project and research (Hanington & Martin, 2012). The method begins with the team brainstorming on all the different people who may have an interest in the defined project. It is important to identify end users and the people that will benefit from the project, who holds the power, those that may affect and even those that may sabotage the design outcome or service (Hanington & Martin, 2012).

A stakeholder is identified by a general role, specific role or by actual people. Each stakeholder can be written down on cards and then visually defined by hierarchies and relations. This could be done with lines or proximity (Hanington & Martin, 2012, p.166).

5.1.2 User Journey Mapping

The user journey mapping comes from the service design area and is used in research work, ideation and to map and visualize the customer's experiences about a product or system (ben Salem Dynehäll & Lärk Ståhlberg, 2014). It creates an understanding of how products, services, and experiences affect both a user or a company, and which values are created or missing. To perform a user journey mapping, the user's experiences regarding the product or a competitor's product must be mapped and visualized on the user journey map. The research team should map out what the users do and what their experiences are (ben Salem Dynehäll & Lärk Ståhlberg, 2014). A user journey can be used in different ways, it can be a visual aid for where a product or service has the potential to be improved (ben Salem Dynehäll & Lärk Ståhlberg, 2014).

Hanington & Martin (2012) suggest that a user journey can be performed by the design team immersing themselves in a user scenario. The first step is to think about what the users might think before using the product or service and which functions or properties are of highest priority. The next step is to familiarize yourself with what the user is experiencing during the actual use or purchase. The last step is to understand what

experiences the user has of the solution and whether it achieves any expectations by mapping out the different emotions the users might have in a so called *UX-Curve* (Hanington & Martin, 2012). What is good and what can be improved are also something to consider (ben Salem Dynehäll & Lärk Ståhlberg, 2014).

5.2 Discover

The Discover phase consists of gaining a large number of insights and data from users and through research (Design Council, 2019). This phase utilizes the following methods: *Interviews, Heuristic Evaluation, Shadowing and Surveys.*

5.2.1 Interviews

According to Johannesson et al. (2013), interview studies are the most essential method for the gathering of user data. Interviews are utilized to identify the user's experiences, behaviors, opinions as well as their attitude towards a specific product or service (Wikberg Nilsson et al., 2015, p. 83).

A semi-structured interview is created by writing down questions beforehand, in order to ensure a clear structure (Johannesson, 2013). However, during the interview, the interviewee is allowed to discuss freely around the subject. A method that can be used to formulate the questions is the *SPIN method*. SPIN stands for *Situation, Problem, Implication* and *Need-payoff,* and focuses on the user's everyday life (ben Salem Dynehäll & Lärk Ståhlberg, 2014). *Situation* is about asking questions regarding the user's situation. *Problem* questions are questions about problem areas or prioritized needs. *Implication* questions consist of identifying the consequences of the interviewee's problems. Lastly, *Need-Payoff* is questions regarding compensating behavior and user solutions to the problem.

One additional element that can be used during interviews is *probing.* According to Fernström Winberg & Hildingsson (2005), probing consists of asking supplementary questions such as *Why? How?* and *Could you explain more?* This contributes to deeper answers and a clearer insight into the research problem (Winberg & Hildingsson, 2005).

5.2.2 Heuristic Evaluation

As stated by Hanington & Martin (2012, p.98) a Heuristic Evaluation is a way for designers to explore and identify issues regarding the usability of a system. The method does not involve users, instead, the design team can discover the system on their own with the help from a predefined set of usability guidelines. Hanington & Martin (2012, p.98) further states that the evaluation preferably is done by 3-5 evaluators individually and then compiled to a collective evaluation. The evaluators can invent their own heuristics if desired (Hanington & Martin, 2012). On the other hand, Nielsen (1995) has created the following 10 heuristics for evaluation that can be used for many systems:

1. Visibility of app status: The user should be able to receive feedback to understand what is going on.
2. Match between the app and the real world: Use the same language as the user and follow mental models.

3. User control and freedom: Support undo and redo
4. Error prevention
5. Consistency and standards
6. Recognition rather than recall: Minimize the memory load for users.
7. Flexibility and efficiency of use: Such as fast repetition of frequent actions.
8. Aesthetic and minimalist design: Nothing irrelevant.
9. Help users recognize, diagnose, and recover from errors: Suggest solutions, clear error messages.
10. Help and documentation

5.2.3 Shadowing

Shadowing is an observation method that allows the researcher to collect insights from the daily life of the observed or specific situation and to track their experiences through a first-hand exposure (Hanington & Martin, 2012, p.578). This method allows the researcher to gain insights into the user's actions, decision patterns and routines. Thus, shadowing should be well documented, if possible, with photos, notes, sketches or audio. It is seen as an exploratory research method that can work as a baseline for the understanding of a problem and possible design decisions (Hanington & Martin, 2012, p.578). It is important that a respectful distance is maintained between the researcher and the observer to avoid interruption of their routines and changing their behaviors. Interactions between the two parts may occur with complementary questions (Hanington & Martin, 2012, p.579).

5.2.4 Surveys

Surveys are a common method for gathering large amounts of data from several different respondents (Johannesson et al., 2013). By asking questions of both open and closed nature, quantitative data can be gathered regarding a specific topic. According to Johannesson et al. (2013) a mix of both open and closed questions are ideal to use. Furthermore, Johannesson et al. (2013) state that a survey is a suitable tool to use to obtain a clear picture of a topic that can be used for statistics or to prove a statement or result.

5.3 Define

The Define phase utilizes the information obtained in the Discovery phase and narrows it down into a brief with requirements (Design Council, 2019), which can then be turned into a blueprint of features. Methods used in this phase were the *Affinity Diagram, Requirement Mapping,* and *Information Architecture.*

5.3.1 Affinity Diagram

The Affinity Diagram is a method to organize research insights and observations on sticky notes (Hanington & Martin, 2012, p.33). The sticky notes are used to get a clearer overview of what type of observations has been made. The method begins with writing down the observations and insights on different sticky notes and place them on a flat surface. The notes are then grouped in categories and form themes (Hanington & Martin, 2012).

One variant of Affinity Diagram is affinity diagramming for a contextual inquiry which means studies from different locations but in the same context (Hanington & Martin, 2012, p.33). A total of 50-100 observations is recommended from each interview and all the notes should be coded so it is easy to trace them back to the original interview if necessary. The team later group notes that are similar or solve the same problem together. From this, the research team can interpret the observations and come up with the basis for the user's problem (Hanington & Martin, 2012).

5.3.2 Requirement Mapping

According to Österlin (2010) there are two purposes with a requirement specification. It can be used to guide the forthcoming design work, but also to facilitate quality verification. Furthermore, the focus of the requirement mapping is to define what needs to be done, not how it should be solved (Österlin, 2010). Hooks (1993) suggest three factors that should be obtained to write a good requirement. The first factor is that the requirement should be *necessary* as he states that there is little point in defining an unnecessary requirement. The second factor is *verifiability* and to ensure this, there should be no ambiguous words such as "easy" in the requirement, as this cannot be verified. The requirement should include specific criteria to make sure that the requirement can be measured. By including a specific measurement, the requirement can be verifiable. The third and last factor is that the requirement should be *attainable*. If a requirement is expected to be unattainable from the start, there is little need to include it in the list (Hooks, 1993).

Business Analyst Learnings (2016) suggests ranking requirements but states this is easier to do when a project consists of one single stakeholder since each stakeholder has different opinions of what the priority of a requirement should be. However, if done properly, the ranking gives a clear overview of what requirements are highly prioritized (Business Analyst Learnings, 2016).

5.3.4 Information Architecture

IA (Information architecture) is a method that is used to design the structure of a digital interface and to define the layout of the content (Tubik Studio, 2017). The IA helps to structure up a map (blueprint) of functions, actions and other components (Tubik Studio, 2017). Yalanska & Arhipova (n.d) suggests a sub-technique to IA, which is called *Visual Hierarchy*. The goal of this technique is to display the priority level of the components that were defined in the IA (Yalanska & Arhipova, n.d).

5.4 Develop

The Development phase is based on the information and observations gained in the *Define* phase. During the *Development* phase, the team starts designing solutions through iterations (Design Council, 2019). The methods used in this phase were: *The Apple, Crazy 8* and *Dot Voting*.

5.4.1 The Apple

The Apple is an *energizer* exercise which can be used as a warmup to an idea generation session (Hyper Island, n.d). As stated in the Hyper Island toolbox (n.d), the exercise is divided into the following steps:
- Divide the participants into small groups (4-6 people).
- Each group receives a paper sheet with 30 squares.
- For 10-15 minutes, the participants will take turns drawing apples, no apple can be the same. This is done in silence until the groups finish or when the time is up.

The exercise is used to demonstrate divergent thinking and to let the participants build on each other's ideas (Hyper Island, n.d.).

5.4.2 Crazy 8

To generate many ideas quickly, Crazy 8 is a useful technique (Levey, 2016). Levey (2017) describes that the process includes steps such as the design team starts the session by folding A4 papers into 8 sections and set a timer for 8 minutes. Then, using markers, the team sketches one idea in each section for 1 minute per idea. No more ideas can be drawn after the timer goes off. Now, the participants can either present their three top ideas individual or they can choose three and continue to develop the ideas for six more minutes and later present these. When choosing the latter option, the participants fold a new A4 into three sections and storyboard each idea on separate papers. This is done so that the participant can put the idea in a context, scenario or visualize the graphical flow. The method ends with every participant voting on the idea they like the most (Levey, 2017).

Levey (2017) further states that this method is particularly good since it generates lots of ideas and lets the participants focus on quantity and not quality. They simply don't have time to go into detail about an idea, to begin with (Levey, 2017).

5.4.3 Dot Voting

To narrow down and select the best ideas or components, Dot Voting is a useful method (Dam & Siang, 2018). It is done by writing down all the ideas on separate notes and letting all the participants vote on the idea they like best, using three to four votes. This method allows every participant to have a say in decision making and what should be designed (Dam & Siang, 2018).

5.5 Delivery

The last step in the Double Diamond process is the Delivery phase where one idea is finally selected, refined, evaluated and finalized (Design Council, 2019). This phase included methods such as *Prototyping, Usability Testing,* and *Think-aloud Protocol.*

5.5.1 Prototyping

Prototyping is a technique that allows the designer to develop visual props for developing and testing purposes with users, clients or within the design team (Hanington & Martin, 2012, p. 138). It is argued that there are two types of prototyping

techniques: Low-fidelity and High-fidelity. Low-fidelity prototypes are prototypes that do not look and feel like the end product would (Sharp, 2007). Paper prototypes such as sketches can be seen as low-fi prototypes and are primarily used to convey the idea for the users at the beginning of a project and should be done quickly and with little details (Haning & Martin, 2012, p. 138). This is because little time should be spent on the mock-ups in the beginning so there is still room for changes (Benyon, 2010).

High-fidelity prototypes are mock-ups of the final product and should convey the real look and feel. This does not mean that the prototype needs to have all the final functionality (Sharp, 2007). A high-fi prototype should include features such as content, visuals, interactivity, and media that resembles the final products as much as possible. They are often used as discussion material with clients and during user testing in the final stage of the project. High-fidelity prototypes are good in many ways but still have some disadvantages such as taking a long time to produce and they might also lead to the testers only commenting on superficial things and not on the functionality (Sharp, 2007).

5.5.2 Usability Testing

An evaluation method that can be used to understand an individual's experience with a digital interface is *Usability Testing.* By having a user perform a set of predefined tasks, which are all based on actual concrete tasks that reflects the user's goals, the researcher can identify parts of the interface that creates frustration and confusion, so that these features can later be prioritized and fixed. Scenarios can be written prior to the test so that the participant understands the context of the test. However, this should not be written to influence the participant to achieve the tasks in a certain way nor should it bias the outcome of the test to justify the product's requirements (Hanington & Martin, 2012, p.194).

Hanington and Martin (2012) set up eight findings that a usability test should result in. These are where the participant:
- Understands the task but cannot complete it in an efficient way.
- Understands the goal but must try different ways to achieve it.
- Gives up.
- Completes the wrong tasks.
- Feel surprised or delighted.
- Feels frustrated, confused or cannot complete a task and blames themselves.
- Expresses that something does not make sense.
- Makes improvements suggestions.

At the end of the method, the research team will have a clearer understanding of where the interface needs to be improved since they will have rich insights from real users and how they use it differently from how the developing team uses it (Hanington & Martin, 2012, p.194).

5.5.3 Think-aloud Protocol

The think-aloud protocol is a usability research method that gets the participant to verbally express their actions and feelings while completing a task. The aim is to convey parts of an interface that brings out delight, confusion, and frustration (Hanington &

Martin, 2012, p.180). This provides the researcher with insights on what features or aspects that are good and what needs to be improved. There are two common practices for performing a think-aloud protocol, first one being *Concurrent Think-aloud, where* participants perform a task while verbally articulating what they are doing, thinking and feeling. Here, it is important for the researcher to remind the participant to express what they are thinking (Hanington & Martin, 2012 p.180). The research aim should be on what is happening and not so much on why it is happening. The second practice is *Retrospective Think-aloud,* which means, as the name implies, that the participant recalls their actions in a retrospective meeting after they have performed a set of tasks in silence. This way can provide the researcher with insights of the participant's intents, reasoning and their strategy (Hanington & Martin, 2012, p.180).

The method should not be used to evaluate an entire product but on smaller functions and perhaps ideas. It can be used for low and high-fidelity prototypes and to test features of competitors' products (Hanington & Martin, 2012, p.180).

6. Work Process

This chapter presents the work process, how the methods from the Methodology chapter have been used, and minor results that have emerged along the project. As explained in the Methodology chapter, the project followed a double diamond process. This is closely connected to the user-centered design approach which has been the building block for the thesis. Based on the user-centered design approach, multiple iterations have been made which have included the users in every step, either by interviews, observations, surveys, workshops or usability tests to ensure the system has fulfilled their goals. The different phases were phase zero, discover, define, develop and deliver, see figure 6.1.

Furthermore, the process has followed an agile UX approach with weekly sprints. Each sprint started with a retrospective of the previous week to see the progress and confirm that everything planned had been completed. The main goals of the coming week were then set and smaller tasks were defined which would fulfill the main goals. Instead of using a typical scrum board, the tasks were listed in a document and color coordinated with yellow for ongoing and green as completed.
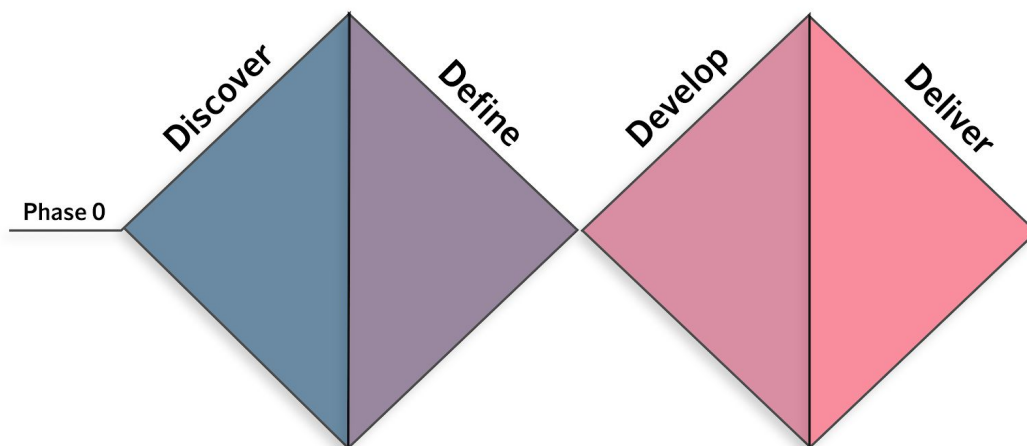
Figure 6.1: Work process based on the double diamond model. Authors' own copyright.

6.1 Phase Zero (pre-study)

Based on the agile approach, the first phase was Phase Zero, also called pre-study. It started with literature research about delayed baggage and related topics. The study was made by utilizing several databases. The most prominently used were: Google Scholar, Chalmers Library, IEEE and ScienceDirect. The most frequently searched words were: *Delayed baggage, Mishandled Baggage, Baggage Handling System* and *Baggage Reconciliation System*. This phase also included researching suitable methods and methodologies. The literature research resulted in the literature review in chapter 2, the theoretical framework presented in chapter 3, and the list of the methodology used in the project which can be found in chapter 5.

The phase also included a benchmark of the current delayed baggage situation and start-up meetings with SAS. In these meetings, the purpose, scope, and limitations of

the project were discussed and defined, which can be found in chapter 1. An introduction to the current digital reporting system was also received as well as an introduction to the design system and guidelines at SAS, which is presented in chapter 4.

6.1.1 Stakeholder Map

In accordance with the user-centered design approach, the next step was to identify the users and what tasks they perform. With the insights from SAS and the literature study, a stakeholder map could take shape, see figure 6.2, which defined the stakeholders and how they relate to each other. After each meeting at SAS, the meeting notes were examined to identify if any new stakeholders had been discussed. The map was then sent to the supervisor at SAS for feedback, which leads to some minor changes such as using the right terminology.

The traveler was placed in the middle of the map as everything revolves around them. The map was then divided into two segments: the inner segment is for main stakeholder groups to give a fast overview, and the outer segment gives more detailed information. The main groups that were identified were SAS Airport Staff, SAS Office Staff, Airport, Other Airlines, Delivery Company, and the traveler's personal contacts.

Figure 6.2: Stakeholder map of the stakeholders influenced by this project. Authors' own copyright.

6.1.2 User Journey Map

A map of the current situation was made to see what steps the traveler goes through and which stakeholders they affect/are affected by when experiencing delayed baggage. The journey steps were identified through brainstorming and complemented by SAS. The main goal with the user journey map was to make a visualization of these steps and to discuss them with SAS to see if it was correctly interpreted. The user journey map was complemented with a UX curve to consider how the traveler feels during the different steps and to check where the travelers feel most negative, as these tasks could be considered to be good areas of improvement. It was also made to immerse in the user situation and attempt to imagine what it would be like to experience delayed baggage.

The complete user journey map can be seen in figure 6.3. The user journey was split into six phases: *Home, Pre-boarding, Flight, Arrival, Destination and Returning* which stands for the typical steps of a journey. The least positive areas turned out to be after arrival when the traveler finds out about their delayed bag, are forced to wait in a queue and must file a report.
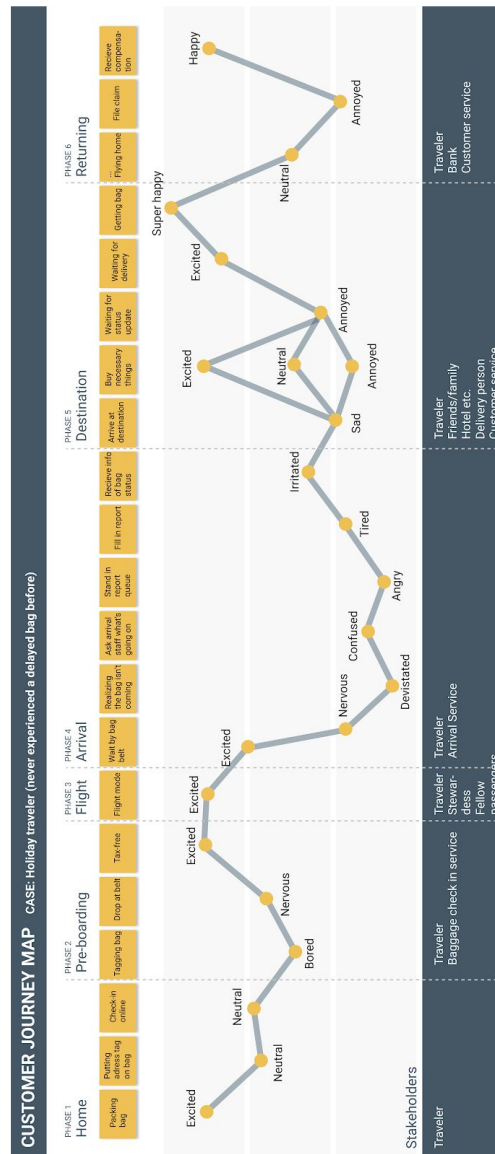
Figure 6.3: User Journey Map and UX-curve of a traveler experiencing delayed baggage. Authors' own copyright.

6.2 Discover Phase

This phase included several methods to gain data from users. The phase began with face-to-face interviews to gain a deeper understanding of the current situation. Early in this phase, an evaluation of the current digital interface of the baggage reporting system was made using the Heuristic Evaluation method. The phase also included a field visit - a so called *walk-a-mile* - at Arlanda Airport in Stockholm, where the arrival service staff were interviewed and shadowed during an entire day. Based on the findings from these methods a survey was created and sent out.

6.2.1 Delayed Baggage Interviews

Six interviews were held as a part of the qualitative data gathering. The questions in the interviews were of open character, meaning that the respondent could speak freely around the questions. To ensure the respondent felt comfortable, the interview began

with explaining what the research was for and that their answers were anonymous. The first question asked was *Can you tell us about the time your baggage got delayed?* The aim of this question was to get a deeper understanding of how the respondent perceived the situation and what their experiences were. By asking this question first, the interviewer would not influence the respondent to talk about specific aspects of the experience, and the respondent would describe the things they remembered best. The full interview protocol can be found in Appendix 1.

At the end of the interview, the questions got more general about the whole experience so that ideas and hypotheses could be checked. Probing was used throughout the interviews to find the root cause of a specific statement. This could be questions such as *why/why not* and *can you explain that some more.* The recruited respondents were all people that have experienced delayed baggage before as this would lead to insights of how the process looks today and gaining an understanding of where the user pain points are and how to solve them. The respondents were a mix of people that had experienced delayed baggage with their family, with friends, with partner and alone. It was both people that had experienced it on outbound and inbound travels and they were different ages from 23 to 59 years old. The mixed selection of participants was chosen as a way to cover as many different experiences as possible. However, it was difficult to find participants outside of Scandinavia, therefore the groups was not as diverse as wished for.

The interviews were analyzed by first printing out all the transcriptions. Thereafter, interesting quotes and phrases were cut out, which were then categorized using the affinity diagram method, see figure 6.4. 14 interesting areas emerged when analyzing the interviews. These are explained further below, with quotes that were found to be extra meaningful.
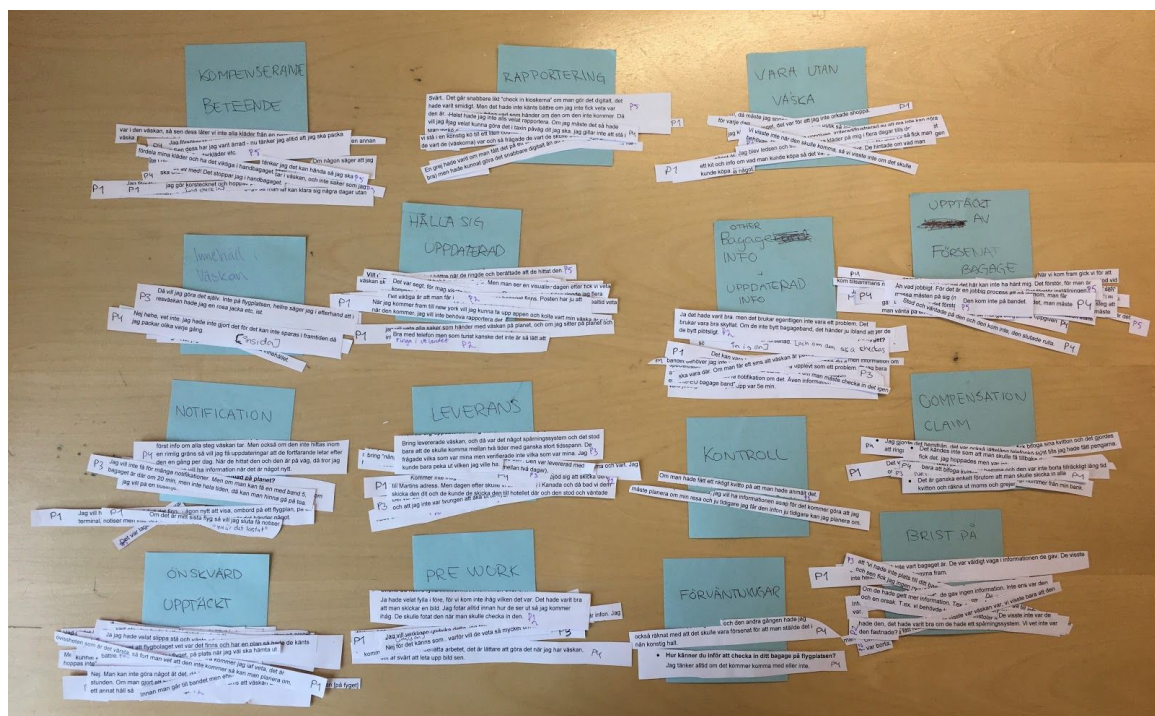
Figure 6.4: The mapping of personal interviews. Authors' own copyright.

One of the biggest categories was the *Discovery of delayed baggage*. All the respondents discovered that their baggage was delayed when it did not arrive on the belt. The interviewees felt irritation and worry when they could not find their baggage, some were worried it was gone. After the discovery, they all went to arrival service to report.

When it comes to when the respondents wanted to find out about their baggage being delayed, there were two personality types. One type wanted to find out as soon as possible while the other one wanted to be happily unaware during the flight but receive the information as soon as they have landed. All respondents wanted to find out before arriving at the baggage belt.

"I want the information asap since this will lead to me having to change my plans and the sooner I know the sooner I can change my plans"
 - Respondent 1

"Why do you have to sit and worry on the flight. There's nothing you can do about it anyways. It will result in a long worrying time."
- Respondent 5

Regarding notifications, there were also split opinions. Some of the respondents wanted notifications about status information as soon as the baggage has reached a new step, such as being loaded on the plane. Some wanted this information to be available, but they do not want any notifications about it. Others do not want any notifications when things are going according to plan, only when there are special circumstances.

The biggest insight regarding the current reporting process is that the interviewees would prefer not having to report at all and feel there are too many steps. They also feel there is a lack of info during the reporting and feel distressed about not receiving information about where the bag is located.

Another issue was that many of the respondents felt that there were too few updates regarding the status of their report. Many kept themselves updated by calling customer service to ask about the status, something many found to be difficult while being abroad. Three of the respondents said that they called at least once per day to get updates. Many did not have essential things in their hand baggage and therefore had to buy necessary things such as clothes and toothbrush. However, many of the interviewed also expressed that they were pleasantly surprised that the baggage was delivered to their address and they did not have to return to the airport to pick it up. The respondents who asked for compensation said that the process was straight forward, but annoying having to keep track of the receipts. Some of the respondents did not believe that they would get compensated until they saw the money on their bank accounts.

Most of the respondents still expect everything to go well when they check in their baggage. However, they have all started with compensating behavior regarding how they pack. They pack important and expensive things and some clothes in their hand

baggage just in case something would happen to their checked in baggage. Only a few of the respondents would be prepared to fill in information about their baggage (such as color and shape) before their trip, as it happens so rarely that baggage is delayed. No one liked the idea of uploading a picture of the inside of their bag.

"Why do they want to know so much about my bag?"

- Respondent 5

Lastly, none of the respondents felt it would be necessary to receive information about the baggage belt (start time etc.). Only if their baggage arrives at the belt for special baggage, or if there is a sudden change in belt number.

