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Beyond Rides: Designing Internal Digital Systems for Dynamic Organization

Creating Guidelines for a Graphical Interface in Theme Park Organizations

Master's thesis in Computer Science and Engineering

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Cover: Prototypes of *Gästis 2.0* and *Opening Hours 2.0* with Liseberg amusement park in the background.

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Abstract

The rapid digitalization of todays society, along with the emerging technologies it entails, places increasing demands on organizations and companies to adopt and implement digital systems. There are generally various systems being used simultaneously, and in order to remain effective and competitive, these need to have a high degree of user-friendliness in terms of being accessible, intuitive, and easy to use. This is of particular importance when it comes to organizations with high staff turnover, which is often the case in specifically service-based entertainment and leisure businesses. Among these are amusement park organizations, which typically rely heavily on seasonal employment, resulting in a constant flow and onboarding of new employees. Despite extensive research on usability in design and user experience (UX), there is a lack of studies regarding these aspects in relation to high employee turnover rates.

This thesis project was carried out in collaboration with the amusement park Liseberg as a stakeholder, and the digital applications *Gästis* and *Opening Hours* as parts of their internal systems. The aim was to investigate what type of design approaches and practices best support usability in user interfaces (UIs) within organizations experiencing frequent employee turnover. The exploration was done by following the Double Diamond design process, with a total of three iterations. A user-centered approach was adopted, which involved semi-structured interviews and user tests conducted with employees at Liseberg, who regularly use any of the applications as part of their work role. The primary outcome of this study is the contribution to user-friendly UIs designed for use in high turnover organizational environments. The project resulted in the development of two high-fidelity prototypes in *Figma*, called *Gästis 2.0* and *Opening Hours 2.0*, alongside a set of formulated design guidelines that can serve as a foundation for future investigation and improvement. The most important design guidelines identified are ensuring consistency across the interface, supporting efficient information scanning, providing clear and immediate system feedback, and following a structured and iterative design process. However, further research is recommended in order to validate feasibility and applicability of these guidelines beyond the specific context of this thesis.

Keywords: UI, UX, interaction design, digital systems, employee turnover, amusement park, prototyping, design guidelines, onboarding.

Acknowledgements

This thesis project of 30 credits has been carried out within the frames of the masters programme Interaction Design and Technologies at Chalmers University of Technology. The work was conducted during the spring semester of 2026, and the thesis report along with the developed prototypes are a result of a thorough corporate process. Thus, both authors are responsible for its design, content, and underlying work. Throughout this project, we have received valuable support and input from several people, without whose contributions and encouragement this thesis would not have been possible.

Firstly, we would like to express our sincere gratitude to our academic supervisor at Chalmers, Professor Staffan Björk, for providing us with expert advice and constructive feedback throughout the whole process.

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Josefine Blomberg & Amanda Vorberg, Gothenburg, 2026-05-24

Contents

List of Figures

List of Abbreviations

Below is a list of the abbreviations and acronyms used throughout this thesis report listed in alphabetical order:

AI	Artificial Intelligence
BI	Business Intelligence
CLT	Cognitive Load Theory
COI	Conflict of Interest
HCI	Human-Computer Interaction
HEX	Hexadecimal Color
InfoVis/IV	Information Visualization
IxD	Interaction Design
NDA	Non-Disclosure Agreement
OTS	Off-the-shelf
RGB	Red, Green, Blue (color model)
RtD	Research Through Design
UCD	User-Centered Design
UI	User Interface
UX	User Experience
WCAG	Web Content Accessibility Guidelines
WP	Wicked Problems

1

Introduction

Given the rise of digitalization and emerging technologies in todays society, the implementation and use of diverse digital systems has become increasingly significant globally. All different types of organizations and companies have some sort of internal digital system, often several ones, that are used daily and thus crucial for operations to function. This emphasizes the importance of observing the various features of the user interface (UI) as well as taking user experience (UX) into account. Research has shown that, within the workplace, information systems become ineffective for the business if it is too difficult for the user to learn [1]. Moreover, having an interface that is both easy and pleasant to use is required in order to ensure that the user has a positive experience, which in turn could influence the users overall impression of the organization. In addition, the system should be able to provide the company and its users with real value, which highlights the need for usability/usefulness and credibility. For example, one aspect includes the implementation of consistency in terms of patterns such as a similar appearance, behaviour and feeling across the interface, as these tend to result in a more user-friendly system [2].

Furthermore, in a workplace setting where employees are frequently replaced and training resources are limited, greater emphasis on learnability is necessary for successful utilization of the system [3]. An example of such a workplace is within the tourism and amusement park industry, in which employment is characterized by a large amount of part-time and seasonal workers [4]. Because of the tourism industrys strongly season-based operations, employees must be released at the end of the seasons, forcing them to seek alternative employment. Consequently, employment stability becomes highly unpredictable [5]. *Liseberg* in Gothenburg, Sweden is one of many amusement parks affected by this, and will serve as an external business stakeholder for this thesis project. The company experiences a high level of staff turnover on an annual basis, resulting in a large number of new system users (that is, employees). Since the amusement park operates across three separate seasons, this also means that most departments recruit new employees right before or at the beginning of each new season. Staff turnover at Liseberg is therefore almost constant. Additionally, there are many different systems in use, which contain complex data that should be presented in an easily comprehensible way. In turn, these aspects imply the need of an intuitive and efficient interface with high functionality in order to make the system accessible and easy to understand.

This project has been carried out within the frames of a masters thesis in Interaction Design and Technologies at Chalmers University of Technology. Additional stakeholders for this project include the two authors, who have an interest in user-centered design (UCD) and exploring how technology can create value by enhancing individuals experiences and interactions. Both authors have work experience from two different departments within Liseberg, hence making it a relevant and suitable company to collaborate with. Moreover, by applying an interaction design (IxD) perspective to the amusement park, the focus is on various UX aspects of their internal digital systems and softwares, aiming to evaluate and develop these further. The intention is to investigate the importance of UX when it comes to a system being used meanwhile there are high rates of employee turnover.

1.1 Aim

By analyzing internal digital systems of Liseberg, the goal is that the acquired knowledge will subsequently be applicable in a broad range of sectors and contexts in which digital systems are being used. Some challenges that can be identified include supporting user-friendly information visualization in information-dense internal systems, and designing internal systems that remain usable and learnable in contexts with high rates of employee turnover. By exploring these challenges, the project aims to develop prototypes and present recommended guidelines for future development in the area, thus also partly aiming for generalizability. The prototypes could work as a visual guideline for future development regarding UX and UI elements, while the recommended guidelines could serve as a theoretical contribution to general research and development in similar areas.

1.2 Research Question

The research question examined in this project is the following:

What design approaches are suggested when designing internal digital systems within theme park organizations experiencing high employee turnover?

To acquire the knowledge needed in order to formulate an answer to this question, multiple methods and approaches were utilized, while taking various theories into consideration. The project work, which can be described as a wicked problem, consistently followed the Double Diamond design process. This was done through three iterations phases, with a focus on research through design. The key aspects of the conducted work consisted of semi-structured interviews, user testing, and prototyping.

1.3 Delimitations

This thesis project focuses mainly on identifying user needs and developing interactive prototypes of a desktop/mobile UI, specifically within the amusement park

industry characterized by high staff turnover. The research conducted and its results is limited to the field of interaction design in terms of UX. Thus, solutions related to aspects such as marketing, business, and logistics will not be considered. Likewise, no back-end will be constructed, and the study will not address the technical implementation of any potential solution. These limitations are primarily due to the projects scope, considering time constraints and the size of the thesis. Finally, this project will serve as an exploratory phase, aiming to provide user insights and recommendations for Liseberg and other stakeholders on how to proceed for future development. This means the thesis project should be regarded as a first step in designing digital systems used in conjunction with high levels of staff replacement, highlighting the need for further research.

2

Background

This section introduces background information regarding the specific problem domain as well as previous research of relevance to this study. Additionally, the chapter presents information about amusement parks and the two internal digital systems used within Liseberg that will be focused upon within the frames of this project. The related work mainly discusses UX and usability, along with cognitive load within graphical interfaces.

2.1 Amusement Parks

An amusement park, or theme park, is a dedicated venue that offers a variety of entertainment options, including rides, games, food and beverage, as well as live shows [6]. The theme park industry has expanded rapidly over the past few decades, leading to the development of a wide range of parks that vary in size, products, capacity, and entertainment offerings [7]. They are either season-based or operate year-round, and typically include rides, pentathlon, wheels of fortune, and other forms of entertainment. Season-based in this context refers to specific themed operating periods rather than the meteorological seasons of the year. Additionally, throughout this thesis report, the terms rides and attractions will be used interchangeably.

Moreover, amusement parks are designed to accommodate family groups as a primary category of visitors, and are commonly structured around one or more central themes [8]. Theme parks and attractions are continuously growing globally, and Milman *et al.* highlight that they play a significant role in supporting the sustainability of destinations by contributing to infrastructure investments, generating tax and tourism revenues, creating jobs, and providing donations and community support [7]. For instance, theme parks and attractions have become increasingly integrated with other tourism and leisure facilities. Beyond traditional features such as rides, shows, and food services, a global trend is that many parks now offer a variety of additional services, such as online booking systems and transportation [7]. To promote extended visits, companies often complement their amusement parks by offering accommodation options, such as nearby hotels, which not only provide sophisticated themed experiences, but also encourage visitors to stay for longer periods during their trips.

Furthermore, Richard *et al.* make a distinction between theme parks intended as destination theme parks versus regional ones [9]. Destination theme parks are typ-

ically part of larger resort complexes that include surrounding hotels and other recreational facilities that serve as tourist destinations. Most of these are owned by large corporations and operate on a year-round basis, meaning that the vast majority, approximately 90%, of their visitors are derived from the tourist sector and travel from locations at least 50 miles away [9]. In contrast, regional theme parks generally operate on a seasonal basis, about 5-7 months per year, and primarily attract visitors from nearby areas, meaning that approximately 90% of their guests are estimated to live within a three-hour driving distance of the park [9].

2.2 Liseberg

Figure 2.1: Liseberg North Entrance [10].

Liseberg is an amusement park located in Gothenburg, Sweden (see Figure 2.1). The park opened in 1923, and is one of Swedens most visited tourist attractions; every year, approximately 2,5 million people come to visit the park. The main business of Liseberg is the amusement park, formally referred to as *Liseberg Park* in English, which includes 40 rides in total at the time of writing. The park is divided into two areas: the main area and *Kaninlandet* (Rabbit Land in English), whereof the latter one is a family-oriented area containing multiple children-adapted rides and activities. In order to serve various needs, there is a broad range of admission (entrance) tickets, ride passes, and annual passes for visitors to choose from, depending on the frequency and purpose of their visits. The standard or regular admission tickets only provide entry to the amusement park, whereas a combined Admission + Ride Pass ticket includes unlimited access to rides during the specific day. There are also evening variants of these tickets, which grant access from 18:00 at a reduced price, as well as specialized ride passes called Ride Pass Kanin and Ride Pass Duo. Both of these two latter options give access specifically and solely to the rides in *Kaninlandet*, however, the Duo ride pass is valid for two people at once - one child and one accompanying adult. In addition, there are several annual pass options, granting either admission or both admission and rides for a twelve-

month period, for instance the discounted Liseberg Park Senior pass specifically for visitors aged 65 and above. Further offerings include for example pentathlon tickets and booklets containing ride coupons. Overall, this is a flexible ticketing system designed to accommodate both regular guests and occasional visitors. The specific ride pass and ticket offerings described above are applicable to the time of writing this thesis, thus subject to change.

Moreover, apart from the rides and restaurants inside the park, there are also several shops with souvenirs of Liseberg, for example *Kaninbutiken* and *Lisebergsmagasinet*. Additionally, the theme park is a venue for several events, such as concerts, a Christmas market, and the open-air nightclub *Klubb Karusell* [11]. The amusement park is season-based and operates mainly during three distinct themed seasons: summer (including both low and high season), Halloween, and Christmas [12]. In other words, it is primarily a regional theme park and a seasonal workplace, although multiple of its departments, such as accommodations, are operating all year around. This means that the company has both seasonal and annual employees, of which the seasonal ones constitute the vast majority.

Figure 2.2: Liseberg Grand Curiosa Hotel [13].

In recent years, Liseberg has expanded its business with the goal of becoming a destination theme park with a wide range of concepts rather than solely an amusement park. The expansion includes for instance the opening of Grand Curiosa Hotel (see Figure 2.2) in 2023 [14], as well as Oceana Waterworld, planning to open at the turn of the year 2026/2027 [15]. Although *Liseberg* as a name is widely associated with the amusement park in particular, the brand encompasses a wide variety of concepts. Overall, the company consists of the theme park, campsites (Lisebergsbyn and Askim Strand), Oceana Waterworld, Liseberg Theatre, the dinner show venue Rondo, and Grand Curiosa Hotel, all of which also include one or several restaurants. In other words, even though the park is seasonal, several areas within the Liseberg premises, such as the hotel, theatre, and *Rondo*, are open year-round [12]. In addition, each restaurant in turn also has its own unique concepts and offerings, and often several different ones. For example, *Mei Rose* is one of the restaurants part of the hotel, which offers booking options such as À la carte, Hot Pot, Rooftop Bar, and Breakfast. The restaurant *Hamnkrogen*, on the contrary, has for instance a Christ-

mas buffet as a distinct concept during the Christmas season, which is exclusive to this particular restaurant.

2.2.1 Information Systems

Across the organization, a total of approximately 150 information systems are being used. The systems span across multiple departments and use cases, such as security management, media and communications management, as well as management of attractions in the park. While a significant amount of these are sourced from external vendors, a considerable number are internal systems developed within the organization. Additionally, some of the systems are being used by several different departments, while some are department-specific. All applications or systems exist within a large internal digital portal called *Asfalt*, which includes an extensive total number of internal systems across the entire corporation. A delimitation within this thesis project is that only two applications are being evaluated and analyzed. In other words, to facilitate easy reading and understanding of the report, the other applications within the portal will not be described. The two specific applications being analyzed for this project are *Gästis* and *Opening Hours*, which will be referred to as both applications and systems throughout this report. These were chosen based on how often they are utilized and by how many people, their reasonable level of complexity within the scope of the thesis project, as well as the initial communicated user needs of the responsible IT staff and mentors at Liseberg. The functionality and overall design of these two systems are described below.

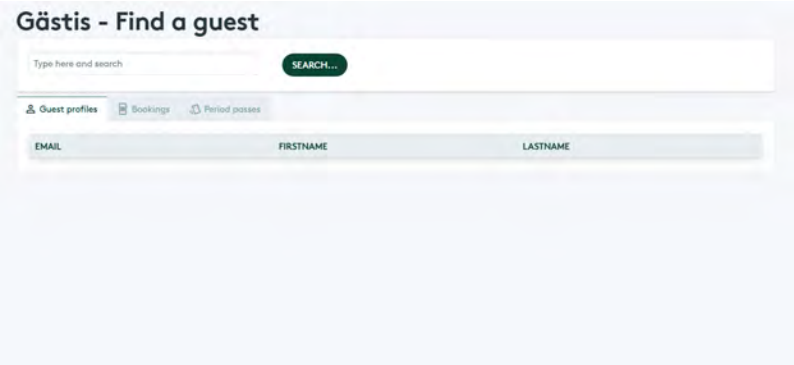


Figure 2.3: Current Default View of *Gästis*.

Gästis is a customer service-oriented software system used to manage guest profiles and bookings (see Figure 2.3). The application is being used by several departments within Liseberg, but is primarily used by Guest Services, Booking & Customer Service, as well as the front desk staff at the Grand Curiosa Hotel. The goal of the application is to provide an overview of a guest profile and the guests current and previous bookings, including amusement park tickets, restaurant reservations, and annual passes. To access a guest profile, the user can search using an order number, email address, or the guests name. Once accessed, an overview of current and previous bookings is displayed, together with general profile information about the guest. The application also displays events and actions related to the guest, such

as payments and email communication between them and Liseberg. Since bookings can not be modified within the application, *Gästis* functions as an intermediary system that provides access points to other internal systems where specific actions, such as editing or managing bookings, can be performed.

Gästis is primarily intended for viewing information rather than performing complex tasks. The application is often being used while employees are interacting directly with the guests, which places high demands on the speed and clarity regarding which information can be accessed and understood. As the application is used across multiple departments and contains large amounts of information, it requires clear and intuitive navigation to support quick access to relevant information, regardless of the users role or task. Additionally, information should be presented in a way that allows users to easily scan and interpret content with minimal effort.

Moreover, *Opening Hours*, or *Öppettider* in Swedish, is a system with the aim of managing opening hours within different areas of Liseberg. In contrast to *Gästis*, this one is primarily used by supervisors and departments with limited guest interactions. The purpose of the application is primarily to adjust the opening hours which will then be updated on the Liseberg website in order to communicate the information to people who wish to visit the amusement park and plan their visit beforehand. This system is used by three different departments, which include Food & Beverage, E-Commerce & Ticketing, as well as Attraction Management. The Food & Beverage department includes all restaurants inside the amusement park and the Grand Curiosa Hotel, whereof the system users within this department consist of several headwaiters. The E-Commerce & Ticketing department manages the Liseberg website and focuses on the opening hours of the amusement park as a whole (see Figure 2.4), and the user group of the system consists of a few employees within this department. Lastly, Attraction Management is a large department that manages all rides and attractions in the amusement parks, however, only one user within this department utilizes the system.

Figure 2.4: Current *Opening Hours* View of the Amusement Park as a Whole.

Since the system is being used by several departments that all have different work tasks, the user context and scenarios vary greatly between them. The largest user

group is the head waiters at the restaurants that use the system to manage all opening hours across different restaurants and restaurant areas. The main view of the system is a calendar display that shows a monthly overview. A sidebar with several dropdown menus are displayed beside the main view that allows the user to adjust and manage the opening hours within the desired department. The opening hours are displayed as different colors and attributes such as circles and dots around or next to the date to indicate different hours and departments or areas.

Furthermore, Liseberg has a complex business structure that includes several departments, of which each department successively consists of several areas or sections. Because of the multidimensionality of the data in the system, it becomes a challenge to display this in such a way that a user fully understands the information displayed, and may constitute difficulties in navigating the application. For instance, a difficult situation may arise when a user needs to manage the opening hours for a specific booking option within one of the hotels restaurants. As previously mentioned, the restaurant *Mei Rose* consists of several distinct offerings, including a separate Hot Pot section, a rooftop bar with both dining area and an indoor bar, and additional spaces that may serve for different purposes. At certain times, the restaurant also serves as a breakfast venue for hotel guests. As a result, when adjusting opening hours of a particular option, the user must first identify the correct space and then navigate through multiple layers of the system before reaching the appropriate location where the opening hours can be modified.

Similarly, an additional challenging situation emerges when the opening hours need to be managed on a day where an event is planned to occur. For example, when there is a separate night event, such as *Klubb Karusell*, some rides close earlier in the evening to prepare whilst the other rides remain in operation as usual until the ordinary closing time. The few rides that will operate during the event will then reopen once the event begins, and subsequently close after midnight the following day, when the park will operate as normal from the morning. This means that one day can have several different opening as well as closing hours that need to be displayed. Similar scenarios happen on a regular basis, and the current design of the system makes it difficult for users to fully understand its components. Since the opening hours are an essential part in the guest experience, having an application that allows for easy and intuitive use is crucial for effectively managing these tasks.

2.2.2 Trademark and Brand

Liseberg as a company has both a strong trademark and brand, which will be taken into account throughout the whole project process. Apart from the amusement park, these also include all of their other concepts, such as Grand Curiosa Hotel and Oceana Waterpark, meaning that each concept has its own trademark in itself, while still being part of the Liseberg trademark as a whole. To strengthen and broaden the image of the company, they have three tools that apply to the entire Liseberg. These tools consist of their brand platform, which is the basis for everything they do, their design principles, which help them hold their expression together and build a strong overall experience, as well as their brand architecture, which explains

how their brands relate to each other and gives the company a structure to work with when developing new offerings. Their brand platform (see Figure 2.5) is their foundation and it describes how they want the entire Liseberg to be experienced, both by customers and employees. The content should permeate all parts of the business and form the basis for strategic decisions in both the short and long term. For instance, Lisebergs five values describe the way their business culture is shaped, and they emphasize experiences that are a mix of creativity and originality, which also will be taken into account within this thesis project. Although the established trademarks and brands are primarily for the consumers experience and connection with the company, they also include aspects such as specific fonts, color schemes, shapes, and patterns, which are important to take into account even within internal digital systems in order to maintain consistency.

Figure 2.5: Liseberg Brand Platform.

Furthermore, their design principles constitute the bridge between the brand platform and the various design platforms. They define the elements that remain consistent regardless of which part of Liseberg is encountered, and support the development of a strong and coherent brand identity. Given their broad portfolio of trademarks, maintaining a unified experience is essential. The four design principles are also applied in evaluations to ensure strategic alignment and that all stakeholders work toward shared objectives. The first principle is called *For all*, and emphasizes that Liseberg is a place for everyone. The company should be warm and inclusive, as well as make it easy to share their experiences and make the guests feel seen. Thus, there should be a warm and inviting tone in both language and visual expression as well as an intuitive interface that is easy to interact with, while following accessibility standards. The second design principle is *Relevance*, which focuses on a modern expression that enables the company to effectively reach its target audience, and each communication platform should be designed in a relevant and optimal manner. Similarly, *Expressive* has to do with the aim of Liseberg being a place that is different from everyday life, where people experience joy together and new memories are created every day. This includes the use of a rich color palette that adds energy and personality, imagery that appears magical and atmospheric, and distinctive shapes and patterns that foster recognition and visual dynamism

(see Figure 2.6). The fourth and final design principle is *High quality*, meaning that Liseberg should always be associated with quality in everything they do. Therefore, the design elements should be applied consistently, with careful attention to detail to ensure a well-crafted and professional expression.

(a) Liseberg North Entrance Details [10]

(b) Liseberg *Saker & Ting* Interior [16]

Figure 2.6: Typical Colors and Patterns of Liseberg.

Moreover, how the various brands relate to one another is of central importance. It must be straightforward for guests to discover and navigate the full range of offerings, and at the same time equally straightforward for employees to develop and communicate those. The brand architecture, as shown in Figure 2.7, provides a clear and coherent structure to work according to. The Liseberg brand has three distinct roles: the corporate brand, or main brand, communicates the entire operation in a business context, the group brand conveys the breadth and diversity of Lisebergs overall offering, and the experience brand highlights the specific attractions and experiences within Liseberg Park. These three also have different target groups, communication tools and platforms, as well as different designs.

The main brand encompasses everything and is used to communicate the business as a whole in a corporate context, thus the target audience comprises Lisebergs stakeholders beyond guests and employees. The design is intended to be iconic, warm, and professional, while simultaneously maintaining a minimalistic and easy appearance. To communicate this, the tools being used include corporate presentations, annual and sustainability reports, as well as correspondence materials, such as business cards, envelopes, and PowerPoint templates. The group brand, on the contrary, communicates the breadth and diversity of Lisebergs overall offering, and serves as the unifying platform for all brands and operations within the group. The target audience are all guests as well as current and prospective employees, and the design should be inclusive, engaging, and broadly appealing. Its communication tools include the website and mobile application, including booking flow and

logged-in mode, as well as destination-oriented communication such as newsletters and package offers. It also encompasses customer service, Liseberg clothing, and communication to employees and when recruiting.

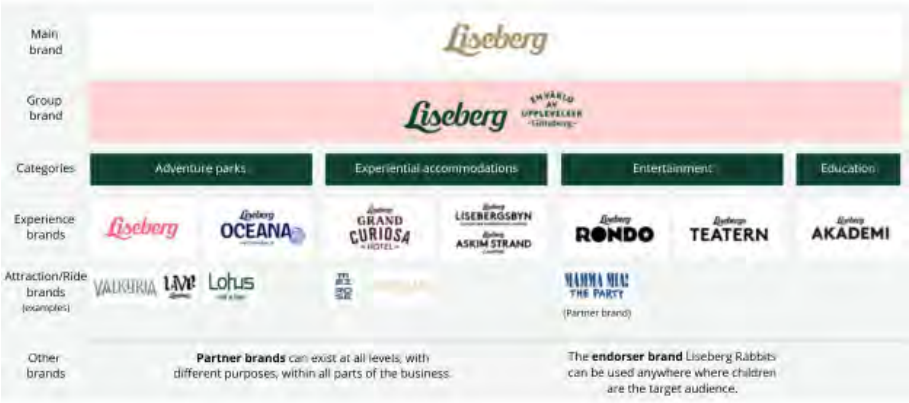


Figure 2.7: Liseberg Brand Architecture.

