MUSEUM

EXPERIENCE & INFORMATION ACCESS

A SER VICE DES IGN APPR OACH

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ABSTRACT

As a result of an increased personalized, customized and technology-oriented world, museum visitors bring more and more expectations about digital and personal experiences into the museum context. New technological possibilities, efforts of digitisation and the number of mobile devices in the hands of the public, have made the possibilities to engage and create experiences tailored to visitors' needs better. This research explores the possibility to create a more personal museum visit at the Danish museum, Statens Museum for Kunst using a service design approach.

In the project, studies with museum staff and visitors were carried out. Studies revealed a number of different expectations, values and need in relation to the museum visit among visitors. studies also showed that visitors sought more interactive experiences, more self interpretation of the art and easier access and more information about the artworks. Furthermore, the study explored the museum experience which was divided into three different categories: A social experience, a zen experience and a learning experience.

On the basis of the findings a service concept was developed and tested. Insights showed that information apps in relation to the personal museum experience, is about (1) providing the right information at the right time and place, (2) giving the the user agency, in layering information so that the user can decide how much they want to indulge in the art piece, (3) providing easier consumable knowledge, (4) giving the user possibilities for memorabilia by 'collection' art. Design choices, test methods, result and personalization are discussed.

TABLE OF CONTENT

1. INTRODUCTION

Public institutions such as archives, libraries or museums serve in many ways as a space where the general public go for educational purposes and delightment on a wide range of areas, such as culture, history, scientific theories etc. (French, 2016). As technological possibilities, efforts of digitisation and the number of mobile devices grow each year, the possibilities to engage and educate the museum visitors in new and different ways becomes greater. Technologies such as mobile applications, websites and augmented reality can be powerful tools that can enhanc the museum's objectives and ultimately bring the visitors closer than ever to the collections and artworks in the museum (French, 2016). These tools and opportunities, can change the relationship between visitors and museums and bring interesting and new insights that can benefit the museum goers and change the visit experience (French, 2016).

Many museums both nationally and internationally have in recent years increased the use of digital technologies in their collections, exhibitions and on their websites. This increase is a fundamental shift in the museum practice, where the museum has gone from being "expert-centric" to being "visitor-centric (Stogner, 2009), and where the museum objectives is no longer focused on the museum itself, but on the museum visitor. Furthermore, with the recognition that satisfying the personal needs of the visitor is an expectation and an important compound in attracting and keeping visitors interested, museums are designing experiences tailored for and with the visitor (Falk, 2013 March; French, 2016). This could also be expressed by saying that museums are trying to personalize the museum experience not only to attract visitors but to create new ways of experiencing art and keep visitors happy.

In Denmark, Statens Museum for Kunst (SMK) has since 2008 been working on becoming a fully equipped digital art museum and has done so by integrating digital medias and incorporating new methods in the museum practice (Friedlander, 2013). SMK has, for example, been working towards providing museum users with the possibilities to freely access, download and share pictures of artwork online. This particular project was in part a result of an organisational shift at SMK, seeking to incorporate medias of the 21st century into the museum practice (Friedlander, 2013). SMK's digital strategy focuses on uniting the areas of digitisation, mediation and communication. The strategy also focus on bringing the visitor into the organisational awareness becoming an active part in preparing and producing communication and mediation. SMK has launched several different pilot projects, and incorporated medias in their collections such as digital tables and videos in the exhibition space. Among other things, these medias are being explored to *"(...) strengthen the interpretative material in the museum and to continuously develop new methods for visitor interaction with the artworks"* (Rung & Laursen, 2012, May 23-15, p. 315). However, even though SMK already uses digital platforms and devices to deliver content and inform their visitors, we find that there is still room for utilizing and exploiting technological possibilities even further, and develop information systems providing visitors with a more personal museum experience.

We find that, as a result of an increased personalized, customized and technology-oriented world, museum visitors bring more and more expectations about digital experiences into the museum context, and visitors are expecting experiences tailored to their needs. Therefore, we will explore the areas of the personal museum experience by answering the following research question:

1.2 Research Question

> How can we design an information service, that supports a personal museum visit?

In order to answer our research question, we have throughout the project worked with three main sub-questions, that has served as benchmarks for our design research and process. The questions were used as tools that helped us maintain the focus in our design process and thus to plan our activities throughout the project. The three questions along with a brief explanation will be presented in the following:

1. What defines the museum as a service and what is the museum's strategy and future plans?
With this question, our aim was to examine and outline the current situation of the museum as a service. This primarily consisted of interviews, meetings and some observations with employees on the ground at the museum and with representants of the organisation. The whole of this study helped us understand the museum as a public service, and allowed us to get an insight into the museum's strategies, current and future goals. This also resulted in identifying different issues with their current service and thus find the focus of our project.

2. What are the museum visitors' needs and how can we characterize the museum experience?
This question was answered by conducting contextual research with the museum visitors, with the goal of understanding visitor's behavior patterns and needs in a museum context. Our research consisted of observations that helped us understand how the visitors use the museum. Moreover, we conducted six interviews with visitors, where our aim was to understand what's important for them in a museum experience and how they use the museum. This resulted into three different types of museum experiences and several visitor needs.

3. Which goals can we set for a design solution and how can we fulfill them?
In relation to the user experience and visitors' needs in a museum experience, we explored different design ideas and established a number of goals and objectives of which our design solution had to support. Having set the objectives, we developed a concept and a prototype, that was tested through three iterations. The prototype was tested by a total of five museum visitors divided into three rounds of tests. While the first two rounds of tests were conducted on a low fidelity prototype, the third and final tests were conducted on a digital version of the prototype. Each test helped us get feedback and uncover user needs. Subsequently, user needs were continuously implemented in the prototype through the iterations of development.

1.3 Project Scope

With this project, we create and test a service-concept based on user-centered approach, including SMK visitor in our design process. However, It is important to note, that while informants and visitors of SMK will take part in the research, the project is not a collaboration between SMK and us as service designers. This means, that the research is not lead by objectives or future goals of the SMK organisation. Our research will mainly be influenced by the museum visitors and we will adopt a problem-setting approach in examining visitors' needs.

The museum is a complex service with different touchpoints and stakeholders. For this project, we chose not to focus on the internal part of the museum service or in other words, the museum as an organisation, rather we chose to focus on the museum from a visitor's perspective and the museum experience as a whole.

Our design approach of this project will be based on service design. The service design approach can be seen as a result of how we tackle the research and the methods we use in our research and design. As service designers it is important to understand, what the users go through before, during and after the visit. We will carry this notion into our design process, yet, our main focus will be on the visitor experience during the visit. This means that will not examine what happens in the pre or post experiences.

Furthermore, as this project is a research project where we focus on the service design opportunities within the visitor's museum experience, we will not be dealing with the technical implementation of a finished service.