6.2.2 Heuristic Evaluation of the Current GUI

A Heuristic Evaluation was performed with the help of Nielsen's 10 heuristics for graphical interfaces. The evaluated interface was the current digital reporting tool for delayed baggage that SAS provides on their website and in the arrival hall at some airports. A test booking number and last name were given by SAS which made it possible to test reporting a delayed bag. By focusing on one heuristic at the time, the process of reporting the delayed baggage was repeated until insights had been gathered for each heuristic.

One of the key findings was the top bar, see figure 6.5, which shows where in the process the users are. This allows the users to go back to a previous page if they like, which can give a sense of control. However, it can only be used to go backward, and sometimes it resets information added after that step.
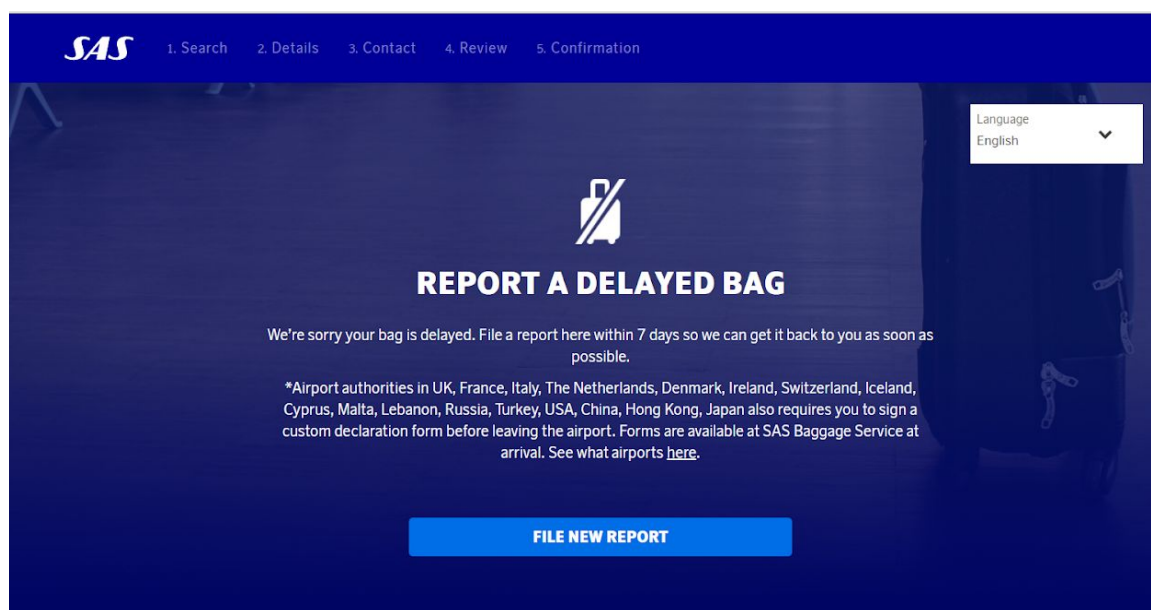
Figure 6.5: The front page of the SAS digital reporting tool for delayed baggage (SAS, 2018). Reprinted with permission.

There were also some problems regarding language and functionality. The system states that it is optional to add a brand to a bag. However, the continue button is grayed out

until a brand has been added. The continue button also has some other consistency issues, as it is sometimes grayed out, and sometimes in its active state, when disabled.

A positive aspect of the reporting tool is the review page at the end, see figure 6.6, where the user can confirm the information they have filled in. The user will however only see a limited edition of the information they have given. Brand and temporary addresses are not included. The user could think that the information is lost when it is not shown in the last review.

Figure 6.6: The review page of the SAS digital reporting tool for delayed baggage (SAS, 2018). Reprinted with permission.

6.2.3 Airport - Walk a mile

To gain a deeper understanding of checked in baggage handling and specifically delayed baggage, a *walk-a-mile* at Arlanda airport in Stockholm was conducted. The field visit was guided by a Duty Coordinator (the manager at the arrival service department) who presented and showed the different sites in the airport and stations in their "back office" at Arrival Service.

Before the visit, some observation points and questions for the employees had been prepared. These were divided into the following sections: *Behind check-in, By the baggage belt, By the reporting disk (arrival service)* and *General questions* for the duty coordinator and those working at the arrival service desk. A complete list of all the observation points can be found in Appendix 2. The most essential aspects to investigate were:
- What are possible reasons for delayed baggage? Is it a system error or/and does it depend on the human factor?
- How do people feel when they wait for their baggage? What are their facial expressions? What are they doing while waiting?

- What are the steps in the process of reporting a delayed bag? How are travelers met by the arrival service? What questions does the traveler have? Are the travelers' feelings different when they arrive at the arrival service versus when they leave?

To find the answers to these questions, the employees at the arrival service were shadowed and interviewed, so that an understanding of how they work could be gained. It was also observed how they perform the detective work backstage in order to find the owner to baggage that has been left behind. The sites visited were: *Arrival Hall Terminal 4, Back-Office at Terminal 5, Arrival Service Terminal 5, Behind the Baggage Belt and Baggage Belts Terminal 5.*

6.2.3.1 Arrival Hall terminal 4

The arrival hall in terminal 4 for domestic flights did not have any arrival service desk, only a computer with the current digital tool for reporting of delayed baggage, see figure 6.7. The Duty Coordinator expressed that there are several issues with the digital interface. The travelers find it difficult to fill out the report and the computers are often not working or lagging. Next to the computer is a SAS ticket service desk. Even though this service desk has nothing to do with delayed baggage, the employees working here receive a lot of questions regarding this. They sometimes even receive threats when they cannot answer the travelers' questions and need to have a sign that says that the travelers should treat the employees with respect, see figure 6.8.

Figure 6.7: A computer with the digital reporting tool in the arrival hall for domestic flights. Authors' own copyright.
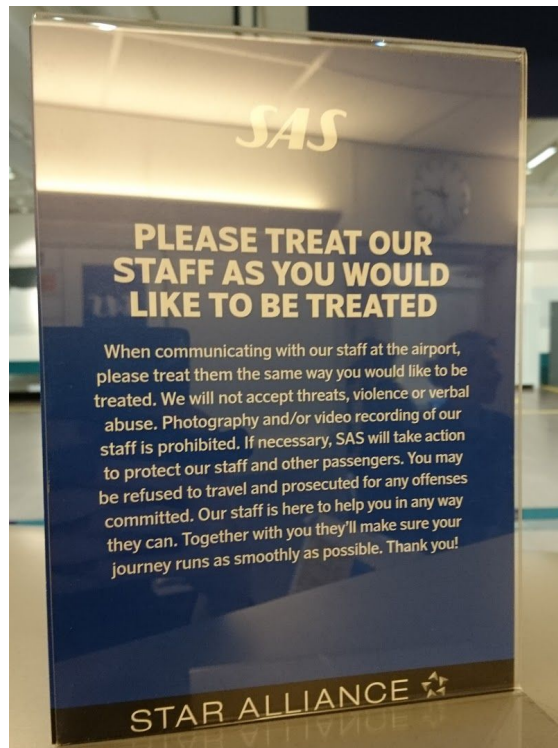
Figure 6.8: SAS service desks need a sign that travelers should respect their employees due to angry customers. Authors' own copyright.

6.2.3.2 Back-Office At Terminal 5

The Duty coordinator later went through the different stations at their back-office at baggage belt terminal 5. These were stations such as e-mail, baggage sorting, missing baggage tags, forgotten baggage, and delayed baggage. At the missing tag station, they investigate to whom a found baggage could belong to. This is done in two stages. First, they open the bag and take a quick look if they can find something that contains the traveler's name such as medicine or notebooks. This is later checked in the baggage system *World Tracer* to see if any of the reports matches. After a few days, if the owner has not been identified, the staff look deeper in the bag to see if they can find something more of significance.

Furthermore, the duty coordinator expressed that forgotten baggage is more likely to be found in their office than delayed baggage. Forgotten baggage can be caused by several reasons. For example, a traveler that usually travels without checked in baggage easily forgets their checked in baggage when they do happen to have one. Another reason could be that the traveler did not know that they needed to check out the bag and take it through customs. The duty coordinator stated that this is information that the passenger gets while on the flight, but easily forget when they step off the aircraft.

At the baggage sorting station, the arrival service staff scans the bag tag and receives information about the traveler. Here they use a system called *Easy Tracer*, which is a simplified version of World Tracer. The system also shows if the baggage already has a report filed. One of the arrival service handlers expressed that these reports often need to be adjusted in the system after a traveler has used the digital reporting tool, as the

traveler easily makes mistakes. When filing the report themselves, the traveler might not have the necessary information to select on which flight the delay occurred and therefor selects the wrong one. Another issue is that travelers are forced to choose a tag number and match it with baggage attributes, even though they might not know which tag is on which bag, which is often the case when multiple baggage is delayed. This leads to extra work for the arrival service since they later have to change the information in World Tracer when it has been filled incorrectly.

"We don't like it when passengers report baggage online at home since this could mean that they didn't wait to see if it actually arrived"

- Duty Coordinator

6.2.3.3 Arrival Service Teminal 5

Once an understanding of the work done in the back office had been gained, the next step was to observe the arrival service desk, where the travelers go and report their delayed/damaged baggage. When the traveler arrives at the service desk, the staff first makes sure the baggage is definitely not at the belt, then starts filling in a report. They ask the traveler for their baggage tag number and then use a baggage identification chart, see figure 6.9, where the traveler can point on certain characteristics of their baggage, such as color and type. They then ask for brand, delivery address and confirm the contact information in the system is correct. The travelers all wanted to know what had caused the delay and where the bag is, but the employee hardly ever has access to this information. After the report is filed, a confirmation message is sent to the traveler's phone. Transcription of the conversation between an older couple filing a report and the arrival service employee can be read below.

Figure 6.9: The baggage identification chart used by the arrival service desk. Authors' own copyright.

By the arrival service desk.

Couple:	We didn't receive a bag [with sad expression]. We come from Miami via Copenhagen and we´re going to Kiruna tomorrow...
Employee:	That's unfortunate, could I have a look at your baggage receipt?
Other couple:	We also traveled from Miami, but our bags arrived!
Employee:	Did the sign by the belt say that it was the last bag on the belt? Sometimes more will arrive, did you stand by belt number 4?
Couple:	Yes.
Employee:	I'm gonna go have a look if I can see anything. [Call on the radio down to the "backstage" baggage department.]
Couple:	What happens now?? We need clothes, a toothbrush and...
Employee:	You will get toothbrushes from me.
Man in radio:	We're looking, await with the report.
Employee:	We'll start filling in a report while we wait. [So that everything is already done if the bag can't be found at Arlanda.] Could you describe the bag?
Couple:	It's red.. wine red plastic with zipper, kind of big. [Points at the baggage identification chart]
Employee:	Do you know the brand?
Couple:	No, it's a hundred years old.
Employee:	[Says an email address] Is this correct? [Couple nods] What's your home address? Phone number? [Couple answers]
Couple:	Why does this sort of thing happen??
Employee:	The connection time could have been too short, or it could have fallen off a trolley, sometimes the tag falls off, or it could be loaded on the wrong plane. Most likely the connection time was too short.
Couple:	The worst thing is that my medicine is in the bag! It's on a prescription. It's heart medicine, among other things.
Employee:	You should always keep important medicine in your carry on. [Turns around to fetch two kits with overnight essentials]. We'll call you when we know where it is. We'll call the hotel so that they now they should expect a bag.
Couple:	Thanks a million for the help! [Leaves happy, relieved and satisfied with their free kit.]

6.2.3.4 Behind the Baggage Belt

The visit also included a tour behind the baggage belts in order to understand why baggage is delayed. Each piece of baggage is scanned automatically and placed on a tile on a long belt. It takes approximately 10 minutes for one baggage to go one lap around the belt. Delays are caused by many different reasons:

1. Baggage can fall off the belt due to the high speed.
2. The baggage goes through different magnetic scanners and if one scanner reacts on something inside the baggage it is sent to another scanner. If that scanner is also reacting then the baggage is sent to a manual checking point. Thus the baggage takes several laps on the belt.
3. The baggage can be missed at one of the scanning points and then goes one extra lap and if it is missed again it is sent to a manual scanning point and then loaded on the belt again.

4. When the baggage arrives at the correct place, it is flipped into a "*pocket*", see figure 6.10, and then loaded into a carriage which takes the bags to the aircraft. If the pocket is full - no more baggage can be loaded there. Then the baggage takes another lap on the belt and can go several laps on the belt until the pocket is emptied.
5. The staff working with loading the baggage on the aircraft scans every baggage when they have time but if there is a lot to do they can accidentally miss to scan a bag, which could then be loaded on the wrong plane if not placed in the correct carriage.

Figure 6.10: Baggage Pocket. Authors' own copyright.

Although SAS always scans baggage that has international transfers, they do not scan baggage going out on the belt at Arlanda. This is, however, something that they wish they did and are looking for technology that can do this automatically, as the scanners today are too heavy and awkward to handle.

6.2.3.5 Baggage Belts Terminal 5

After the tour behind the baggage belts, interviews and observations were made with travelers waiting for their baggage by the belt. The interviews aimed at capturing their emotions when waiting and thus it was important to interview them before the belt started to roll. The questions asked were of a closed type, often used in surveys so that the travelers felt they could give a fast answer if their baggage suddenly arrived on the belt. The interview also included probing questions such as *Why? Why not?* in order to gain an understanding of their answers or issues. The interview started with two ice breaking questions: *Are you traveling for work or holiday?* and *How long have you been away/are you going to be away?* The questions asked after that were about their thoughts and feelings about waiting for their baggage. The interview also included questions about delayed baggage and how the travelers would like to discover their baggage being delayed, and how they would prefer to stay updated. See appendix 3 for the full interview template.

The interviews revealed that many travelers feel neutral when waiting for their baggage by the belt. Even though many of the interviewees had experienced delayed baggage before, none of them were worried it would happen this time. Thoughts that they had were mostly about how to leave the airport and hoping the belt would start soon.

"I just want to get my bag and go home"
- Interview 4

Another insight was that none of the interviewees had difficulties finding their way to the belt. The findings contradict the insights from the personal interviews since people in retrospect believe that they feel anxious and worried while waiting for their baggage. There are several possible reasons for this. One reason expressed by the Duty Coordinator was that the interviews were done on a stress-free and calm day. There were few people in the arrival hall at the same time, with few baggage items on each belt, which means that all travelers found their baggage quickly and did not have to wait more than a few seconds. The Duty Coordinator said that the travelers often start worrying when they wait for a long time while others receive their baggage. They will then start to wonder why their baggage is not on the belt yet.

"People start to get worried when they notice all of the others have received their bags"
- Duty Coordinator

Lastly, the duty coordinator explained that there are several issues with the signs by each belt in the arrival hall. The signs show only two states: *"first bag on belt"* and *"last bag on belt"*. Sometimes *"last bag on belt"* is sent out before all bags have been placed on the belt and more bags might be rolling out on the belt afterward. This leads to travelers filing a report too early when the bag might appear on the belt just a few minutes after. Furthermore, the duty coordinator explained that most travelers (even experienced travelers) are confused while at the airport. They forget the details of their booking which means that every information they get should be very accessible and easy to grasp.

6.2.4 Delayed Baggage Survey

A survey was created with the aim of gathering insights of a more quantitative nature. This was sent out using social media, for example on Facebook. The questions were not based on whether the respondent had experienced delayed baggage earlier but rather on how the whole experience could be enhanced for everyone. The questions were short and easy to answer with closed-ended options and sometimes open-ended options where the respondent could fill in their own thoughts if none of the mentioned seemed right. When a deeper understanding of a question was desired, a *why/why not?* question was asked directly after. However, these questions were not marked as mandatory since the respondent should not feel forced to write an answer. The survey was divided into four sections where the first section asked questions about emotions felt at different stages at the airport: check-in and arriving. The second section was about what type of information they would like to receive about their baggage during

their travel. The third included hypothetical questions about delayed baggage and the last section was for those that had experienced delayed baggage earlier.

The survey resulted in several insights from 95 respondents. The highest ranked feelings when travelers check in their baggage were:
1. Worry (42,%)
2. Neutral (36,85)
3. Stress (23,2%)
4. Calm (15,8%)
5. Relief (13,7%)

The feelings while waiting for baggage by the baggage belt was similar but less neutral. Calm and relief were replaced by frustration & excitement. The top five emotions were:
1. Worry (49,5%)
2. Stress (27,4%)
3. Frustration (25,3%)
4. Neutral (20%)
5. Excitement (13,7%)

The current reporting process (at arrival services) was expressed to be 4-5 out of 5 in difficult levels by 47,1% of the respondents. Something that was conclusive from the survey was that no one wants to find out that their baggage is delayed by waiting by the baggage belt and by seeing if it arrives or not. However, there were divided opinions on when to find out that the baggage is delayed. 61% wanted to find out as soon as the information was available and 39% after landing but before the belt, so that they could stay happily unaware during the flight.

When asked what type of information they would like to see about their baggage during their travel, see figure 6.11, *Arrived at the destination* was the most prioritized one. The second prioritized baggage status information was when it has been loaded on the aircraft and then if it is delayed, what baggage belt it will be loaded on and if it has been checked in correctly. 74.7% want to be able to see the status of their baggage during the travel.

What type of information would you like to see about your baggage?

71 svar

Checked in	—44 (62 %)
Loaded on plane	—61 (85,9 %)
Arrived at destination	—62 (87,3 %)
Baggage belt information	—48 (67,6 %)
Delayed	—55 (77,5 %)
Framför allt statusen från landning til...	—1 (1,4 %)
Where it is in the world	—1 (1,4 %)
Status update	—1 (1,4 %)
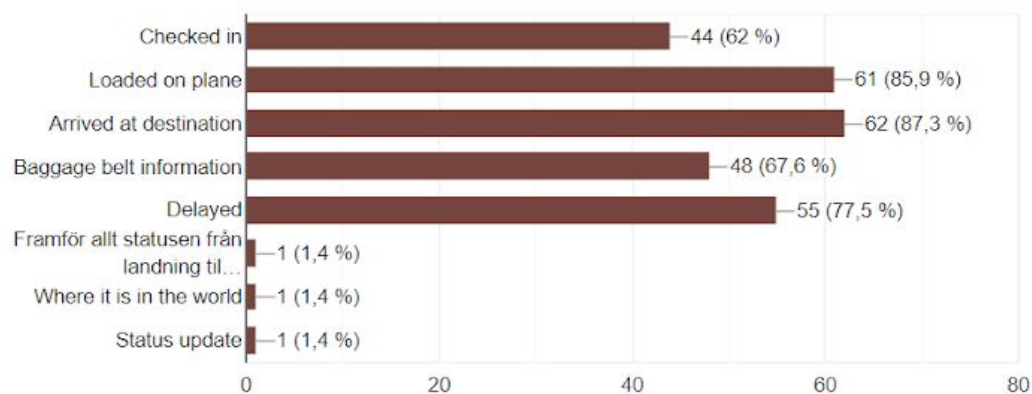
Figure 6.11: Bar chart of what type of information the respondents would like to see about their baggage. Authors' own copyright.

Another interesting insight from the survey was that 74.7% were prepared to fill in information about their baggage's visual attributes before their flight. Although, some expressed that they would not like to do this every time. Some respondents also thought that it felt unnecessary and believe that this could be automated at check-in.

Only 39,2% of those who had experience delayed baggage asked for compensation. Filing for a claim was considered to be a 4-5 in difficulty level by 59,1% of the respondents. The respondents want an easy way to find out where and how to make compensation claims without having to look it up. They also want to receive information about what type of compensation they can get after leaving the airport. The travelers want status updates regarding their delayed baggage when new information is available and 56,3% were also interested in knowing that the airline is still searching for the baggage.

6.3 Define Phase

All the data and insights gathered during the discovery phase were organized and later prioritized into a requirement list in the define phase. The phase started with an Affinity diagram where the observations and insights were categorized, which were discussed with the design team at SAS through a workshop. An additional workshop with 8 stakeholders, all from SAS, was held later in the process where all of the observations and insights could be prioritized. These observations were then converted into an early concept and specified requirements, which were prioritized based on three criteria - feasibility, value for user and wow-factor.

6.3.1 Extracting and Categorizing Observations in an Affinity Diagram

This step in the process was performed with an Affinity Diagram. The cut-out quotes from the start-up meetings, personal interviews, heuristic evaluation, walk-a-mile, and survey were turned into observations, either stated as a problem, fact, solution or

question. These were written on sticky notes color-coordinated to the different observation types. Pink and red were problems, blue was facts, green for solutions and yellow for questions. The questions were written in a way that would lead to later discussion such as: *how might we…*(HMW). It was formulated that way to keep the interpretation open and allow for different answers. The sticky notes were then grouped and regrouped until it resulted in an Affinity diagram.

The Affinity Diagram resulted in 15 categories that are described below.

- **Overall things to consider:** This category consists of good things to consider when developing a system for SAS, such as their motto "world class irregulars" and their four EuroBonus levels: Basic, Silver, Gold, and Diamond.

- **Feelings and expectations:** Include different feelings the traveler has, such as how their expectations change once they have experienced delayed baggage before. For example, they pack differently as they expect it might happen again.

- **Discovering delayed baggage:** Contains facts, questions, and problems regarding how travelers currently discover delayed baggage, but also their wishes for the future. One big problem within this category was that everyone finds out about delayed baggage by the belt, but no one wants to find out in that way.

- **Baggage belt:** Several issues with the baggage belts in the arrival hall was discovered when doing the walk-a-mile at Arlanda. These issues include lack of information and that the screens by the belts change flight too quickly.

- **Baggage content info from the traveler:** Includes issues regarding information about the content of the baggage. This is something that many travelers see as private, but sometimes the baggage has to be opened to locate the name of the owner. Since these aspects are contradicting it also includes ideas and questions that might help solve the issue.

- **Baggage appearance info from the traveler:** Travelers are more open to give away info about the outside of their baggage (rather than the inside) if this can help to trace their bag. To give away this information, many travelers want to know who has access to it and what it will be used for.

- **Personal info from the traveler:** In addition to travelers feeling the content of their baggage is personal, there are other things that the traveler might feel is too private to share. Some do not want to give out their home addresses, and some might not even have a home address.

- **Digital reporting tool:** The current digital interface has many issues. Many travelers fill out the form wrong, which means extra work for the arrival service. The arrival service prefers that travelers file the report by the desk. For example, travelers have issues remembering their booking number and knowing which flight to choose if there are more than one.

- **Reporting at arrival service:** On a busy day, reporting at the arrival service can be very time consuming due to long queues. Some travelers who have just realized their baggage is missing gets very angry which leads to the arrival service receiving threats. However, many of the interviewees feel relief after speaking with the arrival service.

- **Unnecessary reports:** There are many reports about delayed baggage being filed unnecessarily due to travelers forgetting they have a checked in baggage or that they must take their baggage through customs. The arrival service sometimes does not know when to close a report file as they do not receive any confirmation if the travelers find the baggage on the belt after filing the report.

- **Delayed bag info to the traveler:** This category is split into two sections: *immediate feedback* and *status updates.* The first is about what type of information the user wants from the start and the second about how the user can be kept updated about the status of the search and delivery of their bag.

- **Delivery:** This section mainly includes issues with the delivery companies such as that the delivery company do not verify the baggage owner at delivery.

- **Compensation claim:** Only about 40% of travelers ask for compensation for their delayed baggage. The travelers want to know what compensations they are entitled to but the arrival service does not inform about this unless they know the baggage probably will be gone for several days.

- **App:** Many travelers are hesitant to download the SAS app, and if they do - they often remove it after a journey. However, the travelers' information is stored in their account even if they delete the app and later download it again.

- **Personality Types:** Two personality types was defined regarding when the traveler wants to find out about the delay. These are described in detail below.

6.3.1.1 Personality types

The 15th category from the affinity diagram was *personality types* which revealed that there were two sides when it comes to when travelers want to find out their baggage is delayed, see figure 6.12. Those that want information as soon as possible and those that do not want any information during the flight. These were first discovered during the personal interviews but confirmed in the survey. They were named Control freaks and Happy fools and are described below.

“I want the information asap since the sooner I know the sooner I can change my plans"

"Why do I have to sit and worry on the flight? There is nothing I can do about it anyways."

Figure 6.12: Control freaks (red) and Happy fools (yellow). Authors' own copyright.

Control freaks (61%) are travelers who want to be able to see a lot of information about their baggage and would want to find out about their baggage being delayed as soon as possible, preferably on the plane or even earlier. By having access to more information, they feel more secure and like they are in control. They feel fear and anxiety about being in the dark. They want to be able to be flexible and mentally prepared and have the opportunity to rearrange their plans. They don't trust the baggage is with them and would feel less stressed and more relaxed if the information was available.

Happy fools (39%) are travelers that would like to stay happily unaware about their baggage being delayed as long as possible. They trust in the system and expect everything will go according to plan. Having access to information that says this might not be the case could cause them to doubt the airline's trustworthiness. The Happy fools feel relief when checking in their bag as this means they won't have to carry or think about it until landing. They just want to enjoy the flight without worry and believe there is nothing they can do about their delayed baggage until landing anyway.

6.3.2 Identifying and Categorizing Pain Points

The result from the Affinity Diagram a bit too big to tackle. This led to a thorough examination of the observations and later rephrasing them into pain points containing both a problem statement and a question of HMW form. An additional reason for rephrasing the observations was to make them more comprehensible for people not familiar with the topic. At this stage, it was decided the next step would be to have a workshop with SAS employees, which meant that the observations needed to be revised and concretized. The pain points found resulted in a table stating each pain point on the left with the corresponding HMW Question on the right, see figure 6.13.

Pain Point	HMW Question
Feelings & Expectations	
Travelers feel like a lot of the responsibility is on them as they need to report the delayed baggage themselves.	*HMW put less responsibility on the traveler?*
Travelers that have experienced a delayed baggage expect it to happen again.	*HMW make these travelers feel like this was a one time experience?*
42% of travelers feel worried when checking in their baggage.	*HMW reduces the feeling of worry when checking in baggage?*
Discovery (of delayed baggage)	
All travelers find out about delayed baggage at the belt, but would want to find out earlier.	*HMW reduces the unpleasant waiting time of finding out by the belt?*
Delayed baggage set a negative tone of the trip	*HMW reverse travelers' negative emotions?*
Travelers first thought when realizing their baggage is delayed is that it is lost.	*HMW make the realization moment less anxious?*
Baggage belt	
49,5 % feel worried when they arrive at the baggage belt	*HMW make travelers feel less worried when arriving at the belt?*
Information at airports is not clear, e.g. when bags will be loaded on belt etc.	*HMW make the information more prominent and intuitive?*
Baggage content info from the traveler	
SAS need access to information about bag content that passengers do not want to share.	*HMW ensure that correct information about bag content is available for SAS when needed?*
Digital reporting tool	
Travelers have difficulties remembering their booking nr. and flight when using the digital reporting tool. Arrival service has to change the reports that have not been filled in correctly.	*HMW handle questions when reporting online?*
Travelers do not know which bag tag is on which bag.	*HMW connects a specific tag to specific baggage?*
Reporting at Arrival Service	
47,1 % thought the reporting process was difficult and that it was time-consuming.	*HMW reduces the number of steps and time in the reporting process?*
Arrival Service receives a lot of questions about delayed baggage but also threats.	*HMW replace human contact and still make travelers feel calm and answer questions?*
Unnecessary Reports	
Arrival Service do not know when to close a report, due to travelers finding their bags after filing a report/lying about not receiving their bag	*HMW confirm the traveler has received their baggage?*
Travelers are not aware they're sometimes	*HMW make sure the traveler take their baggage*

expected to take their bag through customs.	*through customs?*
Delayed baggage info to traveler	
Travelers feel powerless and as though they are in the dark.	*HMW [digitally] inform the traveler about delay reason and baggage location?*
Travelers want immediate info about when and where the delivery will be, which is information that often is not available immediately.	*HMW calm the traveler when we only have limited and estimated information?*
56,3% are interested in knowing the airline is still looking for the baggage. Others only want updates about special changes	*HMW accommodate both those who want frequent updates and only updates about special changes?*
Unclear text messages are sent to the traveler from World Tracer when the baggage has been found --> confusion and calls customer service, can be difficult to call abroad.	*HMW send out clear information?*
Compensation claims	
59,1% thinks filing claim was difficult and many do not believe they will receive compensation until they do.	*HMW make compensation claims easier and ensure it will be paid out?*
60,8% of travelers did not ask for compensation. Some of these were entitled to compensation.	*HMW remind certain people to file a compensation claim?*
Travelers appreciate free kit with necessities which is not always provided.	*HMW give away kit to travelers that file in the app?*
Travelers want to know what compensation they are entitled to but arrival service do not inform about this, unless they know the baggage will be gone for several days	*HMW communicate what travelers are entitled to without encouraging over consumption?*
Travelers do not keep a few days necessities in their handbag.	*HMW inform about good things to pack in the handbag?*
Travelers have to keep track of receipts and file a claim for everything.	*HMW support continuous receipt handling?*
App	
Sometimes hand baggage needs to be unexpectedly checked in by the gate.	*HMW include unexpected checked in baggage in the app?* *HMW support multiple bags in the app?*
Some travelers are hesitant to download and keep the app between travels.	*HMW influence the traveler to keep the app between travels?*

Figure 6.13: Table of Pain Points and HMW Questions. Authors' own copyright.