Lastly, the experience brand promotes the different offerings within all of the companys trademarks (that is, concepts), such as Liseberg Park, Oceana Waterworld, Grand Curiosa Hotel, and the campsites, to mention a few. The experience brand functions as the sender of all communication relating to offerings at the specific location. Thus, the design should be dynamic and relevant, but also expressive, and each experience brand has their own defined target group and market. Communication of the different brands offerings takes place within the mobile application, on websites, and through newsletters, as well as through physical touchpoints such as tickets, ride passes, merchandise, and room keys. For instance, the green *Liseberg Rabbit* is part of the endorser brand, and is a central symbol that is strongly associated with Liseberg as a company, hence the name of the amusement park area *Kaninlandet* (Rabbit Land). It can be used anywhere where children are the target audience. It appears mainly as a mascot, but it can also be found in the various shops as a motif on a great number of things, as well as in the shape of rabbit balloons, plushies, and headbands with the typical green rabbit ears (see Figure 2.8).

Figure 2.8: Endorser Brand - The *Liseberg Rabbit* [16].

2.3 Related Work and Existing Information Systems

Several researchers have studied usability in enterprise software and the design of digital systems within organizational settings. Much of this research has focused on improving efficiency, effectiveness, and overall system performance. However, comparatively less research has been published regarding how information and enterprise systems can be designed to support learnability and ease of use in organizational environments in which high employee turnover is an inherent and unavoidable condition.

2.3.1 UX and Usability in Enterprise Software

Several contributions have been made in the research of enterprise software and UX. Finstad *et al.* studied the bridge between end users and enterprise software, stating that digital software that does not consider usability and UX, led to high error rates, difficulty for users, and user dissatisfaction [17]. The results from the authors case study and testing of an OTS (off-the-shelf) enterprise software indicated that usable systems can lead to increased end-user productivity. It also highlights the importance of understanding the business and users when designing and developing user-friendly and effective systems.

In a study by Moallem, a feature rich enterprise application was analysed based on the usability of the system, using a design-centered approach [18]. When increasing the usability of enterprise-level systems, the study emphasizes the importance of several techniques and approaches in the design process. Amongst other things, a crucial aspect to consider is user interface (UI) guidelines, including common UI standards, as a basis for designing a user friendly system. Similar to Finstad *et al.* [17], the author emphasizes the importance of understanding the user in order to create an effective system. This includes using efficient user study techniques for a more comprehensive data collection and understanding. The author also presents prototypes as one of the main components during the process of designing usable products, as efficient prototyping can bring several valuable insights, including facilitating communication between UX professionals and other members within the design team, and helping various stakeholders see the product in advance.

The results of the study by Moallem proved several improvements of the initial system, including improvements in navigation systems, such as replacing depth in hierarchy to breadth, which enables fewer steps for the user when navigating through the application [18]. Prioritizing customer productivity was presented as one of the most important factors to consider when designing an easy to use product. The author describes customer productivity as performing tasks in less time and without the need for costly user training, support, and maintenance.

2.3.2 Minimizing Cognitive Load in Graphical Interfaces

In a research contribution by Oviatt, human-centered design and interface design was analyzed [19]. By using the cognitive load theory (see Chapter 3.1 3.1), the author analyzed how interface design affects cognitive load and efficiency when performing a predetermined task. Results from the study showed that challenging interfaces increase cognitive load and reduce task performance. By focusing on the end-user and their needs, while following UCD principles, the author argues that interfaces can be designed to minimize errors and enable users to accomplish their tasks more efficiently.

Zhou and Fang analyzed human cognitive behaviour in relation to interactions with software interfaces [20]. Their findings indicate that an understanding of perception, memory and thinking is essential when designing interactive interfaces that support usability. Based on their analysis, the authors identify four key areas for improving usability in interactive software. Users should be able to operate the system independently, without relying on external assistance or prior experience. The interface should also support different user needs and support a variety of tasks. Moreover, the design should aim to minimize errors and reduce the occurrence of problematic situations. Furthermore, the interface should provide feedback using terminology that is familiar to the user.

In line with the previous mentioned work, Jiang *et al.* studied how the design of information interaction interfaces affect cognitive load [21]. The authors argue that the layout of the interface is of great importance since users are often required to manage a degree of cognitive load, which can constrain both their efficiency in performing tasks and their overall experience of system use. One of the main reasons for increased cognitive load within information interfaces is the layout of elements. This includes presenting large amounts of information that exceeds users working memory capacity, requiring levels of cognitive processing that may be too demanding, and placing uneven demands on users attentional resources. To minimize cognitive load while interacting with information interfaces, Jiang *et al.* suggest various layout design guidelines, including enhancing the focus of important elements, grouping related information elements to reduce cognitive effort during information processing, and limiting unnecessary repetition of information [21].

2.3.3 Existing Information Systems

Several booking management systems are in use at Liseberg, of which one of these is *Citybreak Sales Agent*, part of *VisitGroup*. This is a booking and e-commerce management platform constructed for the tourism industry that supports creation and modification of bookings, as well as providing an overview of the amount of bookings created or changed. The application includes a search function that allows users to navigate between different tabs and guest bookings to maintain an overview of active reservations. Bookings are displayed as a list and expand to the side of the screen when selected, revealing additional information [22]. *Citybreak Sales Agent* covers most types of bookings made online, such as accommodation and park tickets, but does not include tickets purchased on site.

Additionally, *iTicket*, also part of *VisitGroup*, is a cloud-based application for managing bookings and sales across multiple industries such as theme parks, ski resorts, and waterparks. Its design structure is similar to that of *Sales Agent*, with bookings displayed as a list and expanding to the side of the screen coupon selection [23]. Within Liseberg, *iTicket* is primarily used to obtain an overview of season passes and park tickets, including reviewing their activation and expiration date, Point-of-Sale information, such as pickup status for tickets, and guest information. In contrast to other applications discussed in this thesis, *iTicket* encompasses purchases made physically at the park and is not limited to online reservations, offering a broader transactional overview. It does not, however, include accommodation bookings.

3

Theory

The following chapter covers several theoretical frameworks and models which relate to the topic and aim of this thesis project. The theories and central concepts addressed and builded upon include cognitive load theory, information visualization, usability and learnability, as well as onboarding.

3.1 Cognitive Load Theory

Cognitive Load Theory (CLT) is a framework based on the limited working memory capacity of the brain. The cognitive load theory declares that the working memory, also known as short-term memory, is limited in capacity and can therefore only process a finite amount of information at one time [24]. This means that when the capacity is overloaded, the persons effective information processing is impaired, thus leading to reduced understanding, learning, and retention. Simultaneously, in regards to this theory, it has been proposed that knowledge should be divided into biologically primary information, which humans have evolved to acquire naturally, and biologically secondary information, which, on the contrary, is not acquired through evolutionary specialization [25]. Primary knowledge typically consists of generic-cognitive skills essential for human survival and are acquired unconsciously and can therefore not be taught. Secondary knowledge is generally domain-specific and depends on deliberate, explicit instruction, and is initially processed within working memory before being encoded into long-term memory.

Furthermore, three different types of cognitive load can be identified - namely intrinsic, germane, and extraneous. Paas *et al.* describe these three as additive components, in such a way that their combined load must remain within the limits of the available working memory resources in order for learning to occur [26]. The first type, intrinsic cognitive load, depends on the interactivity of elements, and is defined by the intrinsic complexity of information that is to be learned [27]. Germane, or effective, load is influenced by the instructional designer and enhances learning, while extraneous, also known as ineffective, load refers to unnecessary mental effort caused by aspects such as irrelevant information or poor instructional design, which in turn hinders learning [26]. Similarly, working memory load may be affected by the intrinsic characteristics of the learning tasks (that is, intrinsic load), by the manner in which the tasks are presented (extraneous load), and by the actual learning occurring (germane load) when engaging with intrinsic load [28].

Moreover, the cognitive load theory also seeks to develop instructional design guidelines derived from a model of human cognitive architecture [28]. In turn, this cognitive architecture serves as a basis for designing instructional procedures aimed primarily at reducing working memory load associated with complex information [25]. The guidelines are related to the expertise reversal effect, which posits that design guidelines aimed for novice learners differ from the guidelines for more experienced learners [28]. In other words, the instructional design principles vary according to learners levels of prior knowledge. Consequently, the most optimal instructional approaches are also different depending on what type of learner there is. Design guidelines specifically for managing intrinsic load include for instance a low- to high-fidelity strategy as well as a simple-to-complex strategy. As reported by Van Merriënboer and Sweller, the low- to high-fidelity strategy has to do with replacing a series of conventional tasks with tasks that are initially performed in low-fidelity settings and gradually transition to higher-fidelity environments [28]. The latter strategy, on the other hand, refers to starting with tasks that only present isolated or basic elements and principles before moving on to tasks with a higher level of complexity.

Given the ongoing increase in the complexity of electronic learning environments, integrating concepts of cognitive load theory with human-computer interaction (HCI) has become increasingly important [27]. Sweller points out that cognitive load can be measured in several ways, including the number of statements held in working memory, the number of productions generated, the number of cycles to solution, as well as the total number of matched conditions [24]. Additionally, Hollender *et al.* highlight two conceptual models, of which the first one divides extraneous cognitive load into load attributable to instructional design versus load caused by software usage, thereby clarifying the focus of traditional usability principles and instructional design principles [27]. The second model integrates concepts from cognitive load theory into the fundamental components of UCD. Thus, the concept of germane cognitive load demonstrates that increasing cognitive load may be advantageous in the design of e-learning environments [27].

Sweller also explains that the working memory load is typically higher for novices than for expert learners with greater expertise [25]. With increases in expertise, the element interactivity decreases, which in turn have significant instructional consequences, ultimately contributing to the so-called expertise reversal effect. For novice learners on a topic, *studying* problem solutions can be a more effective learning strategy compared to *solving* equivalent problems. However, as expertise increases, the effectiveness of problem solving tends to increase, whereas studying worked examples becomes more ineffective, according to Sweller [25]. In other words, changes in expertise imply a need for changes in instructional procedures. Once a problem solution is understood, additional practice may develop competence further, however, such improvements are typically achieved more effectively through problem solving rather than continued study of worked examples [25].

3.2 Information Visualization

Information visualization (InfoVis or IV) can be described as the process of representing data in a visual and meaningful way in order for a user to understand it better [29]. Card *et al.* (p. 7) define it as the use of computer-supported, interactive, visual representations of abstract data to amplify cognition [30]. The term was introduced in 1989, and emerged from the idea of applying techniques from scientific visualization to abstract information spaces [31]. It is also related to business intelligence (BI), in such a way that an increasing number of companies are beginning to visualize data and build BI projects to facilitate in illustrating complex relationships within multi-dimensional data and reveal deeper insights [32]. Thus, this is an interdisciplinary field of research, combining disciplines such as HCI, cognitive science, graphic design, communication theory, and computer graphics [33]. For instance, various information visualization methods have been invented by visual language researchers and UI designers, and continuous improvements in computer speed and display resolution will likely increase the importance of information visualization and graphical interfaces [34]. By highlighting, simplifying, and structuring collected information, it enables the users to identify patterns and compare items, thus understanding the context easier. Gershon *et al.* also emphasize that effective visual interfaces facilitate the process of searching, interacting, and navigating data [35]. This allows the user to rapidly discover hidden characteristics and trends, which in turn has resulted in a fundamental change regarding how data sets are presented and understood, in terms of new insights and more efficient decision making [35]. Moreover, information visualization supports the interpretation of both large-scale and small-scale features of the data, making it possible to extract key information from more than a million measurements [36]. According to Moere and Purchase, it is especially useful when analyzing large and complex data sets, such as multi-dimensional data [37], hence it being a relevant framework for this specific project.

Existing information visualization techniques support a wide range of application fields, however, they are typically tailored to solve well-defined, specialized tasks [37]. Additionally, its main applications include solving functional and efficient requirements, as well as focusing on the visual quality in terms of aesthetics or UX, of which the latter hold greater relevance to this project. The field also focuses on using interactive techniques to transform data, knowledge, and information into visual representations that can be readily understood by the human visual system [31]. Moere and Purchase argue that mindful articulation of design decisions enables the development of information visualization, and that this applies equally to interactive and analytical features as to visual design [37]. Yet, Gershon *et al.* highlight the importance of understanding both the specific system and its users needs in order to create effective visualizations, as they often function as one component within a larger, complex system rather than as a stand-alone entity [35].

3.3 Usability and Learnability

Usability is defined as a products ease of use [3]. When defining ease of use, researchers emphasize effectiveness and efficiency, and illustrate the difference between them. Efficiency refers to the extent of which a task is achieved, while effectiveness refers to the effort required to accomplish a goal, where less effort equals higher efficiency. Another aspect that is important to consider within usability is user satisfaction, that is, the users acceptance and perceived comfort level when using the product. All three aspects are important within usability, but when designing a product intended for productivity, efficiency and effectiveness may be more important to consider than satisfaction. However, these three components are often interconnected in such a way that when a product enables a user to achieve a task more efficiently and effectively, the satisfaction toward the product subsequently increases. In technological products, usability is seen as mandatory, compared to previous conceptions that usability is to be perceived as a bonus to complicated digital solutions [3].

Within the usability context, learnability is another important component, especially in environments in which training time is limited [3]. There is no fully agreed-upon definition of the term learnability as several studies have been made in various different fields, making it difficult for designers to separate the term in ways that is relevant to their research [38]. The authors separate the concept into two different types of learning: initial learning and extended learning. Initial learning refers to novice users perception of the product during the initial learning phase, and the effort it takes to achieve a task with a predefined level of proficiency, where a highly learnable system is a system that requires a short time to reach proficiency in. Extended learning, on the other hand, relates to the users achievement of effective interaction of the software when receiving no formal training. While the definitions may vary, some state that learnability is the most important aspect of usability.

3.4 Onboarding

An essential part of all different types of organizations is to ensure newcomers join and integrate through onboarding [39]. This, also known as organizational socialization, is the process through which new employees learn the skills, behaviours, and knowledge required to become an organizational insider [40]. The process includes integrating employees into an organization and how it functions by providing them with tools and resources to make them adapt and feel comfortable regarding the structure and culture in an unknown environment [41]. Apart from the companys culture and processes, the onboarding process should also introduce its goals, values, and policies [40]. However, the newcomer must at the same time be able to take their own initiatives, such as, when possible, actively seek regular feedback on their progress as well as engage in practices involving brainstorming, collaboration, and reflection [41].

The overall purpose of onboarding includes ensuring that the new employee can effec-

tively contribute to and participate in the organizations success [42]. It is also a vital practice to guarantee that individuals feel valued and equipped with the resources necessary to excel in their roles [43]. Likewise, Carlos and Muralles emphasize that a deep investment in relationship-building and the establishment of trust among individuals is a key factor in the successful onboarding of a new hire [41]. In addition to this, an optimized and efficient onboarding process holds the potential to decrease the overall time spent, thus resulting in advantages for all stakeholders involved [42]. The total number of interactions between a new hire and other employees within a certain period of time may serve as an indicator of a threshold correlated with successful onboarding [41].

Moreover, all teams change membership over time, whereupon Gregory *et al.* state that the newcomers must rapidly assimilate into the new environment while simultaneously learning how to contribute effectively, without causing significant disruption to ongoing projects [39]. This implies a need for systems that are easy to learn and use, especially in workplaces characterized by high employee turnover. In line with the increasing employee mobility across organizations, Bauer and Erdogan claim that socialization has become equally important for individuals as it is for companies [40]. Besides, Carlos and Muralles argue that it is critical to include both formal and informal opportunities for socialization in the onboarding process [41]. For instance, a successful socialization of newcomers is associated with enhanced productivity, increased employee retention, and reduced costs related to recruitment and training [43]. The socialization component is also important as it enables new hires to develop a sense of connection to the organization and establish interpersonal relationships effectively. The main goals of the onboarding process are skills training and building relationships, which in turn ultimately result in the development of trust [41].

4

Methodology

This chapter provides an overview of the methodological approaches relevant to the theme of this thesis project. The thesis is grounded in the concepts of wicked problems, Research through Design (RtD), and the Double Diamond design process, which together inform the structure, process, and analytical perspective of the work.

4.1 Design Approaches

In this section, different design approaches intended to be followed through the project are presented. The design approach includes Wicked Problems and Research through Design, both of which are presented in this section.

4.1.1 Wicked Problems

Wicked problems (WP) are a class of complex societal and design challenges that do not contain a definitive formulation and resolution [44]. In contrast to tame problems, such as those typically addressed in engineering fields and natural sciences, which can be clearly defined and evaluated, wicked problems lack a definitive formulation. Wicked problems also have no stopping rule telling you when you are finished, have no true or false answers, and the solution of a wicked problem can not be immediately or conclusively tested [44]. In other words, finding a solution does not imply that it can be re-used without any modification, as each solution is context-specific. Furthermore, every wicked problem is essentially unique, meaning that despite apparent similarities to previously encountered problems, specific contextual factors may emerge that alter how the problem should be understood and addressed. As a result, wicked problems resist linear problem-solving approaches and instead require iterative exploration throughout the design process.

4.1.2 Research Through Design

Research through design (RtD) is an approach in which design practices are central in the research process as a means of generating knowledge. Design researchers ground their investigations in knowledge generated through anthropological studies and insights generated through investigations conducted by design researchers as part of the design project. By applying a design research approach, including iterations, ideation, and critiquing potential solutions throughout the project, the

problem is continuously reframed and the outcome of the activity is the development of a concrete problem framing and a description of the desired future state. Therefore, research through design is an appropriate method when investigating wicked problems [45]. Rather than aiming to produce generalizable solutions, research through design emphasizes the generation of conceptual understandings that can inform and inspire further design practice and research [46].

4.2 The Double Diamond Design Process

The Double Diamond (see Figure 4.1) is a universally accepted representation of a design process, used to describe phases in an innovation or design project [47]. The process consists of four phases that should be followed throughout the project, and include Discover, Define, Develop, and Deliver. While the Double Diamond describes four chronological phases, it allows for flexibility and adaptation, particularly in response to the inherently iterative nature of design processes. Given the uncertain nature of design challenges, following a linear process is less suitable for achieving successful outcomes. In this regard, the Double Diamond serves as a conceptual framework for structuring design projects while accommodating iteration and refinement throughout the process [48].

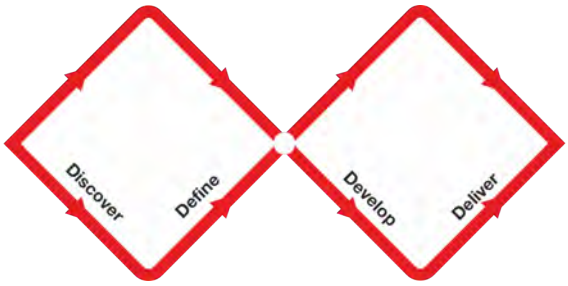


Figure 4.1: The Double Diamond Design Process [47].

4.2.1 Discover

The first phase is about gaining an understanding of a certain problem, that is, to discover its nature. The understanding is gained from speaking to the groups that are affected by the problem. In order to gain this understanding of an issue, methods such as observation, interviews, and brainstorming can be used [47].

4.2.2 Define

Based on the insights from the discovery phase, a different way of defining the problem can evolve. Methods such as customer journey mapping can be utilized in this phase to define the problem space and the area to focus on [47].

4.2.3 Develop

The developing phase initiates the second diamond shape within the design process, in which the focus is to develop potential solutions to the defined problem. In this phase, solutions are developed to solve the challenges that have been understood and defined in the two previous phases. Methods that can be used to develop different solutions include, for instance, user scenarios and physical prototyping [47].

4.2.4 Deliver

During the final phase, different solutions are tested to sort through which solutions do not work and which ones can be improved. Methods such as evaluations can be used in order to test the solutions that have previously been developed [47]. When performing formative evaluation regarding software learnability, the think-aloud protocol is one of the most commonly used methods, as it effectively encourages users to verbalize their thoughts and strategies when performing a task [38].

4.3 Discover Phase Methods

The Discover phase consisted of literature reviews and interviews to gain a deeper understanding of user groups as well as the overall topics of relevance.

4.3.1 Literature Review

A literature review is the method of which research is synthesized to form a foundation for identifying research gaps, discussing a distinct subject, or theoretical development [49]. They suggest four phases to be involved in the literature review process: design, conduct, analysis, and writing the review. The initial design phase includes determining what should be researched, defining the papers audience, and defining the scope that will be reviewed. Deciding on search databases and keywords are important steps in this phase. During the second phase, conducting the actual review, one option is to make selections based on reviewing abstracts of papers discussing the relevant topic, and make a selection based on this to later read the full-text articles. Following this, the third phase involves analyzing the content of each article, considering what information should be used from each article. Finally, the fourth phase consists of actually writing the review, including considering what information to include in the review and reflect on if the information presented is clearly explained and presented.

4.3.2 Interviews

Interviews as a research method is an efficient method in collecting qualitative data. By performing interviews, participants can freely express their thoughts which provide detailed views of their perspectives [50]. Within user centered design, interviews can be applied for multiple reasons and goals, including collecting user, task, and

flow information. Interviews can be either structured, semi-structured, or unstructured. Structured interviews include questions following a specific format and often include questions that allow the participant to choose a response from a set of fixed responses. When performing structured interviews, all participants receive the same set of questions [51].

Semi-structured interviews combine both predefined and open-ended questions following a more unstructured format. Generally, semi-structured interviews follow a predefined interview guide, including a brief description about the topics, including suggested questions related to each topic. Semi-structured interviews can be used in collection of information about a topic, but still allow for exploration of other topics [51]. Additionally, Wilson states that unstructured interviews include a general topic, but does not include specific questions or follow a specific agenda [51]. This approach allows participants or stakeholders to express their thoughts freely with no restrictions. By allowing participants to express their experiences in their own words, they can provide insights in users vocabulary and reveal previous un-thought of issues.

4.4 Define Phase Methods

In the Define phases, affinity diagrams, user personas, user scenarios, and the MoSCoW method was utilized. Each method is described in this section.

4.4.1 Affinity Diagrams

Affinity diagrams is a method based on the KJ method [52], in which unstructured qualitative data is organized and synthesized [53]. When performing this method, individual observations or requirements are written down, often on sticky-notes, by the design team members. All notes are then grouped together based on similarities between them, eventually forming different overarching themes that allow design team members to get a better overview of the collected data [54].

4.4.2 User Personas

A persona is a fictional character or individual portrayed to represent similar needs and character traits as the intended customer or user of a product. Several factors need to be incorporated in a persona, such as a general description of what they like and dislike, and occupation. Additionally, the persona needs to be described in terms of needs and goals in relation to the product to be designed. Including personas in the design process within UCD has several benefits. Primarily, it facilitates more efficient communication about target users between design team members, as well as keeping the design team members focused on user goals and needs [55]. Furthermore, it is an effective method to use during the design process as it helps designers to understand and empathize with the end user [56], and enables a unified language between different stakeholders [2].

4.4.3 User Scenarios

User scenarios is a technique that allows the design team members to envision the context in which the product to be designed is set. Scenarios should be based on a persona, and include several steps of the users interaction with a product, as they often start with a trigger event and end with the resolution of a task. Additionally, these are either based on research or the design teams perception of the users, and is an effective method to ensure that goals and visions are aligned within the design team [54].

4.4.4 MoSCoW

The MoSCoW method is used to prioritize requirements, most in the context of business needs and software development projects [57]. The method involves categorizing requirements and needs into four groups: *Must Have*, comprising requirements that are critical to the success of the end product, *Should Have*, comprising requirements that are valuable but not essential to the projects success, *Could Have*, which include requirements that could enhance the projects end result but are not critical to implement if time resources are limited, and *Wont Have*, which include requirements that are excluded due to low prioritization or deferred to a later stage. The methods simplicity allows for a large degree of adaptation when applying it to real-life projects [58].

4.5 Develop Phase Methods

Prototyping was used as a method in the Discover phases of this project. Different approaches were followed, each of which are presented in this section.