1.4 Project Structure

The different phases of the research project, methods and theories and findings will be presented chronologically. We have also documented our design research and process throughout the project. Pictures, interviews, transcriptions, observation notes, ideation and brainstorm sketches, prototype sketches and other graphic work are either presented in the project or in our appendix. Moreover, we have placed a link to the interactive prototype in appendix. The project is divided in 8 phases, which will be briefly presented in the following:

Chapter 2 - Literature Review

In this chapter we present the theoretical background for this project in the form of a literature review, furthermore we present 'state of the art' examples within the field.

Chapter 3 - Approach and Methods

Here, we present service design as our project approach, our design approach and the methods used in our research and design process.

Chapter 4 - Initial Research

In the chapter of initial research, we present our investigation of how SMK works as an organisation, starting of with an interview with Head of The Digital Unit at SMK. Secondly, we present interviews with staff member that we conducted to map out the different challenges staff members face, and the different challenges the visitors face when visiting the museum. Furthermore, we define the areas of focus, that founded the following contextual research.

Chapter 5 - Contextual Research

In this chapter, we turn our focus from the organisation SMK or the museum towards the visitor. We present observations and sample interviews with museum visitors that we conducted to point out the different visitor expectations, values and needs and to identify and describe the museum experience. Furthermore, we present our focus for our further design through a defined design problem.

Chapter 6 - Ideation Process & Concept Development

In this chapter, we present our brainstorm and ideation process conducted on the basis of our design problem. We describe the selection of three ideas and the evaluation of these. Hereafter, we present our concept development phase and the defined objectives of the new service. Lastly, we present the 'final' service concept.

Chapter 7 - Prototyping & User Tests

In chapter 7, we describe our prototyping process. After setting the concept idea and developing it, we started prototyping. A prototype was developed, evaluated and tested three times, where it was modified in accordance with the feedback received from the users. The goal with the prototype and the tests was to find out whether our concept design supports the needs and expectations of the visitor and ultimately allowing them to have a personal museum experience.

Chapter 8 - Evaluation and Discussion

After exploring the field, developing the concept, designing the prototyping and conducting user tests, we evaluate the service concept in relation to our objectives, design choices and test methods. Lastly, we discuss the aspect of personalization and selected findings.

Chapter 9 - Conclusion

In this chapter, we answer our research question and the formulated sub-questions. Hereby, concluding on our research and design project.

2. LITERATURE REVIEW

In the following section, we will outline the particular area of research and how that integrates in the project. We present the research area of which the project is situated in. As the aim of the project is to design an information service that supports the personal museum visit, the literature review entails the academic areas of a personal museum experience/visit. In the literature review, we will present the predominant research in the field of personalization and how it relates to the museum experience.

2.1 Personalization

The concept of personalization can be considered as old as human society and can be generally described as the impulse of fitting unique needs and concerns of the individual by personalizing tools, environments and products (Fan et al., 2006). Today, in many fields personalization is considered a prominent social phenomenon that brings great economic value as there is an increasing demand for personalized experiences in the economy (Pine & Gilmore, 1999).

However, personalization can mean different things in different fields. We find personalization within fields such as: marketing and e-commerce; cognitive science; social science; computer science; architecture and environmental psychology and lastly information science (Fan et al., 2006). Within these different fields, personalization is described by terms such as: customization; adaptation; individuation; consumer-centric and one-to-one relationship (Fan et al., 2006).

However, the term personalization seems to have two origins (Bowen et. al., 2004; Fan et al., 2006). One origin can be seen as a result of the vast amount of simply overwhelmed people as they couldn't filter or find information relevant for them. Hence, personalization became a way to deliver the right information to an individual or a group of individuals in the right format and layout and at the right time.

The other origin stems from the concept of one-to-one marketing where businesses tailor products and services to a group of individuals instead of the entire target market; by understanding the needs and preferences of customers marketers could increase revenue and decrease business losses (Bowen et. al., 2004). However, within these two origins there is also different understandings, terminologies and methodologies of personalization which makes the concept hard to define. Despite this, Fan et al. (2006) argue that, most definitions include a purpose of personalization, elements that are personalized (interface, content, etc.), and the target of personalization (user, consumer, etc.). Fan et al. (2006) defines personalisation as *"(...) a process that changes the functionality, interface, information access and content, or distinctiveness of a system to increase its personal relevance to an individual or a category of individuals" (*Fan et al., 2006. p. 183). However, there is very little consensus on how best to characterize the personalization construct (Fan et al., 2006). One way to go about this is, rather than focussing on 'how to do personalization', one should focus on 'how can personalization be done well'. Kramer et al, (2000) argue that you cannot say personalization technology without saying user-experience, as this method is used in a design of an end-user experience. First move towards a user-centered design approach within personalization, is to determine the target group. It is however important to note that different types of users have different information needs, therefore it's important to involve the user in our process towards personalization

(Kramer et al., 2000). One way to ensure a successful personalization within a design is by testing, measuring, and iterating the design with an unwavering focus on delivering value to the end-user.

With the recognized importance of the personalized experience, not only private organisations but also public institutions such as libraries are incorporating personalization in their practices, (Bowen et. al., 2004). The first personalized Web applications were developed in libraries, where the aspect of personalization was used to assist the selection or filtering of material for the users. Moreover, personalized service systems created models of users' interests that was used to prioritize information and filter results so that users find material quickly and easily in the database (Bowen et al, 2004). Also, institutions such as museums are incorporating personalization in the museum practice and in their communication with visitors, creating new museum experiences.

2.2 Personalization in a museum context

There has been many contributions in the field of the personal and the personalized museum experience. In 1986 Falk and Dierking seemed to be the first in the field addressing the notion of visitor expectation, what visitors remember after their visit and what a trip to the museum actually means for the visitors. Falk has in the past 30 years explored, why people visit museums and how people use them for personal meaning. Falk (2013, March) addresses a visit to an institution like a museum as being linked with the sense of identity and personal needs. He states about his year long research: *"(...) my colleagues and I have talked to individuals about their museum experiences weeks, months and years after their museum visits (an excerpt from one of these interviews leads off this article). Time and time again, what leaps out in these interviews is how deeply personal museum visits are, and how deeply tied to each individual's sense of identity"* (Falk, 2013, May, p. 111).

According to Falk (2013, May) the museum experience and a visit to the museum is executed to support and fulfil personal goals and needs. *"The ways in which individuals talk about why they went to the museum as well as the ways they talk about what they remember from their experience invariably seem to have a lot to do with what they were seeking to personally accomplish through their visit"* (Falk 2013 May, p. 112). Falk (2013, March) explains that, a museum experience is about the relationship between an institution and one person on one given day. This means that, the experience might change from day to day or person to person. Falk (2013, March) also states that satisfying the personal needs of the visitor, is an important compound in attracting and keeping visitors interested in visiting the museum again. Visitors are expecting that goods and services are designed to meet their personal goals and needs and the public is looking for personalization and customization in institutions like museums (Falk, 2013, March).