6.3.3 Workshops with SAS Design Team and MMB team

To start the creative process and be able to define requirements, two workshops were conducted. One with SAS Design team and one with SAS MMB (manage my booking) team. The two workshops followed a similar structure, but with some differences.

The overall goal for the workshops was to prioritize the problems and sketch on solutions. This was achieved by providing the teams with the two personality traits which they were supposed to have in mind when prioritizing and sketching on ideas. They were also provided three parts out of the customer journey which included four problems and four *HMW* questions each. The parts were: *Pre-flight* (Expectations & Preventions), *Discovery* (Delay & reporting) and *Customer care* (Waiting & Compensation), see appendix 4 for a poster of each of the parts. The problems were grouped this way so the workshop could cover the entire user journey and the pain points within each step could be solved.

The design team that took part in the first workshop consisted of UX and Visual designers. The plan for this workshop (for details, see in appendix 5) was to start with presenting the agenda of the workshop and the expected outcome and goal. This was followed by a quick presentation of the three customer journey parts and the personality types. The next step began with an energizer (warm-up) - *The Apple.* After this, the participants were split into three groups with 2-3 people in each group. The groups then received one part of the user journey each and would then sketch on the related issues individually through a Crazy 6 (6 minutes and 6 squares instead of 8), see figure 6.14. Once the 6 minutes were done, the participants presented within their groups and dot voted on the ideas they liked the most, 3 dots each. Together in the groups, they were then given 5 minutes to sketch a mutual idea. The 5 minutes were discovered to be a bit too stressful for the participants, which lead to a change to 6 minutes for the following workshop with the MMB team. The last step of the workshop was to present the final ideas to everyone, followed by a quick wrap up.

Figure 6.14: Workshop with the design team at SAS. Authors' own copyright.

The design workshop resulted in many ideas, sketches and interesting discussions regarding the issues. It also resulted in insights about how the different problems could be solved. The three final ideas from each team were the following:

1. *Pre-flight:* This group aimed to solve the issue with travelers not wanting to share their content. Their idea was to have a packing list in the app, where the user can add the items they have in their baggage from a list while packing.

2. *Discovery:* To accommodate both personality types, this group suggested using opt in on status updates at baggage drop. Later, if the baggage is delayed, they proposed the user will get a message saying "Want to report? Done! This is going well!" The user will get all the info they need, with some statistics on delays so they can feel calm and safe.

3. *Customer care:* This group focused on conveying delayed baggage is a one-time experience and how to give away different kinds of compensation. Their idea was that the traveler gets a notification in the app saying: "We're sorry your baggage is delayed, but you'll get the following compensation:" which could be either fast track, upgrade or EuroBonus points.

The plan, see appendix 6 for details, for the workshop with the MMB team was similar, but since this team consists of developers, product owner and business analyst the workshop contained a prioritize exercise. The participants were asked to dot vote on the problems in the problem areas, and in that way prioritize which issues are most urgent to solve. The participants were given 3 dots each, which were then summarized to identify one prioritized issue per problem area. Figure 6.15 shows the posters used for this workshop after the prioritization had been done. The workshop would then continue following the same structure as the Design workshop, with some extra time added for explaining the different methods used (The apple and crazy 6). During the workshop, a playlist with beat music was played to create a creative atmosphere and avoid silence.

Figure 6.15: Ranking the problems. Authors' own copyright.

The Apple was tweaked for the MMB workshop so that the exercise would be performed together in groups. They were still given the same amount of time, but it was announced as a relay race, by one person drawing the first apple in a square and then handing over the pen to the next in line to draw in the next square. The team that fills all the eight square first wins. Even this time the group was divided into three smaller teams, see figure 6.16.

Figure 6.16: Workshop with the MMB team at SAS. Authors' own copyright.

Just as the first workshop, the MMB workshop led to several insights and discussions regarding the three steps in the user journey. The prioritized issues for each step of the user journey were:

1. *Pre-flight:* Travelers don't know what baggage tag belongs to which bag.
2. *Discovery:* had three problems with the same number of dots:
    a. Travelers feel like a lot of the responsibility is on them, since they need to report the delayed baggage themselves.
    b. Delayed baggage sets a negative tone of the trip.
    c. Travelers have difficulties with the digital reporting tool.
3. *Customer care:* 56,3% of travelers are interested in knowing if the airline is still looking for the baggage. Others only want updates about special changes.

The three main ideas that were developed within each group were:

1. *Pre-flight:* Each baggage tag will receive one specific number. The number is printed on both the baggage tag and the ripped off part, with the aim of making the users more aware of which tag they assign to which bag.
2. *Discovery:* After reaching the baggage belts, the traveler will receive a notification saying *"Welcome to the city, we hope you have received your baggage"*. The user can then confirm if they have received the baggage or not. The group expressed it is good that the user finds out by the belt so that it is in connection to the arrival service.
3. *Customer care:* Since not everyone is interested in getting frequent updates the group suggested having notification options within the app for each profile. The travelers can also see more info and get statistics about delays.

6.3.4 Early Concept Development

This step in the process began with structuring the findings from the two workshops at SAS. Each problem within the user journey was iterated and an internal Crazy 8 was held with the purpose of coming up with as many different ideas as possible, for each step.

These ideas were later combined with the findings from the workshop and sketched out on an A3 paper. The first problem area in the journey to be sketched out was pre-flight. Once all the ideas had been sketched, screens or functions for the other problems were added or simply adding functionality on an existing screen and building on that existing idea. This approach leads to several sketches of screens and a user flow which worked as a base for the requirement mapping.

The early concept development resulted in a user flow with the necessary views for the app, see figure 6.17. The first views were *bags* and *journey,* which contained functions to add visual attributes to baggage and seeing a visualization of the journey the baggage takes. The user can see if the baggage is delayed in both of these views or in a notification. The next step is filling in the delivery address and then selecting a small compensation. Another step, which had not yet received a specific place in the flow was the receipt collector where the user can keep track of receipts that they want compensation for. It had been noticed that the arrival service does not initially need to know the attributes of delayed baggage, so this will not be a required step until 24 hours after the delay, assuming that the baggage is still not found. Then it could be assumed that the baggage tag has been torn off. The passengers are asked to fill in information about their baggage content after 48 hours as this is something that many did not feel comfortable doing unless necessary.

Figure 6.17: Early conceptual user flow. Authors' own copyright.

6.3.5 Defining Requirements

Based on the different problems found during the discovery phase, the findings from the workshop and the early concept, requirements could be defined. The requirements were written in a digital spreadsheet using the following headlines: Category, Problems

& Facts, Requirements, Sub-requirements, Priority, and Comments. The categories were the three steps in the journey (Pre-flight, discovery, aftercare) and one with general information. The problems and facts from the affinity diagram were written in the Problems & Fact column, in order to show the origin of the requirement. The requirements were written using terminology such as *the system shall….* The Sub-requirement column contained constraints of the requirement with specific measurements to obtain. After this, a prioritization was made in order to see which requirements were most important to fulfill. The prioritization was based on three factors: Feasibility, value for user and wow-factor, as these were based on both a technical point of view and from a user point of view. In this case, the wow-factor refers to unspoken criteria from the user's point of view and the remaining stakeholders. The wow-factor is something that the user have not requested but are expected to bring great value. Each of the criteria was considered individually and given a number between 1-5 (5 being the highest priority). The requirements were then given the prioritization rank of the mean value of all criteria.

The highest ranked requirements for the first version of the requirement list can be seen in figure 6.18. These were all ranked with priority level 5, and most of them are related to the delay discovery and the initial reporting. The requirements include how the user should find out about the delay and how to respond to questions they might have regarding compensation and the whereabouts of their baggage. The highest ranked requirements are all related to making the user feel in control of their baggage, by providing them with baggage information. The requirement list was iterated several times and updated through the entire process. It was continuously tested through wireframes and user tests and revised when needed. The final requirements list can be found in the chapter 7.1 Final Requirement List.

Fact/Problem	Requirement	Sub Requirement
Preflight		
74.7% wants to be able to see baggage status info during travel.	The app shall provide a way to view the baggage's journey	* Checked in * Loaded on plane * Arrived at the transfer destination * Check out and in for customs * Loaded on plane * Belt arrival * Delay information
Discovery		
The traveler finds out about the delay after waiting by the belt.	The system shall give delay notification upon arrival.	The information is always available in the app for the traveler to see the status at any time.
Travelers need to report the delay themselves.	The system shall initially allow filing a report without specifying baggage attributes.	
Delayed baggage leads to dissatisfaction	The system shall supply the traveler with immediate compensation.	Eurobonus, Lounge, Fast track, upgrade, free kit, taxi, food stamps

amongst travelers affected.		
Travelers want to know where the baggage is located.	The system shall always provide information about where the baggage last was scanned.	
Customer Care		
Travelers feel like they are in the dark and do not know how the progress of their baggage is going.	The system shall provide a visualization of the baggage journey until delivery.	* Still looking * Found * Loaded on plane * Arrived at the airport * Delivered to delivery comp. * Delivery address

Figure 6.18: Table of the requirements with priority rank 5.

6.3.6 Structuring the Information Architecture

To structure the new user interface, all the main views were first mapped out. Under each main view was sub-views or content mapped out in a tree like structure. Connections from views, such as the call to actions were also visually mapped out in the structure in order to gain more understanding of how the different views were connected. The requirements were always checked to see if some requirements were missing through each step down in the tree structure.

The information architecture contained a main view called *My Baggage* which hade the subviews *Baggage overview, Timeline,* and *Notification* if the baggage is delayed. All these main views lead to a view called *Delayed Baggage* which contains information about the delay, see figure 6.19.
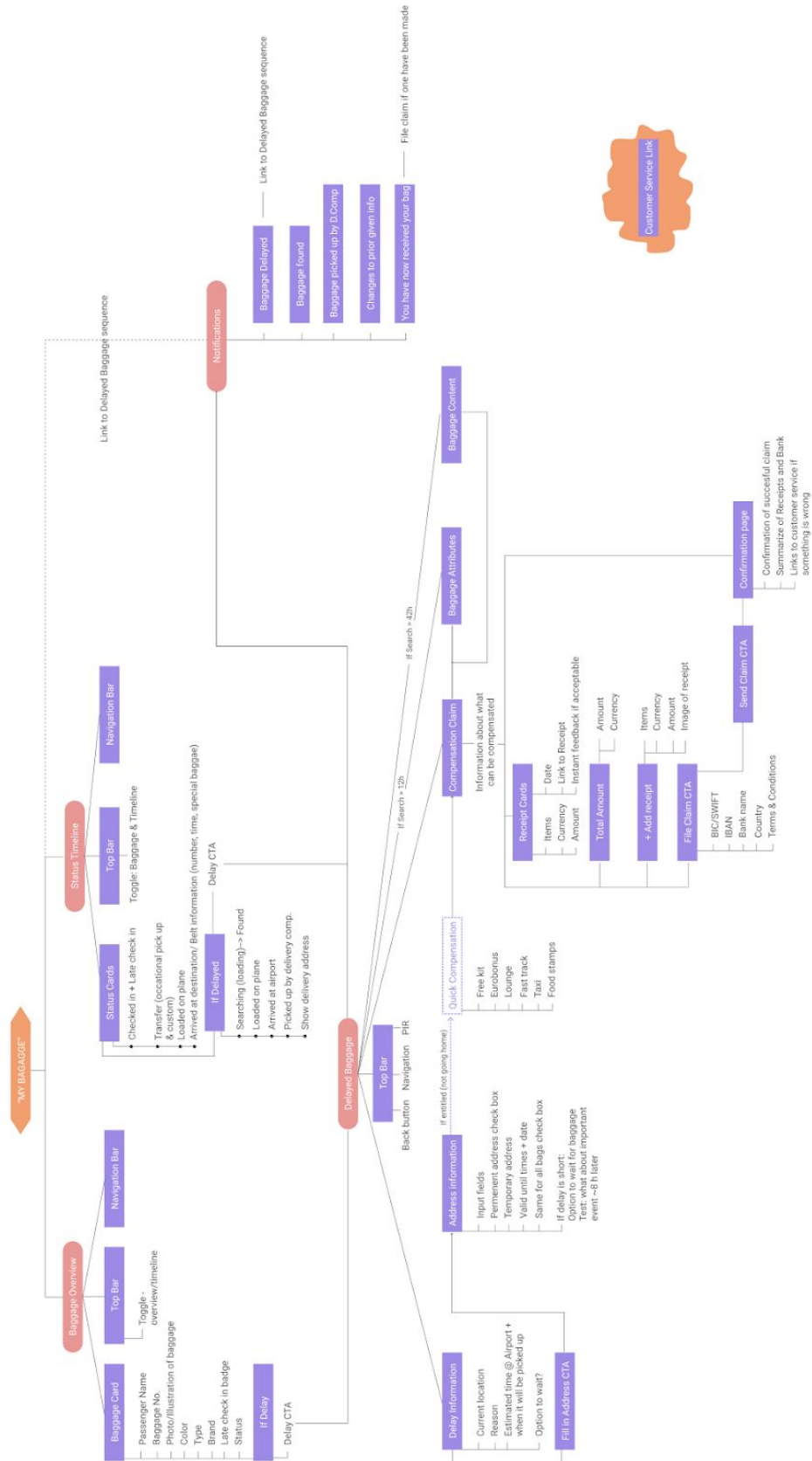
Figure 6.19: The Information Architecture System. Author's own copyright

The *Baggage Overview* contains information about baggage found in the booking. Each baggage has its own tile which contains baggage tag number, passenger name, an option to add an image of the baggage and visual attributes such as color, type, and brand. Furthermore, a status bar that shows where the baggage is right now.

The *Timeline view* shows the baggage journey and status. Information about important times, if the baggage needs to be checked out during a transfer, a badge if a baggage is checked in by the gate and if the baggage is delayed, is also displayed. If the baggage is delayed the timeline is updated with more steps for the new calculated route. If the baggage is delayed but the passenger does not look in the app while on the flight (e.g. happy fool personality) they will receive a *notification* after landing with information about the delay. Hence there are three ways of finding out that the baggage is delayed, which are all displayed on the same level in the system architecture.

After finding out about the delay, the traveler will continue to *the Delayed Baggage view*. This view has several sub-views that will be displayed in sequence order of *Delayed Information, Address input, Quick Compensation, Compensation Claim* and if the baggage is delayed for several hours or days then the passenger will see views with *Baggage Attribute* options and *Baggage Content*. *Delayed Information* contains information about why, where and when. *The address* view shows input fields and the ability to choose between having the baggage delivered to an address or wait for it at the airport. *Quick Compensation* will show options for different free compensations. *Compensation Claim* contains functionality to collect and store receipts and view the total amount. Each view throughout the app also consists of a top bar and a bottom bar with SAS main navigation.

6.4 Develop Phase

This phase included methods to create early wireframes and perform usability tests. It included two iterations, with 2 redesigns and three sets of usability tests. The usability tests aimed to see if the pain points had been alleviated and if it was possible to create a rich experience.

6.4.1 Developing Individual Wireframes

Based on the system architecture, early wireframes were created using the software Figma. The development began with individually creating screens for each of the main views. In order to not get stuck on copywriting and how to phrase features or buttons, blocks were used as a representation for text, see figure 6.20. The wireframes were kept in a low-fidelity state with focus on functions and layout rather than appearance and visual expression. The wireframes were then discussed and dot voted on to find which elements were most desired and to be kept for the next iteration of unified wireframes.

The individual wireframe development resulted in many different versions of the main views. For *Baggage Overview,* two different versions can be seen in figure 6.20, one where the baggage is in a carousel and one where they are stacked in a list. Additionally, three more wireframes can be seen in figure 6.21, which represents the *timeline view*, the *delayed baggage view*, and the *receipt collection tool*. As can be seen in figure

6.20-21, the wireframes had quite different styles (color, font, layout etc.) to explore different options.
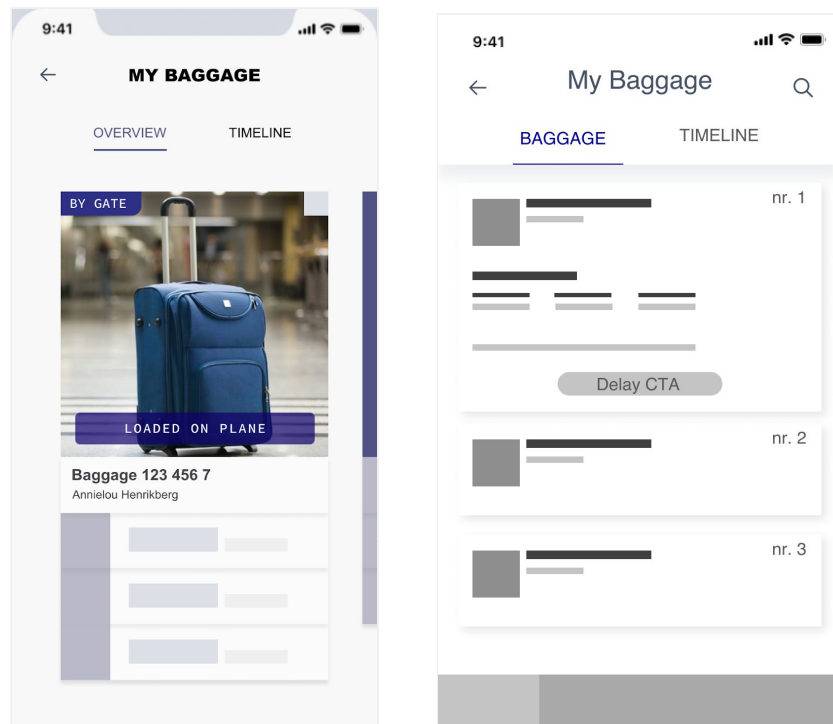

Figure 6.20: One carousel version and one list version of the baggage view. Authors' own copyright.
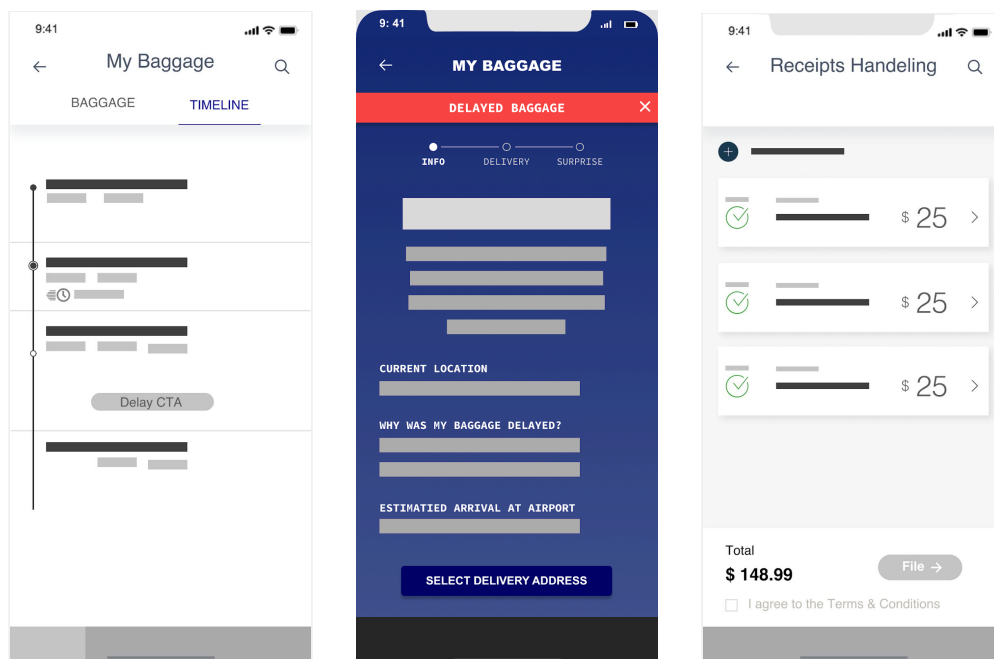

Figure 6.21: Wireframe examples of the timeline view, the delayed baggage view, and the receipts collection view. Authors' own copyright.

When all individual wireframes had been reviewed, a joint concept was developed, using the result of the dot voting. First, a common design structure for components was defined to simplify working on the wireframes individually but still keeping a cohesive

impression. Colors and font from SAS Design System were used to allow the wireframes to look united with the brand.

6.4.2 Applying the Framework for Rich Experiences

When applying the aspect of rich experiences to the wireframes, the focus was still on functionality but also to incorporate emotions as it seemed unavoidable that the system would cause high negative emotions when the user finds out about the delay. In order to ensure that the experience would not solely be perceived as negative, different ways of reversing the negative emotions were examined, with the help of protective frames. The first step was listing all possible negative emotions that could be associated with the delayed baggage experience and which desirable emotions they could be turned into. Using Fokkinga and Desmet's framework for rich experiences, each suggested experience was considered and ideated around. The selection was then based on discussion and which of the ideas were most feasible and most corresponded with the desired emotions and outcome.

The identified negative emotions were fright, frustration, anger and sadness which lead to two of the suggested experiences in Fokkinga and Desmet's framework being used. These were *the Challenging experience* which aims to reverse frustration with satisfaction and *the Thrilling experience* which uses fright and joy. To reverse the negative emotions, the control frame was applied. The control frame is constructed to increase the amount of control the user has over the interface or situation. Allowing the user to abandon the process at any time will stimulate this aspect. This could also be achieved by allowing them to *help* SAS find their baggage as fast as possible by applying attributes to their bag, if not already done, and by using a language that encourages actions. The control frame also includes allowing the user to be agile and move forward in dealing with the negative stimulus fast, which could be achieved by reducing the number of steps the user must go through.

6.4.3 First Wireframes

Based on the selected rich experiences, the first version of unified wireframes were created. Figure 6.22 shows the *baggage view* where the baggage tiles are stacked on top of each other in a long list. Each baggage card includes baggage tag number, passenger name, favorite selection, status, and functions to add attributes such as photo, name, color, type, and brand. The screen is switched to a *timeline view* through a toggle in the top bar. As can be seen in figure 6.23 the timeline view consists of a summary of the travel on top followed by a timeline containing the different steps of the baggage journey. In the view shown below, two baggage items have been delayed and are still at the transfer airport.
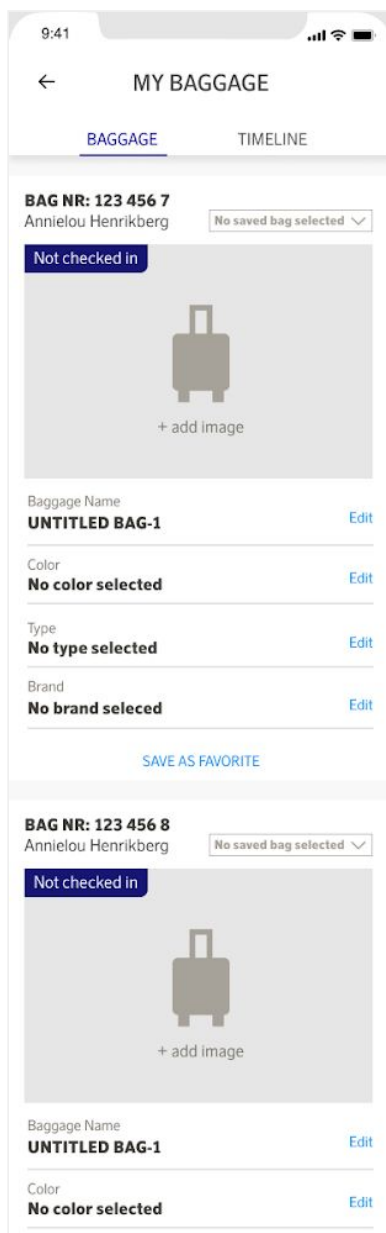
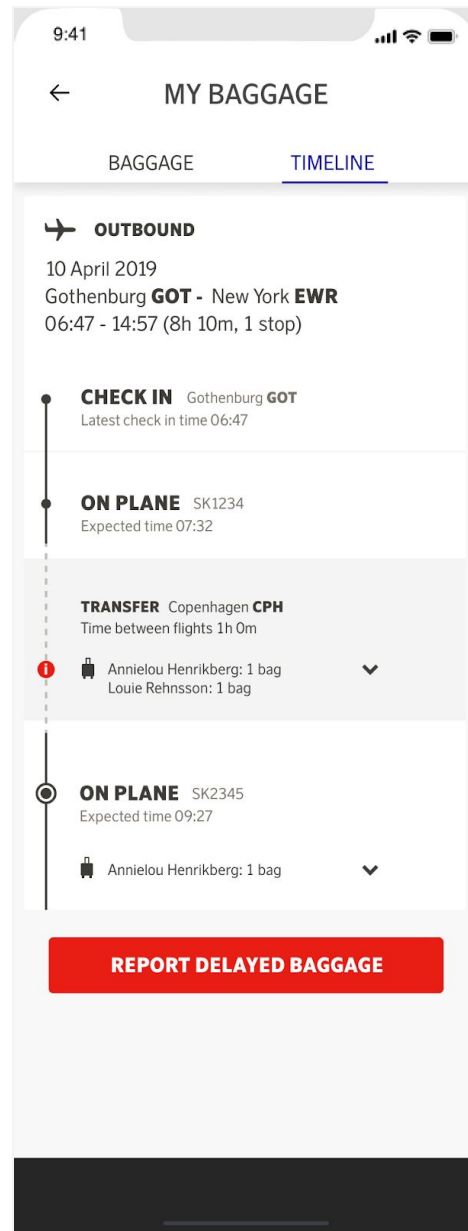*Figure 6.22: Baggage view before delayed baggage. Authors' own copyright.*

Figure 6.23: Timeline view after delayed baggage. Authors' own copyright.