4.5.1 Prototyping

Hartson and Pyla describes prototypes as an early version of the envisioned system [59]. A requirement for prototypes is that it must be something less than the actual system, as it needs to be easily adjusted. Prototypes can be categorized as different levels of fidelity, which is closely related to the prototypes level of detail and visual appearance resembles the final version products, including low fidelity, medium fidelity, and high fidelity. In addition to these, Petrie and Schneider also propose a fourth fidelity of prototypes: mixed fidelity [60].

Low fidelity prototypes offer limited functionality and provide little to no interaction [61]. Such prototypes can be created using various media, including paper and digital tools. Paper prototypes support participatory design practices and encourage a more exploratory approach, while computer based low fidelity prototypes enable the recording of user tests and can be distributed electronically [62]. Regardless of the medium used, low fidelity are particularly effective in the early stages of product development, as they help clarify user requirements and needs [61]. Medium fidelity prototypes are polished versions of a low fidelity prototype [60] and are character-

ized by their main focus of content of design elements, rather than the elements style [63].

High fidelity prototypes, on the other hand, provide interactive features and incorporate functional components. Whereas low fidelity prototypes are primarily useful in the early stages of the design process for exploring layout and structure, high fidelity prototypes allow for the evaluation of navigation, interaction flows, and terminology within an application [61]. Furthermore, mixed fidelity prototypes combine several different types of fidelity in one single prototype. Combining several types of fidelity enables exploration of single elements while ensuring the elements remain within the context in the overall design [60]. Additionally, mixed fidelity approaches support iteration between fidelity types and collaboration between designers. While prototypes are often used as an evaluation tool, Lim *et al.* argue that prototypes function as a design tool for reflection and discovering possibilities throughout the entire design process, enabling designers to continuously refine ideas and solutions [64].

4.6 Deliver Phase Methods

In this section, usability testing is described as the method utilized in the Deliver phases of this project.

4.6.1 Usability Testing

Usability testing is an evaluation method used to assess the usability of a product. The method is characterized by participants performing one or several tasks within the product while researchers observe their performance. The method can vary in terms of both level of formality, and level of prototype fidelity, and often incorporates additional techniques such as think-aloud protocols [65]. Nielsen recommends limiting usability testing to no more than five participants, as larger groups tend to yield repetitive findings [66]. Therefore, he suggests performing iterative usability testing, which allows for progressively deeper insights into usability issues across multiple rounds of evaluation. Usability testing can further be combined with interviews, in which participants are asked to reflect on their experience using the product. Observational methods may also be incorporated alongside usability testing, as they can support a broader understanding of how the product is used in practice and complement the identification of usability issues [67].

4.7 Other Methods

The methods Mood Boards and Stakeholder Meetings do not explicitly belong to a particular phase in the Double Diamond process, but will be used to guide the authors through design decisions throughout the project. Both methods are described in this section.

4.7.1 Mood Boards

Using a mood board within UX design is a way to show the values or feelings that the design should aim for and that a digital product should convey [68]. Mood boards are design tools used to compile and organize collections of visual resources and data, typically represented through imagery, that link to a certain theme [69]. In other words, they are used to communicate information visually by defining different aspects of the product, such as primary UI colors, patterns, and the visual design identity [68]. By creating a mood board, it can work as a guidance throughout the design process regarding the emotional and visual direction to follow.

4.7.2 Stakeholder Meetings

Stakeholder meetings involve the design team and relevant stakeholders, such as the client, coming together to discuss and evaluate the design from multiple perspectives [70]. According to Mortensen, involving stakeholders throughout a project is essential to ensure that the work remains aligned with the goals of the organization in which the project takes place [71]. Engaging with relevant stakeholders helps ensure that the design team has the necessary resources and information to carry out the project effectively, and that the research being conducted remains relevant to the projects objectives.

4.7.3 WCAG Compliance

Web Content Accessibility Guidelines (WCAG) provide a set of guidelines to ensure accessible content of web content. The guidelines are formulated to ensure that a wide range of users, including those with disabilities, can use a website. The guidelines are categorized by four principles, which consist of *Perceivable*, *Operable*, *Understandable*, and *Robust*. To assess whether the guidelines are met, there are three levels of success criteria: A, AA, or AAA, where A is the minimum standard, AA is the general standard, and AAA is the highest level of conformance. However, not all content can achieve AAA success criteria [72]. The guidelines cover different aspects of web design, such as the use of color and text and image contrast. When assessing contrast, various online tools can be used to measure the contrast ratio and determine whether it meets the required standard [73]. In this project, the Web Accessibility in Mind (WebAIM) website was used to assess contrast criteria [74].

5

Process

Due to the limited time between the project being confirmed and the thesis work beginning, no formal planning was completed before the project started. Instead, a general outline was established. This included defining the overall concept which was the evaluation and redesign of two internal digital systems with the goal of developing prototypes following a user-centered design approach, as well as deciding to adopt the Double Diamond process as the methodological framework to be applied across three iterations.

5.1 Pre-Study

The pre-study phase consisted of one initial stakeholder meeting to determine the projects scope and identify which applications would be focused upon and evaluated, followed by a literature review. This phase also resulted in a revised project plan and an initial draft of general usability guidelines, both of which are presented in this section.

5.1.1 Initial Stakeholder Meeting

Before the project work began, an initial meeting was held between the authors and a primary stakeholder, who is one of the product owners responsible for several systems within Liseberg, and who also acted as a mentor and advisor throughout this masters thesis project. The meeting involved a walkthrough of the portal and its systems, covering a wide range of internal tools directed at multiple departments across the organization. During this meeting, the stakeholder described each system and outlined their perceived needs and areas of concern.

As a result of this discussion, two systems were selected as the focus of the project. Both systems presented areas of improvements from the stakeholders perspective, and both offered relevant design implications for the authors to explore. For instance, regarding *Opening Hours* it was initially decided that the specific restaurants that would be regarded within the frames of this project were *Mei Rose*, *Hamnkrogen*, and *Saluhallen* and their different specific menu offerings. However, these turned out to not have any significant impact on the work or process, as the prototyping phases focused on the *Opening Hours* interface as a whole, rather than specific restaurants.

5.1.2 Literature Review

A literature review was conducted to explore previous research within the area. The literature aimed at exploring similar themes, including relevant theories and methods for the projects context. The results of the literature review can primarily be seen in the *Background, Theory*, and *Methodology* chapters. Additionally, a targeted literature view was conducted during the second iteration, following a shift in focus of the *Opening Hours* application. The literature review focused only on literature regarding contextual help, and was therefore not as substantial as the general literature performed in this thesis.

5.1.3 Revised Planning

Given the specific research question and stakeholders for this thesis, the authors suggested Double Diamond as the most suitable method to use and build upon for the project. This method and its phases will be used as a guiding framework for the overall process. The four phases will be iterated, with each iteration informed by insights gained from previous stages, in order to support continuous improvement.

The first four weeks of the project constitute a pre-study phase, which will consist of a literature review to collect the necessary knowledge and understanding of the project theme. The time plan is constructed based on the four phases of the Double Diamond process and most of the phases will progress for two weeks, as shown in Figure 5.1. The phases will be iterated three times in total to enable continuous evaluation, as well as the identification of opportunities for improvement and refinement. Insights generated during each evaluation phase will inform and guide the subsequent phase. Consequently, the research phase in the two later iterations will be shortened to one week, as the analysis of evaluation data can be considered part of the research and discovery process.

After each evaluation phase, time will be allocated for reflection and iteration of the guidelines. Reflecting on the results from each iteration enables the development of more nuanced insights and supports more informed refinements, in line with principles of RtD [45]. By applying insights from the evaluation to the guidelines after each iteration, the guidelines are progressively updated to better address identified challenges and requirements. The four final weeks will consist of concluding writing on the report, opposition, as well as presentation of the finished thesis project.

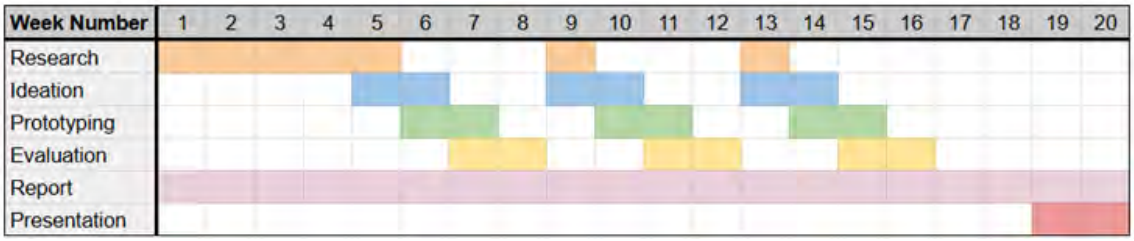


Figure 5.1: The Weekly Planning of the Project.

5.1.4 Initial Guidelines

From the literature review, several theories were explored and researched. From this, particularly from research regarding usability, UX, and cognitive load, a first version of guidelines were developed. The guidelines are based on research within the relevant areas, and displays general established guidelines within user experience and usability. The guidelines are primarily based on Nielsens usability guidelines [75]:

- **Match between system and the real world:** The design should speak the users language.
- **User control and freedom:** Undo buttons and Cancel buttons, as well as clear emergency exits.
- **Consistency and standards:** Do not use different words, situations, or actions for the same thing.
- **Aesthetic and minimalist design:** The interface should not contain information that is irrelevant or rarely needed.

Help and documentation: May be necessary to provide documentation or help users understand how to complete a task.

5.2 First Iteration

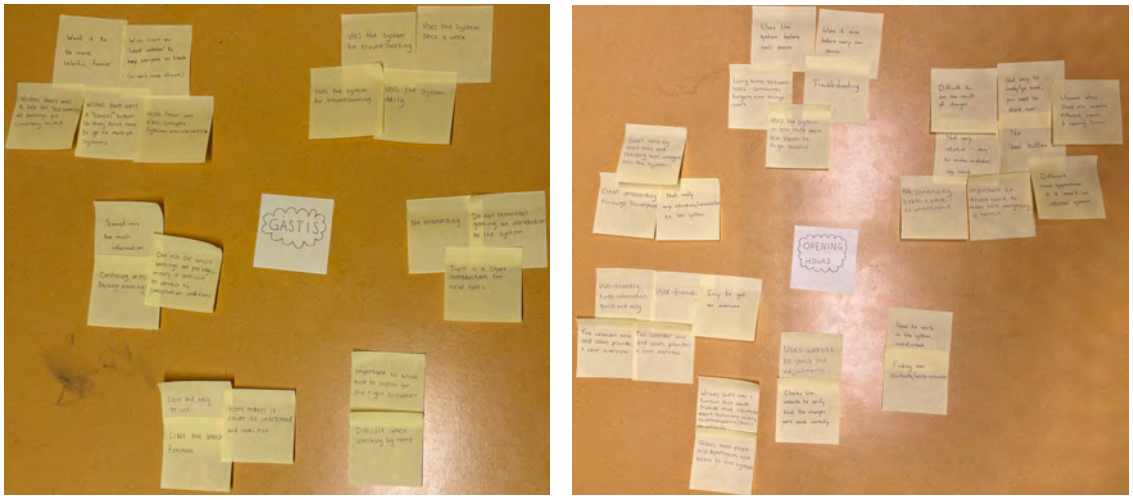
The first iteration followed an exploratory approach, with the aim of gaining a deeper understanding of the applications, their current use cases and their users. The Discover phase consisted of interviews, and the results from the interviews were later defined using several methods, including affinity diagram, user personas, user scenarios, MoSCoW, and mood board. The Develop phase consisted of prototyping, which was subsequently evaluated through user testing.

5.2.1 Interviews

During the Discover phase, five semi-structured interviews were conducted with users of the two specific applications. Two participants were users of *Gästis*, whereas three were users of *Opening Hours*. To ensure a broad perspective, participants were selected from different departments within the organization. For *Gästis*, one participant works within the E-Commerce & Ticketing department, and the other works in a managerial position within the Booking & Customer Service department. For *Opening Hours*, one participant works in the Food & Beverage with several restaurants in the amusement park, another works in a managerial position within the E-Commerce & Ticketing department, and the third works in one of the restaurants at the Grand Curiosa Hotel. The aim of the interviews was to explore the problem space and gain an initial understanding of how the systems are being used, in what contexts they are being used, and general thoughts about the usability of the systems.

5.2.2 Affinity Diagrams

As an initial step in the Define stage, Affinity Diagrams were developed to structure the insights gained from the interviews in order to achieve a unified and organized understanding. Affinity diagrams can be used when there is a large amount of unstructured, qualitative data, and involves grouping similar statements, ideas, and data together [76] - hence it being an appropriate method for this project work. The initial phase of the process was to write down all relevant information regarding the usability of the systems separately on post-it notes. Subsequently, notes that included similar topics, statements, or concerns were grouped together in thematic groups. Each cluster of notes was then assigned a category name describing the core concept or theme of the specific group (see Figure 5.2).



(a) Affinity Diagram for *Gästis* (b) Affinity Diagram for *Opening Hours*

Figure 5.2: Affinity Diagrams in First Iteration.

A total of six themes were identified for *Gästis* (see Figure 5.2a), and are as follows:

Wishes: Several desired features and improvements were identified. In other words, this specific theme was created based on various wants and needs mentioned by the participants. These included an additional tab specifically for outdated bookings, a more colorful and visually amusing interface, as well as a latest updates feature. More broadly, users expressed a desire for a less complex system environment by implementing a greater integration between *Gästis* and other applications within the digital *Asfalt* portal, in order to reduce the need to switch between multiple platforms when performing tasks. Accordingly, this relates to context switching, or parallel browsing, which is the process of switching between multiple platforms, which forces a rapid mental reset of the brain in order to pause, reorient to the new environment, and recall where you left off [77]. This not only lowers productivity and increases stress, but also increases the risk of errors and makes the interface cluttered, which in turn has the potential risk to result in cognitive overload. Therefore, by integrating the different applications with each other, it would be easier to navigate without the need to jump between several different systems and resources.

Usage: Most users stated that their primary use of the system is for troubleshooting purposes, for instance to ensure everything is working properly, or when a guest has encountered some issue with a booking or their account. Additionally, frequency of use varies across roles, with some users accessing the system daily, whereas others use it approximately once a week or when receiving troubleshooting requests from other departments within the organization.

Information Retrieval: Users described the booking overview as containing too much information, especially in cases where a guest profile has many bookings. In turn, this makes it difficult to navigate and find relevant bookings, resulting in a negatively affected system interaction and causing users to feel overwhelmed. This issue was particularly prominent for package bookings, which are bundles that include several products, such as accommodation and amusement park tickets within the same booking. The current design of the system does not distinguish packages from independent bookings - instead, the products within a package are displayed as separate bookings, and besides with no indication that they belong together. This makes it confusing and unclear, for instance regarding the various cancellation policies, as these differ depending on if a booking is a package or independent.

Onboarding: Most users stated that they have received little to no introduction or onboarding to the system. For instance, one participant stated that they do not remember getting any briefing or walkthrough of *Gästis* and its functions, whereas another claimed there is a short, quite informal, introduction for new hires. This theme partly relates to the whishes category, in such a way that a participant mentioned that they would like to have a component for system updates, which notifies and informs the users about new system capabilities, improvements, and changes to existing functionality. Subsequently, such a feature would keep everyone on track, resulting in users working more efficiently. In other words, participants expressed a desire for onboarding - on the one hand, this could therefore have been a part or subsection directly in the wishes category, but on the other hand, several specific things were mentioned regarding onboarding, hence it was considered as valuable to have it as its own category.

UI Elements: The overall graphical interface was described as pleasant, easy to use, and clearly arranged in terms of intuitiveness. For instance, the icons were highlighted as a particularly positive aspect, as they enable users to quickly identify the category of bookings they are looking at as well as navigate the application with ease. The search function was also an appreciated feature by the users, and is commonly used to locate specific guest profiles, bookings, or season passes.

Search Challenges: While the search function was generally perceived as an effective way of finding guest profiles, users noted that searching by a guests name frequently yields no results, whereas searching by an email address or other guest information tends to be more reliable. Thus, knowing how to search effectively was mentioned as one of the most important things for new users to learn, suggesting that the current search function requires a degree of prior knowledge that is not immediately apparent.

For *Opening Hours*, the following seven categories were identified (see Figure 5.2b):

Usage: Frequency of use was similar across all participants, with the system being used relatively infrequently. As this specific system is used to publish the various opening hours to the Liseberg website, it is primarily accessed ahead of each season. In other words, it is mainly used in conjunction with the planning of each operating season - summer, Halloween, and Christmas. For instance, one participant working in the Food & Beverage department stated that they use the system in the transition period between low season to high season. Another participant mentioned that the infrequent use can make the system more difficult to navigate, as certain functionalities are difficult to remember between sessions.

Challenges: It was found that users are unsure or dissatisfied about several aspects of the system, such as the lack of continuity, making it a time-consuming system to learn and understand. It was also described by some as partly unintuitive regarding specific tasks, which increases the likelihood of errors. Moreover, the most prominent difficulty was the inability to see the results of changes directly within the application, resulting in users having to rely on checking the Liseberg website to verify that changes have been applied correctly. All performed edits are directly published on the website, however, there is no clear indication within specifically *Opening Hours* that it has been saved or updated. This uncertainty leads to users not feeling confident in their actions, thus making them struggle and hesitate. This is important to take into consideration, as users need to feel that the system they are using is reliable and that they have control.

Onboarding: All participants reported varying onboarding experiences. One participant received a brief introduction from their manager and supplemented this by, on their own initiative, observing colleagues using the system. Conversely, a second participant mentioned that they received a structured introduction via a *PowerPoint* presentation that included clear images, symbols, and descriptions. A third participant received no formal onboarding, however, they had been involved in the system development process from the outset, thus contributing with requirements and other input when the system was initially created.

User-Friendliness: All participants found the systems overall presentation of information as user-friendly and easy to navigate. For instance, both the newly added calendar view and color coding in the prototype were highlighted as key elements that facilitate information retrieval and comprehension. These provided a clear overview, helping the users to find information easily and quickly.

Wishes: One participant from the Food & Beverage department expressed a desire for an additional feature that would allow users to specify the approximate number of guests currently present in a restaurant, with this status being displayed directly on the Liseberg website to help guests plan their visit beforehand. This idea is similar to already existing features within other systems of the organization that allows its users to indicate how many people are currently in the amusement park or queuing to a specific carousel in terms of statuses such as fully booked. By implementing the same concept for the restaurants, this would benefit both visitors and employees in the park, in such a way that it would give a better overview of which restaurants currently have many guests, and thus where you should eat instead or where more

staff may be needed. Moreover, some users expressed a desire for the *Opening Hours* system to be fully integrated across all departments within the organization, providing users access to the application regardless of which department they are working at.

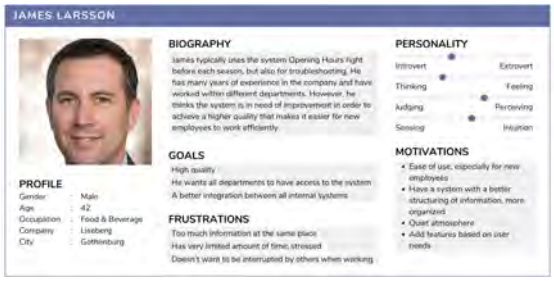
Verification: After making changes and adjustments in the application, users verify that the correct outcome has been achieved by checking the relevant page on the official Liseberg website directly. If a change has not produced the desired result or if a mistake is identified, users redo the specific adjustment manually.

Working Methods: Most users prefer to work in an environment free from disturbances when using the system, as full focus is required to ensure no mistakes are being made. Accurateness is highly important in *Opening Hours*, since all changes are automatically and immediately published on the official website, without any sort of confirmation step. Moreover, some users stated that they work in the system alongside one or two colleagues, while one participant prefers working alone - yet expressing that collaboration would be more effective for the tasks that the system involves. It is also common for users to develop individual workarounds or shortcuts, for example when selecting or deselecting multiple dates in the calendar. Most users consider the system to become easier to use over time as these workarounds are discovered.

5.2.3 User Personas

Utilizing the data and insights gathered from the interviews as well as key aspects from the affinity diagrams, two user personas, Olivia and James, were created. In order to guide the ideation process and facilitate understanding of the target group, these fictional user profiles are meant to represent target demographics and depict users of the two systems - one for *Gästis* (see Figure 5.3a), and one for *Opening Hours* (see Figure 5.3b). Each persona highlights the various goals, frustrations, and motivations connected to the specific role and system usage, with the purpose to cover as many of the identified scenarios and user needs as possible.

(a) User Persona for *Gästis*



(b) User Persona for *Opening Hours*

Figure 5.3: User Personas.

These personas aim to capture two types of system users, since an observation made was that there are slightly different goals and needs depending on which system

is being used. Each persona was created digitally in the graphic design platform *Canva*, and the two profile photos were AI-generated by using *This Person Does Not Exist*, meaning reduced data protection concerns such as GDPR compliance [78]. Subsequently, the personas were later used as a foundation for the development of user scenarios.

5.2.4 User Scenarios

To gain further understanding of the usage of the systems, two user scenarios were created. These are based on the user personas, therefore, two scenarios were created: one scenario for *Gästis* (see Figure 5.4), and one for *Opening Hours* (see Figure 5.5). Both scenarios are based on one goal, and include the steps necessary to reach that goal, including potential error scenarios, that is, potential errors or obstacles users could face during system usage. In turn, the error scenarios include an alternative step showing how the users currently solve obstacles or unknown situations. In connection to the error scenarios and alternative steps, problems and needs were identified to enhance understanding of why error situations occur, as well as potential solutions or needs related to those problems.

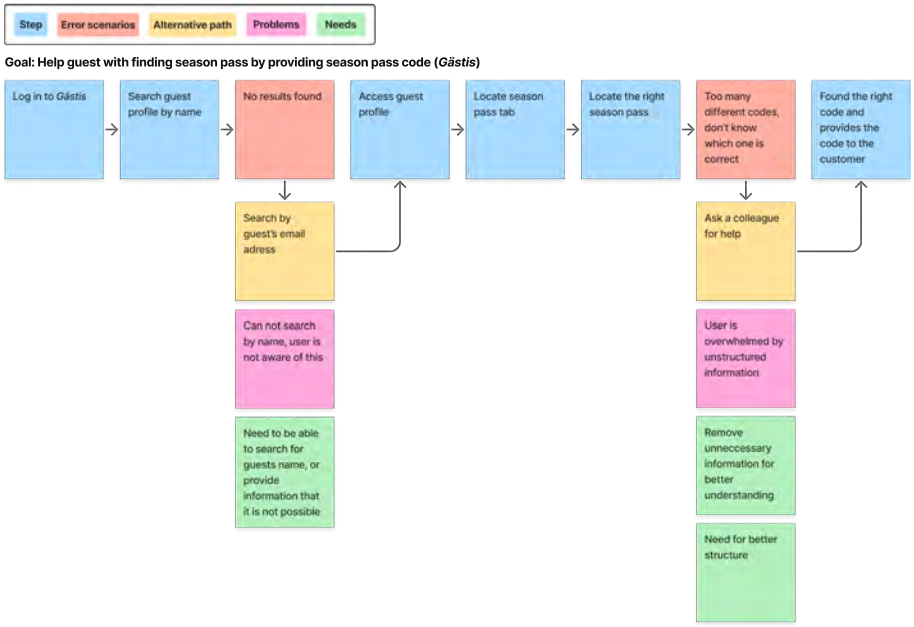


Figure 5.4: User Scenario for Gästis.

In the user scenario for *Gästis*, the goal is to find a guests season pass code. The scenario includes all necessary steps to reach that goal including two error scenarios. The first error occurs when the employee is unsuccessful in finding the guest, because they can not search by the guests name. Instead, they have to ask for another type of identification, such as email. The main problem in this scenario is that it is not possible to find a guest based on their name, posing a problem in quickly locating the correct guest. The second error situation occurs when the user becomes overwhelmed by information and does not know where to look for the right code.

By asking a colleague for help, users can work together to find the correct piece of information, but the overwhelming information poses a problem which leads to longer task performance time, and therefore, unnecessary or irrelevant information should be removed, or the structure of the information should be reconsidered to match the requested information. Both error situations in this user scenario leads to time-consuming tasks or workarounds, thus hindering efficient work flows.