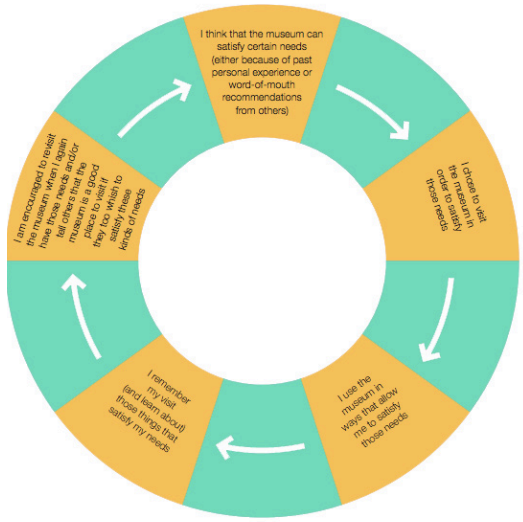


Fig. 1 The Museum experience cycle

Moreover Falk (2013, March) argues that, the museum visitor goes through five stages during a museum experience. He also emphasizes in this experience cycle that the visitors have needs that should be satisfied or met (Falk, 2013, May; see Fig. 1). He explains that there are different types of visitors and they vary according to the museum in question. There are *Explorers* motivated by personal

curiosity and new leanings, *Facilitators* motivated by other people and other people's needs, *Experience Seekers* motivated by the desire to experience a new destination, *Professional/Hobbyists* motivated by specific knowledge related goals and *Rechargers* motivated by a desire for a contemplative or restorative experience. Falk (2013,May) argues that the visitors of art museums often are explorers, who can practice their curiosity and interests by visiting the museum. He also explains that these visitors often come not just solely to experience the art but also to understand it. Falk (2013, May) continues by explaining that explorers as a visitor type, are individuals with a natural affinity for the subject, however, in a general matter and not as experts. He also states that this particular type of visitor is especially common in Denmark, where they represent a large group among the museum visitors.

Falk's (2013, March) notion about the museum being linked to the sense of identity and accomplishment of personal goals is relevant in our research in that we seek to make a service speaking to an individual or a group of individuals' goals and needs in relation to a museum visit. Here, it becomes relevant when exploring why visitors visit the museum and how we can support their experience with the use of a new service.

2.3 Personalization as participation

Another researcher in the field is the experience designer, Nina Simon. Simon (2010) addresses the personal sense of a museum experience and personalization. Like Falk (2013), Simon (2010) states that the first step towards personalizing cultural institutions is to use an audience-centered approach, where the experiences offered are framed in the context of what the visitor wants or needs. To Simon (2010) however, the museum experience is about participation. Simon (2010) expresses the importance of participation, as people and visitors are not passive consumers that want to be filled with knowledge; people make a stronger connection with the content and the conditions for learning are improved when they are invited to actively do something in connections with their experience. Simon (2010) argues that museums should start their audience-centric design processes by mapping out audiences of interest then brainstorming the experience, information and strategies that matches most with them. According to Simon (2010), one way to ensure a personalized experience is by serving visitors a rich content with different interpretations and mechanisms, where visitors then can retrieve content of interest. She continues by explaining, that one way of retrieving rich content is by expanding the interpretations with for example insider stories, anecdotes or contextual information about the time, the artist and such (Simon, 2010). However, this process can be quite complex as visitors have different interests and designers have to be careful with information overload (Simon, 2010). One way to solve this can for example be by having a recommendation system that is based on the visitor's interests or their personal profiles, a system that is often used in libraries or streaming services such as Netflix. This recommendation is usually built on the "you are what you do" data retrieved from the particular visitor or user. The idea is to recommend visitors more artifacts or artworks of what they like based on what they looked at, and this can change the visitor's experience of a museum (Simon, 2010).

Another way of going about personalization is using the *pulling out meaning technique* seen in for example the 'I Like Museums' campaign and in the Tate Modern's pamphlets invite from 2006. Here, both campaigns invite visitors to pull specific content of interest instead of consuming content that is pushed out by the institution (Simon, 2010). The visitor can for example actively seek out the

information that they want. This gives the visitor a kind of participatory power as they choose what to reveal or explore (Simon, 2010).

Bowen et al, (2004) explains that, personalization is not a new phenomena within a museum context. Many museums have created personalized access to either collections, agendas, tour proposals or tour guides etc. One explanation is that this improves the usability of a Web site by facilitating navigation or helping people find the right information, by for example taken age, level of knowledge, or level of education into consideration. This is especially relevant when aiming to facilitate the learning process, as visitor studies show that visitor's learning is stimulated when the information is described in terms that they can understand. Typically, this information is based on their interests (Bowen et. al, 2004). They also argue that museums would benefit from facilitating a personalized system to satisfy the visitor. They would often be more stimulated to come back and reuse the system or encourage other people to try it, and this can economically be an advantage for the museum, with an increase in real visitors as a result of personalization (Bowen et. al, 2004).

While both Falk (2013) and Simon (2010) argue that the way to personalization is by using a user-centered approach, Simon (2010) is more oriented towards the actively participatory museum. We agree with Simon (2010) that people make stronger connections when actively participating in connection with their experience rather than being passive consumers. However, we also find value in the existing or so to say traditional way of experiencing art.

For this project we wish to explore the possibilities for making the museum experience more participatory. However, it is important for us to note that we do not wish to erase the existing way of experience museums, rather we aim to explore participation within the traditional way of viewing art. This we seek to do through a new digital service concept.

State of the art

Using digital technologies in a museum setting is not a new endeavour and there has been a variety of interactive technologies tested in trying to create personal ways for the museum visitors to engage with the artwork and the other visitors. Several museums today also incorporate digital medias in exhibitions and the mediation of art. Most museums today provide their visitors with digital screens in the exhibitions or videos conveying information about the art, also audio guides providing visitors information about artwork or guiding them through the museum or enabling a personal experience. While audio guides today is a common service in museum, it was revolutionary when the Stedelijk Museum introduced it in 1952.

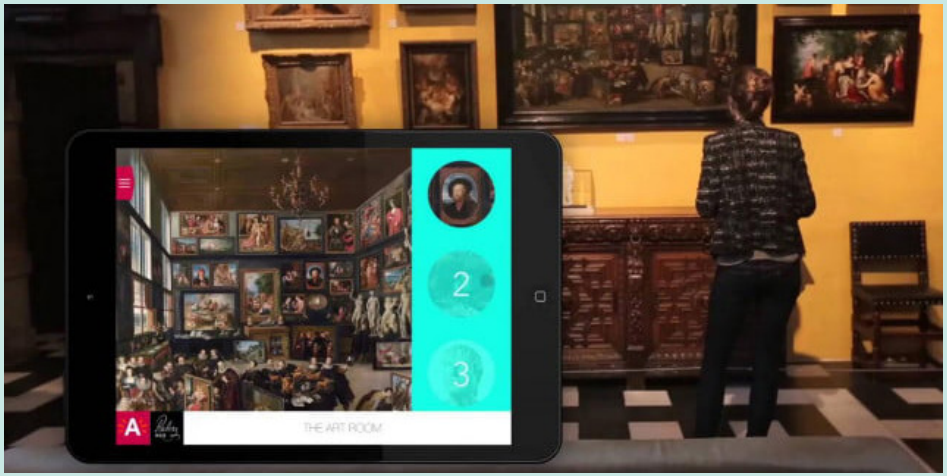
Fast forward to today, museums are using mobile apps, virtual realities, tablets, 3D- printers and beacons, changing the way we experience art and how it is conveyed and communicated to visitors. For example, the Smithsonian Museum in Washington has an mobilephone app which allows visitors to plan visits, showing opening hours, locations, and floor plans and lets the visitor discover highlights by searching through the collections. Furthermore, it has an augmented reality feature, that provides behind-the-scenes work of the Smithsonian's Museum's archives, research centers and libraries.