If the user does not look in the app on the plane, they will receive the notification shown in figure 6.24 as soon as they have landed. The notification informs the user that their baggage has been delayed and will be sent on the next available flight.
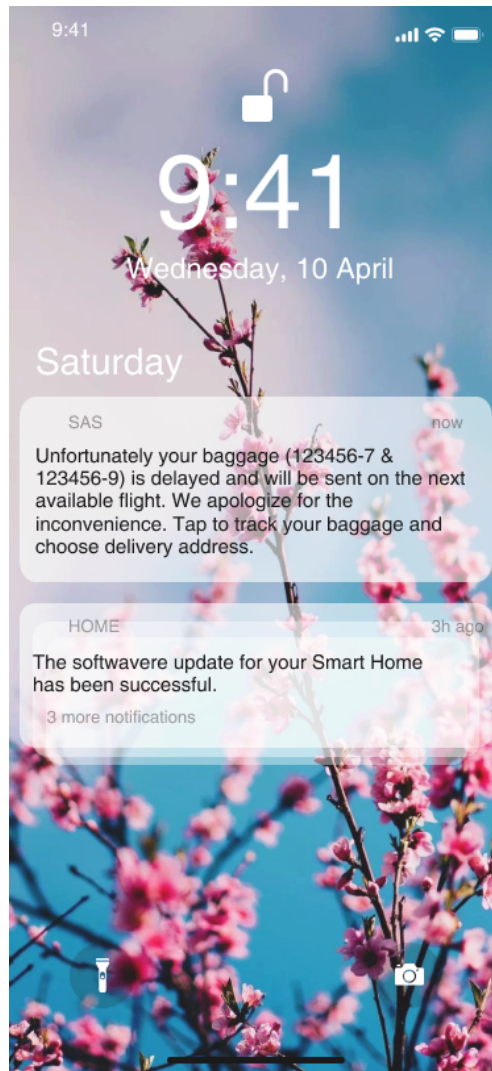
*Figure 6.24: Notification shown to the user after landing if their baggage is delayed.
Authors' own copyright.*

The user then enters a three-step process. In figure 6.25 the user receives information about the delay, in figure 6.26 they fill in their delivery addresses and in figure 6.27 they receive a small compensation with 6 different alternatives. The wireframes use icons to soften the harsh news a bit.

Figure 6.25: Delayed baggage information view. Authors' own copyright.

Figure 6.26: Delivery address view. Authors' own copyright.

Figure 6.27: Compensation view. Authors' own copyright.

Once the three steps are completed the user ends up in the *summary view,* see figure 6.28. This view summarizes the three previous steps but also where the user finds the receipt collection tool and can file a claim.
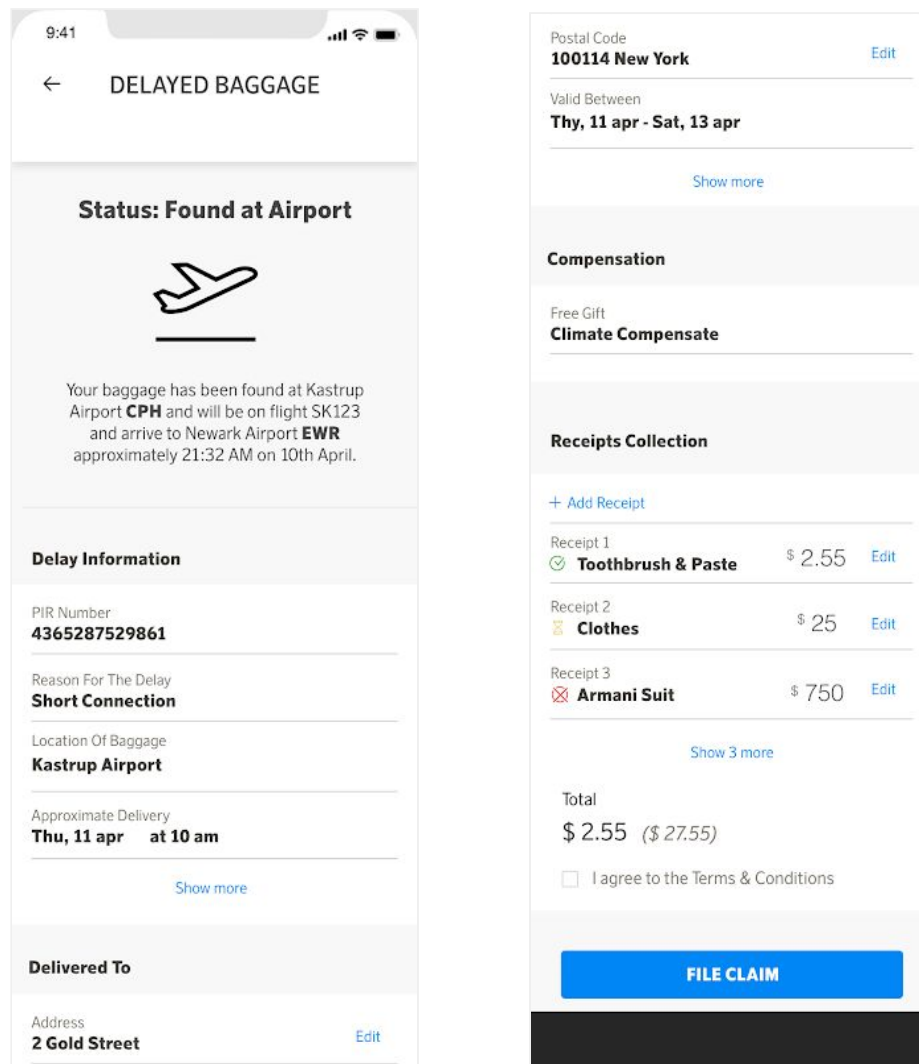
Figure 6.28: First and second part of the summary view. Authors' own copyright.

6.4.4 Usability Test 1

The usability test was prepared by structuring the wireframes in a scenario. The test began with a short introduction of the project, with an emphasis on checked in baggage at airports without specifying that they would be delayed, as the test aim at getting an insight into the reactions when the delay was discovered. The selection of participants was four students at the Interaction Design & Technologies Department at Chalmers University of Technology, all of which were considered to be potential real users.

During the test, one interviewer asked all the questions and one annotator took notes of the answers. The wireframes that were used during the test were showed in Figma and not an interactive prototype, so the participant had to imagine themselves tapping the different buttons and features. The scenario used was: "*You and a friend are traveling to New York from Gothenburg with a transfer in Copenhagen. You have two bags checked in and your friend has one.*" For the whole Usability test transcript, see appendix 7.

First, the participants were given the scenario that they were at home and had just downloaded the SAS app to view their booking. The participants were then asked to think aloud before entering each view and guessing what it would contain. The Baggage

view was the first view shown, and the participants were asked to express what they saw in the view.

The scenario continued and the participants were asked to immerse themselves in the context of being on their last flight between Copenhagen and New York. A question such as *What would you do now?* was asked as a control question to see if they would go in and look at the status of the baggage. Some participants chose to go in and look at the timeline and saw the delay information. Those who did not, were given the notification of the delay. In this step, all the participants were asked to express what they were feeling. They were first asked to speak freely and was later shown a paper with 16 different emotions on it, 8 positive and 8 negative. The chosen emotions were based on emotions that had been expressed during the discovery phase and also emotions that had been found during the first user journey mapping. The participant was asked to point at the feelings they were feeling on the paper and also explain why. This was done for all the screens except for the two in the beginning while they were still at home, i.e. the Baggage and Timeline. By focusing on mapping the emotions, a UX-curve could take shape, showing where in the process the participants felt the most negative, and where the emotions were reversed. Below, in figure 6.29, is a visualization of a collection of the identified emotions. Even though some positive emotions emerged, there were still a lot of negative emotions during every step of the process after receiving the delay information, which meant that further iterations and redesign were needed.
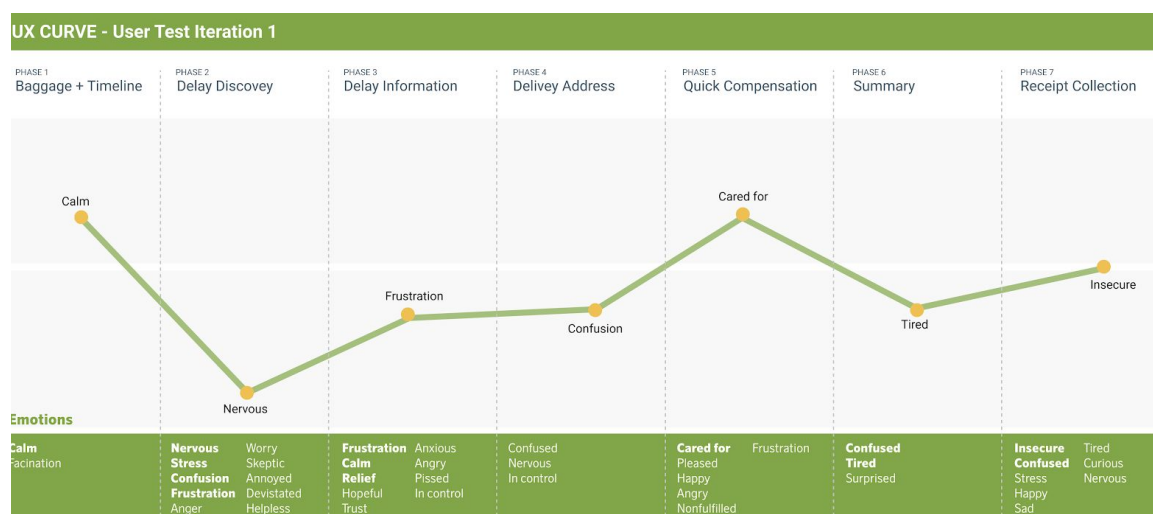

Figure 6.29: UX Curve of the emotions felt during the different steps of the first user tests. Authors' own copyright.

The usability test resulted in many additional findings. One thing expressed by all testers was a resistance to go forward to the next step in the process as they felt they needed to remember information on previous views before continuing and thus having a high memory load. Even though they knew what the next step was based on the button labels, it was not clear that going forward was reversible if needed.

Another finding was that the testers had difficulties localizing where they were in the timeline and where the baggage was. A suggestion was to center the active position when entering the timeline.

Many testers were confused when seeing the delivery address view. After some speculation, they thought that the permanent address was their home address (which is true), but at the same time, they also thought this was wrong and would fill in their hotel address there anyway. The confusion continued on the following view where they received a small compensation. They were unsatisfied with the options and assumed that it would be the only compensation they would get. When they later saw that it is also possible to file a claim for expenses, they were surprised and confused that they could get more compensation.

When finishing the report, all testers were surprised they ended up on the summary view, and not the view they came from before entering the three-step process. Even though they were happy for the summary, they felt as it was another process on top of the first process and wondered when they would be done.

In the receipt collection, the testers felt worried regarding one of the receipts being pending. The tester expressed they liked the function, but it made them feel strongly insecure, worried and confused at first, not knowing if the purchase was ok or not.

6.4.5 Redesigning Wireframes Iteration 1

Based on the findings from the user test, some changes to the wireframes were made. The emotions collected during the first usability test were also discussed and compared to the expectations of the interface. Where the emotions did not reach what was expected, a redesign was made.

One big issue regarding the first wireframes was navigation, as the design used both a top bar, bottom bar and a toggle for navigation. The first change made was the addition of a home page. This is a home view for the entire app which displays a summary of current bookings as well as a to-do list, with suggestions of what to do next, see figure 6.30. This view contains links to both timeline and bag tags. As many testers did not understand the connection between the bags and the tags, the baggage view was redesigned into a bag tag view, with tiles more similar to actual bag tags, see figure 6.31. "Bag nr." was changed to "bag tag nr." to further increase the right associations. When assigning a bag to a tag, the user can choose to add a previously saved bag or create a new one, see figure 6.32. When choosing to create a new bag, the user will then reach the new bag view where they can add attributes.
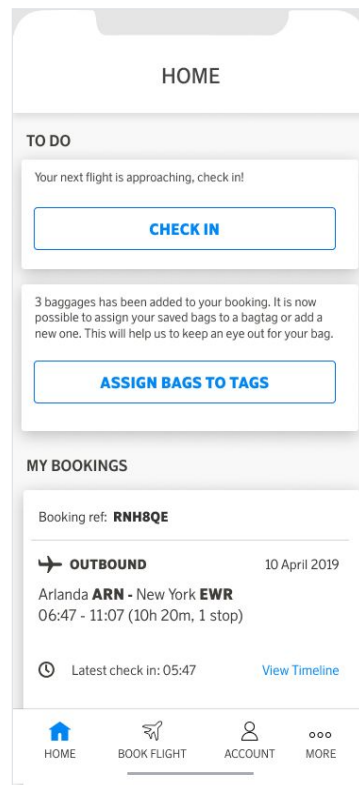
Figure 6.30: Home view with to-do list and current bookings. Authors' own copyright.

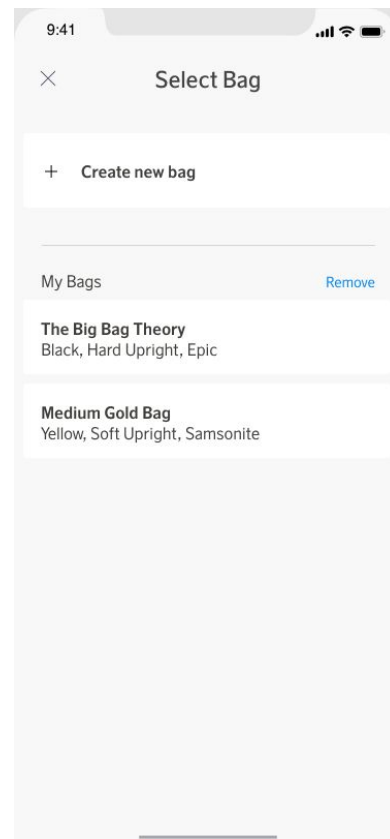*Figure 6.31: Assign bags view, with 2 bags assigned to a tag. Authors' own copyright.*

Figure 6.32: Selecting a saved bag or creating a new. Authors' own copyright.

In the timeline view, the inbound travel was added beneath the outbound travel, see figure 6.33. Both the traveler's and the baggage's journey is now visible in the same timeline as this was something requested by both testers and SAS. To create distinction between future and past in the timeline, the past is colored in a bolder black and future in lighter gray. When baggage is delayed, the label on the button states "Take control", see figure 6.34, instead of "Report delayed baggage" since the old label was associated with having to do a lot of work. Labeling the button "take control" also relates to the protective control frame, as it could create a sense of control for the user.
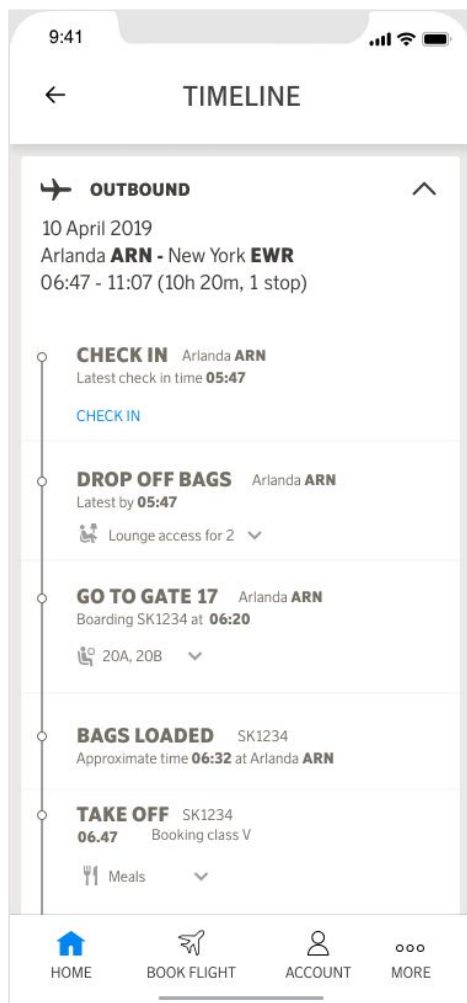
Figure 6.33: Timeline view, before check in. Authors' own copyright.
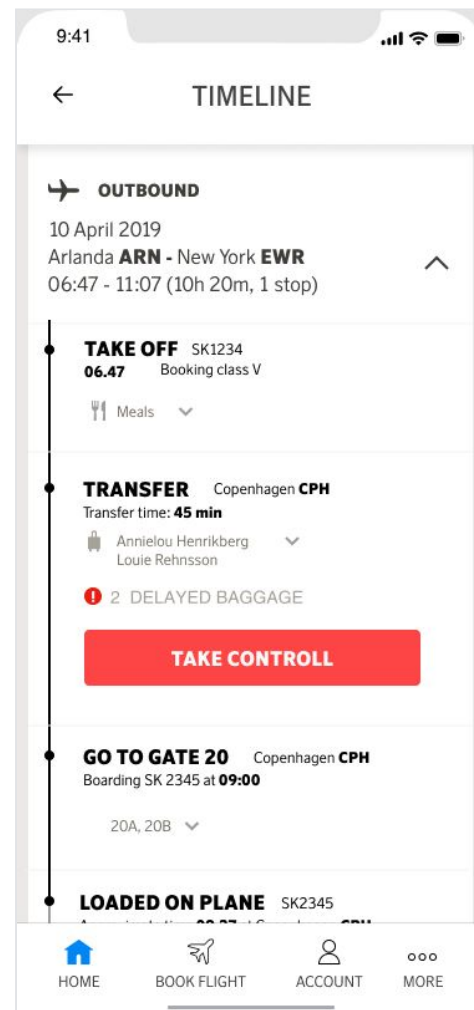
Figure 6.34: Timeline view, with delay information. Authors' own copyright.

The view with delay information was kept quite similar from the previous test, although important information was made more prominent using a bolder font. Since many of the participants expressed hesitation to continue to the next step in this process, a next and a back button was added to indicate that they can go back whenever they want to, see figure 6.35.
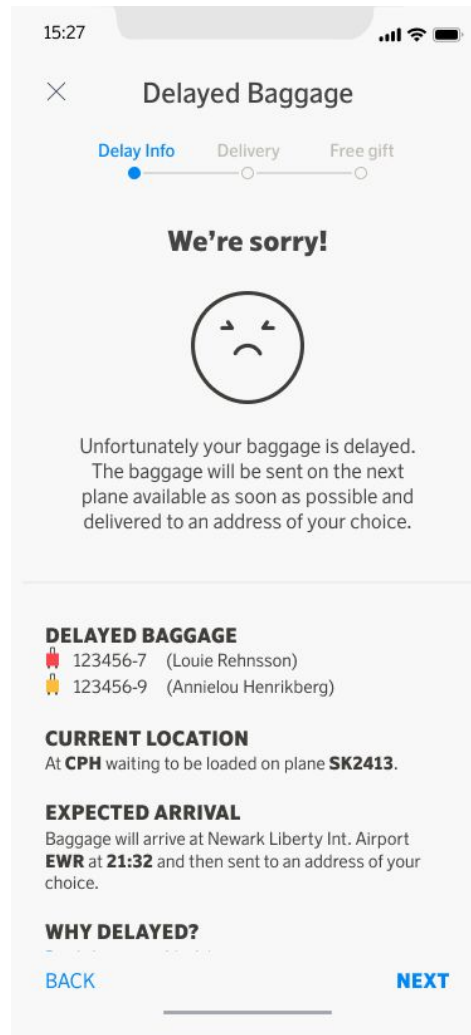
Figure 6.35: Delay information view. Authors' own copyright.

In the view where the user is asked to enter their delivery address, see figure 6.36, the *permanent address*-label was changed to *home address*. These input fields will be pre-populated if the system already has access to the home address. The checkbox for using the same address for all baggage is moved to the top and the temporary address function has a new feature of searching for a hotel name which enters the address fields automatically.

Figure 6.36: Delivery address view. Authors' own copyright.

The number of compensation options in the small compensation view was decreased to three instead of six, as many testers had difficulties making a selection. Since several testers supposed the quick compensation was the only compensation they would get, a small spy icon saying "Psst!" was added, see figure 6.37, to mediate to the user that more compensation for necessary expenses might be available later.
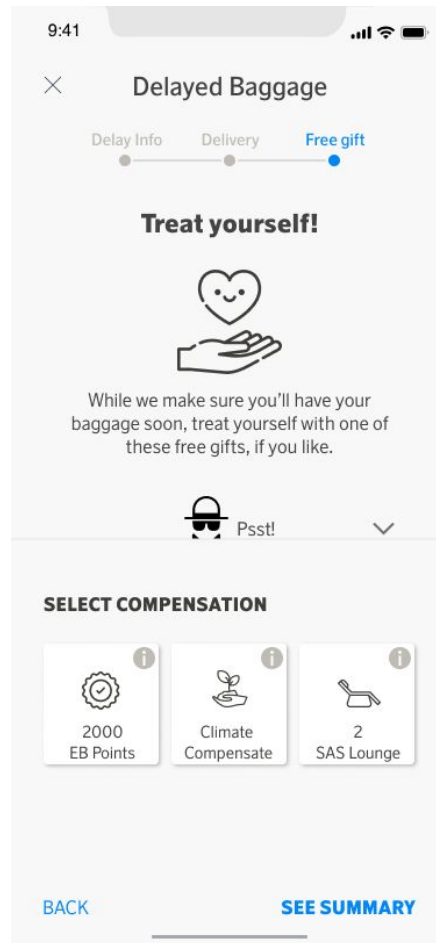
Figure 6.37: Quick compensation view. Authors' own copyright.

After ending the three steps process, the user ends up on the home view again where a summary is displayed, see figure 6.38. The summary was reduced to about half the size as the testers felt overwhelmed by the long summary. There is also a link to receipt collection in the summary which takes the user to a new view where they can add receipts. The biggest change in the receipt view, see figure 6.39, is that it no longer shows if the purchases have been accepted or not, since the pending feature led to stress for the users.
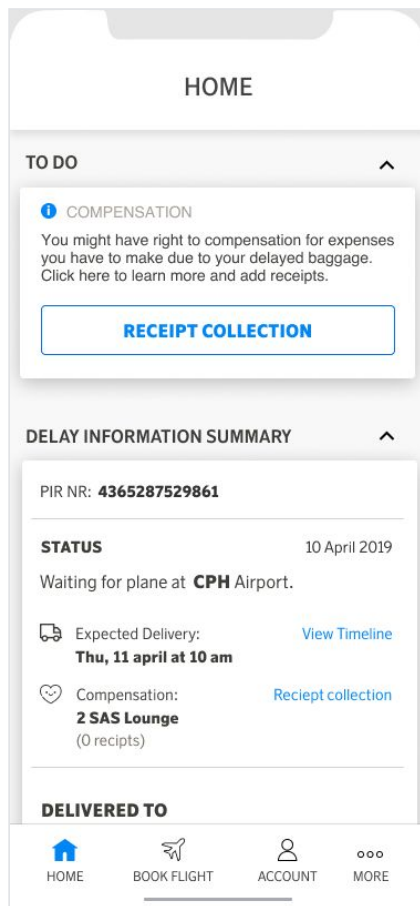
Figure 6.38: Home view with delay summary. Authors' own copyright.
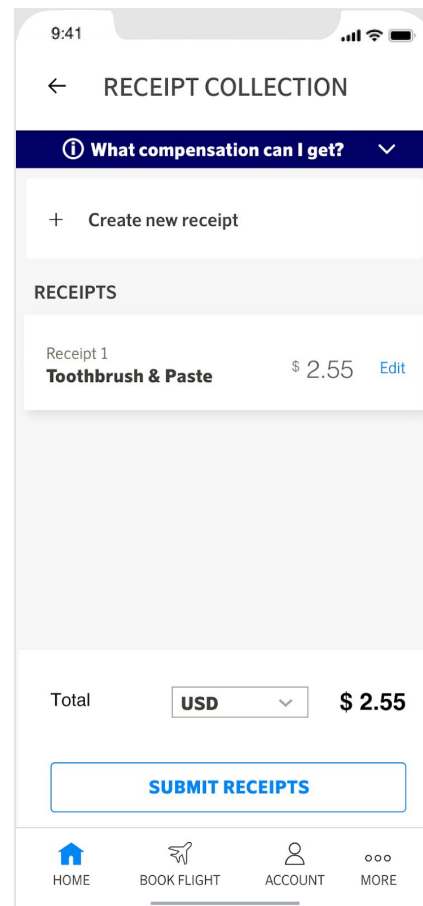
Figure 6.39: Receipt collection view, with receipts added. Authors' own copyright.

6.4.6 Usability test 2

To be able to compare the results of second usability test with the first, the structure and scenario of the first test were reused. This showed if the feelings had changed during the test and if the functionalities were clearer. The selection of participants was a mix of people between 24-60 years old, one of which had participated in the first test as well. By using the same participant again, they could reflect on the changes and give their view on the improvements. The test was made with six people in total, two of which who completed the test together.

A change for the second test was that the prototype was interactive, and the tester was allowed to click through the prototype instead of just viewing images of the different screens. The test also included more *how do you feel questions…?* to further explore the emotions of the participants. Before the usability tests, the structure was pilot tested, to identify potential errors in the prototype. The test structure can be found in appendix 8.

The usability test revealed that the previous hesitation to proceed in the three-step reporting process was not expressed during the second test. This may be due to the fact that there was a new next and back button, which made them feel comfortable that they could go back and change information if needed. There was also a bigger understanding of what "assign baggage" meant in this test. With the usage of skeuomorphism and visualizing a *real* looking baggage tag in the app, the testers now

associated the digital baggage tags to the real tags that are later printed at the airport. However, this was a new functionality they had never used before and some confusion was first expressed.

> *"I feel a little bit confused that I can assign tags to my bags before I have printed them out"*
> - Tester 4

When they later tapped on the *assign bags to tags*-button they understood that they could add their bag to the digital tag. However, some of the testers thought that the digital tags were too realistically looking and that they should print them out at home.

The receipt collection view was perceived as simpler than before. All testers understood how to proceed after they had read through the terms and some expressed that this was a good step since this would make them feel more informed about what they could get compensated for. Although, many said that they wanted this information earlier and more prominent in the process.

Some feedback on the view with the baggage tags was that the testers were confused about why their friend's bag appeared first and also why they had to fill in their friend's bag attributes. However, it was still expressed that it was nice to see, but that it needed to be separated from their own.

The timeline view received good feedback in general but there were some confusion about what steps required user actions, such as "Going to gate", and which steps were airline specific actions, such as "Loaded on the plane". This was extra prominent when there was a transfer that required the bags to be checked out, taken through customs and checked in again.

> *"These are all the steps I have to take. Here is where I drop off the bags and here is where I load the bags on the plane"*
> - Tester 1

When receiving the delay notification, two of the testers expressed they wanted immediate contact information, to be able to call customer service before entering the reporting process. Later, in the delivery address view, there was still some confusion regarding the home address and temporary address. The testers were pleased that their home address was already prefilled, but since the testers were going to New York they still felt the temporary address should receive more focus in the interface. There was also confusion regarding the placement of the checkbox for using the same address for all baggage.

Another issue that arose during the test was that the testers thought it was unclear if they had sent the report or not after completing the three-step process. The "Receipt collection tool" was appreciated by all testers, and they all performed the task smoothly. Only one tester wanted more confirmation that the receipt was saved.