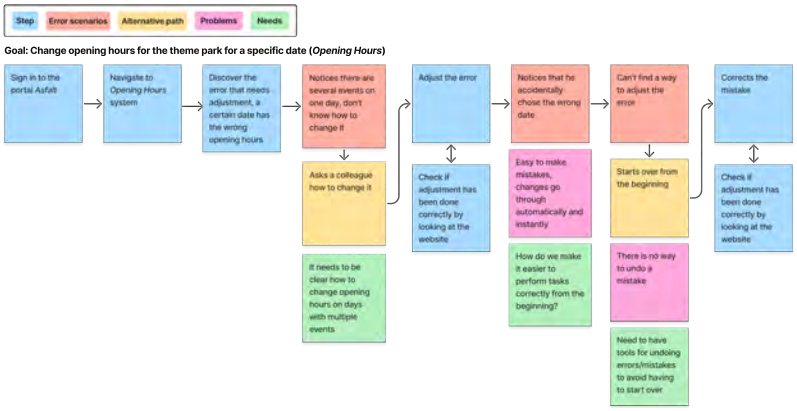


Figure 5.5: User Scenario for Opening Hours.

5.2.5 MoSCoW

In the *Opening Hours* scenario (see Figure 5.5), three error situations can occur during the task of changing the opening hours for a specific date. The first error arises from uncertainty regarding how to perform the task when multiple events occur on the same day. This suggests a need for clearer instructions or a more intuitive interface. The second error situation involves mistakes made during the task itself. Any changes entered by the user are immediately applied and published to the Liseberg website, including incorrect or unintended inputs. Because errors in the system can have significant consequences, there is a need for a solution that prevents changes from being directly implemented without verification. The third and final error situation occurs after a mistake has been made. Currently, users cannot undo their actions and must restart the entire task. This often requires time-consuming workarounds, such as changing parameters in the side menu and then manually correcting them again. Instead, the system should support user control by including features such as an undo function, allowing users to easily correct mistakes.

The MoSCoW method was used to prioritize system functionalities and requirements (see Figure 5.6). Although it is typically used in software implementation projects, it was used here as a tool to support design decisions and guide prioritization ahead of subsequent methods. The prioritization was based on themes and statements identified in the affinity diagrams and user scenarios derived from the interviews. Functionalities were categorized according to the MoSCoW framework: *Must Have, Should Have, Could Have*, and *Wont Have*. Decisions regarding the placement of functionalities within each category were informed by both the frequency of similar statements in the interviews and the authors subjective assessments, particularly

in terms of usability and technical feasibility. For example, in *Opening Hours*, the calendar view was consistently highlighted as a positive element by all interview participants. They indicated that the existing calendar layout supports tasks and information retrieval efficiently. As a result, this functionality was classified as a *Must Have*.

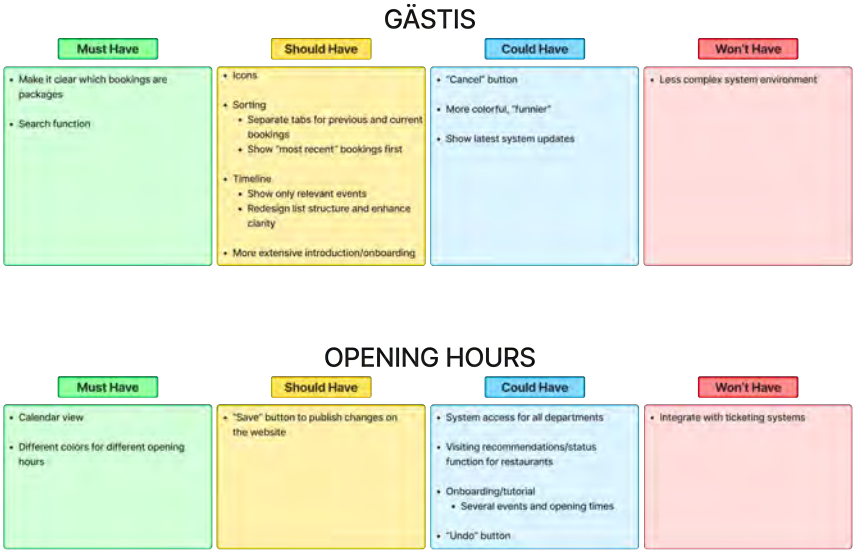


Figure 5.6: MoSCoW.

5.2.6 Mood Board

A digital mood board was created in *Canva* in order to facilitate the development of suitable prototypes for the specific company in question. As Liseberg already has an established trademark and brand, these were taken into consideration. Thus, to develop a user interface that aligns and is consistent with the values and aims of Liseberg, the creation of the mood board was based on reviewing the companys existing brand and product-identity materials. Their design principles include, for instance, specific color palettes, fonts, logos, and patterns. A few of these were then selected and included in the mood board as a guidance throughout the design process to ensure a clear compliance with existing standards (see Figure 5.7).

Figure 5.7: Mood Board.

Color is an important part of Lisebergs graphic profile, as the company aims to be colorful and expressive. However, colors always appear differently depending on the context, whereof the HEX codes and RGB values are the most relevant ones within this project, as these two are used specifically for screens, web design, and digital graphics [79]. Among the color palettes of Liseberg, they are divided into logo colors, primary and secondary identity colors, as well as primary color combinations. These consist of both darker and lighter shades, intended to accommodate a wide range of design needs. Additionally, their typography is divided into two categories: identity typography, which mainly uses the font *Brown*, as well as everyday typography, which uses the fonts *Arial* and *Georgia*.

5.2.7 Prototyping

Based on the insights gathered from the Define phase, low fidelity prototypes were developed. The prototyping was carried out in a collaborative manner and was mainly based on the results from the MoSCoW analysis. Through brainstorming, ideas were generated and later sketched on paper.

5.2.8 Low Fidelity Prototypes

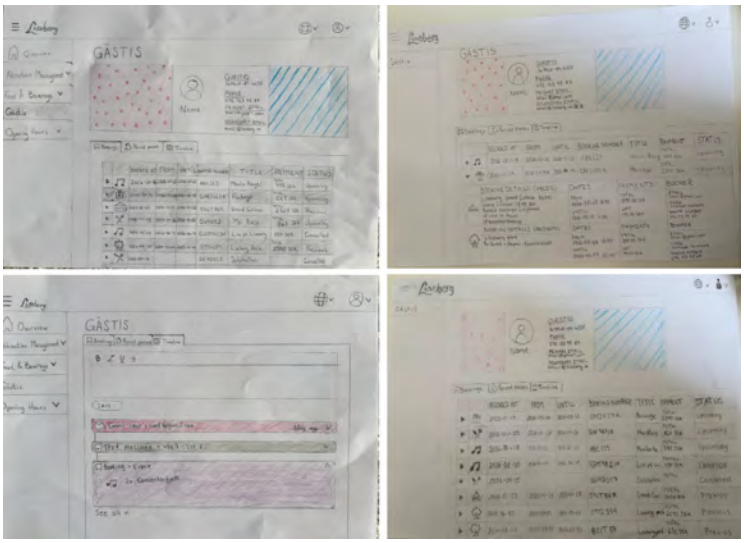


Figure 5.8: Sketches of Gästis.

Low fidelity prototypes were developed that contained adjustments and designs of aspects that have been mentioned as needs during user testing. The *Gästis* prototype (see Figure 5.8) mainly focused on changes to the guest profile and package bookings. In the original application, the guest profile occupied a large amount of space and was heavily text-based. To incorporate elements of Lisebergs visual identity, a pattern derived from their internal visual identity library was added to the profile view, filling otherwise empty space while preserving the guests information. Package bookings were also addressed by introducing a package icon and a

descriptive title to distinguish them from individual bookings. Whereas the original application displayed package components as separate, individual bookings, the prototype groups them under a single parent booking, with each component nested within it. Additionally, the Timeline section was redesigned to color-code events, which are now displayed as separate cards rather than in the compact list format of the original solution.

The *Opening Hours* prototype (see Figure 5.9) includes adjustments to existing functionality as well as an additional feature. During user testing, one participant expressed a desire for a function that would allow them to display the current crowd level of a specific restaurant on the Liseberg website, helping guests decide where and when to eat and plan their visit more effectively. This idea was explored further and resulted in two related features: A crowd level feature for the Food & Beverage version, and a forecast feature for the E-Commerce & Ticketing version. While the two features operate similarly, they differ slightly in functionality. In the Food & Beverage version, the feature intended to work as described by the participant during user testing, enabling restaurants to display live crowd statuses. In the E-Commerce & Ticketing version, the feature functions as a forecast tool, allowing users to input predicted guest levels for specific days. Both versions of the feature are intended to be displayed on the Liseberg website with the aim of supporting better visit planning for guests.

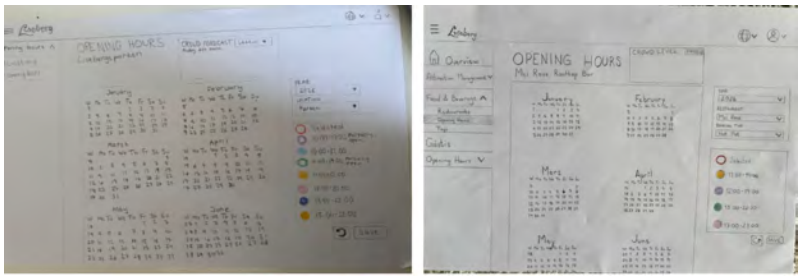


Figure 5.9: Sketches of *Opening Hours*.

Additionally, two control features were introduced in the *Opening Hours* prototype: a Save button and an Undo button. The Save button addresses a limitation in the original application, where any change made to opening hours were published directly to the Liseberg website. With the Save button, changes are instead only published once the user confirms them. The Undo button is intended to improve task efficiency by allowing users to reverse previous changes, making it easier to correct mistakes without having to manually redo changes.

5.2.9 User Testing

As part of the Deliver phase, the prototypes were tested on a total of six participants, whereof two participants regularly used the *Opening Hours* system, and four participants were regular users of *Gästis*. Because the participants were recruited through convenience sampling, some participants were the same as in the Discover phase, while some were new. In addition to the previous participants, three participants

who were testing for *Gästis* were customer service representatives with varying levels of experience at Liseberg, with one person being newly hired, and two people having worked at several different departments beforehand. The testing session started with informing the participants about data collection and their participation. Later, the participants were provided with two or three tasks, depending on the system, that they were expected to perform. The aim of the task-based testing was to explore the intuitiveness of the interfaces, especially new features that the users had not received any particular onboarding or training for. The tasks were related to the participants regular work tasks and focused on new features or features that had been changed as opposed to the current interfaces. During the performance of the tasks, a think aloud protocol was used, as in line with Grossman *et al.* [38]. After the tasks were performed, a semi-structured interview was conducted with the aim of collecting the participants overall opinions and thoughts about the interface in regards to usability, as well as to collect insights into the difficulty or ease of performing the tasks.

For *Gästis*, participants were asked to perform two different tasks, both related to new functionality or design elements introduced in the prototype:

- Task 1: Locate the guests package booking.
- Task 2: Sort the bookings by Status.

All participants completed the first task without difficulty. When navigating the booking overview, two participants based their reasoning on the package icon, while two other participants navigated using the Title field, looking for relevant information in the booking description. All participants noted that the structural organization of the package components was beneficial. When discussing the package booking redesign, all participants expressed particular interest in the package icon, and one participant suggested that including additional icons in the icon field could enhance the experience by providing a visual indication of the package type. Three participants expressed a wish for a more descriptive title clarifying the nature of the package, to make the overview easier to interpret. Most participants completed the second task effectively, navigating the interface and sorting function with ease. One participant was initially hesitant due to the unfamiliarity of the task, but found the function without significant difficulty. The sorting function was generally well received.

Participants were also asked about the Timeline section and invited to share thoughts on its overall design. Most participants responded positively to the color-coded events and expressed that this version was an improvement over the original, which they described as cluttered and difficult to read. Regarding the date format, one participant suggested a modification in which events from within the first month would be described as in the original version, while older events would be marked with their exact date. One participant also noted that the number of events displayed by default should be reduced, identifying this as a contributing factor to the cluttered appearance of the original events tab. Another participant highlighted that comments within the events are often overlooked, as the large amount of information displayed tends to feel overwhelming.

Overall, participants responded positively to the adjustments made in the *Gästis* prototype. Many participants expressed a need to limit the amount of information displayed, or to improve ease of navigation when locating specific information. One participant expressed a wish for system integration, enabling bookings to be modified directly within *Gästis*, while another held the opposite view, preferring to keep systems separate and instead emphasizing the importance of easily accessible navigational links directing users to other systems.

For *Opening Hours*, participants were asked to perform three tasks. Since the two participants worked in two separate departments, they were asked to complete the same tasks, modified to reflect their specific use case of the application:

- Task 1: Change the current status of the number of guests within the amusement park/restaurant to Calm/Crowded.
- Task 2: You have just changed the opening hours for one day and realized that you made a mistake. Redo the changes.
- Task 3: You have just made changes in opening hours. Publish the changes to the Liseberg website.

For the first task, one participant initially found it unclear how to change the status and expressed some confusion before understanding what to do. Once familiar with the interaction, the participant described the feature as clear and valuable, and expressed a wish to see it integrated into other systems, particularly those managing restaurant bookings, as this would reduce the need for switching between different systems. The other participant located the feature easily and responded positively, but highlighted the need to be able to set crowd level several days or weeks ahead. Moreover, the second task was designed to test the Undo button. One participant did not notice the button and instead began reflecting on their current work practices, describing how they would normally handle mistakes in the application. The other participant located the Undo button without difficulty, understood its function, and emphasized the need for such a feature, also describing the inefficiency of their current processes for correcting errors.

The third task related to the Save button, which was implemented in the prototype to address the existing behaviour of changes being published automatically to the Liseberg website. Both participants located and understood the Save button with ease. One participant noted that the functionality felt intuitive, as the Save button followed familiar patterns found in similar applications. In both previous interviews and this user testing session, participants discussed how they verify that changes have been made correctly, with all participants stating that they check the Liseberg website directly to confirm. In relation to this, participants were asked about the potential value of a preview feature that would allow users to review their changes within the *Opening Hours* application before publishing. Participants indicated that such a feature would be a positive addition, but expressed that they would not rely on it entirely and would still check the Liseberg website to verify that changes had been made correctly.

5.2.10 Guidelines

The first iteration of the guidelines resulted in four being added to the existing ones. Three of those are based on guidelines by Jiang *et al.* regarding interface layout for reduced cognitive load [21], and includes: enhance focus of important elements, group related information elements, and limit unnecessary repetition of information. Furthermore, one guideline was based on a subject that arose during user testing, as an addition to one of Nielsens usability guidelines that the system should speak the users language, is that the design should also include icons and colors according to the companys brand and trademark [75].

5.3 Second Iteration

During the second iteration, insights from the first iteration were synthesized and analyzed to refine the results. Affinity diagrams were used to consolidate findings from previous evaluations, followed by stakeholder meetings and a targeted literature review prompted by a change of focus for the *Opening Hours* application. The Develop phase consisted of creating prototypes which were subsequently evaluated through user testing.

5.3.1 Affinity Diagrams

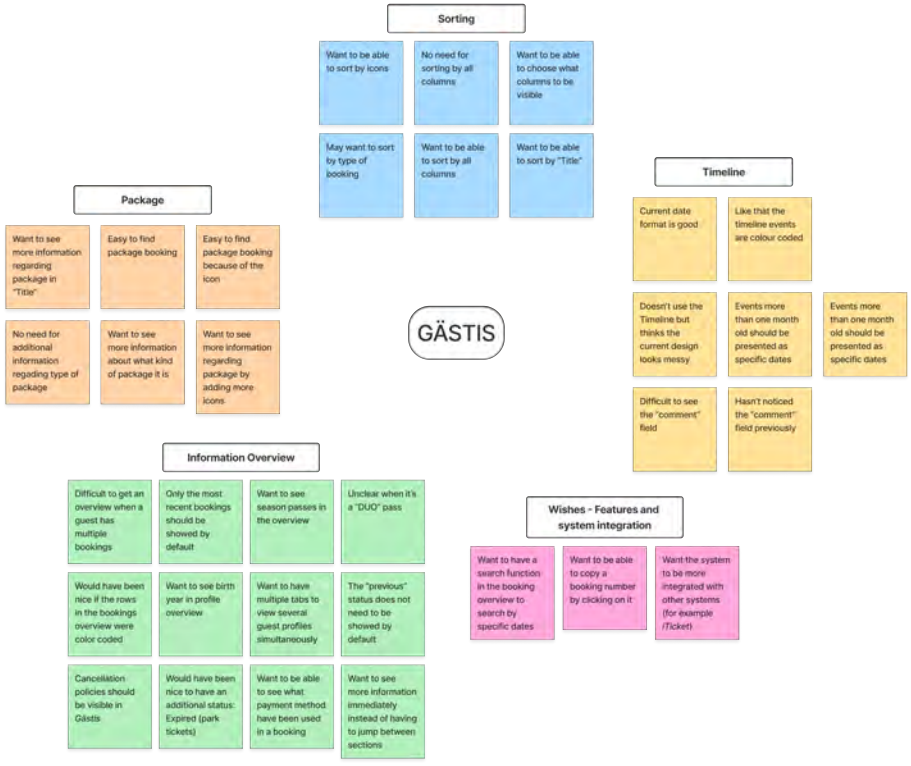


Figure 5.10: Affinity Diagram for *Gästis* in Second Iteration.

Similar to the first iteration, two affinity diagrams were created in order to structure the results from the user testing as well as facilitate a clearer interpretation of the findings. Five different themes were identified in each diagram, highlighting the key aspects mentioned during the user tests. The affinity diagrams were created digitally in *Figma*, and are presented in Figure 5.10 and Figure 5.11.

The following themes and categories were established for *Gästis*:

Package: According to the participants, it was easy to find package bookings thanks to the added package icon. However, there were differing opinions regarding the presentation of information about these. Some users expressed that they want to see more information about packages in the bookings overview, such as what specific type of package it is, for instance in the title or by adding more icons. Conversely, some considered the implemented changes to be sufficient enough already, and that there was therefore no need for additional information regarding the type of package. Moreover, the individual components of a package, that is, its consisting parts, should be consolidated rather than displayed as separate bookings, as this would enhance both the clarity and visibility.

Sorting: Participants valued the added sorting functions within the system, as these facilitate the structuring of information, which in turn improves comprehension when large amounts of information are present. This makes it relevant to *Gästis* considering there are many columns and rows of data. Participants expressed a desire to sort by different categories, whereof two needs were particularly prominent: the ability to sort by booking type, such as concert or accommodation, as well as the ability to filter across all columns. However, some users had differing opinions, as it was also brought up that there is no need for sorting by all columns, while another one wanted to be able to choose specifically what columns to be visible.

Timeline: The Timeline tab in *Gästis* was reported as the least frequently used tab. However, it was noted to still contain valuable information regarding the events and transactions associated with a guest profile. Participants responded positively to the color coding of events, as it was perceived to contribute to a clear visual distinction between them. Nevertheless, some participants found the current date format (stated in the number of days, weeks, or months ago) difficult to interpret, particularly for events that occurred more than one month prior. A clearer approach would be to retain the current format for recent events while displaying the exact date for older events, for instance by presenting the specific dates for events from more than one month ago. Furthermore, some participants reported that they had not previously noticed the comment function in the Timeline view. However, those with prior experience from the Guest Services department acknowledged the comment box as a valuable feature. Yet, it was established that it is insufficiently prominent in the current design. Even the participants that do not use the Timeline tab expressed that they think the current design looks messy.

Information Overview: The number of bookings displayed in the overview should be limited, as the current interface was found to overwhelm participants and make it difficult to locate specific information - especially in cases where a guest profile has multiple bookings. Additionally, certain aspects were found to be missing or

unclear, such as information regarding which specific type an annual pass is. Several modifications to the current design could therefore improve clarity and ease of comprehension. A primary source of difficulty was identified as the large number of unsorted bookings displayed in the overview. Reducing the number of bookings displayed by default as well as sorting them by status were suggested as measures to improve the information overview, and thus reduce cognitive load. For example, bookings with the previous status do not need to be presented from the beginning, as they are rarely meaningful to the user. Instead, only the most recent or relevant bookings should be visible by default, whereas the rest of the bookings could be hidden behind a see more option until a user explicitly requests them. Moreover, users mentioned that they would prefer to see more information directly within *Gästis*, such as cancellation policies or the specific payment method, instead of having to switch back and forth between various applications, which again relates to parallel browsing. Likewise, a specific suggestion that was raised was the possibility to have multiple tabs to open several guest profiles simultaneously.

Wishes - Features and System Integration: Although numerous different wishes and desires were brought up, it became evident that several of these related specifically to system integration. Users expressed a desire for the application to be integrated with other systems being used within the organization, which would enable bookings to be modified and managed directly within *Gästis*. An additional desired feature included a search function for locating specific bookings within the booking overview, as well as avoiding retyping by implementing a function enabling users to automatically copy a booking number to clipboard simply by selecting or clicking on it.

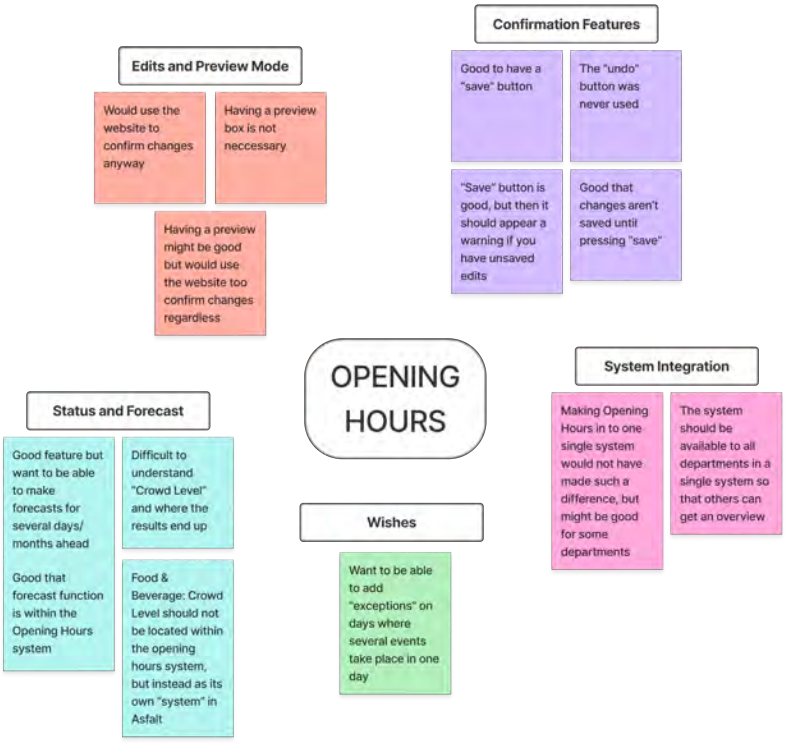


Figure 5.11: Affinity Diagram for *Opening Hours* in Second Iteration.

For *Opening Hours*, the following categories were identified (see Figure 5.11):

Edits and Preview Mode: The current working process involves verifying performed changes by checking the Liseberg website directly. Discussions regarding a preview mode yielded mixed results, with participants either considering it unnecessary or potentially beneficial. Regardless, participants indicated that they would continue to verify changes by checking and comparing with the Liseberg website, which aligns with the current work process.

Confirmation Features: Participants responded positively to confirmation features such as the Save button. This would ensure that no changes are published to the website unless explicitly saved. However, this also increases the need for confirmation dialogues to handle unsaved changes. For instance, one participant highlighted the need for some type of warning message, making users aware when unsaved edits have been made. In contrast, the Undo button was not used during the user tests. This could have two reasons: one participant had developed a personal workflow and therefore relied on a pre-existing method for undoing changes, while another participant simply did not notice the added Undo button but still expressed a desire for such functionality.

Status and Forecast: Upon a previous user request in the first iteration (see Chapter 5.2.2), a status and forecast feature was implemented in the sketches and evaluated during user testing. Overall, this was received positively, however, some participants found it difficult to understand and claimed that it was not entirely intuitive. The participant from the Food & Beverage department responded positively, but suggested that the feature would be better suited for a system used directly inside the actual restaurants, as it would be the specific restaurant staff being responsible for reporting live crowd levels. Implementing the feature within the *Opening Hours* system was therefore considered less appropriate, considering that its users occupy more administrative roles, and may thus not have immediate access to real-time data. The participant from the E-Commerce department also responded positively, but wished to extend the forecasting capabilities further to include days or months ahead as well, rather than only in the present moment. In general, this participant considered the feature a valuable addition to the *Opening Hours* system, as no comparable tools for adjusting opening hours are currently available to them.