In the Netherlands, the Rijksmuseum has created an audio guide and information app that provides curated information about the artworks. Here, the visitor fills in a digital code on the app and receives a one minute curated audio information about the specific artwork. Another example is the Field Museum of Natural History in Chicago that has implemented an app with curated tours and exclusive content. The app also allows visitors to share their favorites with friends and create their own tours at the museum based on their interests or a theme. The app has video with scientists giving visitors insight into the featured artifacts and specimens. The Cleveland Museum of Art has created ArtLens, an application that uses iPad with image recognition software to recognize two dimensional artworks and give additional curated content upon scanning.

The Met has also experimented with emerging technologies like augmented reality. A demo project incorporated an augmented reality app called Blippar, that animated a painting once the phone is placed in front of it. Lastly, The Brooklyn Museum allows guests interact with museum experts. Visitor can point to the artwork and ask questions about the details of piece.

After examining the above mentioned examples, it is important that we design a service-concept that distinguishes from these examples, in order to add value into the personal museum experience research field.

ArtLens at Cleveland Museum of Art



The Brooklyn Museum application

3. APPROACH & METHODS

In the following section we will describe the approach of this project and the applied methods. We present and explain service design and the approach which has guided and informed our research and design. Furthermore, we present the design process lead by divergence and convergence activities. Lastly, we present the methods applied in this project. We describe ethnography as a way of studying human behavior and the ethnographic methods that were used in our contextual research and design process.

3.1 The design approach - service design

In the following we will describe the process and approach of the project. First we will introduce the discipline of service design which has guided our research and design approach. We first characterize the prominent pillars of service design og secondly, how service design can be applied in the museum context. We seek to use this approach as a way of dealing with visitor experience in relation to museums. Furthermore, we will describe the design process that has guided our research and design.

Service design and the museum experience

As a framework for this project, we will apply the concept of service design. Service design can be seen as an interdisciplinary field, that draws inspiration from industrial design, interaction design, communication design, experience design and marketing and management (Ainamo 2008; Holmlid 2007). This also means that tools used in a service design processes are a crossover of many different concepts from various disciplines. A key element in service design, however, is the holistic, user-centered design approach (Polaine et al., 2013).

This means, that the user experience is at the core of the design process, and the aim is to understand, sustain and improve positive service interactions between the service provider and the user (French, 2016) - in other words, it is about improving the way humans interact with the world.

As the name suggests, service design is a discipline focused on designing for services and the design process builds upon the assumption that, the interactions with services are very different than interactions with products. This also means, that designing for services is very different than designing products and services are experienced in entirely different ways (Polaine et al., 2013). Services are invisible exchanges that take place everywhere, they are intangible and cannot be possessed (Shostack, 1984). While a visit to the museum might not be the classic example of a service exchange, applying service design to the museum context can offer a different way of looking at the visitor experience at the museum, and help create better and different digital interactions between the museum and the visitor (French, 2016).

Museums have for several years been concerned with the notion of experience, and digital strategies have been implemented to create visitor experiences across various channels (French, 2016). The increased focus on experience can be traces back to Pine and Gilmore's theory of the 'experience economy' that focuses on delivering experiences in contrast to the economic focus of manufacturing products and delivery of services (Pine & Gilmore, 1999). The notion of experience broadens the understanding of digital products in the museum context.

"The word "experience" elevates digital products—such as a kiosk, app, or website—into a broader realm of context, where the visitor is at the center of the action. An experience isn't only how our visitors make choices or clicks within a website, for example. Experience implies something about the wider time, place, and context in which the interaction occurred" (French, 2016).

Furthermore, it's important to remember that visitors visit museums with a specific and complexed set of needs and desires, that they seek to fulfil with a visit to the museum (Falk, 2013). For capturing and understanding visitor desires, values, and needs and to design for the notion of experience, we apply the practice of service design in our project approach. Furthermore, we will apply a set of service design methods, which are:

Personas: We applied personas to visualize our findings from contextual research in relation to the visitor. Furthermore, we use personas to develop empathy for the visitor and for the subject of our design.
Service Blueprint: A Service Blueprint was applied to gain an overview of the experience the visitors have at the museum. The blueprint was used to structure our findings, and to pinpoint 'good' and 'bad' points of interactions.
Ideation: In producing different solutions to the found problems, we applied ideation techniques as a structure and to think in new ways in order to meet the user needs.
Prototyping: For conceptualizing the service, we developed a prototype. The prototype was used to observe the interaction between the user and the service concept in the situation and place where the service will actually take place.

In the project we both use service design as a way of thinking about the museum experience as we apply a holistic perspective, furthermore, we use service design as a set of tools that has guided and informed our research and design. In the following we will describe our design process.

3.3 The design process

Applying a service design to a project implies an involvement in the design process that goes deeper than just putting finishing touches on an already developed idea. As a service designer involvement in the design process, from exploring a problem space to finding solutions, is given. This way, we are examining possible problems and exploring underlying issues before seeking to find a solution. When the problem is mapped out, we explore and open up for possible ideas to subsequently develop and concretize ideas. This process can also be visualized through the double diamond (Norman 2013) as shown in the figure below.

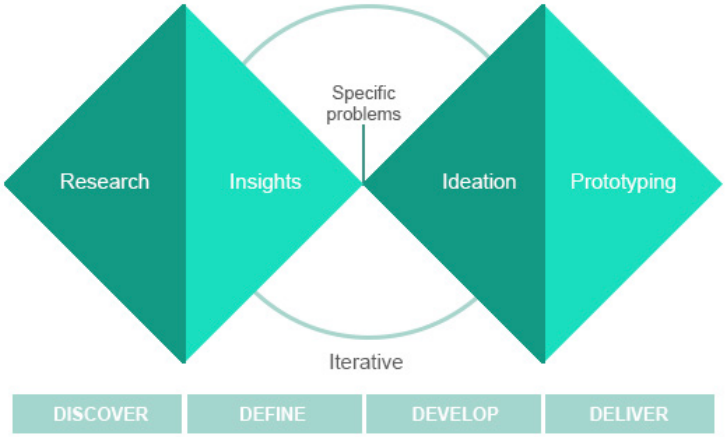


Fig. 2. Double Diamond Design Process Model

The process is categorized by iterative divergent and convergent thinking. We are exploring opportunities and refining ideas in a constant cycle. The double diamond model presents four main stages across two adjacent diamonds. The four stages are characterized by either convergent or divergent thinking. These stages are:

Discover –identify, research and understand the initial problem.
Define – limit and define a clear problem to be solved.
Develop – focus on and develop a solution.
Deliver – test and evaluate, ready the concept for production and launch.