The emotions from this test were also plotted into a diagram visualized in figure 6.40. The line shown between the different stages shows that the experience goes from excitement and positive emotions to negative and then slowly back to positive again. This indicates that the negative emotions felt during the discovery of the delayed baggage had been reversed and thus a rich experience was created. However, there are still some frustrations and irritations, and when asking the tester to explain these emotions, the response was that it was still annoying to go and buy necessary things but that they still felt calm and that the interface allowed them to be in control. However, further design iterations were needed.
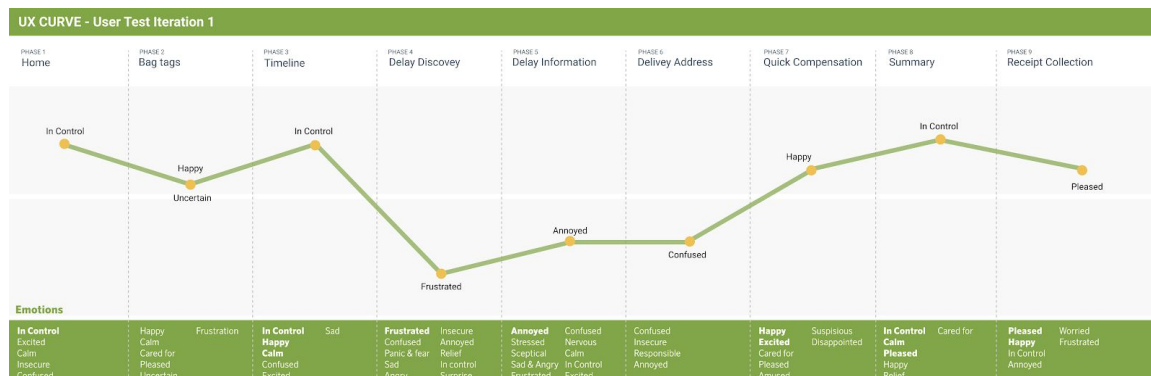
Figure 6.40: UX-curve after second usability test. Authors' own copyright.

6.4.7 Redesigning Wireframes Iteration 2

Even though the first redesign led to less confusion and more positive emotions, there were still some aspects that needed to be changed and redesigned after the second test. A meeting with SAS was conducted in order to discuss the findings and receive feedback from the company's point of view. The meeting consisted of generating new design solutions, which were considered when redesigning the interface.

Based on SAS feedback, the to-do list was moved from the general home view, see figure 6.41, into the booking reference view, see figure 6.42. The timeline is now displayed directly in the view for a specific booking. To differentiate between things the user must do and things the airline/airport will do, things that are done by the airline/airport have lighter color, smaller font and are written in italic.
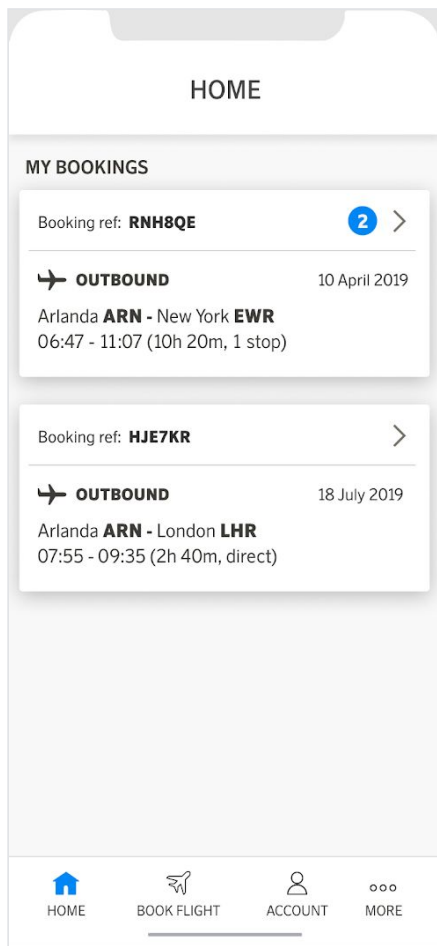
Figure 6.41: The app's home view. Authors' own copyright.
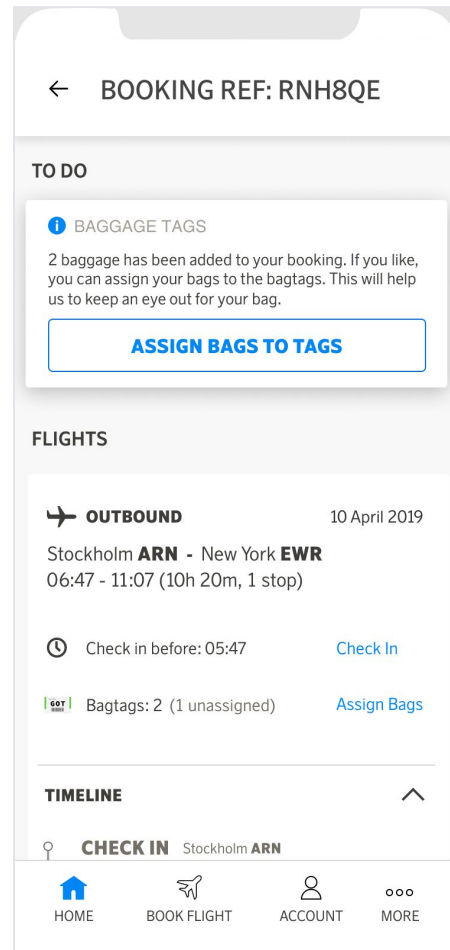
Figure 6.42: The view for a specific booking, with details and timeline. Authors' own copyright.

In the bag tag view, the user's own bags are displayed at the top, and their travel companions' bags on the bottom, see figure 6.43. The hit target area for assigning bags was changed from a dotted box to a solid gray box, with a thicker plus sign. The baggage symbol was changed to a more realistic bag in perspective view, see figure 6.44. Once the bag attributes have been added to a tag, a small "X" appears in the corner of the baggage image, so that the user can empty the tag again.
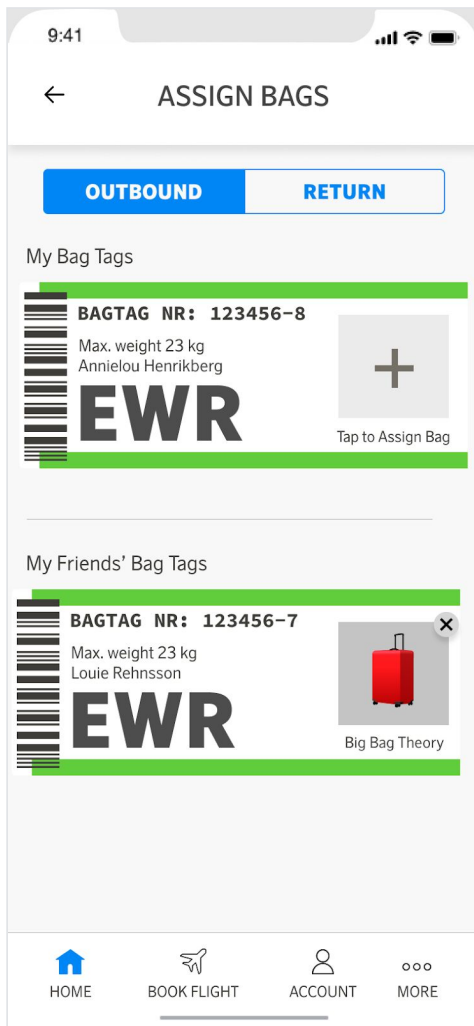
Figure 6.43: Assign Bags view, with bag tags. Authors' own copyright
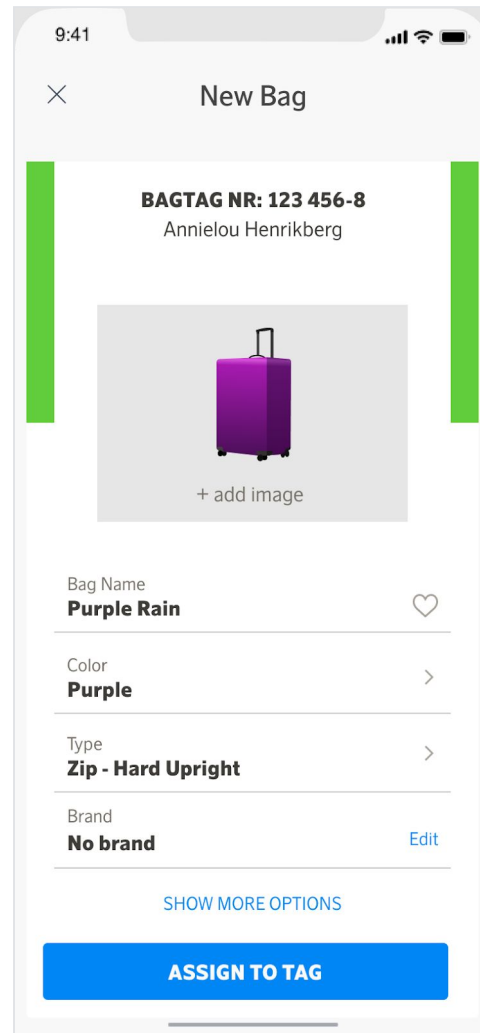
Figure 6.44: Assigning baggage attributes to a specific tag. Authors' own copyright

The "Take control" button when a baggage is delayed does no longer appear in the timeline, as it is displayed in the to-do list on top of the view, see figure 6.45.
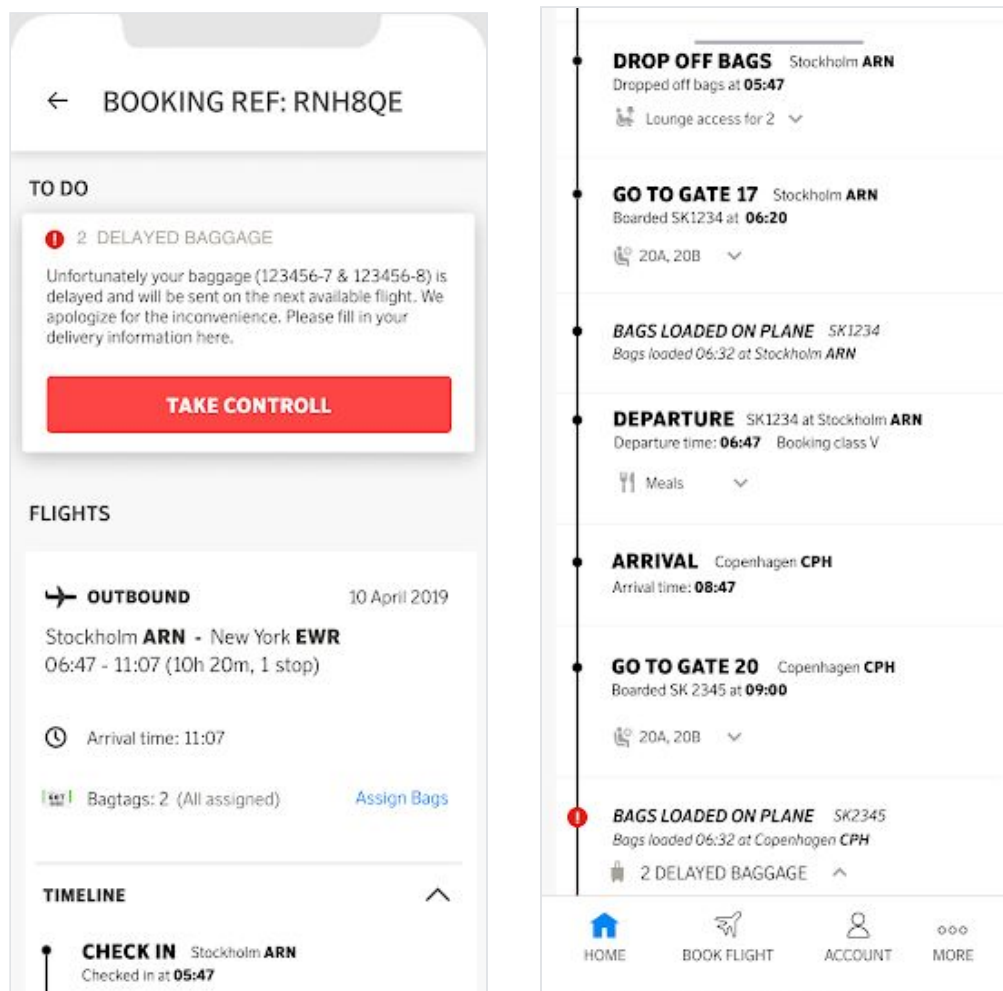
Figure 6.45: First and second part of the timeline, which shows a small delay notification, and the take control button is in the todo list on top. Authors' own copyright.

In the three-step reporting process, most changes were made in the delivery and compensation screens. The "Add temporary address" button was added on top of each baggage card, and the home address was written more like a summary, although it is still editable, see figure 6.46. The compensation view changed focus from the free gift to information regarding the compensation for expenses made due to the delayed baggage, see figure 6.47. The free gift will instead appear in the to-do list after submitting the report, see figure 6.48. When submitting, the user will return to the booking reference view where they will receive a toast that their submission was successful and a summary of the delay information.
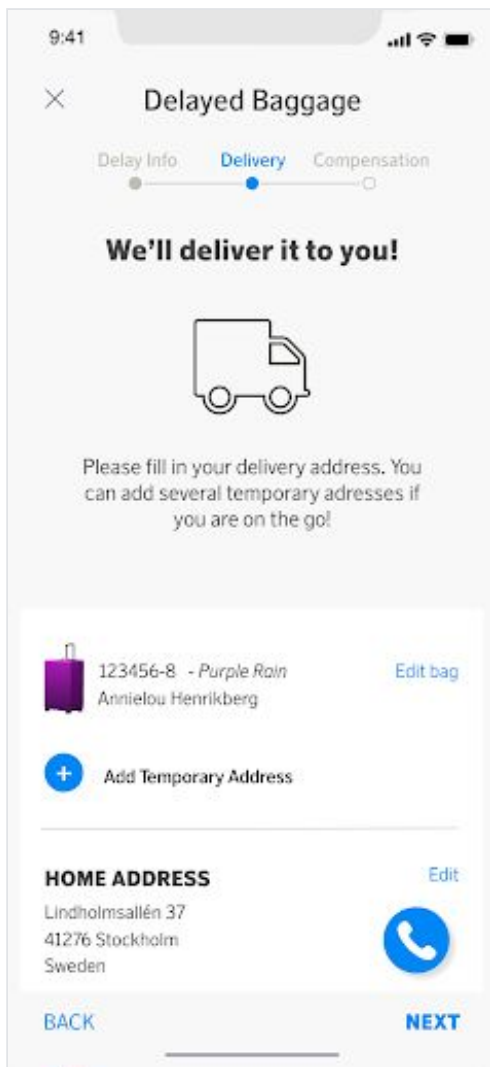
Figure 6.46: The delivery address view. Authors' own copyright.
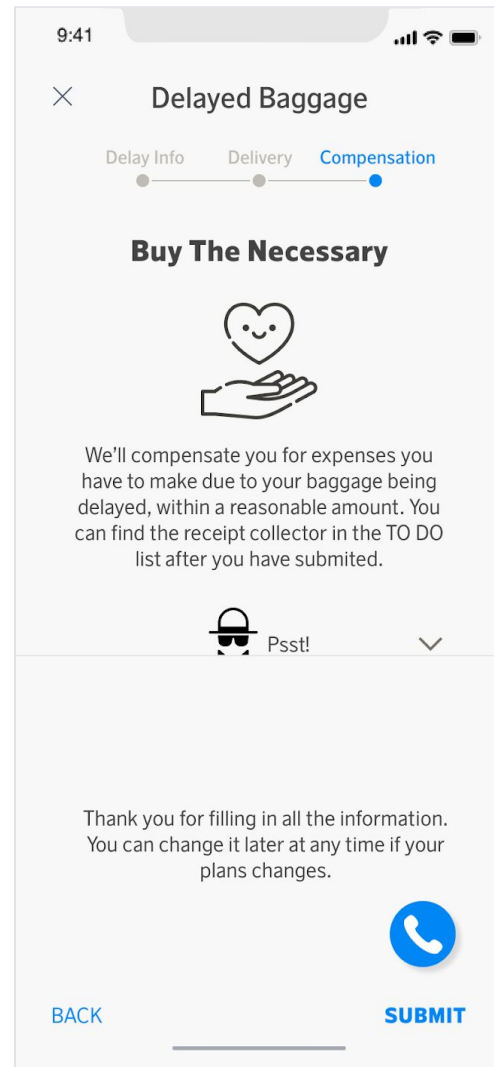
Figure 6.47: The compensation view. Authors' own copyright

The receipt collector only went through minor label changes and the information regarding what compensation the traveler can expect was changed from a dropdown to a link, see figure 6.49.
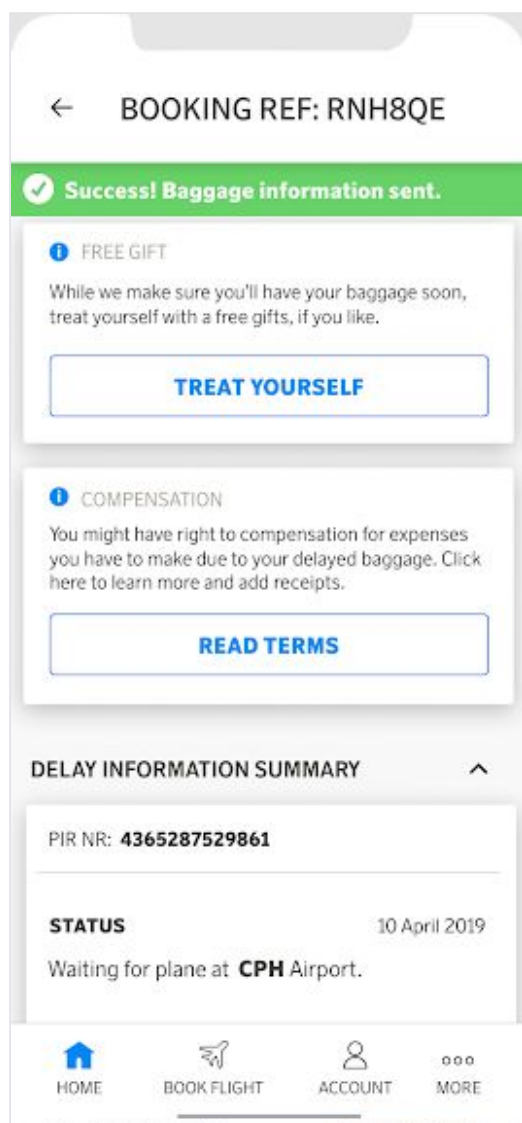
Figure 6.48: The delay summary and free gift appear in the booking view. Authors' own copyright.
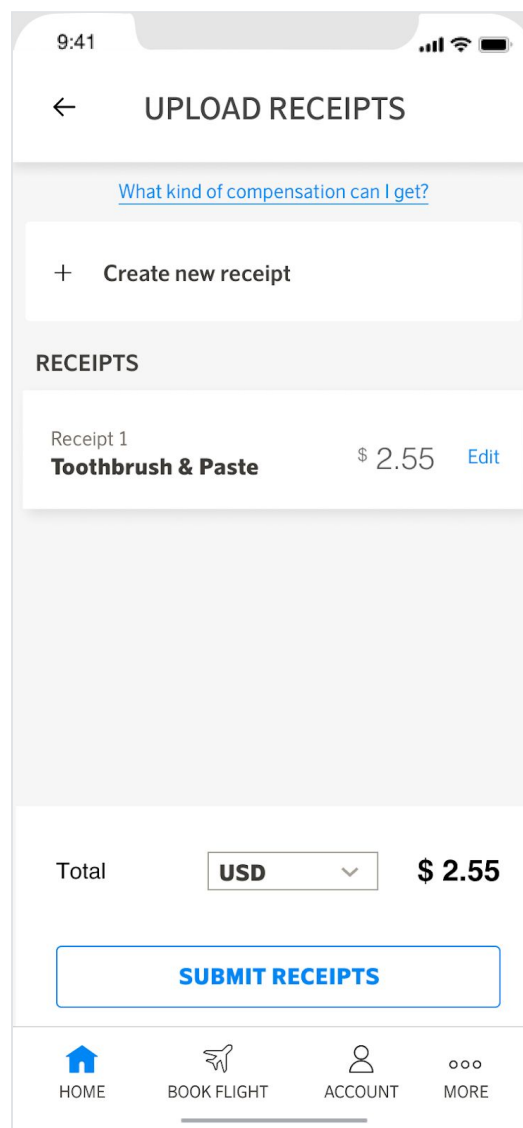
Figure 6.49: The receipt collector. Author's own copyright.

6.4.8 Usability test 3

The result from the second Usability test showed that the emotions had gone from positive to negative and back to positive, as was anticipated. Therefore, the third usability test did not include any questions about the emerged emotions. This test followed the same structure and scenario but the participants did not have to think aloud what they thought the next step would include in advance. Now they were simply given tasks to solve, still thinking aloud. The complete test structure can be found in appendix 9.

An interactive prototype made in Figma was used during the test and the participants were all members of SAS' EuroBonus membership and recruited by SAS as well. The test followed the same structure that SAS uses in all their usability tests. These are written so that it could be performed by multiple test leaders. It included a short introduction

with the purpose stated and notes to the test leader. The usability test was a part of a larger test where other SAS functionality was tested as well. To ensure that the structure of the test was optimal, one pilot test was performed and a preparation meeting was held at SAS. These lead to minor changes in the design and the test. To fit the rest of the SAS' test, the wireframes were revised so that all prototypes tested could be a part of the same scenario. This lead to only testing the discovery part when the tester finds out about the delayed baggage as well as upload a receipt.

It was a total of 9 tests that were held during two days. They were held in a conference room at Café&Co in Stockholm. The test contained three smaller tests that all were fitted into a scenario started from booking a flight, the check in flow, bid on an upgrade and lastly the delayed baggage test. Each test was held by one test leader and one notetaker. A program called lookback was used to record both the screen and the testers reactions and facial expressions. This also allowed following the test remote as it was recorded live. The notes taken during the test was done in a Google Form and was prepared with input fields for the different parts of the tests. Before the test began, the participants were asked to sign a consent form stating that they were okay with being recorded.

The third usability test revealed that the structure in the prototype was good and that it had a good flow. The testers navigated their way through the tasks and the interface without any problems. Although there were a few places that the tester got stuck, these were mainly where there was a lot of text displayed in the interface - specifically the compensation view. A majority of the testers looked for a number saying how much compensation they could get and did not find it clear that there would be more information about this later.

One interesting insight from the tests was that all had experienced a delayed baggage earlier and they all expressed that this way of finding out was a lot more positive than waiting by the belt to find out. The testers liked that the process had been digitized and that the number of steps in the report had been reduced.

> *"Oh, this is fun! How can they know about this already?"*
> \- Test 2

"I feel safe! They're gonna fix this, this is really positive"
\- Test 1

> *"Then you don't have to stand and wait by the belt and get pissed off"*
> \- Test 2

They also liked the receipts functionality. The feedback was that this was a great feature that should have been available a long time ago. It was expressed that there was anxiety to lose the receipts for the necessary items that they had to buy and that this solution would ease their mind since they could add receipt directly and then throw away the physical one. This was the first time that the button *create new receipt* and *submit all receipts* were tested and the response was positive. Many of the testers thought that the *submit all receipts* button meant that they would send in all receipts at once and

that they should wait until they had all their receipts added, after receiving their baggage. However, there was a hesitation about this and it seems like they were guessing about this feature and not being 100% certain. Therefore, this feature should be revised and possibly add more information or add a step after submitting all receipts that say that this will close the case.

There were mixed opinions regarding the spy icon saying *"Psst"* in the compensation view. On one hand, some of the testers considered it to be fun and lightening up the mood, as well as bringing extra focus to the information within. On the other hand, there were testers who became annoyed by having to make an extra click, finding it whimsical and feeling as the information is hidden.

> "That was unnecessary. It feels like someone is trying to be whimsical."
> - Test 9

6.5 Deliver Phase

The last phase was the deliver phase where everything was completed and turned into deliverables, ready to be handed over to SAS. To finalize the requirement list, the previous list was revised by going through each requirement one by one. The requirements were also discussed to see if they had been fulfilled or not. If it had not been fulfilled then it was either revised, removed or labeled as future work.

This phase also consisted of defining the major pain points based on the results of the usability tests. It was easy to spot which pain points made the biggest impact on the experience and was most prioritized to reverse. Based on the pain points and the usability tests the concept was revised one last time - creating the final concept. This was then evaluated based on the final requirement list as well as on the general design guidelines in the theory chapters regarding *transient posture, mobile design, gestalt laws,* and *accessibility.* The last step in the process was to formulate guidelines based on the pain points and how they could be addressed based on the findings from all the usability tests.

7. Result

This section contains the final thesis result. As stated in the process chapter, this is the final phase of the double diamond and the deliverables of the thesis. The deliverables include the final requirement list, major pain points and the final design for the app. Lastly, the design guidelines for delayed baggage experiences are presented.

7.1 Final Requirement List

The final requirement list is presented in figure 7.1 with the highest ranked requirements, for full list see appendix 10. The requirement list does not bring up standard design and accessibility guidelines, although this has been considered during the design process and implementation. The requirement category that received the highest rank were those that are connected to the delay in baggage information and how it should be implemented in the system, which is similar to the first version of the list. This is also the category that has the highest number of requirements as many emotions and requests appears from the user in the discovery moment.

The requirements with lower ranks are requirements that are either not highly prioritized by the travelers or have lower feasibility than the others. Some of them also need more investigation before being implemented such as if the crew should be able to receive information about the delay, and what possibilities they have to reverse the travelers' negative emotions. Another requirement that received a lower ranking was that the system should offer the possibility to add a packing list. This is based on the findings from the discovery phase that revealed many of the respondents did not feel comfortable adding that type of data into the app unless it is necessary. Therefore, it is still a feature that should be available at least after 48 hours when the passenger needs to provide packing details so that the baggage can be identified.

Problem/Fact	Requirement	Sub-requirements	Rank	Included in final design
Pre-flight				
The traveler should not have to manually add baggage to the system after booking	The system shall visualize all the baggage connected to the booking	For both the outbound and the return journey	**4**	Yes
Travelers often use the same baggage for many travels	The system shall provide a way to store baggage information for future travels		**4**	Yes

74.7% wants to be able to see baggage status info during travel	The app shall provide a way to view the baggage's journey	* Dropped off * Loaded on plane * Check out and in for customs * Belt arrival * Delay information	**5**	Yes
Discovery				
The traveler finds out about the delay after waiting by the belt	The system shall give delay notification upon arrival. The information is always available in the app for the traveler to see the status at any time.		**5**	Yes
Travelers need to report the delay themselves	The system shall initially allow filing a report without specifying baggage attributes		**5**	Yes
The system might not have access to the delivery address	The system shall ask the traveler for delivery address in conjunction with the delay notification		**4**	Yes
Travelers location might change over time	The system shall provide the option to add multiple temporary delivery addresses	"Valid until"	**4**	Yes
Travelers on their return flight have reduced rights for compensation.	The system should be able to recognize if the traveler is on an out- or homebound journey.		**4**	No
Travelers' first thought might be that the baggage is lost	The system shall reassure the traveler that the bag is not lost but delayed.		**4**	Yes
Delayed baggage leads to dissatisfaction amongst travelers affected	The system shall supply immediate compensation to the traveler.	Maximum three options. Examples: Eurobonus, Lounge, Fast track, upgrade, free kit, taxi, food stamps, climate compensation	**5**	Yes
Travelers want to know where the baggage is located	The system shall provide immediate information about **where** the baggage was scanned last		**5**	Yes
Travelers want to know the reason their baggage is delayed	The system shall provide information about **why** the baggage is delayed		**4**	Yes
Travelers want an estimated delivery time	The system shall provide estimated time of		**4**	Yes

	delivery.			
Travelers do not know what is ok to buy	The system shall provide information as soon as possible about the traveler's rights for compensation		**4**	Yes
If the baggage is already on the next incoming plane, the traveler does not know if they should wait	The system shall show the estimated arrival time of the incoming plane, so the traveler can choose to wait for their baggage		**4**	No
Customer Care				
Some do not want continuous updates about baggage status	The system shall only send out relevant notifications	* Found * Arrived at airport * Picked up by delivery comp.	**4**	Yes
Some travelers want continuous status updates. Travelers feel like they are in the dark and do not know how the progress of their baggage is going	The system shall provide a visualization of baggage journey till delivery	* Still looking * Found * Loaded on plane * Arrived at airport * Delivered to delivery comp. * Delivery address	**5**	Yes
Sometimes the baggage needs to be identified by its appearance	The system shall ask for a description of the baggage, if it is not already available	If multiple bags or If bag search > 12 h Color, Shape, Brand	**4**	Yes
Sometimes baggage needs to be opened in order to identify the owner. Sometimes the baggage tag can be torn off	The system shall ask the traveler for a description of content information, if it is not already available	If delay > 42 h	**4**	Yes
The travelers do not like to keep track of the receipts and fill in claims when they get home from their trip	The system shall handle continuous receipts collection and handling	* Sum * Image * Items * Currency	**4**	Yes
The travelers do not expect the compensation will be received until it is confirmed	The system shall provide instant feedback if a purchase is accepted for compensation	Immediate accept or rejection	**4**	No
Travelers might forget what compensation they can get	The system shall offer information about what compensation is available until report is closed		**4**	Yes

General Information				
Travelers are expected to do certain things in a certain order	The system shall give hints on what the user should be doing next		**4**	Yes
Travelers want to receive an indication that their information is saved and sent	The system shall give modeless feedback that entered information is saved		**5**	Yes
Travelers might be reluctant to proceed with delay process	The system shall encourage the user to complete tasks		**5**	Yes

Figure 7.1: Final requirement list with the highest ranked requirements. Authors' own copyright.