Wishes: One participant suggested that it would be beneficial to have the option to add exceptions on days where several events take place. For instance, there are occasionally days when a private corporate event takes place in the amusement park, for example between 09:00 and 11:00, while the parks regular public opening hours are 11:00-22:00. In such cases, the *Opening Hours* users want it to be visible for themselves in the internal system that the park will be operating already from 09:00 that day, whereas the official website should only display the regular and public opening hours starting from 11:00.

System Integration: The topic of system integration was raised during the testing, in which participants expressed that consolidating all departments opening hours management into a single system would be beneficial. The participant from the Food & Beverage department was particularly positive about this. The participant

from the E-Commerce department, however, did not regard this as a need for their own department, yet acknowledged that it could potentially be helpful for others. Nevertheless, both participants agreed that system integration in general would be a positive development, provided that users from other departments were granted view-only access rather than editing rights.

5.3.2 Stakeholder Meetings

Throughout the whole project process, although most frequently during the second iteration, weekly stakeholder meetings were held. The meetings were attended by both authors and primarily the product owner for both applications. The primary purpose of the meetings was to discuss relevant project updates and progress, while also providing an opportunity to review the applications themselves. The meetings allowed the authors to raise questions regarding the applications, such as those concerning technical possibilities and data management, in order to develop a deeper understanding of each application and their underlying structure. Additionally, the meetings provided stakeholders with an opportunity to communicate their opinions and requirements, yielding valuable insights from an additional perspective. The stakeholder meetings also presented an opportunity for the authors and stakeholders to develop a shared understanding of system features that had not been apparent from the outset. One such misunderstanding concerned discrepancies in the *Opening Hours* application, leading to a shift in focus of this system. In addition to the meetings with the Product Owner at Liseberg, weekly meetings were held with the thesis supervisor from Chalmers University of Technology. Beyond discussing the structure of the report, these meetings provided an opportunity to receive feedback on the designs from an external perspective, offering more nuanced reflections from a stakeholder that is not employed by Liseberg and has no prior experience with the applications. This also allowed for an assessment of the intuitiveness of the applications from the viewpoint of an unfamiliar user.

5.3.3 Change of Direction

During the second iteration, a considerable amount of previously unknown information came to light. This was partly due to the version of the *Opening Hours* application provided to the authors not including all features available to actual users, which led to several misunderstandings. During user testing and interviews in previous iterations, all participants stated that changes are automatically published to the Liseberg website, indicating a need for a Save button or equivalent feature. However, it was subsequently discovered that a similar feature already existed, allowing users to make changes without immediately publishing them to the website, yet this feature was not being utilized. Furthermore, it was found that this feature was only available within the *Opening Hours* settings for the amusement park as a whole, and not for the restaurants or rides. The Food & Beverage department lacked this feature entirely, with no equivalent Save button present. This highlighted notable discrepancies between the different departments using the *Opening Hours* application. This newfound knowledge, in combination with the discovery of sev-

eral existing but non-apparent features and functions, led the authors to redefine the focus of, and change the direction for, the *Opening Hours* design. Rather than concentrating on the visual design of the application, the focus was shifted towards making existing hidden features and functions more visible, intuitive, and accessible to users.

5.3.4 Targeted Literature Review

Following the decision to shift the focus of *Opening Hours*, from visual design to making hidden functionalities and shortcuts more visible and accessible, a targeted literature review on the topic was conducted. By examining different types of contextual help, several approaches were identified and compared, and two alternatives were selected in collaboration with the authors and the stakeholder from Liseberg. These two alternatives were subsequently evaluated through user testing. Within software design, contextual help provides guidance within the interface as opposed to a separate window or browser [80]. Knowing where to look for certain elements or functionality is essential for a positive user experience as it decreases frustration, reduces task completion time, and minimizes errors. Icon and text labels can guide users in locating functionality and provide supporting information that facilitates interpretation, thereby reducing the effort required to interact with the interface. Less representative labels may require users to engage in exploratory learning, or rely on additional help such as tooltips [81].

Ehret identifies two types of cost associated with locating and learning elements in an interface [81]. *Search cost* refers to the effort required to scan and read labels in order to find a specific element. When search cost is high, users are more likely to rely on remembered locations rather than reading labels each time. *Evaluation cost* refers to the effort required to read a label and determine whether the specific element is the one currently needed. When evaluation cost is high, users similarly tend to rely on location memory rather than label interpretation. Jones and Dumais emphasized that the ability to find something depends not only on knowing what it is, but also on knowing where to look for it [82]. They further suggest that new elements or features to an interface may actually make it more difficult for users to remember where existing elements are located, as the additional visual content competes for users attention and mental resources, potentially interfering with their ability to build and retain an accurate mental map of the interface.

In a study by Chundury *et al.*, a contextual help framework was proposed for user interfaces containing complex and multidimensional data [83]. The authors highlight that integrated help systems within user interfaces can facilitate learning and enhance user experience for both experienced and novice users. They suggest several approaches when designing contextual help in such applications, including highlighting interactive interface elements to reduce the space between user action and the corresponding response. Additionally, design language should align with those of the underlying application in order to reduce extraneous cognitive load. Further, they emphasize that help should be immediate and proactive, while remaining unobtrusive so as not to disrupt the users task performance.

Moreover, Andrade *et al.* found that users completed tasks more successfully when using trial and error, but argue that combining exploratory learning with help functions is the most effective approach to problem-solving within user interfaces [84]. In line with Chundury *et al.* [83], the authors argue that, when integrating multiple forms of help, it is important that contextual help does not interfere with task performance. Tooltips are identified as particularly effective when implementing this type of combined help system. The following contextual help formats were largely based on descriptions provided by Cooper *et al.* [2], whereof each was initially considered, but ultimately deemed unsuitable for this specific application:

Guided tours: Guided tours introduce users to interface features through a series of cards or screens containing images and text describing the different functions of the interface. Users progress the tour sequentially by interacting with each card [2]. Although guided tours were considered given that *Opening Hours* users do not use the application frequently, they were ultimately excluded for several reasons. Guided tours require users to passively absorb and retain all information presented during the tour [85], which is problematic given the large number of functionalities and shortcuts within the application. This would make it difficult for users to retain all relevant information without having to repeat the entire tour.

Overlays: Overlays are similar to guided tours in that they are typically launched upon first use of an application. However, they differ in that the guides are more incorporated in the interface of the application design [2]. An overlay approach was excluded as they require the user to retain a large amount of information, similar to the guided tours. Additionally, the static nature of both overlays and guided tours hinder access of on-demand questions [83], making both approaches unsuitable for the application.

Wizards: Wizards are dialogues that provide guidance within complex processes, walking the user through the features and processes while the user performs the tasks provided by the wizard [2]. This approach was excluded because the *Opening Hours* application and its use cases should support optional and non-intrusive access to contextual help. The nature of wizards conflicts with this requirement, as they impose a structured process on the user that may interfere with completion of work tasks.

Moreover, the following approaches were deemed as relevant for the application:

Tooltips: Tooltips are brief informative texts that are displayed when users hover over, focus on, or tap an interface element [86]. This approach was considered due to the formats efficiency in providing guidance on the relevant elements or features that the user wants to explore further. When activated, tooltips display a text label identifying an element, such as a short description of its function, and is used for interactive imagery.

Tooltips overlay: Tooltips overlays are usually activated by users pressing a help button. Brief descriptions about functions within the interface are displayed adjacent to the relevant feature and require the user to actively dismiss the overlay by pressing a button or similar element [2]. This approach was included because

it provides optional help, allowing users to decide when they want to use the guidance. Additionally, it shows all features and shortcuts, making them easily accessible whenever needed.

5.3.5 Prototyping

Based on the insights gathered from the user tests in the first iteration, as well as the result from the affinity diagrams, medium fidelity prototypes were developed. The aim of the prototypes was to visualize and test functionality and information flow, focusing on the problems and needs derived from the previous user testing of the sketches. Additionally, ideas discussed during stakeholder meetings were also considered. All wireframes and prototypes were created in *Figma*, allowing the authors to work concurrently.

Initially, wireframes for the *Gästis* application were designed to determine the overall information structure and placement of the most essential elements (see Figure 5.12). The wireframes were also created to facilitate further design decisions and worked as a guide for the authors through the prototyping process. Based on the results of the user tests, the current overall design was perceived as generally positive and the focus, instead, was on the functions and elements within the current design structure. Because only a small part of the basic structure was to be redesigned at this point, the wireframes were moderately detailed.

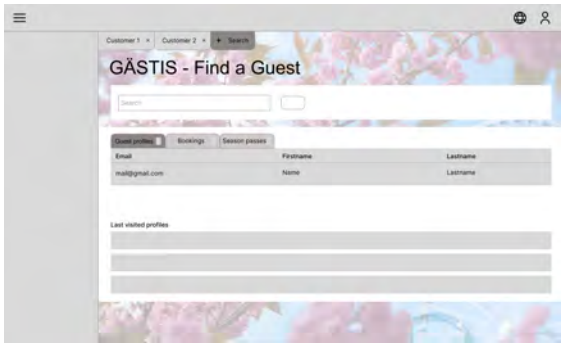
Figure 5.12: Examples of *Gästis* Wireframes.

Subsequently, the wireframes were further developed to simulate a realistic work environment, with continued emphasis on information flows and key elements. This provided both the authors and the user participants with a clearer sense of how the applications would function in practice. However, all designs were deliberately kept at a medium level of fidelity, rather than being designed into fully polished interfaces. This was due to maintaining focus on key information flows and functionality. For certain sections of the applications, multiple design alternatives were developed to support design exploration.

For *Opening Hours*, the prototyping process began with a review of different forms of contextual help and tutorial approaches identified through the literature review. Following discussions between the authors and a stakeholder at Liseberg, several different alternatives were compared and evaluated in order to identify the most appropriate solution for the application. Two different tooltip approaches were deemed most suitable, each forming the basis of a separate prototype intended to explore which type of contextual help most effectively guides users through the applications hidden functionalities and shortcuts.

5.3.6 Mixed Fidelity Prototypes

The *Gästis* prototype includes several adjustments and redesigns of design elements and functionality within the application. Three different design alternatives were created for the start page of the application. All versions include a background image derived from Lisebergs collection of media. The first version (see Figure 5.13a) is similar to the original application with the additional added background and includes a search field, tabs, and recently visited profiles. The second version is shown in Figure 5.13b and includes a background image, a search box and recently visited profiles structured by the last visited booking. The third version is shown in Figure 5.13c and is designed in a similar way as the second version, but includes specific recent searches, in addition to the recently visited guest profiles.



(a) First Version

(b) Recent Searches and Recently Visited Guest Profiles

(c) Recently Visited Specific Bookings

Figure 5.13: Different Versions of Search Page.

The bookings overview and guest profile also includes several different design versions to facilitate an exploratory approach and allow for more nuanced feedback. The guest profile includes five different versions, some including an image or pattern design, and some versions have different ways of structuring the text-based information (see Figure 5.14). The amount of information displayed in the guest profile is reduced to GuestID, name, phone number, primary email, and secondary email. This was due to some previous information being deemed as unnecessary for the tasks performed within the system. Additionally, a feature was added that would allow the user to minimize the guest profile to make space for the booking overview.

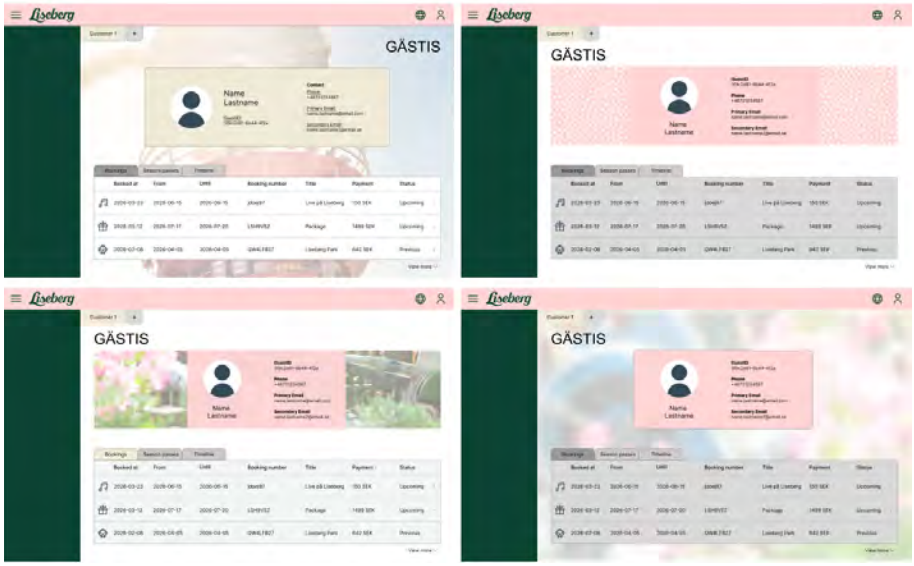


Figure 5.14: Different Versions of Guest Profiles.

The bookings overview has a similar list design as the original application, but does not include a grid-like format on the list as the original application. Seven fields are included in the list: Booked at, From, Until, Booking number, Title, Payment, Status, and an icon related to the specific booking type. All bookings with the status Upcoming are displayed by default, and the list can be expanded to show the rest of the bookings connected to the guest profile. Furthermore, the bookings are sorted by status by default. When a booking is selected, a detailed view is expanded to the side of the screen, allowing the user to view additional, in-depth information about the booking (see Figure 5.15). For package bookings, the specific components are displayed as nested list entries below the overall package. While all information about a booking is displayed in the detailed view, some information remains in the overview on the left side of the screen. The fields displayed are Booking number, Title, Payment, and Status, as well as the bookings related icon. The decision of what fields should be included was based on results from previous user testing.

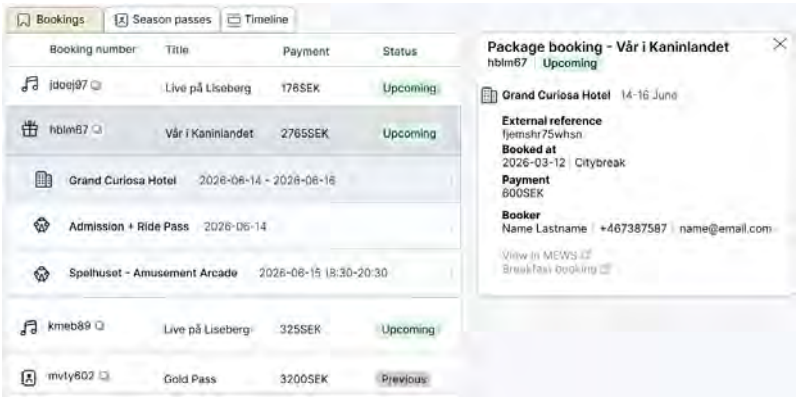


Figure 5.15: Detailed View of Package Booking.

During a previous user test, a desire to include a search function within the booking overview was expressed and several participants had stated they often experience challenges with finding specific bookings. Therefore, a search functionality was incorporated in the prototype. The search functionality follows a similar structure as several other systems within the portal in which *Gästis* exist, namely one search field per list field, allowing the user to search within specific fields. The search functionality can be accessed through a search icon within the booking overview (see Figure 5.16).

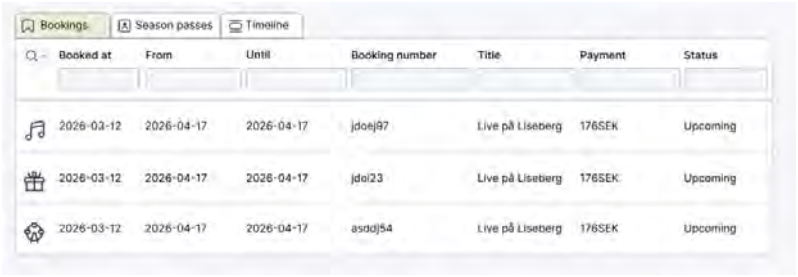


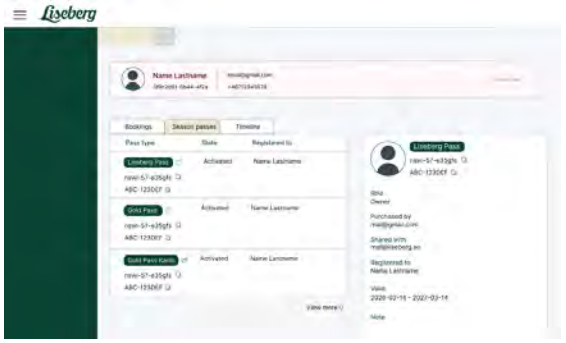
Figure 5.16: Search Functionality in the Bookings Overview.

The Annual Passes overview is designed in a similar way as the bookings overview (see Figure 5.17a). A list view of annual passes connected to the guest profile are displayed, sorted by Status, and only the annual passes with status Active are displayed by default, where pressing on View More expands the list to display all annual passes connected to the guest profile. Statuses have color-coded labels to enhance the intuitiveness of the state of the annual passes. When selected, a detailed view of the annual pass is expanded to the right side of the screen, similar to the detailed booking view.

The fields in the list are Pass Type, State, Registered To, Valid, and Note. The original application included an additional Role field, which was removed in the prototype. Instead, Role is displayed when opening the detailed view. When a detailed view of an annual pass is opened, two versions were created in regards to what field should display in the overview list on the left side of the screen. In the

first version (see Figure 5.17b), the fields Pass Type, State, and Registered To are displayed. In the second version (see Figure 5.17c), an additional field, Valid, is displayed as well. The aim of the two versions was to facilitate further discussions about what information is of greatest importance for users in regards to information overview and retrieval.

(a) Annual Passes Overview



(b) Detailed View - First Version

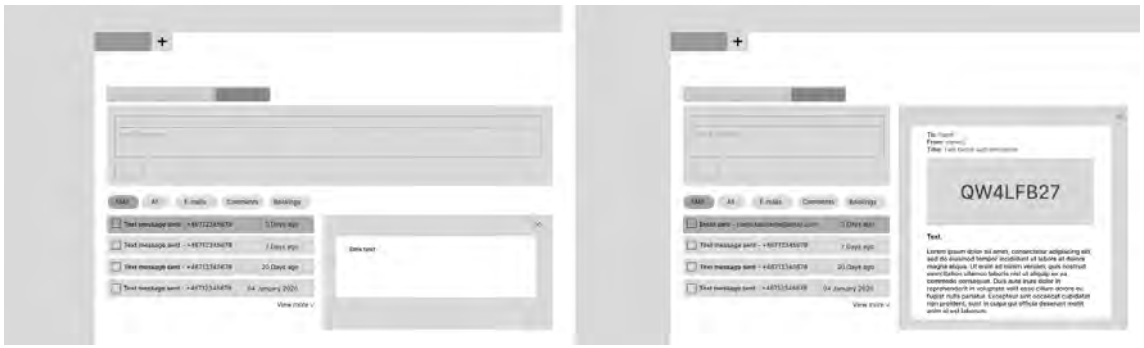
(c) Detailed View - Second Version

Figure 5.17: Different Versions of Annual Passes View.

Additionally, the state labels were changed for the annual passes. Previous labels included the states Activated, Unactivated, and Blocked. Activated indicates an active pass, while Unactivated indicates an annual pass that has been bought but not yet activated, and Expired indicates both annual passes that have extended their validity period, or passes that have been manually blocked. To match the labels with labels already existing in other similar applications, such as *iTicket*, the labels for annual passes in *Gästis* were changed to Activated, Expired, and Revoked.

The Timeline section included two versions of the prototype. One version is similar to the original, with events being displayed as individual cards in a list, expanded downward when selected (see Figure 5.18a). The other version includes similar functionality as the booking and annual pass list, with selected events showing a detailed view expanded on the right side of the screen (see Figure 5.18b). Additionally, a filter function was implemented, allowing users to filter the type of event they specifically want to show. By default, all events are displayed.

(a) First Version



(b) Second Version

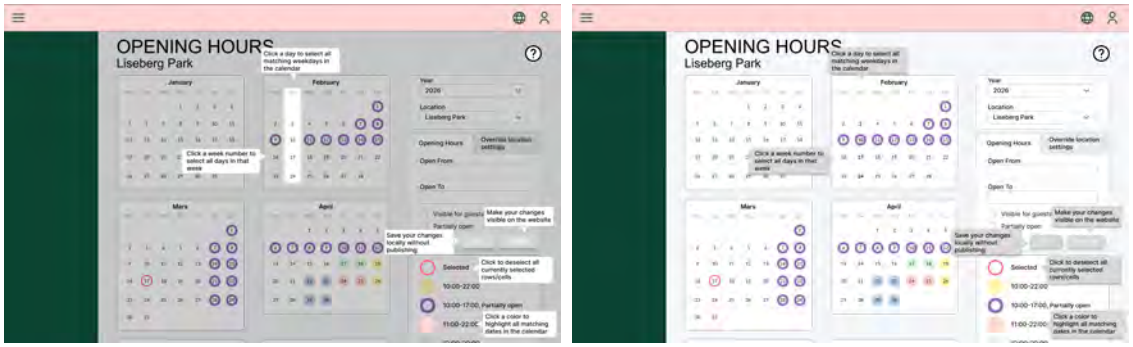
Figure 5.18: Different Versions of Timeline View.

An additional calendar view was implemented, as shown in Figure 5.19. This view was intended to provide a descriptive overview of all the guests bookings, displayed in the format of a calendar, showing each date of occurrence along with color coding. In contrast to the Timeline tab, this one solely displays bookings as well as annual passes and their period of availability or occurrence.

Figure 5.19: Calendar View in Gästis Prototype.

The prototype also includes a feature that allows users to switch between different guest profiles, and clicking on Search redirects the user to the search page of *Gästis*

without restarting the application by selecting it in the system menu. While the *Opening Hours* prototype primarily focuses on the addition of contextual help approaches, some adjustments were also made to the interface itself. Based on the results from the previous user testing, two buttons were added: a Save button and a Publish button. The Save button is intended to save changes locally without publishing them to the Liseberg website, while the Publish button serves as a final action that makes the changes visible on the website. Moreover, the first prototype featured a tooltip overlay, in which all available features and shortcuts are displayed by clicking on an icon within the application, accompanied by a highlighted section indicating each corresponding element (see Figure 5.20a). The second version of this approach consisted of displaying the tooltips on top of the interface without the overlay element, as seen in Figure 5.20b.



(a) Version One (b) Version Two

Figure 5.20: Tooptip Overlay Versions in *Opening Hours* Prototype.

The second prototype featured standard tooltips, in which relevant information about features are shown by hovering over a specific element, as shown in Figure 5.21. As the differences in the prototype versions were highly dependent on user interaction, both were developed as interactive prototypes, resulting in a higher level of fidelity compared to the *Gästis* prototype.

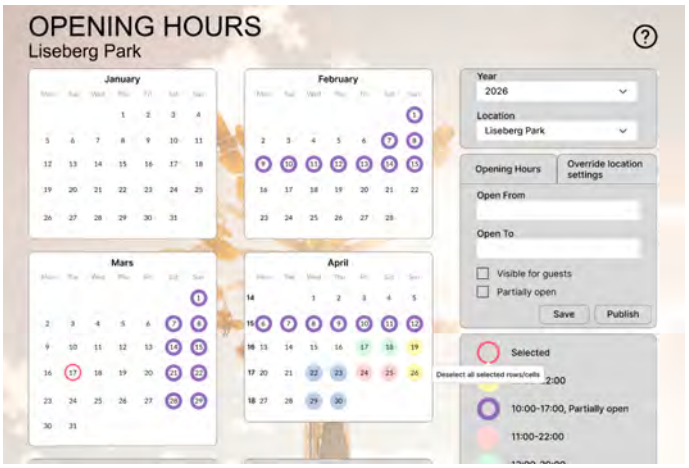


Figure 5.21: Standard Tooltip Approach in *Opening Hours* Prototype.

5.3.7 User Testing

Both the *Gästis* and *Opening Hours* prototypes were evaluated through user testing. These sessions followed an interview-based structure, however, the format varied between the two applications.

For *Gästis*, a total of five participants took part in the user testing. The first participant holds a managerial position in the Booking & Customer Service department. The second participant works within the E-Commerce & Ticketing department. The third participant was employed on a temporary contract in the Booking & Customer Service department and had been recently hired. The fourth participant has been working at Liseberg for five years, recently transitioning to Booking & Customer Service after working in the Attractions department and Guest Services. Likewise, the fifth participant has worked at Liseberg for several years, across the Attractions department and Guest Services, and is now also based in the Booking & Customer Service department. During user testing for *Gästis*, participants were shown several different design versions of the application and asked to share their preferences. They were invited to comment on what worked well and identify potential areas for improvement. Following this, general questions about the prototype were asked.