In the project we use the process of the double diamond throughout the project span as the design process was not a linear process. During the project we have moved back and forth exploring different design ideas and revisiting different insights, jumping between different design stages.

3.4 Applied methods

In the project we have applied several different methods in our research and design activities, which we will describe in the following.

Ethnographic inquiry

In the project we applied methods of ethnography. Ethnography have been used within field of design and in *Human Computer Interaction (HCI)* practices since the early 1980's. As technologies became an increasing part of the everyday life, designers and developers needed a way to understand the interaction between people and computers set a apart from their own assumptions (Blomberg & Burrell, 2012). According to Blomberg & Burrell (2012) ethnographic inquiry relies on few basic principles which are *"studying phenomena in their natural settings, taking a holistic view, providing a descriptive understanding, and taking a member's perspective."* (Blomberg & Burrell, 2012, p. 1028). Studying a phenomenon in its natural setting is based on the assumption, that one need to gain a first hand encounter with the world in order to understand it. This also means, that in ethnographic studies there is an emphasis on gathering information in the setting of which the studied activities occur. According to Blomberg & Burrell (2012) people are not always capable of describing how and what they do seperated from the social and material environment. Furthermore, people's actions are often guided by tacit understandings, which makes actions hard to describe. Ethnographic inquiry also demands a holistic point of view, which means studying activities not as separate occurrences, but in a larger context of activities.

According to Blomberg & Burrell (2012) another important part of ethnographic inquiry means providing a descriptive understanding. However, this doesn't mean that ethnography can result in a prescriptive result. In HCI, ethnography it is

often the goal to identify opportunities of change, however one needs to understand the situation in order to change or evaluate it. Lastly, Blomberg & Burrell (2012) argue that ethnographers need to gain an insight into the activities and people from the perspective of the studied object. This means describing behaviors in ways the studied subject finds meaningful.

In ethnography there are several different methods of which to support the ethnographic way of thinking (Blomberg & Burrell, 2012). In the project we used ethnographic research methods in the form of observation and interviews. In the following we will describe the methods and how we applied them.

Observations

According to Bloomberg & Burrell, observation is use to study *"(...) human behavior in the context of which they naturally occur"* (Bloomberg & Burrell, 2002, p.969) and observation is a cornerstone in ethnographic research. Observation is often performed to gain insights into human behavior of which the studied subject are not able to express. What people do and what they say they do are often be two different things, as people often stribe to express an ideal behavior. Observation can hereby reveal important insight into tacit knowledge about the human behavior (Blomberg & Burrell, 2002). . In the project we used observation techniques to study museum visitor's behavior at SMK. We performed observation in different stages of our projekt. We did observation as a starting point for our initial investigation about museum visitors behavior at the museum. We also used observation when conducting user tests of our developed design solution. In both cases observation was used to gain an insight into the behavior of the studied subjects uninfluenced by the thoughts or expressions of visitors. Observation also became the starting point of which interviews were conducted and interviews was done to clarify observed behavior.

Interviews

In the project we conducted interviews with several different stakeholders in several different stages of the design process. According to Blomberg & Burrell (2002) interviews *"(...) are essential to understand member's perspective"* (Blomberg & Burrell, 2002, p. 970) and are another method within ethnographic studies. Interviews can be grouped in categories such as structured, semi-structured and unstructured (Blomberg & Burrell, 2002).

In the project we used semi-structured interviews to explore the different perspectives of the different stakeholders. We performed semi-structured interviews in the initial phase of our research with different stakeholders of SMK to explore the research area and we also conducted interviews in relation to user tests later in the project process to explore and evaluate developed design solutions with the users.

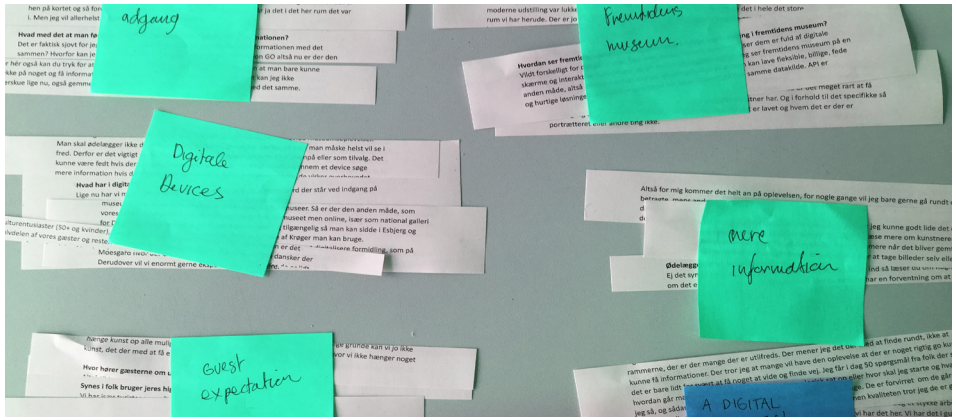
User tests

In the project we conducted user tests of a developed design concept through a prototype. This we did to gain an understanding of the user experience and the way the concept aligned with the user's needs (Kaasinen et al., 2010). The user tests was a think-aloud test, where users had to say out loud what they did using the prototype. Furthermore, the user tests had predefined tasks of which the users had to perform. The user tests were conducted through three iterations of the design development and users consisted of people recruited from our network, and people randomly selected at SMK. The user tests will be explain in depth later in the project.

Organising and analysing data

Throughout the project we have been collecting data. To make sense of the data we used different methods to collect and organize it.
When conducting observations during the project process, field notes of what we had observed were written down on a phone. They were then gathered in a digital document, compared and discussed to better understand what we had observed. Interviews conducted during the project process were audio recorded and transcribed into written text - this way we were able to better gain an overview of what was expressed.

When analyzing findings from collected data we used Affinity Diagrams (Kawakita, 1982). Affinity diagrammig, originally a business tool, is a process for understanding research data, insights and problematic areas. Affinity diagram breaks qualitative data into to smaller categorised areas and organizes these areas into clusters of a particular theme (Kawakita, 1982). We use affinity diagrams to gain an overview of our findings and to see relationship between the different insights from different research methods.



Affinity diagramming

3.4 Research position

As previously mentioned we work throughout the project with creating a service and a design to use in the museum context. We seek throughout the project to know more about how this service can become meaningful for the museum visitors and by doing so, we have through the research, empirical data gathering and development of a design, automatically taken on different philosophical scientific positions. This means, that the knowledge creation and the different empirical work of the project has been conducted from the perspective of different scientific paradigms. The paradigms can be considered the result of what we seek to accomplish, how we position ourselves and our use of methods. Throughout the project we work within the two different scientific paradigms: The hermeneutical paradigm and the pragmatic paradigm.