7.2 Major Pain Points

There were several user pain points identified. They began to form in the definition phase and have been the building blocks of the following phases. They have been iterated throughout the project and used in the workshops as well when designing the concept. The major pain points identified are listed below and are based on all the problems and facts that were described in the final requirements. It was a total of six pain points that was identified as the most important one to consider when designing. These six pain points cover most of the problems found during the entire user journey from discover to deliver.

- **Location Unknown**
  Travelers are nervous about not knowing where the baggage is when traveling. The first thing that comes to the traveler's mind when discovering the baggage is delayed is *"Where is it?"* Control freaks are also nervous about their baggage location the entire trip.

- **Discover by Waiting**
  It is not desirable for travelers to find out about the delay after waiting by the belt.

- **Responsibility**
  Travelers do not want to report the delay themselves, and feel as there is a lot of responsibility put on them.

- **Negativity**
  Travelers feel strong negative emotions when discovering their baggage is delayed. This is increased further as they are forced to go through a long manual reporting process.

- **In the Dark**
  Travelers feel like they are in the dark when information about their baggage status is not available. This leads them to feel that the situation is out of their

control.

- ***Compensation Hassle***
  Travelers do not like to keep track of receipts and are unsure of what is ok to buy. This also leads to many calls to customer service.

These were considered to be the pain points of highest priority since they were expressed in both interviews, surveys, workshops and user tests. Many of the respondents, participants, and testers shared the same experiences and were concerned about the same issues. Therefore, the pain points above are considered the be the areas with the highest possibility of creating a large positive impact on the user experience, should they be addressed. When the final test was done, the features that fulfilled the pain points were also the ones that received the most positive response, such as the delivery of the delay information.

7.3 Final Design and Evaluation

Based on the two major personality types that were identified, there are several different usage flows in which the app can be explored, whether you are a *Control freak* or a *Happy fool.* The app follows a transient posture as this is an application that the user uses on the go and for a short period at the time. As Cooper et al. (2014) suggest, the interface uses clear language that explains each functionality in an intuitive way. An example of this is the large buttons with clear labels, which are used throughout the entire interface. The labels encourage user actions and hint the next step. Furthermore, the app uses bold colors to highlight features of importance, such as buttons, toggles, and links. To increase accessibility, no buttons look disabled. If the user tries to tap a button without filling in the required information, an error message with suggestions will be presented to guide the users. This helps users that have limited cognition. When it comes to navigation, there is a bottom navigation bar, as well as a complementary top bar that contains the title of the view and a *back* or *close* button, see figure 7.2. The app does not use actions that require fine manual manipulation, as this can be difficult for users with limited motor skills.

The first part of using the interface consists of the user entering information about their baggage and connecting it to their bag tag numbers. This can be done prior to the flight, but also later at any stage of their journey. This feature is located within each specific booking, which can be found in the home view of the app. There is also a to-do list in the booking view, which guides the user to take certain actions, see figure 7.2. This a clear example of how the gestalt law *proximity* is used in the interface, since features and text related to each other are close to each other. One of the first items in the to-do list is to assign bags to the bag tags. Even though the user is encouraged to perform this step, it is not mandatory to fill it in until a baggage has been delayed for more than 12 hours.
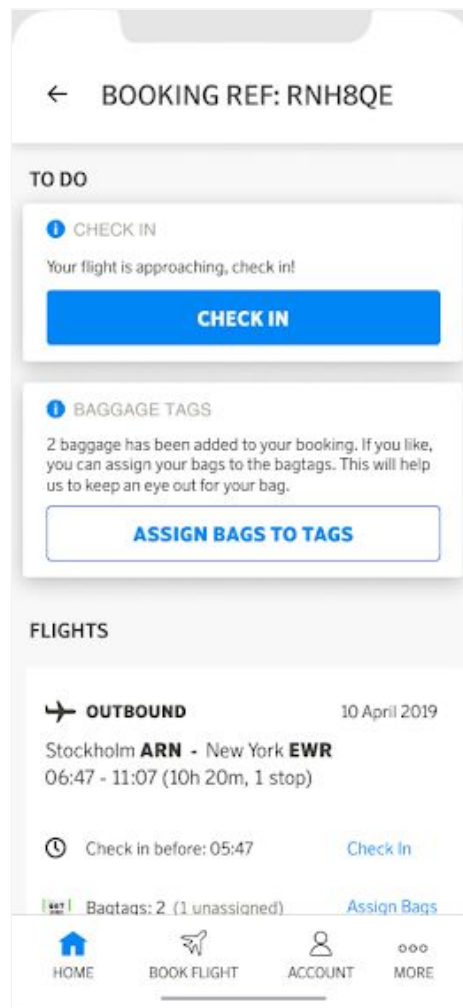
Figure 7.2: Booking view - with to-do list. Authors' own copyright.

One of the requirements were that the user should not have to manually add the baggage tags to the system, which is why the tag numbers have already been assigned and added in the app as soon as the booking is made. To show visual connectivity with the real tags, these are represented through skeuomorphism in the bag tag view, see figure 7.3. This leads to higher awareness once the users later print out their tags at the airport and place them on their baggage. Based on the requirements, the system shall also separate the baggage belonging to the user from other baggage in the booking, which is made by having two separate headlines. The baggage attributes are assigned by tapping the "Tap to assign bag" button. The user can then assign color, type of bag, brand as well as adding a photo of the bag. If no photo has been added, the system displays a visual representation of the baggage attributes that have been selected, see figure 7.4.
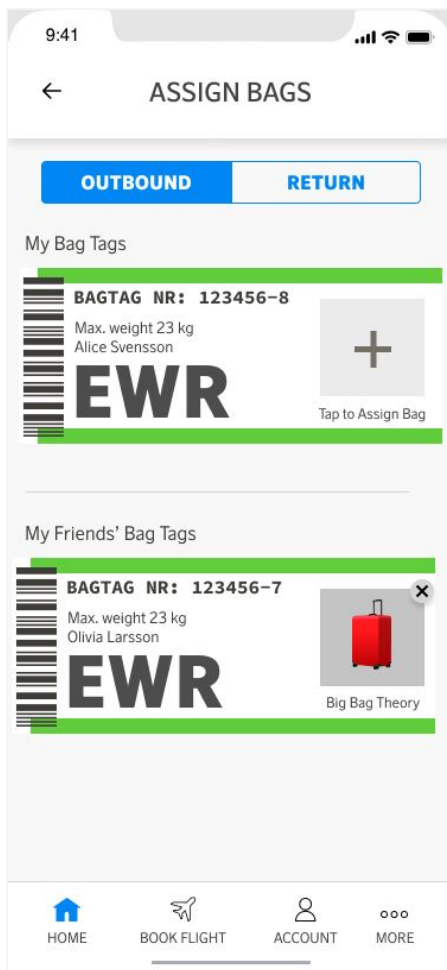
Figure 7.3: Assign bag view. Baggage attributes are assigned to the different tags. Authors' own copyright.
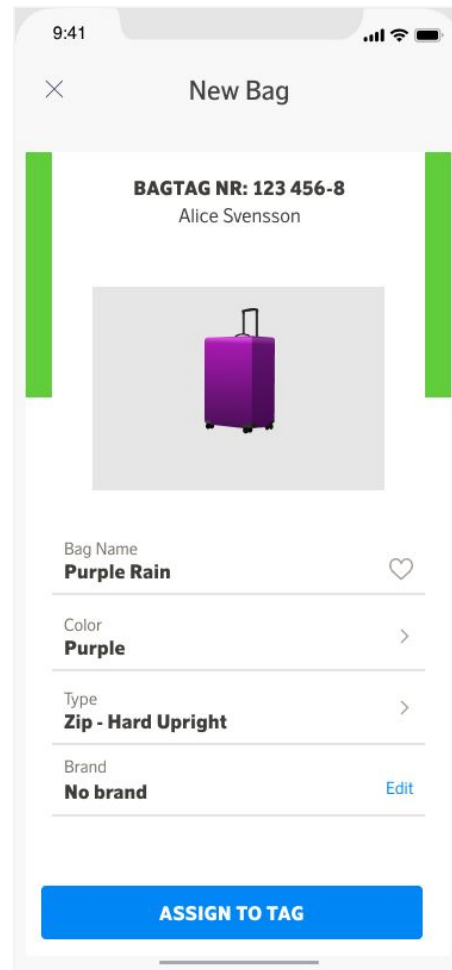
Figure 7.4: The image of the baggage changing to match the attributes that has been added by the user. Authors' own copyright.

A view that has not been prototyped yet, but is still included in the concept is the *my baggage* view, which is located under *account* in the bottom navigation. This view contains all the baggage that has been saved by the user, but they can also choose to create a new bag. One requirement related to this is that the user should be able to create a bag based on their carry-on bag. Sometimes carry-on bags are forced to be checked in by the gate, and if this happens the user can quickly connect the new bag tag provided by the gate with their previously created carry-on bag. This also enables the user to reuse their bags for future trips, by not having to enter all the information each time.

Another feature, which accommodates both behavioural types, is the timeline view, see figure 7.5. This view shows detailed information for those who go in and look (*Control freaks)* but does not force any information upon users who are not interested (*Happy fools).* The timeline uses the gestalt law *Closure and common region,* as the information is placed within a card, which is also used in several places in the interface. Each step in the timeline also uses this law as they are separated from each other by lines, which creates one region each. This makes it easy to distinguish the information presented for each step.

The timeline shows both the steps the user takes, as well as the baggage journey, since this was requested by participants from the Usability test as well as SAS. The steps made by the airline/airport are distinguished by lighter color and a smaller, italic font, to increase accessibility and to not rely solely on color. The timeline also includes information about if the user needs to pick up their baggage and take it through customs and then check it in again.
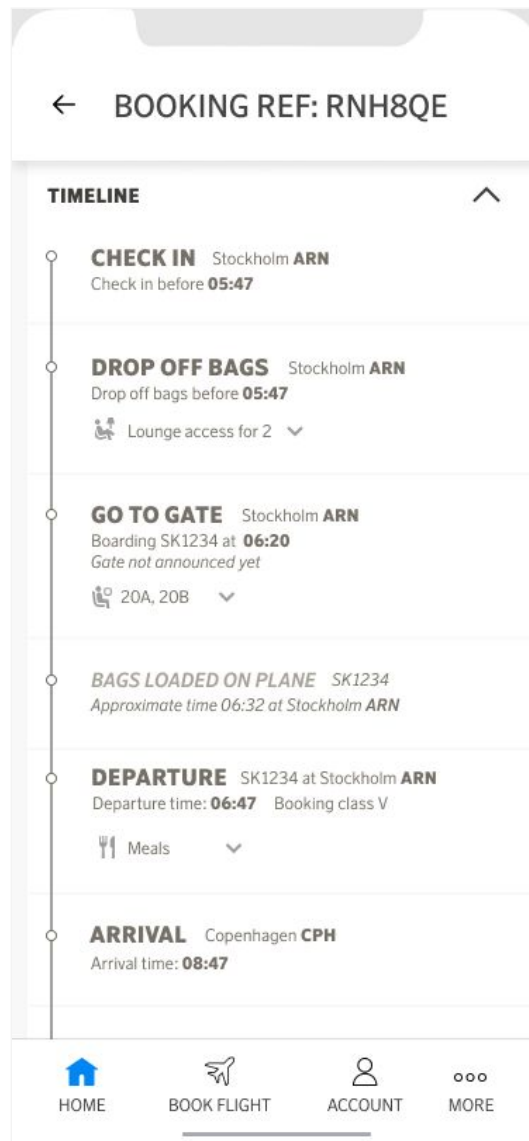
Figure 7.5: The timeline with all steps that both the traveler and the baggage makes. Authors' own copyright.

The biggest focus for the project has been the moment the traveler discovers their baggage has been delayed, and the process that follows. The discovery can happen in several different ways. As soon as the information is available it will appear in the to-do list and in the timeline in the booking reference view, see figure 7.6. However, a notification has not yet been sent, as there are some travelers that wishes to stay happily unaware until arrival. The delay notification, see figure 7.7, is sent after landing

only if a traveler have not yet checked the app. Either way, no one has to find out about the delay by waiting by the belt anymore.

A big annoyance for current travelers, described in Delayed Baggage Interview in chapter 6.2.1, were that they needed to report the delay themselves. In the final concept, the delay is already reported when they receive the information. The only thing that is initially asked for is for the traveler to enter their delivery information. The app already has access to the home address of the user, so if they are going home, this step is already pre-populated and will only need a confirmation from the user.
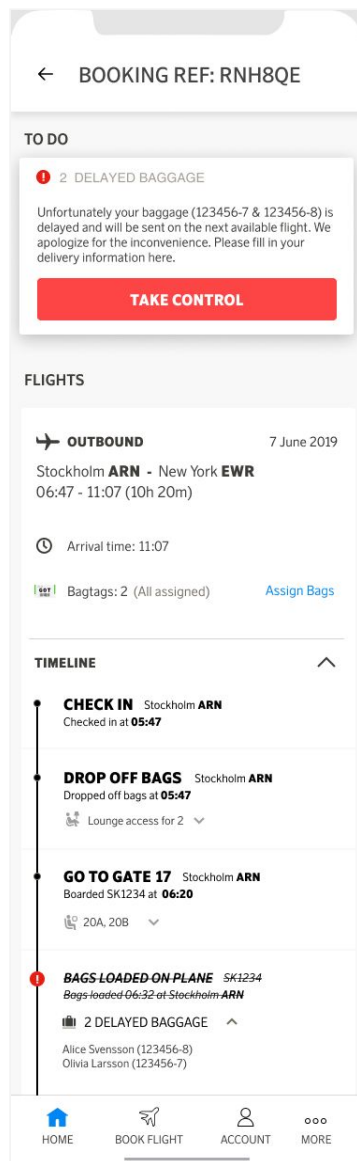
Figure 7.6: Delay information appears in the to-do list and in the timeline. Authors' own copyright.
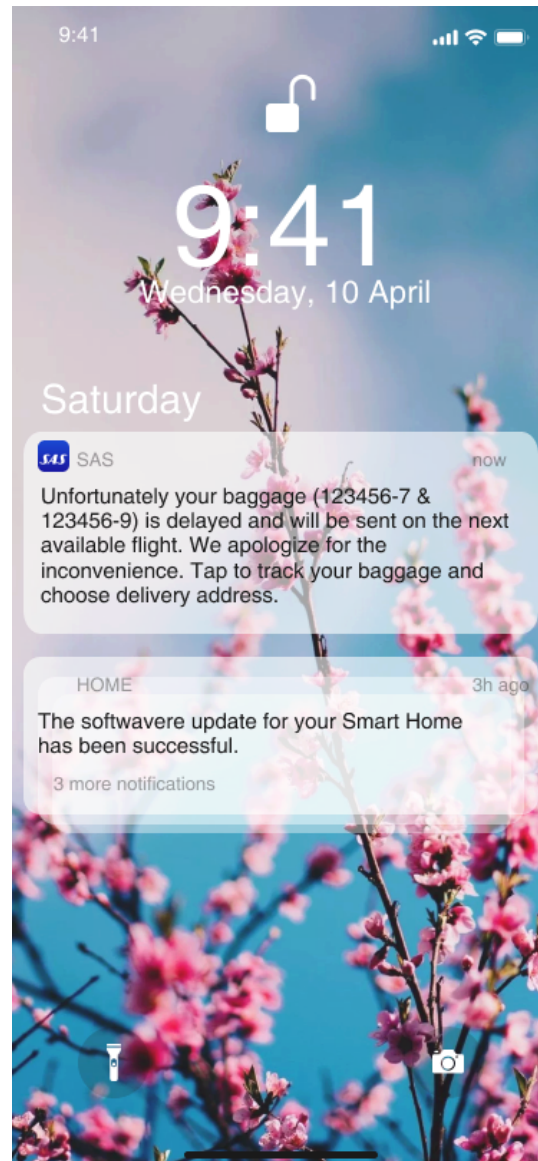
Figure 7.7: Delay notification. Authors' own copyright.

Entering the delivery address is a part of a 3-step process that is reached by pressing the *Take control*-button or the notification. This process starts with an information view, see figure 7.8, where the traveler immediately finds out about where their baggage is, when it is expected to arrive and possible reasons for delays. After the third usability test, it

was stated that the PIR (Property Irregularity Report) reference number should be visible in this view and was therefore added. Even though the requirements state it should specify the exact reason of the delay, this information is difficult to specify today, and when providing the testers with vague information, they were just annoyed. The information view led to the user feeling in control and knowing that the baggage is not lost, just delayed. The user then continues to the delivery address view, see figure 7.9. The home address is always prefilled if the information is available, and the user can choose to add one or several temporary addresses on the go. After entering a temporary address, the user can also choose to copy this to the other delayed baggage in the booking.

The last step is the compensation view, see figure 7.10, which gives quick information that the user can later submit their receipts to receive compensation for expenses made due to their delayed baggage. The 3-step process also have a floating button for contact/chat, if needed.
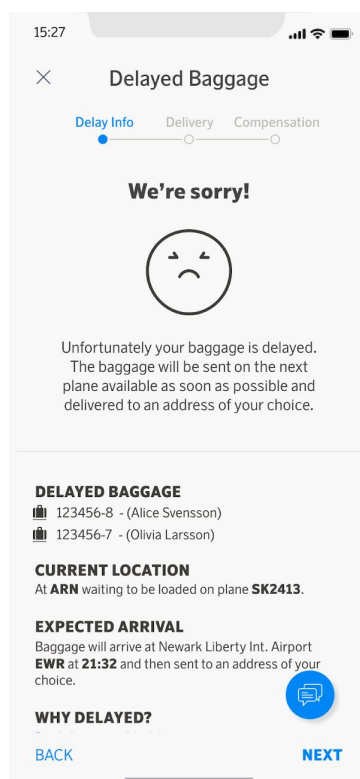
Figure 7.8: Delay information view. Authors' own copyright.
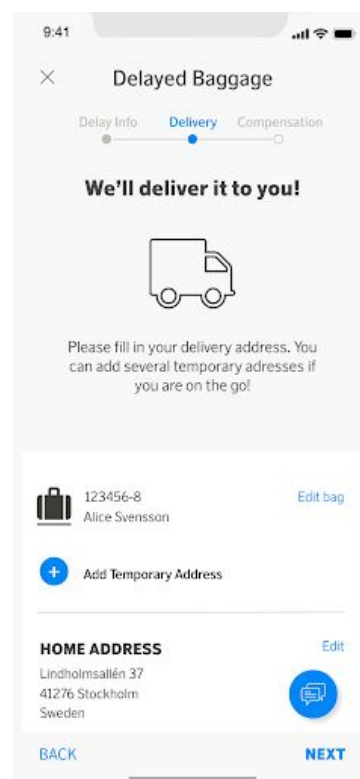
Figure 7.9: Delivery address view. Authors' own copyright.
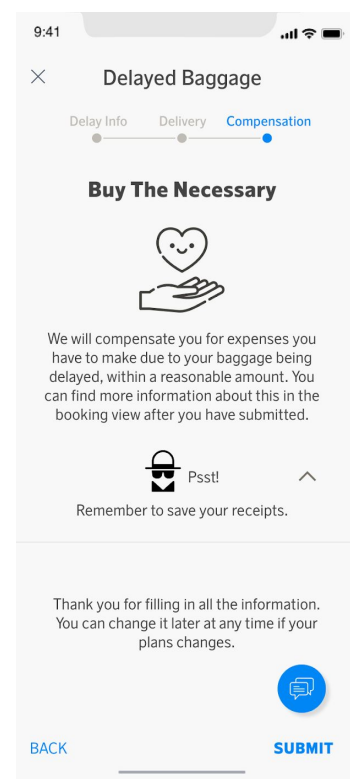
Figure 7.10: Compensation view. Authors' own copyright.

Another top ranked requirement is that travelers should receive immediate compensation for the delay. In the current situation this is done by the arrival service handing out a free kit when the traveler have reported their bag missing. Since this is difficult to do in the app, the user receives a small gift instead. After submitting the 3-step process, a *treat yourself* card will appear in the to-do list. When entering the gift view, see figure 7.11, the traveler can choose one of the following free gifts: *1000 EB points*, *Climate compensate* or *One-time access to SAS lounge*. A note above the button states that the gift is personal and cannot be changed after selection.
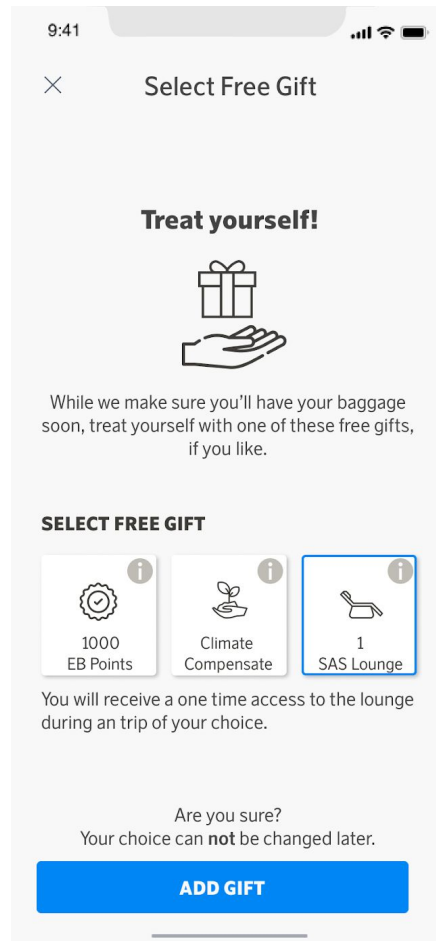
Figure 7.11: The free gift view. Authors' own copyright.

After submitting the 3-step process, a new card also appears in the booking reference view with a summary of the delay details, such as the PIR number, the delivery details, and a link to assign attributes to the delayed baggage, see figure 7.12. The new route for the baggage also appears in the timeline, see figure 7.13. No notifications are sent out unless new information is available, such as the baggage arriving at the airport or picked up by the delivery company. If the baggage has not been located after 12 hours of being delayed, the user is asked to fill in the color, type and brand of their bag if this has not already been done previously, see figure 7.14. Only after delays longer than 42 hours, the user is asked to fill in information about the content of their bag. If a baggage has not been located within that time, it can be assumed that the tag has been torn off and it must then be identified through its content.
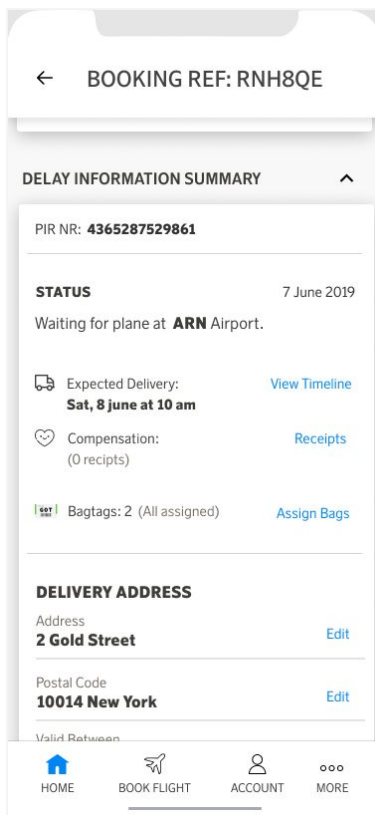
| Figure 7.12: The delay summary card in the booking view. Authors' own copyright. | Figure 7.13: The updated timeline in the booking view. Authors' own copyright. | Figure 7.14: Notification asking the user to fill in their baggage attributes. Authors' own copyright. |
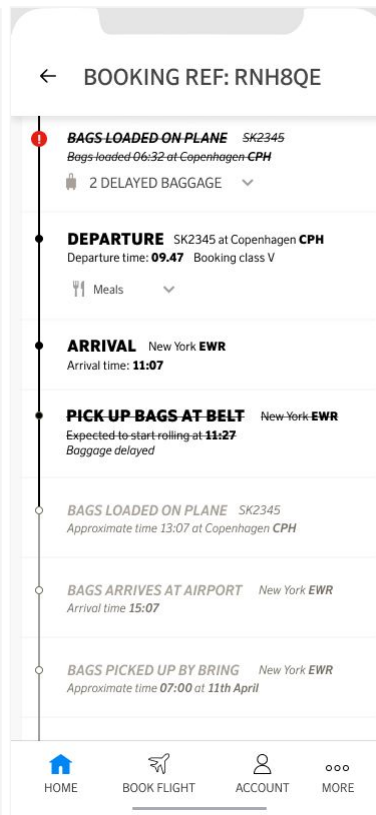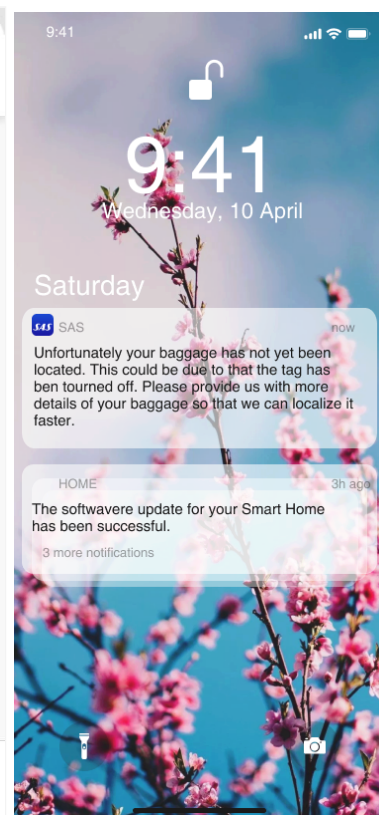
As was discovered during the discover phase, travelers do not like to keep track of their receipts and would prefer submitting their receipts continuously. A card for collecting receipts appears in the to-do list, which leads to a view where the user can read more about the terms when it comes to compensation, see figure 7.15. After reading the information, the user reaches the receipt collector, see figure 7.16. This is a view were the user can upload their receipts by adding an image of the receipt, and then specify the items, currency and amount, see figure 7.17. Once all the information is filled in, it is possible to tap on the "Add to receipts" button which takes the user back to the receipts view. When all the receipts caused by the delay is added and the bag has been retrieved, the users submits all their receipts together by tapping on the "Submit all receipts" button.
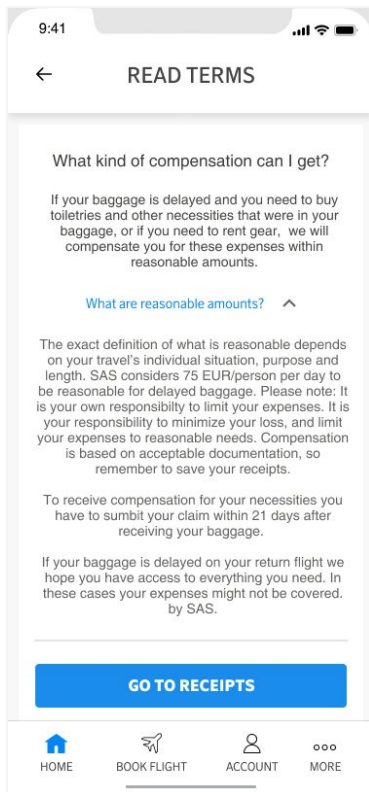
Figure 7.15: The compensation terms. Authors' own copyright.
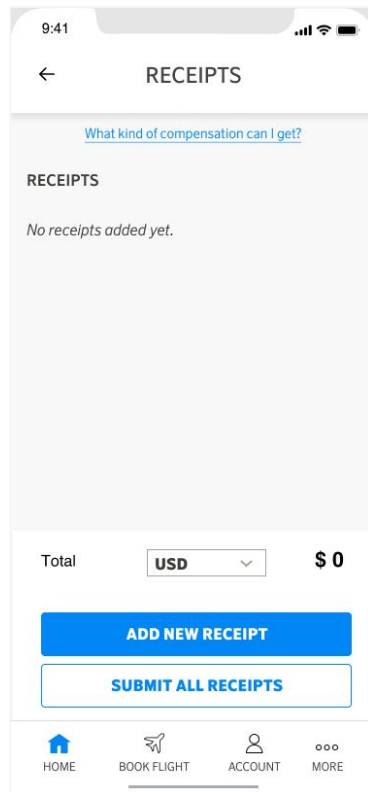
Figure 7.16: The receipt collector. Authors' own copyright.
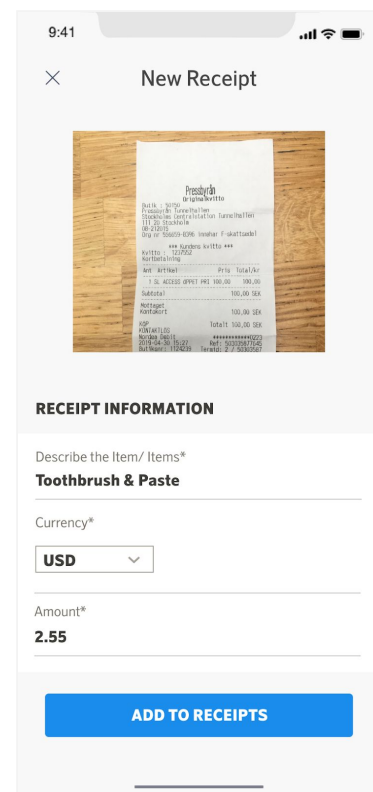
Figure 7.17: Adding a receipt. Authors' own copyright