For *Opening Hours,* two users participated in the user tests. One participant worked in the E-Commerce & Ticketing department, and one participant worked in the Food & Beverage department. As the *Opening Hours* prototype was more interactive than the *Gästis* prototype, participants were asked to complete tasks in both versions and subsequently share their thoughts, including which version they preferred: the standard tooltip, or the tooltip overlay. Additionally, general questions regarding the usability and intuitiveness of the prototypes were asked.

For *Gästis*, all participants responded positively to the multiple guest tab functionality, expressing that it effectively addresses the issue of having to restart the application when searching for a new guest profile. One participant highlighted that the functionality is particularly valuable when performing certain tasks within the application, and another participant noted that the functionality resembled the function available in *Citybreak Sales Agent*, and emphasized the benefits of this. When asked which search page alternative they preferred, two participants favored the option displaying previous searches and guest profile visits, two preferred the option most similar to the original version, and one preferred the option showing recently visited specific bookings. One participant did not express a clear preference but emphasized the importance of being able to view previously visited guest profiles, as this supports efficient task performance.

Four design alternatives for the guest profile were evaluated. One featured a pattern design, one incorporated an image integrated within the profile box, and two used a background image for the entire application with different profile box designs. Three participants preferred the pattern design alternative, while two preferred having a background image for the entire application, suggesting either a background that changes automatically or one that users can customize themselves. The option to minimize the guest profile was considered potentially useful for departments such as Guest Services, while four participants found it unnecessary for their own use.

When asked what guest information they considered most relevant to display, most participants identified name, phone number, as well as primary and secondary email address as the most important. One participant also noted that birth year would be useful.

When evaluating the booking overview, several elements and functions were discussed. Four participants responded positively to the detailed booking view expanding to the right side of the screen, while one participant preferred the original format. For the detailed view layout, most participants preferred the version in which content is displayed across two columns rather than listed vertically, describing it as more spacious and easier to read. Most participants also responded positively to the default list being limited and sorted by status, with the option to display all bookings by selecting View more. Two participants expressed a wish to see opening hours for the park check-in times for the hotel within the relevant bookings. Most participants responded positively to the search function within the booking overview. One participant mentioned that it might not always be necessary, as most guests do not have a large number of bookings, potentially making the function redundant in many cases. Another participant suggested that a single search box would be sufficient, rather than having a search field within each column.

Additionally, most participants also found the reduced amount of fields in the annual pass overview beneficial, preferring to have key information accessible in the default view. The primary reason given was that the original version of displaying roles in annual passes was perceived as cluttered and difficult to interpret, resulting in information overload. One participant mentioned that the prototype version would be insufficient for Guest Services, where having all annual pass information visible is important for efficiency. This participant emphasized the inefficiency of having to navigate through multiple steps to access essential information. Participants responded positively to color-coded labels for the status field in both the booking overview and annual passes overview, expressing that they make information easier to interpret at a glance. When evaluating the detailed view of events within the Timeline, three participants preferred the detailed view expanding to the side, one participant preferred vertical expansion similar to the original version, and one had no preference. All participants responded positively to the redesign of the Timeline, and particularly the filtering function, which allows users to select which types are displayed. The additional calendar feature was perceived positively for four participants, who acknowledged that it could be useful for some users, though they were uncertain whether they would use it themselves. Two participants explicitly stated that they did not find the function particularly useful.

For the *Opening Hours* user testing, both participants acknowledged the value of both the tooltip overlay and the standard tooltip approach, and agreed that a combination of the two would be the most effective solution. One participant noted that the tooltip overlay would be especially beneficial for new users, providing guidance on functionality that they would otherwise have to discover independently over time. The other participant was particularly positive about the highlighted area indicating the element of interaction. One participant noted that while the standard tooltip offers valuable guidance, it could become frustrating over time as the user becomes

more familiar with the applications functionality. One participant mentioned that the question mark icon used in the prototype was not intuitive, and that they would be hesitant to interact with it over use, assuming it would open an external browser.

While the primary focus of the *Opening Hours* user testing was to evaluate the two contextual help approaches, other areas of improvements were raised during the two sessions. One such subject concerned the Save and Publish buttons. One participant expressed difficulty understanding the exact purpose of the Publish button and felt that the Save button alone was sufficient for completing tasks efficiently. This participant also stated a preference for the current behavior of changes being published automatically to the Liseberg website. The other participant responded positively to the Save and Publish button combination, expressing a desire to be able to save changes locally before publishing them. However, they raised a concern about multiple users being logged into the same application simultaneously which could present complications for this type of functionality. This participant also mentioned that they had never used the Visible for Guests function, and similarly preferred the current automatic publishing behavior, as they have never felt the need to save changes without immediately publishing them.

5.3.8 Updated Guidelines

Based on the results from the methods utilized during the second iterations, several guidelines were added to the existing ones. In the previous iteration, most guidelines included existing, general design guidelines for usability. At this stage, a substantial amount of guidelines were derived from the user testing, leading to more context-specific guidelines. The following guidelines were added based on the results from user testing:

- The systems language should be consistent with the company's language
- Maintain consistency across the system while adapting to role-specific needs
- When system integration is not possible, the system design should be coherent with surrounding systems
- Avoid visual complexity
- Communicate states through color-coded labels
- Make functionality visible

In addition, the following guidelines are derived from Hartson & Pyla [59], and were added due to their relevance in this project:

- Control layout complexity
- Cognitive affordance legibility
- Make previous actions visible
- Change labels depending on state
- Remind users to complete their actions

5.4 Third Iteration

The third and last iteration included final design decisions and adjustments regarding the prototypes. The methods involved in this iteration phase included high fidelity prototyping and user testing. Due to time constraints, this iteration turned out to be shorter than the previous ones, thus involving fewer participants.

5.4.1 Prototyping

Based on the results from the previous iterations, high fidelity prototypes were developed. Since the key functionality and interaction flow was evaluated in the previous iteration, the third iterations prototyping focused on detailed design elements and incorporated the designs that were most positively perceived during the second iterations user testing. The authors initiated the prototyping process by deciding on what version to use among the various alternatives, which was done by discussions among the authors as well as the Liseberg stakeholder. As the *Opening Hours* prototype already included interactive elements, most of the third iterations prototyping focused on *Gästis*, while minor improvements were made to the *Opening Hours* prototype. Overall, the focus was to implement the design decisions based on previous user testing, as well as refining design elements within the prototype, focusing on details and making it interactive. Some adjustments and new features were added as well. Similar to the previous iterations, prototyping was carried out collaboratively in *Figma*.

5.4.2 High Fidelity Prototypes

The *Gästis* prototype incorporates several adjustments compared to the previous iteration. For the search page, the option combining specific previous searches with recently visited guest profiles was selected and implemented as the final version. The guest profile was also redesigned, as results from the previous user tests indicated that a minimize or expand function for the profile was unnecessary for most users. Yet, it was noted that it could potentially be relevant for the Guest Services department, where a better overview of bookings is particularly important. Due to this, the profile box was redesigned to be more compact by default, while still incorporating a familiar Liseberg pattern and all relevant guest information (see Figure 5.22). Similarly to the creation of the user personas, the AI tool *This Person Does Not Exist* was utilized once again to generate fictional human faces to be used as more authentic profile photos.

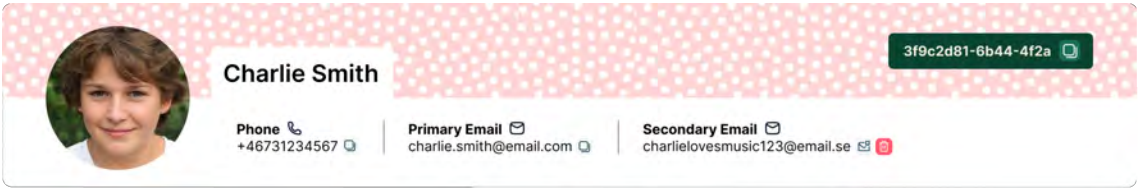


Figure 5.22: Guest Profile in the Third Iteration Gästis Prototype.

Moreover, within the detailed view of a booking, cancellation policies were added upon a request. This was identified as a need during user testing, as having this information readily available reduces the need to switch between different systems or browser tabs. When hovering over the information icon, the cancellation policies are displayed in the exact same wording and phrasing as they appear on the Liseberg website, as displayed in Figure 5.23.

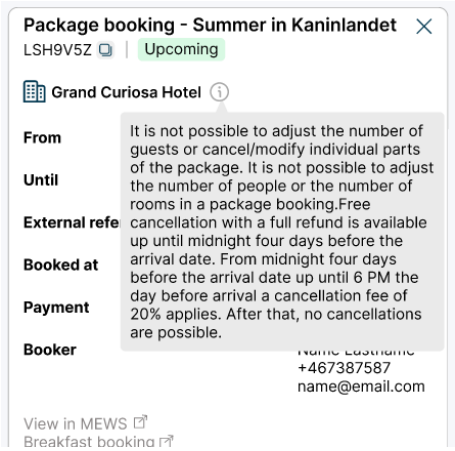


Figure 5.23: Cancellation Policies Displayed When Hovering Over Icon.

In the previous iteration, the Role field in the annual passes overview was removed, with role information moved to the detailed view and shown only when a specific annual pass was selected. While some participants mentioned that not all information needs to be visible at once, the Role field was reintroduced due to its importance for certain departments, such as Guest Services, where users need to quickly scan and interpret information without navigating through multiple steps. Rather than removing the field, the focus shifted to reducing visual clutter through color-coded labels. The field was also split into two distinct columns: Role, displaying the guests role, and People on this pass, displaying all individuals connected to the annual pass. The redesigned Annual Passes overview is shown in Figure 5.24.

Figure 5.24: Annual Passes Overview in *Gästis* Prototype.

Results from the user testing showed that most participants preferred the Timeline version that expands to the side of the screen, since it is consistent with the rest

of the application, and allows users to get an overview of all events even when displaying the specifics of one event. Therefore, this version was chosen as the final one. The section was further refined, with icons added to represent each event type and distinct colors assigned to each category, derived from colors used in the companys external communication (see Figure 5.25).

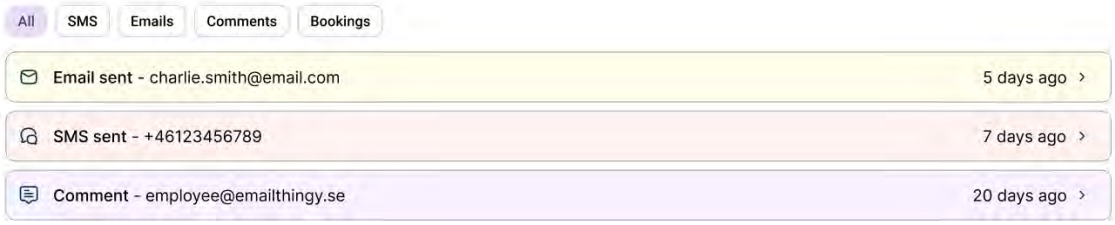
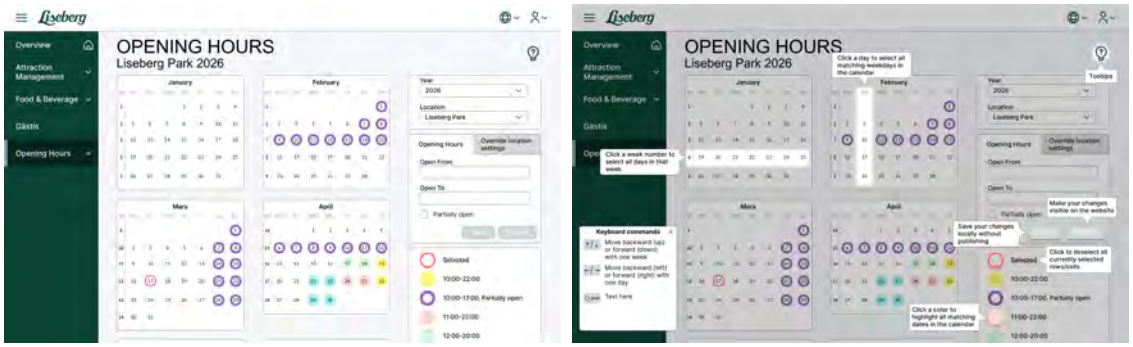


Figure 5.25: Redesign of Timeline Events in *Gästis* Prototype.

The changes made to the *Opening Hours* prototype included replacing the tooltip icon to improve intuitiveness. Following a suggestion made by a participant during user testing, the previous question mark was replaced with a lightbulb icon. Additionally, keyboard shortcuts were incorporated into the tooltip overlay, providing users with guidance on all available shortcuts within the application (see Figure 5.26).



(a) (b)

Figure 5.26: *Opening Hours* Prototype from Second Iteration.

5.4.3 User Testing

The third iterations user testing aimed at collecting general feedback regarding the prototype. Two participants were involved in the user testing, whereof both had previously participated in the first and second iteration. Both participants use specifically the *Gästis* system, and work within the Booking & Customer Service department, where one is an area manager, and the other participant had previously been working at the Guest Services department. The evaluation followed an informal approach, where participants were shown the final prototype and asked questions regarding its general design, usability, and intuitiveness. After going through the

prototype, the participants stated their general thoughts on the application in full. Their answers were digitally noted down during the testing.

The results from the user testing showed that the overall design of the application is improved compared to the original version, where users expressed that it is more user-friendly, intuitive, and includes design functionalities and elements that makes it easier to interpret and locate necessary information. One participant mentioned that the prototype now works more as a work tool, rather than just a collection of guest profiles, which had been the participants previous impressions of the application. The participants also noted that the final version of the prototype includes more explaining, intuitive elements, particularly since it offers a more gradual intuitiveness. The softer, rounded corners throughout the design were perceived positively by one participant, setting that it aligns with other modern systems. The search page was positively received by one participant, while the other participant mentioned that the recent search words resulted in an overload of information, especially since they almost always search for guests email addresses, making the recent search keywords unnecessary.

Moreover, both participants responded positively to the guest profile. Both participants particularly expressed interest in the pattern design, where one participant suggested that it would have been beneficial if users could change the pattern or image design and tailor it to their preferences, alternatively, having the pattern design change automatically. Overall, the guest profile pattern design aligned with Lisebergs visual identity, which was expressed as a positive feature. The larger font of the guests email addresses was also noted as particularly positive, since it allowed for more efficient performing certain important tasks within the application.

In the booking overview and detailed view, participants appreciated the implementation of cancellation policies. Furthermore, they both were positive to the formulation of the policies aligning with the Liseberg website, as it allows users to see the same formulations as the guest. Both participants also expressed that the title of package bookings actually included the words package, as it may facilitate easier understanding of the booking type for other departments such as Guest Services. One participant mentioned that prices for each package component should not be displayed, as the only relevant price information is the total amount of the package, and other systems do not have any information regarding price information for particular package components.

Participants also responded positively to the annual pass overview, and expressed that the color-coded labels made it easier to understand and interpret information about Roles. One participant expressed a need for incorporating different colors for each annual pass label, in contrast to the current version where all annual passes have the same color on the label. The assigned colors to each label were received as logical. Both participants mentioned that, since all information is available in the annual pass overview, it is not necessary to have a detailed view of a selected annual pass. For the Timeline section, both participants expressed that the color coding of events is beneficial and enhances user-friendliness, and further emphasized the benefits of the filtering functionality.

6

Results

Based on the design methods performed in the Double Diamond process, two prototypes and several design guidelines were developed, and are described in this chapter. Firstly, the two final prototypes, called *Gästis 2.0* and *Opening Hours 2.0*, are presented. Then, guidelines for designing internal digital systems that support usability within theme park organizations experiencing high employee turnover are presented.

6.1 Gästis 2.0

The final *Gästis 2.0* prototype includes several adjustments made to support usability and learnability. Below, each section of the application and their primary redesigns is presented. All pages from the original application are retained in the prototype but have been modified.

Tab Functionality: During evaluation, participants expressed a desire to switch between different guest profiles. The original application does not support having multiple guest profile tabs open simultaneously, meaning that if users want to search for a new guest profile, they are required to restart the application through the system menu. The *Gästis 2.0* prototype addresses this by introducing tab functionality, which allows users to search for a new guest profile within the application and switch between multiple open profiles (see Figure 6.1). This tab functionality is present throughout the entire application and allows for an organized navigation, thus eliminating unnecessary steps and interactions that may otherwise slow down task completion.

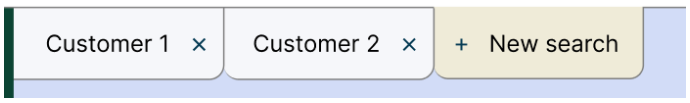


Figure 6.1: Customer Tabs in *Gästis 2.0*.

An additional tab functionality includes the use of an active tab indicator for the Bookings, Annual Passes, and Timeline tabs (see Figure 6.2). To differentiate an active tab from an inactive one, a light green colored visual element was added at the top of the tab currently open, while also having a focused state by adapting to the white background color of the container. Each one also has its own icon that

communicates the type of content a tab represents in a simple and recognizable way. All tabs in the prototype are fixed in a cluster and left-aligned.

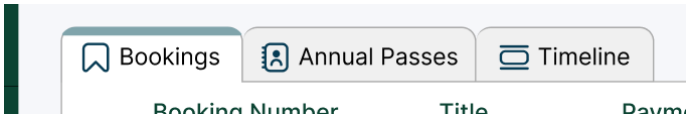


Figure 6.2: Active Tab Indicator in *Gästis 2.0*.

Search Page: The Search page serves as the start page of the application and is displayed in Figure 6.3. The original version of *Gästis* offered the ability to search across multiple sections, such as Profile or Annual Passes, however, users were always directed to the guest profile and bookings overview regardless of the search type. This functionality has therefore been replaced by a single search box. Recent searches as well as recently visited guest profiles are displayed below the search field. Additionally, a background image was added to make the interface more visually appealing but without making it distracting. The image depicts a balloon in the shape of a *Liseberg Rabbit*, relating back to the endorser brand of the organization (see Chapter 2.2.2).

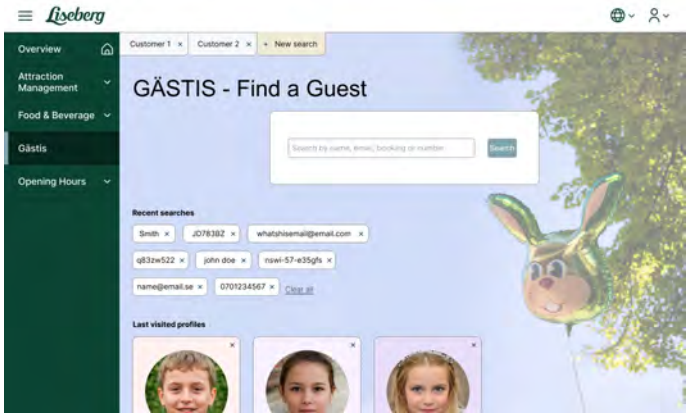


Figure 6.3: Search Page in *Gästis 2.0*.

Guest Profile Overview: Several adjustments have been made to the guest profile overview (see Figure 6.4). To reduce the amount of unnecessary or irrelevant information presented to the user, the displayed guest information has been reduced to name, phone number, guest ID, primary and secondary email, and a profile picture if the guest has an annual pass registered in their name. The decision of what information to display was based on the evaluations. The profile also incorporates a pattern design derived from Lisebergs collection of color styles and patterns, aligning with their visual identity and brand. The guest profile is persistent throughout the entire application, as it contains information relevant to the user across all sections and tasks.

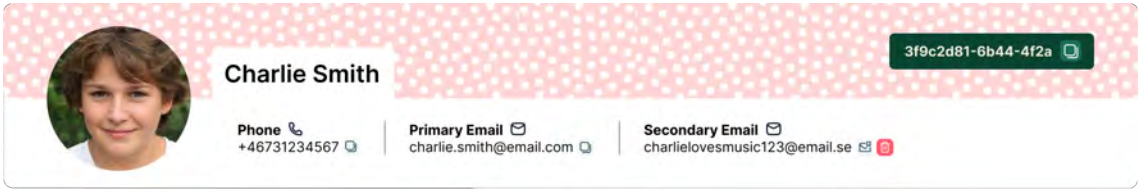
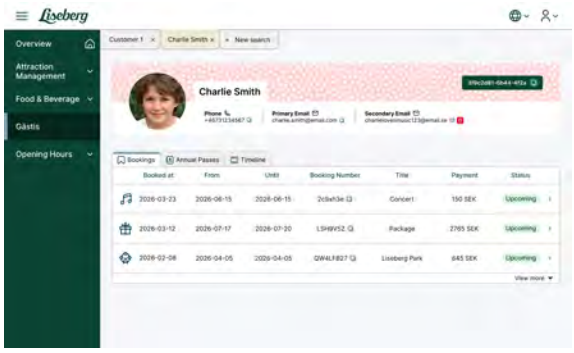
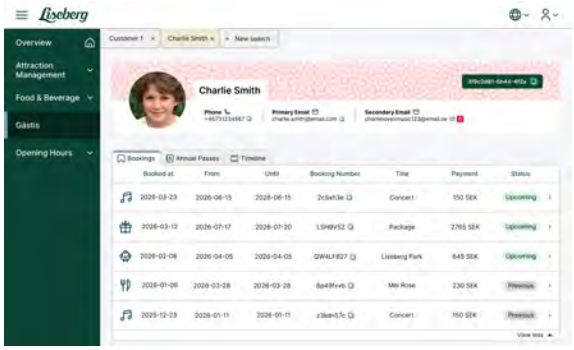


Figure 6.4: Guest Profile in *Gästis 2.0*.

Bookings: The bookings overview displays all bookings registered on the guest profile in a list. By default, only bookings with the status Upcoming are shown (see Figure 6.5a). Additional bookings can be revealed by selecting View more, which expands the list to include all bookings connected to the guest profile, as shown in Figure 6.5b. Each status is represented by a color-coded label, allowing users to quickly identify booking statuses with minimal cognitive effort.



(a) Default List



(b) Expanded List

Figure 6.5: Bookings Overview in *Gästis 2.0*.

When a list item is selected, a detailed view of the booking expands from the side of the screen. The view displays additional information about the specific booking, including opening hours or check-in time, navigational links, and cancellation policies. This design is also consistent with the structure of similar booking management applications used within the organization. Package bookings are distinguished by a package icon and a descriptive title. When selected, the individual components included in the package are shown as nested items within the package list entry.

The detailed view of each component can be accessed by selecting that specific part (see Figure 6.6). The list is designed to include visual feedback cues, such as a color change when hovering over a list item. Selected items are displayed in a darker shade of grey to indicate that they are currently active.

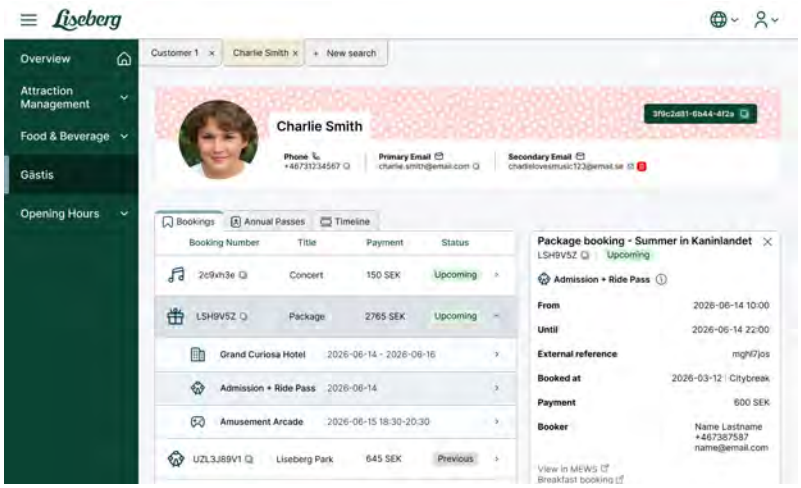


Figure 6.6: Detailed View of Package Booking in *Gästis 2.0*.