In the initial phases of the project we work within the hermeneutical paradigm. In the hermeneutical paradigm the *"Ontology and espistemology are intertwined in interpretivism because knowledge (understanding and meanings) is so essential in the ontological assumptions of the constitution of the world."* (Goldkuhl, 2012 p. 138). The hermeneutical philosophy does not seek to explain but to provide an understanding of the world. Furthermore, the hermeneutical philosophy prescribes an expansion of one's understanding of the world by constantly expanding preconceptions (Goldkuhl, 2012).

In the initial phases of the project our understandings of the museum context, museum visitors, their behavior and needs can be considered limited. At first, our preconception was therefore based on an external research of the areas and we sought to expand our understandings about the museum visitor and research domain. Therefore, we used observation and interviews to gather empirical data about the museum practice and the museum visitors.

In this phase of the research the museum and the museum visitor could be considered the object of study and we sought to uncover and describe their behavior and needs in the given context - this means that we, as the hermeneutical philosophy describes, tried to uncover and describe a world of which our knowledge was limited, hereby pending on the knowledge that awaited us.

Later in the project our research position can be characterized by a more pragmatic approach. *"The essence of a pragmatist ontology is actions and change; humans acting in a world that is in a constant state of becoming"* (Goldkuhl, 2012, p. 139). The pragmatic paradigm focuses on acknowledgement through action and change, that can cause changes in human perception of the world (Goldkuhl, 2012). By developing a new service and design we seek to change and intervene in a practice. We were therefore more active and made choices on the basis of the information we had gathered in previous phases. We conducted user tests that became the basis for further development of a new service. The visitor was not as much the object of study, but more a part of the development process. This way, our research position shifted as we moved from uncovering and describing a context and a behavior through empirical data gathering, to seeking intervening in a context and a behavior.

We operate within the two paradigms in that we believe it reflects the world in which we exist. We find that the world where humans act and explore, rarely can be defined by one paradigm; we have different strategies for how we act in different situation and contexts. We also find that it is essential for the pragmatic practice to know something about the domain you wish to intervene in. This way, you need to uncover a reality before you seek to change it. The two paradigms can be considered the two main scientific positions of this project. However, we are aware that the two paradigms will overlap and merge throughout the project.

4. INITIAL RESEARCH

In the following chapter we will present the initial research for this project. The goal of this was firstly to understand how the museum operates as an organisation and service and secondly to understand the present and future initiatives and challenges the museum faces. Furthermore, we wanted to know more about what challenges visitors experiences when visiting the museum.
We arranged a meeting with Head of the Digital Unit at SMK, Jonas Heide Smidt and conducted interviews with two employees at the museum. Both parties gave us insights into the museum practice and this became the starting point of our research. In the following we will first present the organisation, Statens Museum for Kunst, secondly insights from the meeting with Jonas Heide Smith and thirdly, the insights from the interviews with the museum employees.

4.1 Statens Museum For Kunst

According to Danmarks Statistik, SMK is the third most visited art museum in Denmark (Danmarks Statistik, 2015). The museum is situated in Copenhagen, 10 minutes from Nørreport station, and is partly known for it's iconic yet complex architecture with the contrast from the modern extension, built in 1998, meeting the old original building from 1884.

In 2015 SMK had a record in the amount of visitors, where a total of 450.000 guests chose to pay the museum a visit. In 2016, this number decreased with a total of 380.000 guests paying SMK a visit. This can partly be explained with the decision of reintroducing an entrance fee on the 1st June 2016.

SMK houses more than 700 years of art and art history. According to SMK, they describe themselves to be Denmark's largest collection of art experiences, where their vision is to redefine the museum as an institution and support the creative and reflective society (smk, 2017). Apart from the physical space, SMK uses different platforms, such as their website and their social media profiles, to communicate or promote their exhibitions.

The organisation is divided into three different areas, each area with different departments (SMK, 2017).

1. Administration, Maintenance & Security. These two departments handle maintenance on two levels. The administration of SMK makes sure that the organisation internally is taken care of with departments such as HR, financing, accounting, IT, recordkeeping and such. Maintenance and security are responsible for the building, technical facilities, fire protection and the general security.

2. Collections & Research, Conservation. These departments are responsible for regularly expanding the collection in SMK, where they are also in charge of the display and the research on the art or the artists featured in the collections. It's also in this department that the museum conserves the artworks, restoring damages and/or preventing damage. This department is also responsible for the research about the genesis of the artwork, on the choice of materials, and how much the materials have changed over time.

3. Learning & Interpretation, Communication- & Brand Development. These two departments deals with communication but in two areas. One works with the users' encounter with the art in display, by stimulating the audience's ability to see, experience or understand ar,. While the other department is in charge of the external communication for example with their social media, press materials, the museum's website, marketing etc.

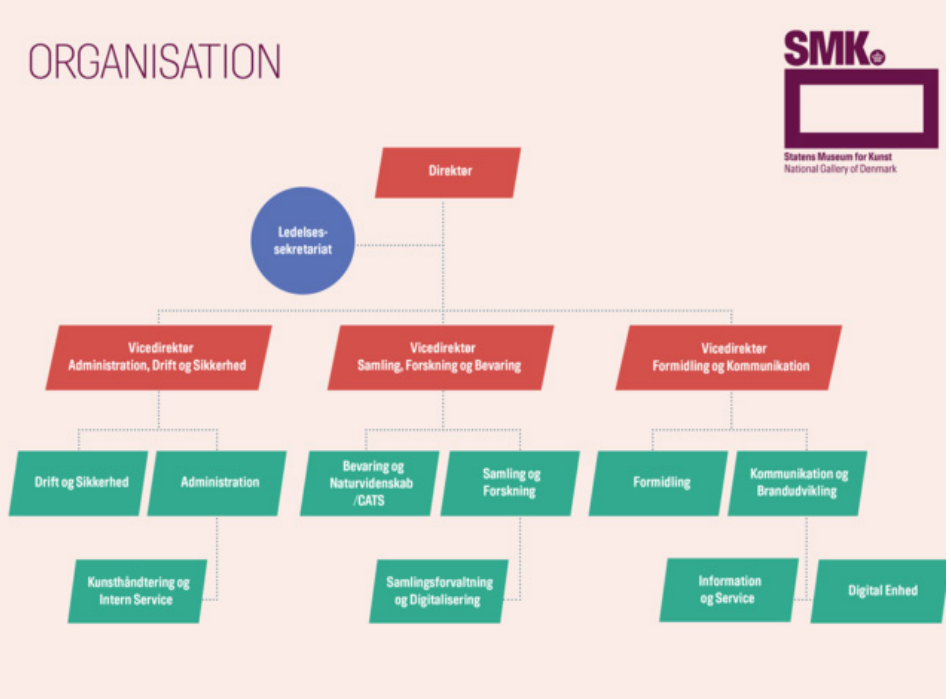


Fig. 3. Organisation diagram, SMK

Having examined how SMK as an organisation works, gave us an insight into how to museum operated and how the museum practice is structured. However, to get a deeper insight in the museum strategies and initiatives, we arranged a meeting with Head of the Digital Unit, Jonas Heide Smidt.