Since everything is saved immediately in the app, the app uses toasts whenever the user enters new information, to indicate that everything has been saved. An example of this can be seen in figure 7.18, which relates to Cooper et al.'s (2014) guidelines regarding immediate feedback. Since the app is made for handheld devices, it follows the proposed gestures of Cooper et al. (2014). There are two main gestures used in the app: tap and vertical scrolling through swipes.
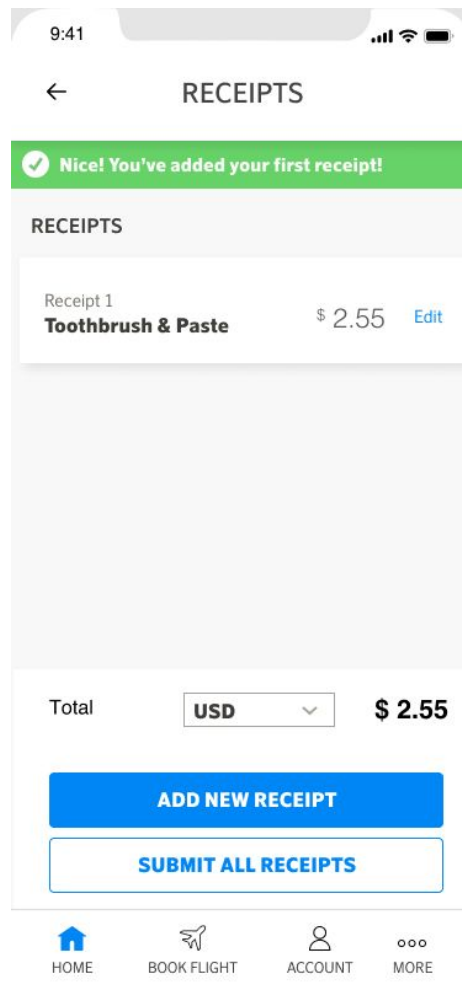
Figure 7.18: Example of a toast. Authors' own copyright.

7.4 Design Guidelines

The guidelines are one of this thesis main deliverables and are general and applicable for the entire airline industry. These can be used as an ideation tool to solve different scenarios for the travelers. The guidelines are presented below.

- ***Provide Real Time Baggage Location***
  The baggage location status should be available for the traveler at any time.

- ***Provide Immediate Delay Information***
  As soon as the information about a delay is available it should be visible for the users. This will accommodate the Control Freaks as they can see the status and the Happy Fools can receive this information in their own terms.

- ***Take Responsibility***
  The airline should be responsible of filing the property irregularity report (PIR). The user should initially only be asked to enter their delivery address. Filing in information about the visual appearance and content of the baggage should only be requested when it is needed.

- ***Reverse Negative Emotions***
  By showing that the users are cared for by providing them with a free small gift, information about the delayed baggage and updated timeline.

- ***Provide Status Updates***
  After a report has been created, the traveler should be kept updated with information about their baggage status. The traveler should be able to see the location and estimated arrival time, as well as the expected steps the baggage will take.

- ***Ease Compensation***
  Provide a way for the users to continuously add receipts. There should also be information about what is okey to buy.

8. Discussion

This chapter contains a discussion about the thesis. It discusses the process, the thesis deliverables and ethical dilemmas to consider when designing a service and interface. The biggest challenges, possible sources of errors and potential opportunities for improvement are also discussed. Finally, it brings up future work to consider that was not included in this thesis but could potentially affect the experience positively as a whole.

8.1 Thesis Process

The thesis process contained many challenges along the way. Early challenges were to find research related to the topic of delayed baggage. Many reports contained information from the system's point of view about why delays happen and what can be done to avoid it. However, very few studies have been done based on the user's point-of-view, that is, how they experience the delay and what can be done to improve their situation. Thus, the user experience regarding delayed baggage was an unexplored territory.

When the thesis entered the discovery phase, one challenge that emerged was to find participants for the interviews. As the selection for the interviews was based on the criteria that the participant must have experienced delayed baggage previously, there were difficulties finding participants that were diverse in other ways. There were representatives for ages between 23-59, both men and women, as well as people experiencing the delay on inbound/outbound travels, with friends, alone, with a partner or with family, which means there was a mixed selection. However, the selection could have been even broader, as all of the participants were Scandinavian and some had experienced the delay a long time ago, which means the data might not be applicable or not remembered correctly. If the interviews had been the only way through which data about the current experience was gathered, it could imply that the reliability of the data was low. However, when continuing the study with the help of experts, the survey, workshops, shadowing, and airport observations, the data could be confirmed. Therefore, it does not seem that the data gathered was a convenience as it was confirmed continuously through the different phases of the thesis. This presumably means the study has high reliability.

As stated above, the main thing that might affect the reliability negatively is the lack of data from users with non-scandinavian background, perhaps making the result applicable only in Scandinavia. Further studies and tests could be made in order to test the deliverables on people with other nationalities as well. This could bring up differences in how people see on personal properties and owning. Also, the validity can be considered high as the study collected the intended data.

A big challenge in the define phase was to narrow down all the gathered data and structure them in an intuitive way. Several iterations were made until a first version of the pain points could be defined. The difficulties continued when the pain points were then to be turned into a system architecture and formed into requirements. It was

difficult to understand the hierarchy and what belonged together. To solve this, the system architecture was mapped out on a whiteboard, discussed through the workshops, and then changed numerous times along the way to make it more comprehensible.

When designing the prototypes, it was tricky to keep the design in alignment with the SAS Design System, as the concept contained many new functionalities. There was also no clear vision for the design of the app, as SAS expressed that the interface would be redesigned later. This made it difficult to find a good position for the features in the app, as well as finding a coherent design system. Another consideration was regarding rich emotions. From a master's thesis view, this is something that could have been explored further and taken more over the top. However, from a business perspective, it was kept at a moderate level to not offend the user by emerging extreme emotions that can be seen as over the top and keep it at a professional level and embrace the seriousness of the situation.

As stated in the Process chapter, UCD has been one of the major focus points in this thesis. The user has been the center of attention throughout the entire project and was involved through interviews and user tests etc. The participants have always been real potential users. The only phase where they did not participate as much was in the development phase, where they could have been involved more through co-creation workshops. Nonetheless, they were still the priority in this phase, even though other stakeholders played a bigger part such as the design team at SAS and the expert within the field of designing for emotions.

The agile approach that this thesis has followed allowed us to review what we had done the previous week, and to get a clear overview of the current week's main goals and tasks. At the end of the project, the agendas were replaced by a todo-list which included a long list of all tasks that needed to be done that particular week. It was still agile, but not as strict, which worked well as there were only a few tasks left to-do.

8.2 Thesis Deliverables

The deliverables have been the major result of the thesis. It contains the different pain points, design requirements, an interactive prototype and recommendations for future work and for an MVP. The pain points were first introduced after the affinity diagram and had been an important building block for the work that followed such as ideation with a rephrasing of the pain points into the how might we questions. This was specifically helpful during the two workshops and the crazy 6.

The interface was iterated in multiple steps of the process and was refined during the entire development phase. It contained several functionalities that were proven to be intuitive for the users, such as the "assign attributes to a bag". However, some choice of words would need to be reviewed, such as the *To-do* and the *Take control* label on the button for delayed baggage as this could imply that the responsibility lies on the users, as is the case in the current process. Furthermore, the *Take control* button could also imply that the responsibility to retrieve the bag is on the user. This contradicts the requirement that the users should not be the one who reports the delay. However,

there were not a lot of testers that responded that this was an issue or that they felt that more responsibility was put on them. On one hand, the *to-do list* was chosen since this would be actions that the users actively have to take or suggestions of actions, such as the check in and assign baggage attributes. On the other hand, the to-do headline could be removed, but still use the *To-do* cards. This is something that needs to be tested further.

Another feature of the interface that caused confusion, frustration or stopped the flow were the views with a lot of text on them. It was clear that the testers wanted to understand what it said but that it was frustrating that they could not find the information that they were looking for fast. It should probably have been revised and important information or certain information that they were looking for should have been more prominent and distinguishable from the rest of the copytext. One clear example was the compensation page with the terms for compensation. There, it is stated what type of compensation they can get and an approximate amount. The specific amount could have been easier to spot than it was in the prototype. Another insight from the user tests was that some of the testers thought that the delay information view with the sad face and the copy "*We're sorry*" was either funny or a bit unnecessary. They further thought that the expandable part of the compensation information view was either considerable funny and that it drew the users' attention or that it was considered mocking them and that it was intentionally hidden so that the users would not find it.

One of the requirements that did not get implemented was the way of knowing if the traveler is going home or not. This is important to know since it affects the compensation rights. It could be argued that if the traveler is on their return flight then they are going home. However one scenario could be that the traveler has booked a flight from one place and back but needs to take a several hour long bus ride to their home and perhaps stay one night before that. So it is very hard to know when a traveler is on their way home or not. Although, in a majority of the cases, this will be the case. Another feature that was not implemented or tested was the option to wait for the delayed baggage at the airport. This is something that was thought of but was not tested as it did not fit into the scenario. It could also be strange to give the option to wait several hours at the airport. Nevertheless, this is an important feature that should be included in the interface when the technology is available.

Another feature that was discussed a lot in the beginning of the project and brought up as an issue by the duty coordinator at Arlanda Airport was the fact that there is no way of knowing 100% when to close a delayed baggage case. There is no functionality implemented in the final concept where the user has to confirm that they have received the baggage, more than when they send in all the receipts. This could work as a feature for closing the case as many of the testers said that they thought that submitting the receipts equaled closing the case. However, it could be argued that they thought that they are done adding receipts and that they do not need to buy anything else and therefore submits all the receipts and thus do not realize they close the case. Therefore, travelers can still argue that they have not received the baggage. Another argument could be that the delivering company has to confirm that the traveler has received their

baggage. However, it was discovered during the interviews that this is not the case and that the delivery company does not check what baggage belongs to which traveler. If that was not the case then this could be a way of closing the case.

8.3 Ethical Considerations

When the traveler realizes their baggage is not on the baggage belt, they feel confused and frustrated, which is something that Cooper et al. (2014) claimed is a sign of psychological harm. Another thing that causes frustration is not being updated on the status of the baggage search. This is something that was considered and improved in the redesign of the experience.

One of the biggest issues with making situations digital could be that people are excluded from the service. There are people without access to computers and phones with internet, which means that there will still be a need for manual reporting through help desks. Even though accessibility guidelines have been followed when designing the final concept, which increased usability, this will not help those who do not have access to the interface.

Another ethical issue with automatization of processes is that it could result in less social connection between humans and possibly fewer jobs. However, by optimizing the delayed baggage experience, travelers will have more time to socialize with people of their choice instead. If this is something that is important for the user, they can still choose to go to the arrival service or call the customer care service.

Some ethical issues that arise when collecting data from user studies is the handling of the sensitive data that has been gathered. It is important that the interviewees are aware of what the study is for and how their information will be used. As was mentioned in the Social Research chapter 3.1.3, an interviewed person might feel uncomfortable to answer questions which demand them to make a judgment based on their values and beliefs, which could result in dishonest answers. Those kinds of questions have been used sparingly in the study. All interview transcriptions in this report have been anonymized, by assigning them numbers such as respondent 1, to keep the participants' integrity. This was communicated before the test started, as was stating that it is the interface that is being tested and not the interviewed person.

8.4 Future Work

The exact location of the baggage is technically not available today at all airports as discussed in chapter 4.1. Therefore, the final design was seen as a visionary concept of how the situation could be solved when the information is available.

What should be done next is to perform a user story and map out all the requirements and remove the ones that is technically not applicable today, the ones that are too expensive to implement and the ones that creates the least value for the users. The only functionality that should be left should be the ones that lets to users perform tasks that

allows them to achieve the main goal and thus create an minimum viable product (MVP).

Based on the initial meetings and the study made at the airport, it is recommended that the MVP should first include the reporting functionality. This could be implemented by a card in the booking reference view asking if the user did not receive their baggage. In this step, the user then has to fill in details about their baggage such as the attributes and where they want it to be delivered. This is similar to how it works today, both in the digital interface but also when reporting it by a desk. The receipt collection was a functionality that was highly appreciated by the interviewees as this minimizes the anxiety about losing the receipts or forgetting to send them in when they get home. Therefore, this feature is something that should be available in the MVP, as well as accommodating for the free gift. The free gift was proven to be something that made the participants feel cared for and that they appreciated. This also leads to a reverse of the negative emotions felt when realizing that their baggage is delayed.

The recommended MVP is thesible today and could be implemented. However, this MVP does not solve the travelers' biggest pain point which is to find out that the baggage is delayed by waiting at the belt and discovering it there. It still solves many of the other pain points and could be considered as a good starting point when digitizing this process. Still, this is a feature that could be possible in a near future as the baggage scanning points will be standardised throughout all airports. As of today, it is only feasible in Norway, which could be a good place to start the testing.

9. Conclusion

The purpose with this master's thesis was to examine the experience with delayed baggage and from this identify the pain points for today's travelers. Based on the pain points a set of design guidelines would then be defined. The research question for this thesis was:

Based on user pain points, what design guidelines should be considered to improve the user experience for delayed baggage tracking and reporting, associated with air travels?

In order to describe the design guidelines, the pain points that they were based on must first be defined. The study identified six major pain points, the first one being *Location Unknown*. When experiencing delayed baggage, the first question that occupies the travelers mind is "*Where is it*?" This lead to the guideline of *Provide Real Time Baggage Location,* meaning that this information should be available at any time.

The second pain point is *Discover by Waiting*. Travelers do not like to wait by the belt to find out about the delay. Although, there was a diversion of when they want to find out and two personality types emerged, *Happy fools* and *Control freaks.* Happy fools wanted the information after landing and Control freaks wanted the information as soon as possible. This lead to the guideline *Provide Immediate Delay Information,* which means that the information should be available immediately, and the traveler have the option to view it or not.

The third pain point is that the traveler feel as there is a lot of *Responsibility* put on them, as they are the ones that have to report their baggage being delayed. This formed the guideline *Take Responsibility* which means that the airline should be responsible of making the report and pre-fill it with all the information already available in the system. The traveler should only be asked to enter further information when it is needed.

The fourth pain point is *Negativity* as delayed baggage is associated with strong negative feelings. This lead to the guideline *Reverse Negative Emotions.* This can be done by designing for positive emotions, turning it into a rich experience, rather than a purely negative experience.

The last two pain points, which could help reverse the negative emotions, are that the travelers feel *In The Dark* and that there is a *Compensation Hassle*, which are both related to the customer care that happens after the traveler leaves the airport. The guidelines to counteract these pain point are *Provide Status Updates* and *Ease Compensation.* The traveler should be able to view the status and location of their bag and view the estimated time of arrival. Regarding compensation, there should be an easy way of keeping track of receipts for expenses made due to the delayed baggage.

In conclusion, by implementing the guidelines, a design that enhances the experience of delayed baggage can be created, which in turn solves a majority of the travelers' pain points. Finally, it can be concluded that the results of the thesis indicate that the purpose and goal have been achieved.

References

Alsyout, I. Humaid, F. Al Kamali, S. (2014) *Mishandled baggage problem: Causes and improvement suggestions.* IEEE. Retrieved on: 2019-01-30 from: https://ieeexplore.ieee.org/abstract/document/7058619

ben Salem Dynehäll M., Lärk Ståhlberg A. (2014). *Loopa Affärsutveckling för entreprenörer.* Stockholm: Liber AB.

Benyon, D. (2010). Envisionment, Chapter 8 in Designing Interactive Systems, Addison-Wesley, pp 177-197.

Björk, L., Räisänen, C. (2003). *Academic Writing A University Writing Course.* Lund: Studentlitteratur.

Business Analytics Learning (2016). *A List of Requirements Prioritization Techniques You Should Know About*. Retrieved 2018-12-01 at:
https://businessanalystlearnings.com/blog/2016/8/18/a-list-of-requirements-prioritization-techniques-you-should-know-about

Cooper, A., Reimann, R., Cronin, D., Noessel, C., Csizmadi, J., LeMoine, D. (2014). *About Face.* John Wiley Sons.

Dam, R., Siang, T. (2018c). *How to Select the Best Idea by the end of an Ideation Session.* Retrieved 2019-01-04 from:
https://www.interaction-design.org/literature/article/how-to-select-the-best-idea-by-the-end-of-an-ideation-session

Dillingham, G. (2012). *Delayed Baggage Trends and Options for Compensating Passengers.* Washington: United States Government Accountability Office.

European Telecommunications Standards Institute. (2018). EN 301 549: Accessibility requirements for ICT products and services. Sophia Antipolis Cedex: ETSI.

Fernström Winberg, K., Hildingsson, L. (2005). *Anställningsintervjuns betydelse i rekryteringsprocessen: Att lyssna.* Retrieved 2019-01-15 from:
http://www.diva-portal.org/smash/get/diva2:134891/FULLTEXT01.pdf

Fokkinga, S. F., & Desmet, P. M. A. (2013). *Ten ways to design for disgust, sadness, and other enjoyments: A design approach to enrich product experiences with* negative emotions. International Journal of Design, 7(1), 19-36.

Gaver, W. (2012). *What Should We Expect From Research Through Design?* Austin: CHI 2012.

Hanington, B., Martin, B. (2012). *Universal Methods of Design - 100 Ways to Research Complex Problems, Develop Innovative Ideas, and Design Effective Solutions*. Page 102: *Interviews.* Rockport Publishers, 100 Cummings Center, Suite 406L Beverly, MA 01915.

Hyper Island. (n.d.) *Apple Drawing Ideation.* Retrieved 2019-03-19 from https://toolbox.hyperisland.com/apple-drawing-ideation-exercise

IATA. (2019). *Baggage Tracking.* Retrieved 2019-01-25 from https://www.iata.org/whatwedo/ops-infra/baggage/Pages/baggage-tracking.aspx

ISO. (2011). ISO 26800: Ergonomics - General approach, principles and concepts. Geneva: ISO copyright office.

ISTFLYER. (2018). *REVIEW OF QATAR AIRWAYS FLIGHT DOHA → ISTANBUL IN ECONOMY* [Online Image]. Retrieved 2019-01-25 from https://flight-report.com/en/report/29399/Qatar-Airways-QR243-Doha-DOH-Istanbul-S AW

Johannesson, H., Persson, J., Pettersson, D. (2013). *Produktutveckling: Effektiva metoder för konstruktion och design.* Stockholm: Liber AB.

Levey, Y. (2016) *How to: Run a Crazy Eights exercise to generate design ideas*. Retrieved: 2019-01-16 from:
https://www.iamnotmypixels.com/how-to-use-crazy-8s-to-generate-design-ideas/

Levey, Y (2017) *Download my Crazy Eights templates for your next design sprint or workshop.* Retrieved: 2019-01-16 from:
https://www.iamnotmypixels.com/download-my-crazy-eights-templates-for-your-next-design-sprint-or-workshop/

Lufthansa (n.d) *Digital baggage services.* Retrieved on: 2019-01-25 from:
https://www.lufthansa.com/de/en/digital-baggage-services

May, T. (2011) *Social Research, issues, methods and process.* Fourth Edition. Open University Press: Berkshire, England.

Mishra, A. Mishra, D (2010) *Improving Baggage Tracking, Security and Customer Service with RFID in the Airline Industry.* Retrieved 2019-01-30 from:
http://epa.niif.hu/02400/02461/00023/pdf/EPA02461_acta_polytechnica_hungarica_20 10_02_139-154.pdf

Mälardalen University. (2014). *Validitet.* Retrieved 2019-01-15 from:
http://www.mdh.se/student/minastudier/examensarbete/omraden/metoddoktorn/metod/validitet-1.29071

Nielsen, J., (1995). *10 Heuristics for User Interface Design.* Retrieved 2019-01-18 from:
https://www.nngroup.com/articles/ten-usability-heuristics/

PostNord. (n.d, a). *Om oss.* Retrieved 2019-01-25 from:
https://www.postnord.se/om-oss.

PostNord (n.d, b) *PostNord App.* Retrieved on: 2019-01-25 from:
https://www.postnord.se/vara-verktyg/postnord-app

PostNord. (2019). PostNord (Version 6.4.0) [Mobile application software]. Retrieved from https://itunes.apple.com/se/app/postnord/id396871673?mt=8

Qatar Airways. (2019). *What do I do if my bag does not arrive?* Retrieved 2019-01-25 from:
https://qatarairways.zendesk.com/hc/en-us/articles/206465828-What-do-I-do-if-my-bag-does-not-arrive-

SAS. (2018). *Report a Delayed Bag.* Retrieved at: https://bags.flysas.com/

SAS. (2019a). *SAS corporate story.* Retrieved 2019-01-06 from
https://www.sasgroup.net/en/sas-corporate-story/

SAS. (2019b). Damaged and delayed baggage. Retrieved 2019-01-06 from
https://www.sas.se/reseinfo/damage-and-delayed-baggage/

Sharp, H., Rogers, Y., & Preece, J. (2011). *Interaction Design: Beyond Human - Computer Interaction.* John Wiley & Sons

South China Morning Post. (2018) *World's best airline 2018: Singapore Airlines voted winner, toppling Qatar Airways; Cathay Pacific, Hainan Airlines in top 10, Hong Kong Airlines in top 20.* Retrieved 2019-01-25 at:
https://www.scmp.com/lifestyle/travel-leisure/article/2155935/singapore-airlines-voted-worlds-best-toppling-qatar-airways

Tubik Studios (2017). *Information Architecture. Basics for Designers.* Retrieved 2018-01-28 at:
https://uxplanet.org/information-architecture-basics-for-designers-b5d43df62e20

Vredenburg, K. Isensee, S. Righi, C. (2002) *User-Centered Design: An Integrated Approach*. Prentice Hall PTR.

Wadsworth, Y. (2016) *Do It Yourself Social Research*, Third Edition. Routledge.

Ware, C. (2012). Information Visualization: perception for design.

Wikberg Nilsson, Å., Ericsson, Å., Törlind, P. (2015). *Design: Process och metod.* Lund: Studentlitteratur AB.

Yalanska, M. & Arhipova, A. (n.d). *Tips on Applying Copy Content in User Interfaces* Retrieved on 2018-01-28 at:
https://tubikstudio.com/tips-on-applying-copy-content-in-user-interfaces/

Österlin, K. (2010). *Design i fokus*. Malmö: Liber.

Appendix 1: Personal Interviews

Purpose

Hi, We are doing a study about the experience regarding baggage by airports. The purpose with this interview is hearing your experience regarding this, especially your experience with delayed baggage.

Experience of delayed baggage

- **Could you please tell us some about the event when your baggage was delayed?**
    - What type of baggage did you have?
    - Airline? Destination? Year?
    - What were the steps you had to go through?
    - What was your experience with the different steps?
    - What would make this experience more positive for you?
    - Could you explain that some more?
    - Was it an outbound or inbound travel? (Away or home?)

    - Have you experienced a delayed baggage before?
    - **If yes,** have you experienced delayed baggage with different airlines?
    - What did you experience as the major difference/s between the different occasions?
    - **If yes,** was it different airlines?

    Discover:
    - How did you find out your baggage was delayed?
    - What was your first idea when you couldn't see/find your baggage.
    - How did you feel when you discovered your baggage was delayed?
        - How would you want to find out?
        - When would you want to find out?
        - Where would you like to find out? (On plane, by the belt, in the app?)
        - Why would you like to find out in that way?
    - What did you do?
        - Why?

    Baggage report:
    - How did the baggage reporting work?
    - How did you experience the way that the staff met you?
    - What could they have done differently?
    - What did you think when filling the report? (What made you think that way?)
    - How would you like the reporting to work? Digital or analog?

- ○ Have you ever had to describe the content in your bag?

Wait:
- ○ How long were you without your baggage?
- ○ How did you keep yourself updated about the status of your baggage?
- ○ How often would you like to receive updates about the status of your bag?
    - ■ About what?
- ○ What kind of information would you like regarding status?
- ○ How did you feel while waiting for your baggage?
- ○ How did you find out when and where the baggage would be delivered?
    - ■ Did it arrive on the specified time?