Annual Passes: The Annual Passes tab follows a similar structure to the booking overview by presenting information in a list with multiple fields. The displayed information includes pass type, state, role, people on the pass, who it is registered to, validity, and notes. Roles are characterized by color-coded labels, with a unique color assigned to each role. Similarly, states are color coded to allow users to quickly scan the information with minimal cognitive effort (see Figure 6.7). Moreover, the annual pass label for the specific pass type contains an external link icon that, when hovered over, indicates navigation to a separate system for managing annual passes and park tickets, reducing the amount of fields in the list.

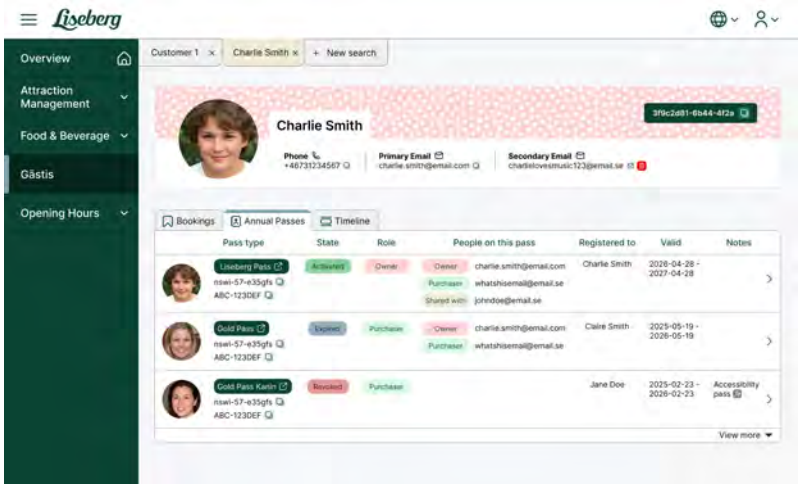
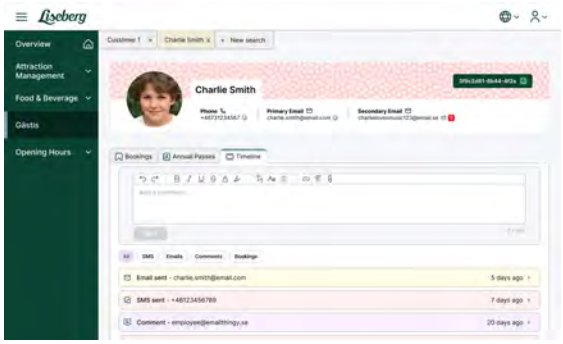


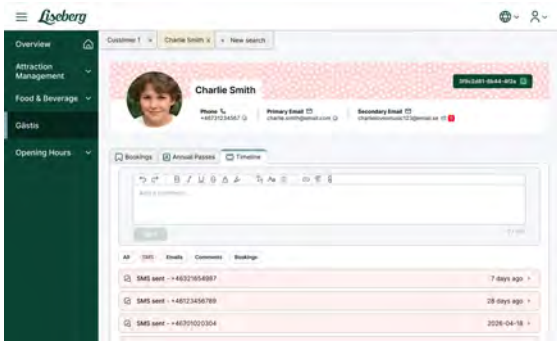
Figure 6.7: Annual Passes Overview in *Gästis 2.0*.

Timeline: The Timeline section includes a comment box alongside all events and

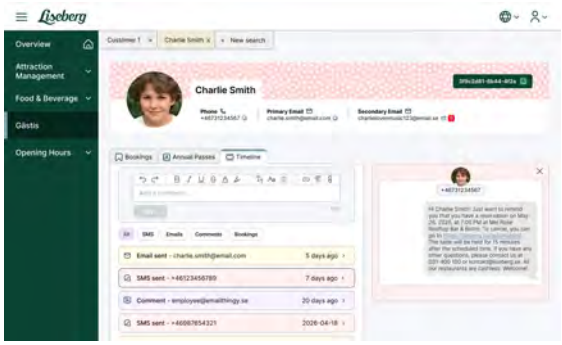
transactions connected to the guest account (see Figure 6.8a). Events are color coded, and a filter function displayed as filter chips is implemented to provide quick access to specific event types relevant to the user (see Figure 6.8b). When selected, events are expanded to the side of the screen, similar to the bookings (see Figure 6.8c). Each event includes information about when it occurred with the formatting varying depending on how recently the event took place. Events that occurred within the past month are labeled with the number of days ago they took place, while events older than one month are labeled with the exact date of occurrence.



(a) Default View



(b) Filtered View (SMS only)

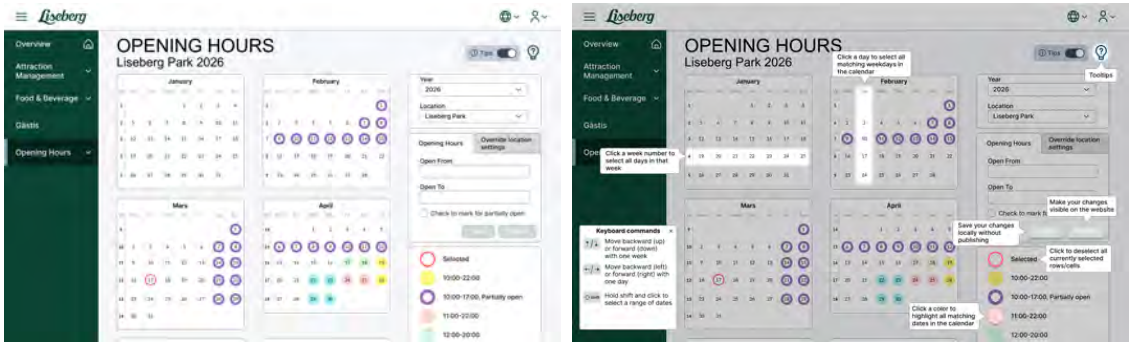


(c) Expanded View

Figure 6.8: Different Versions of Timeline in *Gästis 2.0*.

6.2 Opening Hours 2.0

The *Opening Hours 2.0* prototype combines the two tooltip approaches evaluated in this project: a tooltip overlay and a standard tooltip approach. The primary approach is a tooltip overlay (see Figure 6.9). When the lightbulb icon in the top right is pressed, all available functionalities and keyboard shortcuts are displayed adjacent to their relevant interface element. The affected areas are highlighted to clarify which element can be interacted with, and to indicate the scope of each function. To dismiss the tooltip overlay, the user should click at the same lightbulb icon again.



(a) (b)

Figure 6.9: Tooltip Overlay in *Opening Hours 2.0*.

Nevertheless, results from the user testing showed that both tooltip approaches were beneficial for users when completing tasks within the application. Therefore, a standard tooltip approach was implemented in the prototype as well, alongside the tooltip overlay. The standard tooltips display a brief description of each elements functionalities when hovered over. Results from the user testing also showed that while participants found this approach useful, they expressed concerns that it could become frustrating over time, once all available functions had been learned. The standard tooltips can therefore be toggled on or off with the toggle switch, allowing users to activate or deactivate them at any point according to their preferences, as shown in Figure 6.10.

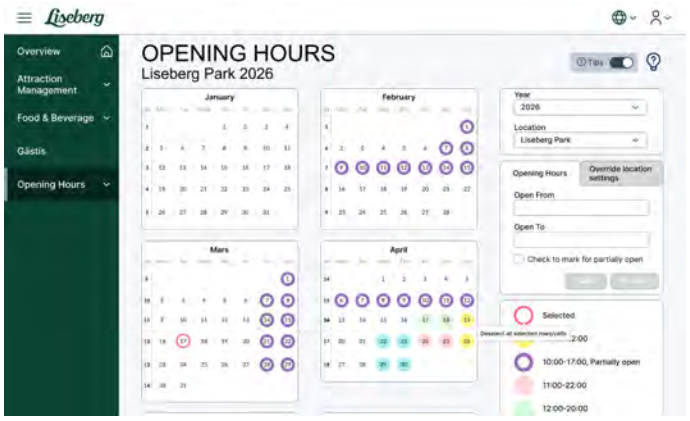


Figure 6.10: Standard Tooltips in *Opening Hours 2.0*.

Together, the two tooltip approaches provide contextual help throughout the application. The tooltip overlay serves as a comprehensive guide to all available functionalities, particularly useful when a user has not used the application for an extended period. The standard tooltips offer quick, on-demand descriptions accessible by hovering over a specific element. Combining both approaches ensures full disclosure of available functionalities, while giving each user the flexibility to tailor the experience to their individual needs and preferences.

6.3 Guidelines

This section describes recommendations for guidelines to consider when designing internal digital systems within theme park organizations characterized by high employee turnover. The guidelines are based on the assumptions of existing, established guidelines within usability and user experience, and each described in this section should be understood as context-specific extensions of them, including guidelines that have previously been presented based on existing literature [21], [75]. Additionally, UX or interaction design guidelines can be described as statements suggesting considerations and recommendations for designing specific aspects of interaction within a given context [59]. The following guidelines described in this chapter are grounded in existing theory and based on empirical research, but are tailored to the specific needs and conditions identified throughout this project.

The guidelines are divided into four categories, each consisting of several guidelines grouped under the overarching theme. The categorization is intended to provide clarity and improve readability, as well as give a clearer picture of how the guidelines connect under the common theme. The guidelines and their corresponding categories are not presented in any hierarchical order. Every guideline is described across three dimensions: its general implications, key factors to consider when applying it, and potential consequences of doing so. Three of the four categories contain design-specific recommendations based on insights gathered through the user testing and methods described in this thesis. The fourth category addresses process-level considerations for conducting similar design projects in comparable contexts, and is based on insights and reflections that emerged throughout the project.

6.3.1 Consistency

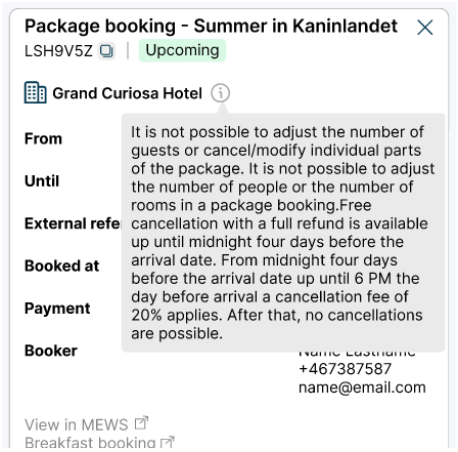
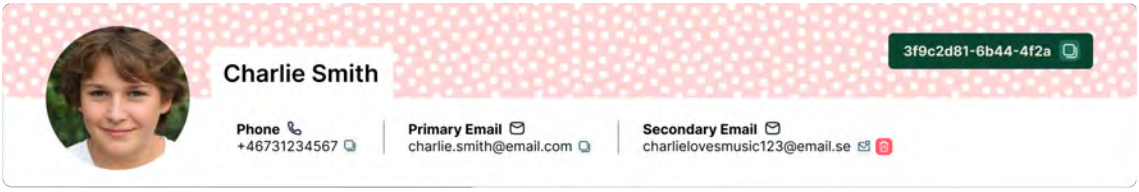


Figure 6.11: Utilization of Lisebergs External Communication in *Gästis 2.0*.

The systems language should be consistent with the companys language: Formulations within the system should match the companys external communication to keep language consistent for both employees and customers. By incorporating

existing formulations found in other channels of communication, the users of the internal systems are consistent in their communication with both other employees and customers, ensuring clarity and avoiding confusion. Providing similar formulations within internal applications as in external channels also reduces the need for switching between different systems and therefore reducing time completion of tasks and maximizing efficiency. In this project, the formulations used in Lisebergs external communication were utilized within the cancellation policies in the *Gästis 2.0* prototype, as shown in Figure 6.11. Additionally, the box with the cancellation policies is a so-called popup or picture-in-picture, meaning it becomes visible when hovering over the information icon. This is a type of multi-view interface that lets users keep multiple resources visible at the same time, which can reduce the interaction cost of context switching or parallel browsing [77].

Use icons and colors consistent with the companys visual identity: Leverage familiar brand elements that are familiar to the user. Similar to the previous guideline, colors, icons and other elements that are already established and incorporated in the companys visual identity reduce the need to interpret the interface, ensuring increased efficiency. In this project, pattern designs and colors included in Lisebergs established trademark and brand, for instance the pattern design displayed in Figure 6.12a, were incorporated to increase familiar elements and resulted in increased user satisfaction. User satisfaction is one of the most important factors to consider when designing interfaces with high usability [3], making this a highly relevant principle to consider within this context. To address this, a mood board involving already existing brand specific design principles was created as a way to accommodate the established visual identity of Liseberg (see Figure 6.12b).



(a) Utilization of Liseberg's Visual Identity in *Gästis 2.0*

(b) Mood Board Incorporating Specific Colors and Patterns

Figure 6.12: Liseberg's Visual Identity.

Maintain consistency across the system while adapting to role-specific needs: Ensure that all users within one application have access to the same functionality and system version. If users of the same application have access to different interface designs, important needs may go unnotified. This is particularly important when the application is used infrequently or when high employee turnover is present, since users may not have time to explore functionality beyond their immediate tasks. Maintaining a consistent application across departments and user groups also improves coordination between stakeholders and users, and supports clearer communication about the system. In turn, design developments of the application can target the most essential user needs, resulting in a more user-friendly interface and satisfactory system interaction.

When system integration is not possible, the system design should be coherent with surrounding systems: Incorporate design structures that follow similar structures or design patterns as existing systems within the work context. By leveraging design structures from applications that users are already familiar with, users can apply existing knowledge to the new system, reducing initial learning time. For instance, two other systems used within the system environment studied in this project use detailed views expanding from the side of the screen. Implementing this structure in the current project yielded positive results, as participants were already familiar with the pattern. This design structure is shown in Figure 6.13.

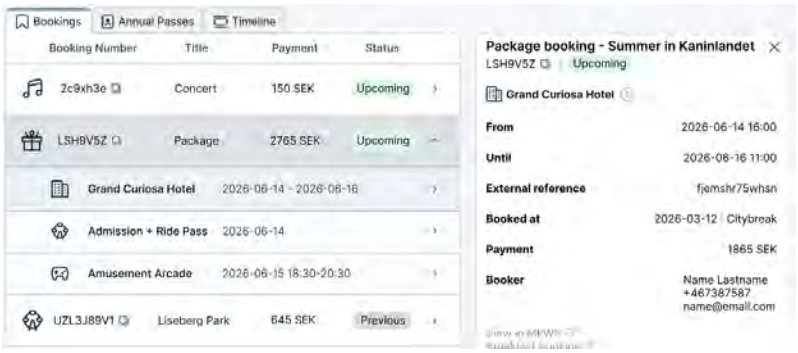


Figure 6.13: Utilization of Familiar Design Structure in *Gästis 2.0*.

6.3.2 Information Scanning

Control layout and visual complexity: Control cognitive affordance presentation complexity, for instance through grouping, organization, and effective layout. Screen clutter can obscure needed tools and cognitive affordances such as icons, prompt messages, state indicators, dialogue box components, or menus [59]. This makes it difficult for users to find them, which in turn highlights the need for controlling layout complexity of UI objects. By limiting the variety of colors and visual elements used simultaneously, attention is directed toward primary functionalities and elements, reducing the navigational effort required and thereby improving task performance and reducing cognitive load. Additionally, this also concerns prevention of visual overload, for example by not including too many different colors within the two systems, since that may be overwhelming.

Communicate states through color-coded labels: Color-coded labels indicating different states such as activated and expired enable users to quickly scan and interpret information. Reducing reliance on text-heavy content and combining this with intuitive colors improves contextual understanding and allows users to navigate the presented information more efficiently. Results from this projects user testing show that using applications while simultaneously speaking to a customer requires information to be easily interpreted and quickly accessed. This situation is very common in the context of which this project was conducted, indicating a need for this guideline in similar applications. In this project, color-coded labels were incorporated in the *Gästis 2.0* prototype in several sections, including the annual passes overview (see Figure 6.14). When applying this guideline, it is important to prioritize color coding for the most essential information in order to avoid visual complexity. Overuse of labels and colors alongside other complex layout designs may undermine the intended purpose. Additionally, this relates to the previously mentioned consistency guideline concerning the use of colors consistent with the companys visual identity, as the chosen colors for the labels and buttons originate from the brand and trademark identity of Liseberg (as discussed in Chapter 2.2.2).

Figure 6.14: Color-Coded Labels in *Gästis 2.0*.

Cognitive affordance legibility: Make text legible and readable. Text legibility refers to discernability rather than content and words being understandable [59]. To ensure this, it is important to consider the way the text of a button label is presented so that it can be read or sensed, for instance through font type and size, background color, contrast, and use of bolding or italics of the text. The meaning is the same regardless of the color or font, however, unclear labels, low contrast, or inappropriate font sizes increase extraneous cognitive load, as users are forced to exhaust mental resources decoding the interface rather than completing tasks. Cognitive affordance legibility was taken into account in both *Gästis 2.0* and *Opening Hours 2.0*, and also relates to some of the other guidelines, in such a way that it was done through color-coded labels, which in turn are in colors that are part of Lisebergs visual identity.

Limit default list items when entries are information-heavy: Show a limited number of items by default, with the option to expand or load more. In this project, this was achieved primarily in *Gästis* by sorting bookings by status, and displaying only upcoming bookings by default. Combining sorting with a reduced number of visible list items decreases the need to search through unstructured information, minimizing intrinsic load and thereby facilitating learning. Limiting the

amount of information displayed prevents working memory from being unnecessarily occupied, supporting better understanding and learning [27], [28]. Moreover, this is also in line with recommendations by Hartson and Pyla [59], including providing user control as well as only giving most important information at first and more on demand. In theme park organizations experiencing high employee turnover, this is relevant since it increases the users ability to quickly scan the interface and locate relevant information. This is important when speaking to a customer and using the application simultaneously, which is a highly recurring scenario specifically within theme park contexts.

6.3.3 System Feedback and Visibility

Make previous actions visible: Keep track of task flow, particularly regarding previous completed actions and what is possible to do henceforth. In this project, this was applied in the *Gästis 2.0* prototype through the presentation of previous search history, such as recently visited guest profiles and recent searches verbatim. Externalizing memory reduces the demands and load on working memory, thereby freeing cognitive resources for the actual task. Visible system states also support the process of developing effective interaction over time, reinforcing extended learning. Additionally, buttons should be disabled in order to indicate an inactive state, thus making wrong choices unavailable. This was implemented by having a grayed-out Save button in the Timeline view in *Gästis 2.0* when the comment text field is empty as well as grayed-out Save and Publish buttons in *Opening Hours 2.0* when no changes have been made. By having these types of progress indicators, it keeps users aware of task progress, making clear all possibilities for what users can do at every point.

Change labels depending on state: Communicating state visually, for instance by dynamically changing labels when toggling, reduces interpretive effort required by users [59]. By clearly indicating the state of a label, users can immediately understand the current status of an element without additional interpretation. For instance, when the same control object is used to control the toggling of a state, Hartson and Pyla emphasize that the object label should change to show that it is consistently a control to get to the next state - otherwise, the current system state may become unclear, making it difficult for users to determine whether the label represents a possible action or feedback about the current state [59]. This is specifically relevant for *Opening Hours 2.0*, in which the implementation consists of displaying Check to mark for partially open in an inactive state and Marked for partially open in an active state (see Figure 6.15). In other words, the label differs depending on whether the checkbox is selected or not.

(a) (b)

Figure 6.15: Dynamically Changing Labels in *Opening Hours 2.0*.

Remind users to complete their actions: Provide cognitive affordances to remind users of uncompleted tasks, also described as avoiding completion slips [59]. The system should support users by providing feedback when a task has not been fully completed, ensuring that no changes are lost and avoiding unnecessary repetition of work. This also allows users to focus on completing the task efficiently, reducing the cognitive resources spent on keeping track of what has and has not been done. This guideline relates specifically to those parts within the two applications that have a Save button, as it entails the risk of an error in which the user forgets or omits a final action - often a crucial one for consummating the task. Likely completion slips that can occur include not saving changes made in *Opening Hours 2.0* as well as not saving a comment written in the Timeline tab within *Gästis 2.0*. In these cases, particular attention is required in the interaction design to provide strong cognitive affordances that remind users of the final step in the task process to help prevent this type of slip. For instance, dialogue boxes combined with warning messages regarding unsaved changes can be effective in these situations, such as a pop-up message reminding the user to click the Save button before being able to switch tabs or log out of the system. However, Hartson and Pyla also emphasize the importance of not trapping a user in an interaction, but always providing a way for them to deviate from an ongoing action [59]. The user should have a way to escape if they decide to not proceed with the changes, for instance through a Cancel button in a dialogue box.

Make functionality visible: Do not hide features or expect users to discover them independently. Making functionality visible and accessible is essential in applications containing a large amount of hidden or non-obvious features. Learning interface functionalities through trial and error is generally efficient when completing tasks [84]. However, within organizations characterized by high employee turnover, such as theme park organizations, applications are often used infrequently, or are used by new employees who do not have the time to learn their own workarounds and shortcuts. Therefore, making functionality within an interface visible is essential to designing applications that are easy to learn and use within these contexts. Disclosing functionality in an intuitive manner, for instance through tooltips and tooltip overlays, supports task completion and increases efficiency, reducing the time users spend on discovering functionality on their own [83], [84]. In this project, a tooltip overlay (see Figure 6.16) enabled an experienced user to discover functionality they had not previously encountered through regular use of the system, highlighting the value of proactively disclosing functionality rather than relying on incidental learning. Providing contextual help therefore ensures that tasks can be completed more

efficiently from the outset of learning the application.

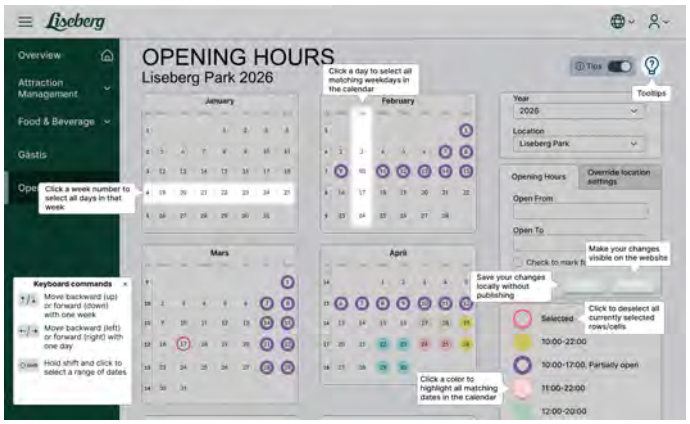


Figure 6.16: Tooltip Overlay in *Opening Hours 2.0*.

6.3.4 Design Process

Ensure the design team has the same system access as users: Through communication with relevant stakeholders, confirm that the system version available to the design team corresponds with the one being evaluated. Working with a different version may result in unnecessary steps in the process, such as conducting user tests on functionality that already exists within the users version of the application. If the design team evaluates a different system version than the one users actually work with, the validity of the evaluation is compromised. Including stakeholder meetings early in the design process helps ensure that the design team and stakeholders remain aligned. Additionally, applying observation methods, in which design team members observe users completing tasks within their own systems, can yield more in-depth insights.

Conduct workshops or meetings involving users from different departments that use the same system: During this project work, it was discovered midway through the process that two users from different departments working in the current *Opening Hours* application had access to two different versions. In other words, they had different versions despite using the same system, with some parts of the interface differing between them. This highlights the importance of coordinating system versions across user groups. Methods that bring together multiple stakeholders, such as workshops involving design team members, stakeholders, and users, can create an open forum for comparing system versions, sharing ideas, and discussing issues and potential improvements collaboratively.

7

Discussion

In this chapter, discussions about this projects sections are presented. The results and process are discussed, as well as the results validity and generalizability. Furthermore, future work in the area and ethical considerations are acknowledged at the end of this chapter.

7.1 Results Discussion

The final results of this project consists of one prototype for each application evaluated, as well as a set of guidelines applicable to both of these. In this section, the prototypes are discussed, followed by the guidelines generated throughout the project.

7.1.1 Prototypes

Technical feasibility was not considered throughout the project. However, some attention was given to structural factors affecting the usability of the applications. For instance, the search function in *Gästis 2.0* follows a similar design pattern to other search functions within the digital *Asfalt* portal. While some participants suggested that only one search field would be sufficient, the authors took the underlying data structure into account - specifically the fact that multiple fields within the booking overview are date-based, including when the booking was made, and its start and end dates. Searching by a single date could therefore return results across three different date fields simultaneously, potentially yielding excessive results. For this reason, the authors prioritized the technical implications of this functionality, as doing so was considered likely to support rather than hinder usability in practice.