4.2 SMK strategies, intiatives goals

To identify SMK's core values, goals and challenges, we first arranged a meeting with Head of the digital unit at SMK, Jonas Heide Smith. The goal of the meeting was to understand how SMK operates as a museum and to get a closer look at the existing and future museum practice. At the meeting we were informed about SMK's digital strategy, opportunities and challenges. Furthermore, we gained an overview of the museum initiatives, practices and future work.

Museum practice and digital strategy

SMK as a museum institution has a specifically defined purpose and role. SMK, like other museums, has the task of providing access to cultural heritage as well as informing and educating the public about the cultural development. SMK has an agreement with the Cultural Ministry with a set of directives and goals for the museum practice. Alongside the general goals of improving conservation and research, is the goal of expanding the knowledge and use of the cultural heritage at the museum. The latter is part of SMK's digital strategy, where the museum seeks to incorporate digital medias in the museum practice (SMK, 2014).

At the meeting with Jonas Smidt, we were informed that SMK is currently working on creating a digital database containing the art pieces of the museum. As SMK is a national museum, it wishes to be seen as an accessible and public institution, not only to people present at the museum, but also remote 'visitors'. The database is offering visitors and the opportunity to find all art pieces in the museum, read information about them, and to download images of them for free. While this initiatives seems to be the main focus for the museum at the present time, other digital initiatives can also be found.

In the museum space, SMK has a couple of digital devices supporting the museum visit. Incorporated in the museum space is touch screen tables, a couple of screens with curators speaking about selected art pieces and a web supported audio guide informing the visitor about the art. SMK also experiments with digital devices at the museum's temporary exhibitions. For example the museum's 2017-exhibition, Japanomania, visitors can use iPads to swipe through manga themed books. According to Jonas, SMK seeks to incorporate more digital devices in the museum space, however to do so in an noninvasive way as to interfere with the exsisting museum experience. Jonas expressed that, the digital solutions should be an extra layer on the experience - not imposed on the visitor but optional.

According to Jonas, using digital elements at museums can be done in two ways. One is to digitalize the experience, as seen in museums like Moesgård Museum in Aarhus and Museet for Søfart in Helsingør, and another is to digitalize the artworks and their metadata so they can be easily accessed regardless of time and space. SMK's main priority at the moment is on the latter and it is the expectation that a new database can deliver content to all the digital devices in the museum. SMK's main focus is therefore not improving the experience in the museum space, but creating a groundwork for easy accessible information and artwork. He continues by saying that, this does not mean that they don't want to make the museum experience better for visitors at the museum, and the museum is well-aware that several challenges occur in the museum space.

Challenges and opportunities

According to Jonas one challenge at SMK is wayfinding and visitors are often confused about the signage and directions. Jonas stated that, the buildings invite

you to move towards a certain direction, the exhibition in another direction, while the staff tells you to go in a third one. Often visitors get lost which can be frustrating for them. Moreover, Jonas expressed that tourists especially have a hard time finding the museum, as it is not visible from a train station and there are no street signs that guide the visitors, which is a challenge that starts before the actual museum visit.

Moreover, SMK's main visitors consists of culture curious people, typically women around 50 and tourists. Here he points out that, SMK is in a unique position, compared to other 'competitors', where they also have a large audience of young people who come to the museum, especially to attend their popular social event SMK Fridays. While it doesn't seem to be a challenge to engage the youth, engaging visitors such as children and the more 'museum skeptical' visitors is still a challenge yet to be solved. These visitors need a more participatory approach to a museum visit, where interactive opportunities supports the museum experience. There is an expectation of not only experiencing art in the old fashion way, but that the museum should offer the visitors some kind of suitable, interactive museum activity, that enriches their museum experience as visitors wish to participate in the exhibition on a higher level than they do at the current state. Furthermore, according to Jonas, the museum is a social experience to many visitors because people often come with a companion or in groups.

Lastly Jonas mentioned that throughout the past year, SMK has changed from being a free museum to having a fixed admission fee and this might pose some challenges with SMK's image of being a public and national museum.

The meeting with Jonas Heide Smith gave us insights into the initiatives at SMK and the perceived opportunities and challenges at the museum from an organisational perspective. On the basis of the meeting we wanted to investigate the field further, and get a closer look at the actual experience of a museum visit. Therefore we sought out SMK employees that could inform the experience in depth.

4.3 Employees at the museum

At the meeting with Jonas Heide Smith, we were informed about possible problems and challenges at SMK as perceived by the organisation. To get a closer look at the actual museum experience from the perspective of a party closer to the experience, we consulted employees at SMK for interviews. The main focus of these interviews was not on the museum strategies or initiatives at the museum, but on the visitors and the practice of staff. We found that the interviews with employees could give us a more first-hand impression, in that employees have one of the most immediate understanding of visitors dealing with visitor everyday. We wanted to know how visitors behave at the museum and how they go about a museum visit. We also wanted to know how visitors experience a museum visit, and what they find particularly good or particularly problematic.

For the interviews we selected two employees at SMK that were present at the museum that given day. The two staff members were Søren, an on-the-ground/ security guard and Heidi, an employee at the information desk. We found that both employees possessed valuable, but also very different, information about the museum visitors, as they both have many interactions with the visitors but

at different places and times. We also found that the interviews gave us 'behind-the-scenes' insights into the museum practice, visitor behavior and probable issues in relation to a museum visit - hereby informing the museum experience.

Both interviews were semi-structured and conducted on February 8, 2017 at SMK. The interviews were then transcribed, analysed and insight were structured in affinity diagram and divided into themes. In the following will will present the insights of the interviews.

NAME	EMPLOYMENT	DATE	PLACE
Søren	On-the ground/security employee	08.02.2017	1st floor, SMK
Heidi	Information Desk employee	08.02.2017	Information Desk

Table 1. Table of Interviewed employees

Great exhibitions and initiatives

In the interviews both employees were very positive toward the museum practice in general. According to information desk employee, Heidi, SMK has many great initiatives and offerings. SMK arranges *SMK Fridays*, an event happening on a Friday each month with concerts, talks, artist etc. SMK Fridays and the museum's presence on social media seems to attract the younger audience in great extend (Appendix C). Furthermore, Heidi expressed that the SMK yearly membership cards is a good initiative, as it allows visitors to come and go as they please and for as long as they please.

In the interviews both employees stated that SMK's greatest value lies in its great artworkt and the organisation's ability to curate exhibitions, showcase and collect artworks. Both employees emphasized the quality of the art as the biggest asset and Heidi also found that SMK had a high level of professional knowledge as many employees were well educated in the area of art history (Appendix C). However, both employees had concerns about the circumstances surrounding the museum visit. While the artwork seemed to be no object for critique, according to both employees many aspects regarding the museum visit could be improved upon (Appendix B; Appendix C). These aspect seemed to address three things in particular: Conveying and delivering information to visitors, visitors finding the way around the museum and the flow and placement of the information desk area.