Compensation
- ○ How did you solve the situation of being without your baggage?
- ○ Did you ask for compensation for your delayed baggage?
    - ■ **If yes,** how was it?
        - ● How did it go about?
        - ● How did you feel while waiting to get the compensation approved?
    - ■ **If no,** why?
- ○ Did you know what you could get compensation for?
    - ■ What?
    - ■ How did you find out?

General
- ● How/What do you feel about checking in your baggage at the airport?
    - ○ **If worried,** do you do anything to feel less [worried/other negative emotion]? (Such as packing differently)
    - ○ **If worried,** is there anything else that could make you feel less worried (or other emotions they express) when checking in your baggage?

- ● Do you ever think about your checked in baggage while on the flight?
    - ○ What do you think about?
    - ○ What emotions do you have?
    - ○ Why do you feel that way?

- ● Would you like to receive information about you baggage while on the flight?
    - ○ What kind of information?
    - ○ Would you like to know when your baggage have been loaded on the plane?
    - ○ What would you think/do if you sat on the plane and received a message saying your bag haven't been loaded.
    - ○ Would you like to receive information about which belt your bag is arriving on, and how you get there? Why? Why not?

- ● What were your thoughts while standing by the belt and waiting for your bag?

- ○ How do you feel?
- ○ Why do you feel that way?
- ○ Would you like to receive information about what time the bags are arriving on the belt before going there?
- ○ Why? How would that make you feel?

- When you discovered that your baggage was delayed you had to fill in some information about your bag while doing the baggage report. To avoid doing this, would you be prepared to fill in information about your bag before your travel starts? This is information that would be saved and reused for future flights.
  - ○ Would you rather fill in the information before or after the travel?
  - ○ Would you feel more at ease if you had taken a picture of the bag before your travel?
    - ■ Why? Why not?
    - ■ In what way do you think this would be helpful?

- In some cases the baggage tag can accidentally be separated from the baggage which means that it can be hard to identify a bag solely on the appearance, and it can be necessary to look in side the baggage to see what's inside.
  - ○ Would you feel more at ease if you had taken a picture of the content of your bag?
    - ■ Why? Why not?
    - ■ Would you rather give that information upon request?

Appendix 2. Observation points for walk a mile

Date: February 19th 2019
Aim: See how it looks behind the scenes and how baggage is handled after they have been checked in. Also to see how the reporting of a delayed baggage is carried out at the airport.

Behind check-in counter

- What happens to the baggage after they have been checked in?
- Does baggage fall of the belts?
- How does the scanning points look like?

By the baggage belt:

- What facial expression do people waiting for their baggage have?
- What facial expression do they have when they see their baggage?
- What are they doing while waiting?
- What does it look like they are feeling?

By the Arrival Service desk

- How are the travelers met by the staff?
- What does the staff say? Anything about status or compensation?
- What steps are necessary to do the reporting?
- What steps seems difficult? What are the travelers having issues with? What do they need help with?
- What are the first thing the travelers says when they arrive at the desk?
- What are they worried about?
- How does they seem to feel? Angry? Worried?
- Are their feelings different when they leave?

Questions for the duty coordinator:

- Is there anything special you have observed?
- How do you think the situation can be improved?
- What are the biggest issues regarding delayed baggage?
- What are the biggest issues for the traveler regarding delayed baggage?
- Do you think a digital solution could make the travelers feel calmer?
- How do you think a digital solution could be made?

Questions for the Arrival Service:

- How are travelers treating you?
- Are there any difference in the treatment you get from those traveling outbound vs. inbound.
- What are the most common questions you get?
- What are the least common questions you get?
- Do you give the travelers some information about compensation? What?
- What step in the reporting process do travelers struggle the most with?
- Does they seem worried? Do you say anything to calm the traveler?
    - How do they take in that information?
- How often can you give direct feedback about the status of the baggage? How do they react?
- Have their feelings changed in anyway after the reporting?

Appendix 3. Airport Interviews

By the baggage belt
Hi, we are two students from Chalmers University and are doing a study to understand the experience about checked in baggage and how it can be improved. Can we ask you a few quick questions?

- Are you traveling for work or holiday?
- How long have you been away/are you going to be away?
- What are your thoughts when standing here waiting for your baggage?
- Why is that? Why are you thinking about that?
- If you could describe your feelings right now with some emotions, what would those be?

I'm now going to ask you some questions about delayed baggage, this has nothing to do with your baggage today, it's just in general. (Hypothetical)

- Have you ever experienced delayed baggage?
- How would you want to find out that your baggage was delayed?
- Would you want any information about your baggage before you arrive at the belt? What information?
- How was it for you to find your way here to the baggage belt?

Discovering
- Can't you see your baggage?

Tell them where they can report it and walk with them and tell them about the study about delayed baggage.

- How did it feel to find out that your baggage didn't arrive on time like this?
- Would you like to have found out in another way? What way?
- What type of information would you like to have about your baggage?
- When would you like to receive this?
- What is the next step for you now?

In the reporting queue

Hi, we are two students from Chalmers University and are doing a study to understand the experience about delayed baggage and how it can be improved. With your input, hopefully we could make this process better. Can we ask you a few quick questions?

- Are you traveling for work or holiday?
- How long have you been away/are you going to be away?
- Have you experienced a delayed baggage before?
- What expectations do you have when you get to talk to the customer service agent?
- What information do you think you will get? And what would you like to get?

After arrival service and reporting
- How did you perceive the reporting?
- Is there any step you would like to skip?
- Is there any other way you would like to be able to do the report?
    - How?
- How do you feel now that you have made the report?
    - Do you feel more at ease?
- How did you perceive that the staff handled your case?
- What would make you experience this situation more positive?
- How will you handle being without your baggage?
- How would you like to stay updated about your case?

Appendix 4. Workshop Posters
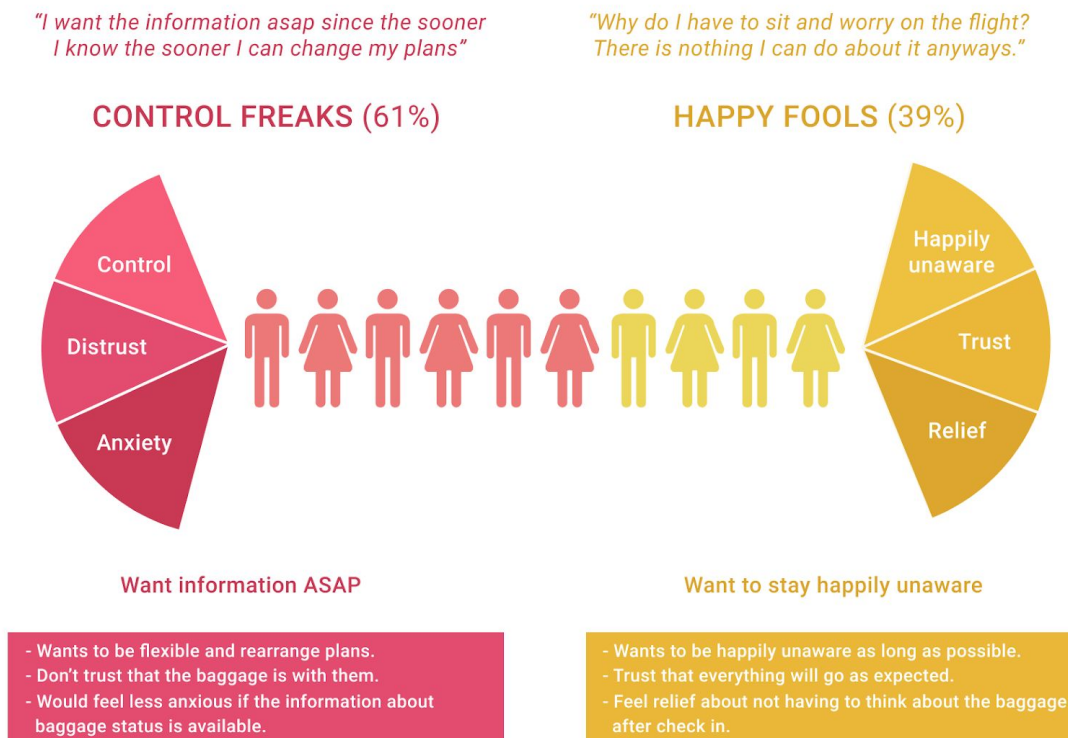
Figure A: Illustration of the behavioral types used in the workshop. Authors' own copyright.

PRE-FLIGHT
EXPECTATIONS & PREWORK

SAS wants access to private information about baggage content that passengers don't want to give out.

HMW ensure that correct information about bag content is available for SAS when needed?

~50% are ok with filling in information about their baggage appearance before flight, others would rather give the info when it's needed.

HMW eliminate filling in attributes about the bag? Or HMW encourage the traveler to fill in baggage information before flight?

Travelers don't know what baggage tag belongs to which bag.

HMW connect a specific baggage tag to a specific baggage?

Sometimes hand baggage needs to be unexpectedly checked in by the gate.

HMW include unexpected checked in baggage in the app? HMW support multiple bags in the app?

Figure B: Problems and HMW questions found for the pre-flight step of the customer journey map. Authors' own copyright

DISCOVERY
DISCOVERY & REPORTING

Travelers feel like a lot of the responsibility is on them, since they need to report the delayed baggage themselves.

HMW put less responsibility on the traveler?

All travelers finds out about delayed baggage at the belt, but would want to find out earlier.

HMW reduce the unpleasant waiting time?

Delayed baggage sets a negative tone of the trip.

HMW reverse their negative emotions?

Travelers have difficulties remembering their booking number and knowing which flight to choose when using the digital reporting tool. The arrival service sometimes have go in and change the reports as they have not been filled in correctly.

HMW ensure the correct information is filed and handle questions when reporting online?

Figure C: Problems and HMW questions found for the discovery and reporting process. Authors' own copyright

AFTERMATH
WAITING & COMPENSATIONS

Travelers that have experienced delayed baggage expect it to happen again.

HMW make these travelers feel like this was a onetime experience?

56,3% of travelers are interested in knowing if the airline is still looking for the baggage. Others only want updates about special changes. (The baggage is found etc.)

HMW accommodate both those who want frequent updates and those who wants updates only about special changes?

Travelers appreciate the free kit with necessities.

HMW give away kit to travelers that files online/in app?

Travelers want to know what compensation they are entitled to. Arrival service only communicate this when they know the baggage will be delayed for several days.

HMW communicate what travelers are entitled to without encouraging over consumption?

Figure D: Problems and HMW questions for the steps after reporting delayed baggage. Authors' own image.

Appendix 5: Workshop structure with Design Team

Goal: Prioritize the issues, sketching. Discuss around the problem areas.

1. **Present the Agenda of the workshop (2 min)**
   a. What we are going to do
   b. Our expected outcome and goal.

2. **Quick background and presentations of the three areas. (10 min)**
   a. Behavior types
   b. Problem areas

3. **The Apple energizer (5 min) (3 min räcker för design gruppen)**

4. **Divide into three groups á 3 assign each group one area (3 min)**

5. **Sketching exercise (27 min)**
   a. Crazy 6 individual (7 min)
   b. Present ideas within groups (7 min) (tar lång tid)
   c. Dot voting (2 min)
   d. Together develop the highest ranked idea into a 3-part-flow (5 min) → 7 min
   e. Present ideas for everyone (6 min)

6. **Wrap up (3 min)**

= 50 min

When? 7/3
- 9-9.45 with Design team

Equipment:
- Poster
- Dot stickers?
- Markers
- Opposite-quiz
- Post-its
- Music + speaker

Appendix 6: Workshop structure with MMB Team

Goal: Prioritize the issues, sketching. Discuss around the problem areas.

1. **Present the Agenda of the workshop (3 min)**
   a. What we are going to do
   b. Our expected outcome and goal.

2. **Quick background and presentations of the three areas. (10 min)**
   a. Behavior types
   b. Problem areas

3. **Prioritize through dot voting (5 min)**
   a. 3 dots per person.
   b. Dot vote on the problems.
   c. Summarize dots: Circle the highest ranked problems

4. **Divide into three groups (3 min)**

5. **Energizer the Apple 2 min (3 min)**
   a. Relay race

6. **Crazy 6 (8 min)**
   a. Assign each group one area
   b. Present crazy 6 method (1 min)
   c. We don't judge anyone, you can sketch or write whatever you feel
   d. Individuellt crazy 6 (6 min)

7. **Present the ideas for each other in groups (5 min)**

8. **Dot vote on the ideas in groups (2 min)**
   a. 3 dots per person

9. **Together develop the highest ranked idea into a 3-part-flow (6 min)**

10. **Present ideas for everyone (6 min)**

11. **Wrap up (2 min)**

= 53 min

Appendix 7: Usability Test 1

1. **Intro (3 min)**
   a. Describe project scope: We are working with the topic checked in baggage at airports and the whole experience around this. We will later show you some wireframes of an early concept, but we will start with asking you a quick question.
   b. Imagine the following: You are waiting for a package being delivered to you. You have the option to track the package and see the journey it takes. Do you use this feature, if yes how often would you go in and look?

2. **At home (5 min)**
   a. You are a group of 2 people going to New York with a transfer in Copenhagen. You have 3 bags connected to your booking. Your are currently at home packing your bags and you download SAS app to view your booking details and see a link to My Baggage view.
      i. What do you think you can see/find there?
      ii. Show Baggage view
      iii. Can you explain what you see?
      iv. Show timeline view
      v. What do you see here?
      vi. *[This is a timeline showing the status of your checked in baggage, which you can use to track your baggage]*

3. **On second flight (CPH → JFK). (5 min)**
   a. So now you have had your flight from Landvetter to Copenhagen and you have had a layover in CPH and are now on your last flight to New York. You are sitting by the window have just access the free wifi onboard and are currently waiting for your lunch. What do you do?
   b. *[If open app]* Show Timeline/Baggage view with delay CTA
      [If doesn't open app] Show notification
      i. What do you see?
      ii. What do you feel?
      [If no one opens app] You suddenly feel an urge to check that your bags are with you on the plane. So you open the app to take a look where they are.
      iii. Which screen would you like to see?
   c. Fill out emotion chart

4. **Delay Information** [Some are shown with wait button] **(5 min)**.
   a. [Click on the Delayed Baggage button]
   b. Show Delay Information view
   c. What do you see?
   d. What are your feelings?
   e. Fill out emotion chart
   f. What would you do now?

5. **Delivery address (3 min)**
   a. [Click on the Delivery Address button]
   b. Show Delivery Address view
   c. What do you see?
   d. What are you feeling?
   e. Let's try to add a temporary address, since you are not going home, your going to new york.
   f. What do you see?
   g. What do you think the valid between section means?
   h. Let's pretend we have filled in all the information, what would you next?

6. **Quick Compensation (5 min)**
   a. [Click on the Quick Comp button]
   b. Show Quick Comp view
   c. What do you see?
   d. What are you feeling?
   e. Fill out emotion chart
   f. Where do you think you end up if you click on complete report?

7. **Summary view (3 min)**
   a. [Click on complete report button]
   b. Show Summary view
   c. What do you see?
   d. What are you feeling?

8. **At hotel (5 min)**
   a. You have now arrived at your hotel in New York. It's late and you realise your toothbrush and toothpaste is in your delayed baggage. You go down to the lobby were you buy both items and you realize that you should get compensated for this. What do you do? How do you do that?
   b. What do you see?
   c. What do you think the different colors mean?
   d. What do you feel?
   e. Fill out emotion chart

9. End questions (1 min)
   ● Have you ever experience delayed baggage?
   ● What is your impression of this service?

Appendix 8: Usability Test 2

Describe project scope: We are working with the topic checked in baggage at airports and the whole experience around this. We will later show you some wireframes of an early concept, but we will start with asking you a quick question.

- Imagine the following: You are waiting for a package being delivered to you. You have the option to track the package and see the journey it takes. Do you use this feature, if yes how often would you go in and look?

1. **At home**

   You are a group of 2 people traveling from Landvetter (GOT) to New York (EWR) with a transfer in Copenhagen (CPH). Your name in this test is Annielou Henrikberg and you have 2 bags to check in. Your friend is named Louie Rehnsson and have 1 bag to check in. Your are currently at home packing your bags and you download SAS app to view your booking details and goes in to the apps home view:

   a. *Show home view*
      i. What do you see here?
      ii. What do you feel?
      iii. Is there anything you would want to do now while at home?
         1. Where would you tap if you want to assign bags to your tags (that you will later print out at the airport?)
         2. What do you think you would see if you press on assign tags?

   b. *Show Baggage view*
      i. Can you explain what you see?
      ii. What do you think you can do here?
      iii. What do you feel?
      iv. Now you want to assign attribute to your friends bag, what do you do then?
      v. What do you think you can find there?

   c. *Let them click through assign bag*
      i. You have two bags saved in the system that you frequently fly with, your friend has a red, hard upright Away bag with zipper.
      ii. Now you want to save the bag in your bag library, how would you do that?
      iii. But now you changed your mind and want to remove it again, how do you do that?
      iv. And now you want to assign your medium sized golden bag that you often travel with to your bagtag nr 123456-9.

   d. Now you want to view a timeline of the journey of your upcoming trip, how do you do that?
      i. *[Goes back to home view and taps on View Timeline] Show timeline view*
      ii. What do you see here?
      iii. What do you feel?
      iv. Could you try to collapse the two flights and then expand them?

   v. [This is a timeline showing the status of your trip and the different steps you and your checked in baggage will take/takes, which you can use to track your baggage]

2. **On second flight (CPH ⟶ JFK).**
   So now you have had your flight from Landvetter to Copenhagen and you have had a layover in CPH and are now on your last flight to New York. You are sitting by the window and have just access the free wifi onboard and are currently waiting for your lunch.
   a. What do you do?
   b. *[If open app]* Show Home/Timeline/Baggage view with delay CTA
     i. Where are you in the timeline, where are your bags?
     [If doesn't open app] Show notification
     ii. What do you feel?
     iii. What do you see
   c. [*If no one opens app] You suddenly feel an urge to check that your bags are with you on the plane. So you open the app to take a look where they are.*
     *i. *Which screen would you like to see?
   d. Fill out emotion chart
   e. What would you do next?
     i. [Click on the Take control button]

3. **Delay Information**
   a. *Show Delay Information view*
     i. What do you see?
     ii. What are your feelings?
     iii. Fill out emotion chart
   b. What would you do now?
     i. [Click on the NEXT button]

4. **Delivery address**
   a. *Show Delivery Address view*
     i. What do you see?
     ii. What are you feeling?
   b. Considering you are on your way to new york, and not going home, what would you do now?
     i. [Click add temp address]
     ii. What do you see?
   c. What do you think the valid between section means?
   d. What do you think edit bag means?
   e. Let's pretend we have filled in all the information, what would you next?
     i. [Click on the Quick Comp button]

5. **Quick Compensation**
   a. *Show Quick Comp view*
     i. What do you feel?

      ii.   What do you see?

      iii.   What do you think this PSST means?

      iv.   Fill out emotion chart

  b. Where do you think you end up if you click on SEE SUMMARY?

      i.   [Click on See summary button]

6. Summary view

  a. Show Summary view

      i.   What do you see?

      ii.   What are you feeling?

7. At hotel

You have now arrived at your hotel in New York. It's late and you realise your toothbrush and toothpaste is in your delayed baggage. You go down to the lobby were you buy both items and you realize that you should get compensated for this.

  a. What do you do? How do you do that?

  b. What do you see?

  c. What do you feel?

  d. Fill out emotion chart

8. End questions

  a. Have you ever experienced delayed baggage?

  b. What is your impression of this service?

Appendix 9: Usability Test 3

To test leader: _The purpose is to test the discovery of delayed baggage and the reporting of this, to see if the user can solve the tasks with as little help as possible._

Scenario (Discovery): You and your friend are now sitting on the plane between Stockholm and New York. You have just got access to the wifi onboard and you decide to go in the app to see what time you're landing. YOu go into the booking reference of your journey.
- _To test leader:_ _Show Booking ref view - 2 baggage are delayed._
- What do you see here?
- What do you do now? (Please think aloud)
- _To test leader:_ _The user taps on take control and then arrive at delay information, clicks to delivery address._

At the delivery address view:

Scenario: You and your friend wants the bags delivered to your hotel at 2 Gold street in New York.

- _To test leader:_ _We want to know if they add a temporary address + if they uses the checkbox for use same temporary address for all._
- _To test leader:_ _The user then taps to compensation and submits. Then goes to the booking reference._
- How did this feel?
   - Was anything unclear?

Scenario (Free gift):

- What do you think will happen if you tap select free gift?
- _To test leader:_ _we want to know their thoughts about the gifts and what they would choose._
- What can you see here?
- Which one would you choose and why?

Scenario (Compensation/Receipts): You have now arrived at your hotel in New york. It's late and you realize your toothbrush and paste was in your delayed baggage. You take the elevator down to the lobby and buy both items. At the same time you realize you shouldn't be the one who pays.

- How do you do to get compensated in the app?
- _To test leader:_ _THe user taps "add receipts", read terms, create new receipts and add to receipts._
- How did this feel?
- What do you think will happen if you tap submit all receipts?

Finishing questions:

- How did this experience feel?
- Have you ever had a delayed baggage?
   - If yes: how did that experience differ from what you've just tested?

Appendix 10: Final Requirements List

Problem/Fact	Requirement	Sub-requirements	Rank	Included in final design
Pre-flight				
The traveler should not have to manually add baggage to the system after booking	The system shall visualize all the baggage connected to the booking	For both the outbound and the return journey	**4**	Yes
The traveler has difficulties remembering which baggage tag belongs to which baggage	The system shall distinguish the baggage tag belonging to the user and to friends		**3**	Yes
Travelers do not always want to fill in information about their baggage until it is needed	The system shall offer the possibility to add attributes to baggage	* Color * Type * Brand * Photo of outside/inside * Specific content * Other special attributes	**3**	Yes
Travelers want to feel connectivity between the attributes and their real bag	The system shall provide a representation of the baggage based on entered attributes	Unless an image has been added	**2**	Yes
Travelers sometimes need to check in baggage by the gate	The system shall distinguish late checked in baggage		**2**	No
Travelers don not remember which carry-on baggage receives which baggage tag	The system shall provide a way to add attributes of carry-on baggage manually before it appears as "check in by gate"		**2**	No
Travelers have difficulties remembering what they have packed	The system shall provide a way to add packing list in the app	Add significant stuff	**1**	No
Travelers often use the same baggage for many travels	The system shall provide a way to store baggage information for future travels		**4**	Yes

74.7% wants to be able to see baggage status info during travel	The app shall provide a way to view the baggage's journey	* Dropped off * Loaded on plane * Check out and in for customs * Belt arrival * Delay information	**5**	Yes
Travelers want to be able to see their own trip info during travel	The app shall provide a way to view the user's journey	* Check in * Go to the gate * Departure * Arrival * Go to belt * Delay information	**2**	Yes
Discovery				
The traveler finds out about the delay after waiting by the belt	The system shall give delay notification upon arrival. The information is always available in the app for the traveler to see the status at any time.		**5**	Yes
The flight crew is unaware of the delayed baggage	A notification is sent to the crew as soon as the information becomes available.	The crew does not take proactive action unless the traveler starts to complain.	**2**	No
Travelers need to report the delay themselves	The system shall initially allow filing a report without specifying baggage attributes		**5**	Yes
The system might not have access to the delivery address	The system shall ask the traveler for delivery address in conjunction with the delay notification		**4**	Yes
Travelers location might change over time	The system shall provide the option to add multiple temporary delivery addresses	"Valid until"	**4**	Yes
The delivery address is sometimes the same as the home address in the app	The system shall prepopulate home address if the information is available	This is the default delivery address unless the temporary address is added	**3**	Yes
Travelers on their return flight have reduced rights for compensation.	The system should be able to recognize if the traveler is on an out- or homebound journey.		**4**	No
Travelers' first thought might be that the baggage is lost	The system shall reassure the traveler that the bag is not lost but delayed.		**4**	Yes

Delayed baggage leads to dissatisfaction amongst travelers affected	The system shall supply immediate compensation to the traveler.	Maximum three options. Examples: Eurobonus, Lounge, Fast track, upgrade, free kit, taxi, food stamps, climate compensation	**5**	Yes
Travelers do not know when the baggage will arrive on the belt	The app shall notify the travelers about the estimated arrival time of their baggage		**2**	Yes
Belt- and flight number information displayed on the screens in the arrival hall are confusing to travelers	The app shall show information regarding baggage belt when available	Number, Flight and Arrival Service	**1**	Yes
Sometimes travelers arrive when the belt number is no longer displayed on airport signage	The app shall continue to display the belt number and refer the traveler to the arrival service if needed		**1**	Yes
Travelers want to know where the baggage is located	The system shall provide immediate information about **where** the baggage was scanned last		**5**	Yes
Travelers want to know the reason their baggage is delayed	The system shall provide information about **why** the baggage is delayed		**4**	Yes
Travelers want an estimated delivery time	The system shall provide estimated time of delivery.		**4**	Yes
Travelers do not know what is ok to buy	The system shall provide information as soon as possible about the traveler's rights for compensation		**4**	Yes
If the baggage is already on the next incoming plane, the traveler does not know if they should wait	The system shall show the estimated arrival time of the incoming plane, so the traveler can choose to wait for their baggage		**4**	No
Sometimes travelers need to get in contact with customer service to ask questions	The system shall display contact information to customer service (SAS Sales & Service)		**3**	Yes
Passenger do not know where to find their PIR number or what it is for	The system shall show the PIR number of the report made in relation to delayed baggage info		**3**	Yes

Customer Care				
Some do not want continuous updates about baggage status	The system shall only send out relevant notifications	* Found * Arrived at airport * Picked up by delivery comp.	**4**	Yes
Some travelers want continuous status updates. Travelers feel like they are in the dark and do not know how the progress of their baggage is going	The system shall provide a visualization of baggage journey till delivery	* Still looking * Found * Loaded on plane * Arrived at airport * Delivered to delivery comp. * Delivery address	**5**	Yes
Sometimes the baggage needs to be identified by its appearance	The system shall ask for a description of the baggage, if it is not already available	If multiple bags or If bag search > 12 h Color, Shape, Brand	**4**	Yes
Sometimes baggage needs to be opened in order to identify the owner. Sometimes the baggage tag can be torn off	The system shall ask the traveler for a description of content information, if it is not already available	If delay > 42 h	**4**	Yes
The travelers do not like to keep track of the receipts and fill in claims when they get home from their trip	The system shall handle continuous receipts collection and handling	* Sum * Image * Items * Currency	**4**	Yes
The travelers do not expect the compensation will be received until it is confirmed	The system shall provide instant feedback if a purchase is accepted for compensation	Immediate accept or rejection	**4**	No
SAS has a hard time to know when to close a report	The system shall know when to close a file		**2**	No
Travelers might forget what compensation they can get	The system shall offer information about what compensation is available until report is closed		**4**	Yes
General Information				
Some travelers do not know or forgets to pick up their baggage and take it through customs	The system shall give reminders to pick up the baggage and take it through customs when required		**3**	Yes

Travelers are confused about where to pick up special baggage	The visualization shall provide information about whether the baggage will be delivered on the belt for special baggage			**3**	No
Travelers are expected to do certain things in a certain order	The system shall give hints on what the user should be doing next			**4**	Yes
Travelers want to receive an indication that their information is saved and sent	The system shall give modeless feedback that entered information is saved			**5**	Yes
Travelers might be reluctant to proceed with delay process	The system shall encourage the user to complete tasks			**5**	Yes