Moreover, several measures have been taken to ensure accessibility within the prototypes. To support readability, design elements were tested to confirm that they meet WCAG AA or AAA standards [72]. In the *Gästis 2.0* prototype, some of the lighter, more muted colors used in the Timeline, specifically those representing different event types, may be difficult to distinguish from one another. Increasing the saturation of these colors risked creating a visually cluttered interface, so alternative accessibility measures were applied instead, including including high contrast between background colors and text, as well as distinct icons that represent and differentiate each event type. In the *Opening Hours 2.0* prototype, the tooltip overlay

in combination with highlighted areas corresponding to specific functionality has been implemented to support readability and interpretation considering the substantial amount of elements and text are present simultaneously. Furthermore, the possibility to toggle the tooltip functionality on or off further supports usability by allowing users to tailor the interface to their individual preferences and needs.

One important theme during this project has been onboarding and learning. During the initial phase, participants were asked about their introduction and onboarding experience with both applications, in order to gain a better understanding of how users first encounter and learn the systems. These insights are highly relevant to the research question investigated in this project, which include examining how intuitive the systems are in the absence of substantial onboarding or formal introduction. This is not to suggest that onboarding to new systems within an organization should be disregarded. On the contrary, the authors emphasize the importance of onboarding, in line with existing theory and research in the area, and argue that it should be considered in combination with systems that are designed to be intuitive and easy to learn.

7.1.2 Guidelines

The guidelines formulated in this project were specifically formed to address the research question, and were produced based on insights gathered throughout the design process. Some guidelines were derived from existing literature and established principles within usability, and applied within the context of this projects theoretical framework, making the guidelines founded and contextually relevant. Additionally, they hold relevance to theme park organizations considering the operational complexity and high levels of employee turnover that characterize the industry. As amusement parks tend to rely heavily on seasonal, thus temporary, staff, this implies a continuous onboarding of new users of the systems. In turn, this emphasizes the need for systems that are intuitive, easy to learn, and user-friendly - both visually and functionally. The guidelines are organized into four overarching themes which all are relevant within this context, each discussed below in relation to the research question and the evaluated applications.

Consistency: Maintaining consistency with both internal and external systems by incorporating the organizations visual identity or adopting design structures that resemble similar applications, makes it easier for users to apply existing knowledge to a new system. When users are already familiar with a design pattern, they can direct their attention toward learning the parts of the application that matter most, such as specific functionality and work tasks, rather than spending time learning how to navigate the interface itself. Moreover, this guideline category is specifically important in organizations such as Liseberg, in which employees interact with multiple internal systems. By having consistent layouts, visual structures, and interaction patterns, it reduces the amount of new information and impressions when navigating between systems, which in turn could reduce the cognitive load. Consistency within a system and across multiple ones also facilitates faster onboarding.

Information Scanning: A cluttered interface containing a large amount of infor-

mation can overwhelm users and make it difficult to locate relevant information. Unlike experienced users, new users do not yet know where to look. Facilitating easier information scanning and incorporating design elements that guide the users attention can enhance the overall experience. Similar to the *Consistency* category, this allows users to spend less time searching the interface and more time efficiently performing their tasks. This is highly important as employees at amusement parks tend to work in fast-paced environments involving direct interaction with visitors. For instance, users of *Gästis* are required to quickly locate and interpret important information while simultaneously communicating with a visitor. Therefore, having effective scannable layouts of the systems helps improve task efficiency, which also makes it easier for novice users recently introduced to the system.

System Feedback and Visibility: Relying on users independently developing their own ways of working through trial and error is not a sustainable approach, as it can result in functionality intended to support task performance going undiscovered. Users may instead develop less efficient workarounds that slow down their work compared to using the tools available to them. Providing help functions, such as contextual help, reduces reliance on users memory and directs users toward efficient ways of performing tasks. This is particularly valuable for new employees and for users of applications that are used infrequently. When workarounds and shortcuts exist only in users heads, that knowledge is lost when they leave, leaving new employees to rediscover the same solutions independently. Offering guidance shifts focus from figuring out how to perform a task to actually performing it.

Design Process: Throughout the project, insights emerged regarding the design process itself, as the authors encountered certain obstacles along the way that required them to shift focus in some aspects. These insights reflect the issues experienced and lessons learned from them, and could offer valuable contributions to similar projects. They demonstrate that, alongside the suggested design guidelines, how a design project is structured and conducted is equally important to consider, especially in the initial phases. Moreover, high levels of staff turnover also entail frequent recruitment of new employees with varying levels of digital competence. Therefore, it would be beneficial to continuously involve different users in the design process, in order to ensure that the systems remain comprehensible and accessible for both new and experienced employees.

7.2 Process Discussion

This chapter discusses some specific parts regarding the process of this project that can be considered to have particular significance. These include reflections about the Double Diamond design process, iterations performed, and methods used within each phase. Additionally, the *Opening Hours 2.0* change of focus and its implications are discussed.

7.2.1 Double Diamond Design Process

Throughout the project, the Double Diamond design process was utilized. The initial plan allocated similar time periods to each phase, with the goal of iterating through the process three times. During the first iteration, the authors followed the time plan as scheduled, completing each phase and its associated methods. The second iteration similarly followed all phases, with minor adjustments in the time schedule. However, the authors found that some phases required more time than others. For instance, the Discover and Define phases in the second iteration required considerably less time than the Develop and Deliver phases, which allowed the authors to compensate for earlier deviations and realign with the overall plan.

During the third and final iteration, the authors focused exclusively on methods within the Develop and Deliver phase. This was partly due to external factors that slowed the process, requiring certain methods to be reconsidered and partly because the evaluations themselves generated sufficient structured data to inform design decisions. Rather than applying multiple research and ideation methods, stakeholder meetings proved valuable in prioritizing decisions derived from the user testing results, as they allowed the authors and the Liseberg stakeholder to weigh organizational needs alongside user insights. As the stakeholder regularly meets with system users, they also provide a well-informed perspective on user needs and behavior. Finally, if more time would have been allocated to discovery methods in the final iteration, more nuanced ideas might have emerged. On the other hand, dedicating additional time to prototyping allowed the authors to iteratively address design-specific challenges, and the prototyping process itself served as a form of exploratory approach.

7.2.2 Prototyping

In this project, prototyping was conducted across different levels of fidelity, including low, medium, high, and mixed. By gradually increasing the level of fidelity across iterations, the authors were able to build upon previous prototypes, further exploring identified usability issues, and refine previous results. This approach also proved effective in that insights from each round of user testing could be directly applied to the subsequent prototype, yielding increasingly nuanced reflections and ultimately resulting in a final product that incorporates perspective and insights gathered across multiple iterations.

The mixed-fidelity approach proved particularly effective throughout the process. The prototyping during the second iteration followed a more exploratory approach, with several different design alternatives developed and evaluated simultaneously. By prioritizing the generation of multiple alternatives, less time was spent on designing detailed design elements, resulting in varying levels of fidelity with a primary focus on interaction flow and functionality. This process began with the creation of wireframes that served as a foundation for the different prototype versions, which was subsequently developed further with attention to element placement and information structure. As the structuring of information had been identified as one of the main usability issues in the current *Gästis* application, this exploratory approach

allowed for valuable exploration of that particular aspect. The mixed-fidelity approach also allowed the authors to distribute their focus across different dimensions of the applications. For instance, maintaining an overarching perspective on key information flow while still attending to specific details such as color-coded labels and pattern design.

By using prototyping as a reflective tool to continuously uncover new possibilities throughout the process, and consistent with the description by Lim *et al.* [64], prototyping itself frequently served as an exploratory method throughout the project, with new ideas and insights emerging during prototyping. This resulted in research-informed decisions being embedded in the prototypes, which were further enriched through the explorative activities carried out during prototyping development.

7.2.3 Deliver Phase

During user testing, the aim was to recruit participants from all departments that use the evaluated applications. For *Gästis*, the system is used across the organization, including Guest Services, Booking & Customer Service, E-Commerce & Ticketing, and the Grand Curiosa Hotel front desk. Participants from the Booking & Customer Service as well as E-Commerce & Ticketing departments were successfully recruited. While it was not possible to include all departments in the evaluation, two participants from Booking & Customer Service had recently worked within Guest Services and were able to draw on experiences from that department, which were taken into consideration throughout the process. No participant working at the hotel front desk could be included, and their involvement would have broadened the user pool, leading to greater representation of users and more nuanced insights. The majority of participants worked within the Booking & Customer Service department, partly due to availability and scheduling constraints. However, this department is also one of the primary users of all parts of the system, and the participants were therefore able to offer a broad perspective on its use.

Since this project focused on the redesign of two existing systems, participants were recruited from among employees who already used the applications in their daily work. All participants had experience with the applications, though their level of familiarity with each varied. Recruiting participants with varying levels of experience was a deliberate decision, particularly for the *Gästis* evaluation, since the authors wanted to capture perspectives from both users with limited experience and those who had previously worked in other departments that rely on the system, such as Guest Services. For the Opening Hours application, the user pool was very limited, which increased the need for a more flexible recruitment approach in which the authors worked with whoever was available. Involving participants who already use the application proved beneficial, as it allowed for broad perspectives and informed reflections grounded in real use. However, given that the overarching themes of this thesis encompasses learnability, onboarding, and usability, including participants who had no prior experience with the applications may have yielded more relevant insights into how new users encounter and navigate the systems for the first time.

Regarding the *Opening Hours* application, it was decided in advance that only two

departments were going to be included in the evaluation: E-Commerce & Ticketing, and Food & Beverage. This decision was made because the authors, in collaboration with the Liseberg stakeholder, were unable to accurately estimate the time required for each department, particularly given that the project involved the evaluation of two applications simultaneously. As a result, the Attractions department was excluded from the project. Including this department would have presented a greater portion of the user base and may have yielded more nuanced results.

7.2.4 Third Iteration Deliver Phase

During the third iteration, the goal was to conduct a brief evaluation to collect general feedback on the final prototype from as many previous participants as possible. Due to time constraints and challenges in coordinating and scheduling participants, only two user tests were conducted, and these covered the *Gästis* prototype only. A larger number of participants would likely have yielded more nuanced insights regarding future development and allowed a broader range of users to share their perspectives. However, the limited number of participants did not affect the actual deliverable of this project. No user testing was able to be conducted for the *Opening Hours* prototype. As more substantial adjustments had been made to *Gästis*, and given that the *Gästis* prototype included a greater number of components, it was prioritized for the final evaluation. However, conducting a final evaluation of the *Opening Hours* prototype would likely have generated additional feedback, which the authors in turn acknowledge may have resulted in richer and more actionable insights.

7.2.5 Opening Hours' Change of Direction

During the second iteration, new information emerged regarding the *Opening Hours* system that the authors were unaware of initially. Through stakeholder meetings, it became apparent that the authors were working with a different version of the system than the one used by the actual users, which resulted in the evaluation of design elements and functionality that were already addressed in the users version. This, combined with the discovery of a large number of available functionalities within the system that had previously gone unnoticed, prompted a shift in focus. Rather than redesigning the interface elements itself, the focus moved toward making existing functionality more visible through contextual help within the interface.

This shift was supported by several findings. For instance, participants noted during user testing that much of the systems functionality had been figured out independently through use, such as learning by doing, rather than through any formal instructions or guidance. A recurring theme across the evaluation was that the interface design itself was generally well-received, but that learning to perform tasks effectively through the available functionality was what took the longest. Participants also noted that the application is used infrequently, which can make it difficult to remember how to carry out certain tasks. These findings, combined with input from stakeholder meetings, informed the decision to redirect the focus for this application. Consequently, one fewer iteration was completed. The deviation from

the planned design process and iterations resulted in considerably less time spent on prototyping, which may have limited the depth of insights gained. However, the results from the earlier user testing continued to inform design decisions throughout, meaning the first iteration was not without value and still contributed meaningfully for the final outcome.

7.3 Validity and Generalizability

This study can be considered to have a high degree of validity, as it examines and measures what it intends to investigate, which is in line with the definition by Cohen *et al.* [87]. In other words, it accurately reflects and addresses the declared aim and specific context, namely to analyze internal digital systems of a theme park organization in order to discover what design approaches support usability in light of high degrees of employee turnover. Nevertheless, the results are not restricted solely to the specific applications *Gästis* and *Opening Hours*, examined in this study. The findings of the study also serve as an initial demonstration of generalizable design concepts, while simultaneously emphasizing the importance of and need for further research in order to validate and refine them across broader contexts. For instance, in line with the specified aim of this study, the two prototypes may function as a visual framework or benchmark for future UX and UI development, whereas the proposed guidelines could support and provide a theoretical contribution to broader research and advancements in similar fields. In other words, design aspects such as consistency, visual layout, and system feedback can be considered extensive enough to be implemented in other digital systems. Yet, certain features may be more specific to theme park organizations or high degrees of employee turnover, thus needing more adaptation to be useful and applicable in other settings. Additionally, the evaluation of generalizability is also limited by the small-scale as well as short-term testing conducted within the frames of this study.

On the one hand, this project has a focus on Liseberg as a stakeholder and includes the aim to analyze and improve two of the internal digital systems being used within this specific organization. In other words, this work is mainly serving the staff at Liseberg. On the other hand, as Liseberg to a large extent is a seasonal workplace with a yearly extensive number of new employees, this is a crucial aspect that has been considered throughout the process. In turn, this means that it is possible to state that the results of the project will not solely serve Liseberg and its employees, but also hold the potential to be valuable and beneficial for other organizations with a high staff turnover, thus indicating a generalizability of this project. At the same time, the proposed guidelines also have a varying degree of generalizability, as some of them tend to be very generic and broad rather than specific to a context related to theme park organizations. Moreover, as there are only two applications in the internal digital system that are included and focused upon within the frames of this project, this could imply an exclusion of other potential areas for improvement within digital systems. This means there is a need for future work in the field for deeper understanding and further improvement on the whole.

7.4 Ethical and Social Considerations

Various ethical and social considerations can be identified within the frames of this project. For instance, the internal digital systems of Liseberg contain large volumes of personal data of the guests visiting any of their facilities. The data being collected and stored include information such as last names, email addresses, and ages, which emphasizes the importance and need of taking ethical aspects into account. Therefore, due to an extensive quantity of sensitive data involved throughout this project, each author was required to sign a Non-Disclosure Agreement (NDA) prior to getting access to the systems, establishing a binding legal duty to maintain confidentiality and proprietary rights. For safety reasons, the access provided was limited to read-only, allowing to view and access data but without the ability to make any changes.

Silverman declares the critical role of reflexivity within research, meaning the researchers ability to be transparent and self-aware in order to manage subjectivity throughout the process and enhance the studys validity and credibility [88]. Various factors such as personal beliefs, values, biases, and previous knowledge all pose a risk of influencing the data collection and interpretation [88]. Considering that both authors have several years of work experience at Liseberg, these aspects are particularly important to address. In addition to this, the authors acknowledge the fact that employees at Liseberg may have an inherent interest in promoting the company and its offerings in a favorable manner and thereby presumably will make things appear as good as possible. Following this, it entails a potential risk of bias both regarding the interviews and certain references used during the pre-study phase.

Moreover, the collection of data in terms of interviews has taken various ethical aspects into account. Cohen *et al.* highlight that it is rarely possible to achieve full anonymity [87], however, the study will guarantee confidentiality for the participants. For instance, all participants were clearly informed about the purpose and implementation of the study, how the collected material would be used and presented, as well as an assurance of confidentiality. This means informed consent was obtained from each research participant prior to the data collection procedure. In accordance with the Swedish Ethical Review Act (2003:460) concerning the ethical review of research involving humans [89], participation in the study was also completely voluntary, and participants were informed about the right to withdraw their participation at any time without the need to state a reason. Besides, no sensitive personal data nor classified information was collected during the interviews and user tests, which is in line with the General Data Protection Regulation (GDPR) [78]. All collected data have also been stored and used solely for the purposes of this specific thesis project. The inclusion criteria for the study required participants to have a current employment at Liseberg and frequently make use of any of the two specific applications, *Gästis* or *Opening Hours*, as part of their work role, thus having at least some experience and familiarity with the UI being investigated. This was decided to ensure the sample is appropriate and capable of providing valid and reliable answers in the interviews and user tests, relevant to the study aim and context.

At the same time, there still remain various problematic aspects that can be iden-

tified, which are important to address. For instance, one such aspect includes that the participants consent was obtained verbally instead of them having to read and sign a written consent form. Without this signed documentation, it becomes more difficult to demonstrate that participants were adequately informed about the purpose of the study, how the data would be used, and their right to withdraw. In turn, this may raise concerns regarding ethical rigor in terms of transparency and accountability. However, according to established frameworks, participant consent in research can still be obtained ethically through alternative methods, as the key requirement is that consent is informed and voluntary, regardless of how it is acquired more specifically [90]. A further issue is that this thesis project was conducted in collaboration with Liseberg, which is also the workplace of the two authors - both have a current employment within the organization at the time of writing, which creates a potential conflict of interest (COI). On the one hand, the authors prior familiarity with Liseberg, its systems, and workplace culture contributed to valuable contextual understanding and pre-knowledge, which, for instance, facilitated communication with stakeholders and participants. On the other hand, this prior connection also implies a risk of bias in data collection as well as interpretation.

Nevertheless, to reduce the influence of organizational loyalty or personal assumptions, this thesis project followed a user-centered and iterative design process in which findings were mainly grounded in theoretical frameworks, usability testing, and participant feedback. In addition to this, system users from different departments participated in the interviews, which helped broaden perspectives beyond the authors own previous experiences. The project also involved weekly discussions with the academic supervisor and stakeholder mentor, which contributed to continuous critical reflection. Moreover, all staff in the IT department at Liseberg possess expertise and significant professional experience in the field of digital systems, whether they are seasonal or full-time employees. However, the digital systems are utilized across multiple departments within the organization, but considering todays digitized society it is possible to assume that the majority of individuals are well acquainted with digital tools. Therefore, the use of these digital systems is unlikely to impose a significant cognitive load. By analyzing and improving two of the applications, the aim is that the overall cognitive load will decrease further. Yet, individuals experiences and knowledge of digital tools and systems is something that can not be guaranteed, which is an additional factor that places demands on ease of use, such as usability and learnability.

Furthermore, qualitative methods are designed to provide an in-depth understanding of a certain phenomenon or context [91]. Thus, the semi-structured interviews are a suitable method for this project. During the interviews and user testing sessions, notes were taken by the authors instead of using audio or video recordings. This decision was made primarily with the intention to protect the participants privacy and create a more comfortable data collection environment, considering that the study took place within the participants workplace and involved its internal digital systems. On the one hand, avoiding recordings means limiting the amount of sensitive data being stored, thus decreasing concerns regarding confidentiality. On the other hand, there is a risk of details, critical information, and valuable context in

participants responses being missed or lost when no recording is used. However, to mitigate this risk, both authors were present during all user tests and collectively reviewed the notes and analyzed the collected data afterwards, ensuring a shared understanding and increasing reliability in the data interpretation. Besides, a purpose of taking notes during user tests also includes assisting the memory regarding the participants non-verbal cues and behaviors. These include, for instance, facial expressions conveying confusion or contentment, as well as eye contact indicating interest or attention, which are aspects that are important to take into account, but which a recording can not capture [92]. As a further step towards ethical, trustworthy, and responsible research, the data was de-identified by removing direct and indirect identifiers, such as names and gender, as these immediately reveal a participants identity or may identify them when combined with other variables [93]. For research ethics reasons, the notes taken will not be included as appendices in this thesis.

7.5 Future Work

Both the prototypes and the guidelines presented in this project can be further developed in future research projects. Regarding the prototypes, the final user tests revealed several potential improvements for the *Gästis* application. One participant noted that the recent searches feature resulted in a cluttered interface. Additionally, payment details within the individual components of package bookings should not be displayed by default, as this information is often unavailable and its inclusion may be excessive, potentially causing confusion. These aspects require further investigation and refinements in future iterations of the project. For instance, future work should include evaluation and interviews with broader user groups, including users from all departments that use the systems, to ensure that a more representative range of perspectives is captured and to produce more rigorous and generalizable results. Future studies should also include a larger number of participants with no prior experience of the applications, in order to test whether the proposed guidelines are effective in real-world conditions with first-time users.

Moreover, the guidelines developed in this project are grounded in the specific environment and application studied, and have not been tested in other real-world contexts. As such, there is no guarantee that implementing them will yield the intended outcomes in different settings. Future work should therefore include testing the guidelines with other design projects to assess whether they lead to measurable improvements. Furthermore, as this project focused on two internal applications within a single organization, it should be noted that theme parks vary considerably in terms of system environment, organizational structure, and workforce size. Studies aiming to research similar themes in other theme park environments should account for those specific conditions. Since this project primarily focused on usability, design elements, and functionality, implementing the proposed guidelines in the actual applications requires further investigation into back-end structures to ensure that the recommended design changes are technically feasible. Future development and research could also explore how multiple systems, such as guest profile

management and booking management, could be integrated into a unified platform, consolidating all relevant applications within a single domain into one cohesive system.

8

Conclusion

This thesis has examined and aimed to answer the following research question:

What design approaches are suggested when designing internal digital systems within theme park organizations experiencing high employee turnover?

In order to do this, the work was carried out in collaboration with Liseberg and followed a Research through Design (RtD) approach, through which the authors evaluated and redesigned two internal digital systems used within the organization: *Gästis* and *Opening Hours*. The process was based on the Double Diamond design process and involved three iterations, of which each included different relevant design methods to explore and gain insights about the applications and its users. A key contribution of this thesis includes the development of two high-fidelity prototypes that implement the redesigned functionalities and design elements of the original versions. The *Gästis 2.0* prototype primarily focused on improving ease of scanning information and efficient navigation within information-dense workflows, while *Opening Hours 2.0* focused on functionality visibility and contextual help rather than structural redesign. Collectively, these prototypes demonstrate that usability improvements may require different design approaches depending on the system context and users interaction patterns.

In addition to the prototypes, the results also consist of a set of guidelines to suggest approaches to consider when designing internal digital systems in regards of usability in organizations with a high degree of employee turnover. At the beginning of this project, the aim was to propose guidelines related to design elements and functionalities. However, during the course of the project, several insights emerged regarding the design process itself, resulting in two additional recommended guidelines for the design process when performing similar projects. A total of 14 guidelines were suggested, categorized in four themes, as listed below:

- Consistency
  - The systems language should be consistent with the companys language
  - Use icons and colors consistent with the companys visual identity
  - Maintain consistency across the system while adapting to role-specific needs
  - When system integration is not possible, the system design should be

coherent with surrounding systems

- Information Scanning
  - Control layout and visual complexity
  - Communicate states through color-coded labels
  - Cognitive affordance legibility
  - Limit default list items when entries are information-heavy
- System Feedback and Visibility
  - Make previous actions visible
  - Change labels depending on state
  - Remind users to complete their actions
  - Make functionality visible
- Design Process
  - Ensure the design team has the same system access as users
  - Conduct workshops or meetings involving users from different departments that use the same system

Moreover, this thesis project contributes to the interaction design field by addressing an area that has received limited attention in previous UX research, namely the design of internal digital systems in organizational contexts characterized by high employee turnover. Previous research focuses mainly on aspects such as general usability, efficiency, and productivity, whereas this project examines how interaction design can support onboarding, learnability, and more long-term usability in environments where system users are frequently replaced. A further contribution includes presenting high employee turnover also as an interaction design and UX challenge, rather than solely an organizational challenge.

In conclusion, the suggested guidelines can be applied directly to the applications studied in this project, and also be interpreted as broader theoretical recommendations for designing usable interfaces within theme park organizations. The guidelines have not yet been evaluated practically in a real-life context, implying that future work should include implementation of the guidelines within an application to verify that they produce the intended outcome. This should be pursued alongside research into similar themes across different theme park organizations in order to further assess their generalizability. Additionally, the findings serve as an initial framework for designing internal digital systems used within dynamic organizations characterized by frequent staff replacement and thus continuous onboarding needs. Although the formulated guidelines have been developed specifically within the context of Liseberg and the theme park industry, the guidelines may also be relevant for other industries with seasonal or temporary workforces, such as tourism in general, retail, and hospitality. In other words, this thesis contributes both theoretically and practically to the interaction design field. Ultimately, this project indicates that system usability

in these types of environments is best supported through user-centered and iterative design processes, emphasizing efficiency, cognitive simplicity, and learnability.

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