Conveying and delivering information

One area that seemed to concern the two employees was the museum's ability the deliver and convey information in particular in relation to the artworks and exhibitions. As stated, one of the information opportunities offered by the museum is the audio guide, SMK Highlights. This are offered through the information desk and on all floors by the permanent exhibitions. SMK also has a number of brochures in the hall and by the information desk where visitors can read about the exhibition and the museum in general. The staff however plays a big part in informing and guiding the visitors.

"What seems like a paradox is that they (visitor) have a hard time finding information, and that should be the easy part. This means that many walk around and talk to two, three, five employees before finding the information they need" (appendix B)

According to both staff member, people often consult the staff at the Information desk or on the ground about exhibitions or specific artworks, that they can't find information about in other ways. The task of conveying information or conveying the right information to the visitor seems to be entrusted to the employees. This means, that visitor don't receive information automatically but have to seek it out. Furthermore, the information offered, like the audioguide, seems insufficient as it only offers information about a selections of specific works, and the information tends to be overwhelming (appendix B).
Another concern seems to be conveying information about the museum in general. At SMK the modern exhibition is closed for renovation for the winter and part of the spring (2017). This information however does not reach all visitors, and they often turn up frustrated or disappointed (Appendix C). Although such information is available in the brochures and through the information desk, it's hard to make visitors aware of where to look for it (Appendix C).

Finding the way

Another area that is problematic was finding the way around the museum. According to Søren (Appendix B), this problem does not just occur in specific places but throughout the entire museum visit. People have a hard time finding the information and the cloakroom, and in general, what to do upon arrival. Furthermore, after entering, people have a hard time finding their way from exhibition to exhibition. According to Søren (Appendix B), one reason for this confusion is the poor signage in the museum. Another concern is finding the way through the specific exhibitions. Søren (Appendix B) expressed that, many people do not know how to see and walk around inside the exhibitions. According to Søren, it is not always clear to the guests, how the exhibitions are put together - whether the artworks is arranged by date or according to themes.

"I get 50 questions a day from people asking, how to walk through the exhibitions, if they are showcased chronologically, or where they should start, and then what (...)" (Appendix B)

The Information desk

At the museum many interactions happen through the museum information. Here people go to buy tickets and membership cards as this is the only place to do so. It is also here people go before viewing the exhibitions and here they return afterwards. The staff here have the task of informing visitors about the exhibitions and the art, and often become the receivers of good or bad reviews of the visit (Appendix B). According to both staff members a lot of pressure is put on the Information Desk as there often is a long line to buy tickets, pay for souvenirs and get information about art and exhibitions (Appendix B;Appendix C). According to Heidi, a digital system where people could buy tickets and renew their membership cards could reduce the waiting and the pressure on the Information Desk - allowing staff to focus on informing the visitors about the exhibitions, the art or the museum in general. (Appendix C).

From the interview with Jonas and the two staff members it was clear that SMK has many good initiatives capturing and helping the visitor in his or her visit to the museum. From the interviews it was also clear that some areas seem problematic or could somehow be improved upon. On the basis of the meeting and the interviews we set up a list of areas of which a new service could improve:

Wayfinding: Securing and creating better wayfinding systems, that guide visitors through the museum and through each exhibition.

Information desk self-service: Create a self-service opportunity to buy tickets, renew membership cards and find general information about museum and exhibitions

Conveying and delivering information: 1. Providing easy accessible information about the museum in general - such as opening hours, exhibition status ect. 2. providing accessible information about the artwork and art pieces at the museum.

Interactive experiences: Engage visitors through interactive experiences with the art and the exhibition.

After defining the areas, we sat out to explore the field further. The areas became the starting point for the further research.

5. CONTEXTUAL RESEARCH

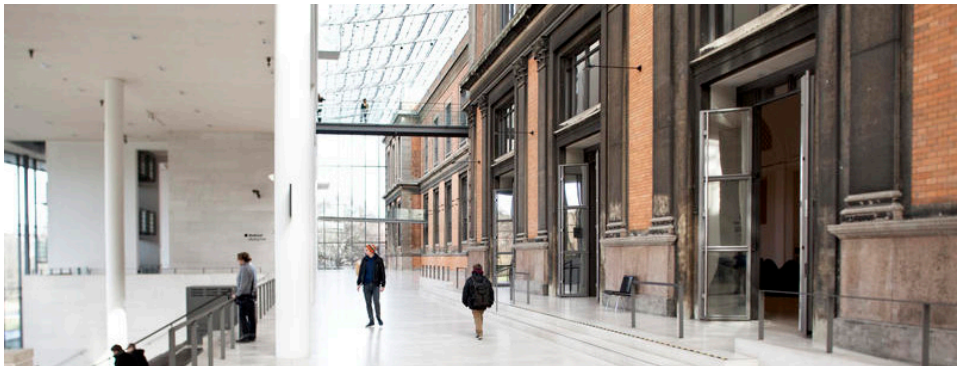
After exploring the museum practice and experience from the perspective of the organisation and from employees, and defining areas of improvement, we sat out to explore the experience from the perspective of the museum visitor. This we did by employing ethnographic methods such as observation and interviews with the museum visitors. In the following chapter we will present the use of our methods and the findings from both observation and interviews. Furthermore, we will present defined visitor needs and a categorization of the museum experience. Lastly, we will present personas created from the insights of the contextual research, a target user for our design and a formulated design problem.

5.1 Visitors at the museum

As Schön (1993) expresses: *"Problems are not given. They are constructed by human beings in their attempt to make sense of a complex and troubling situation"* (Schön, 1993). Thus, setting the problem is as equally important as finding the design solution. It's important to first explore the possible problems from the perspective of the 'perceiver'. To get a closer look at the museum experience from the perspective of the visitors, we observed and conducted sample interviews the visitors at SMK. Firstly, we did observations of the museum visitors, to get an impression of how they use the museum and how they go about a museum visit. We then conducted semi-structured interviews with visitors in the museum, to know more about what we had observed and to gain new knowledge of what we couldn't observe.

Observation

With the acknowledgement that: *"(…)some aspects of people's experiences can only be understood through observation of activities as they occur. (..) innovation requires an understanding of the present"* (Blomberg et al, 2002, p. 966).
We started our contextual research by observing visitors at SMK. We observed different areas: The entry hall, the entries to the exhibitions on the first floor and inside the two exhibitions, Japanomania and Danish & International artist from the 1900 century. We observed what people did when they enter the museum, how they interact with the art and how the visitors use the museum in general.
To make sure that there were enough visitors to observe, the observations were conducted from 12-1 pm on a Wednesday (08.02.2017) as SMK opens at 11 am. We realized however, that the given time, might have determined the visitor composition.
Observations were done separately, which means that we each observed different areas and exhibitions of SMK. The insights were written down on a phone, making it easy for us to move around and to blend in, as we didn't want to affect visitors' behavior. Furthermore, during the observations we kept our distance to the visitors, trying to stay as much in the background.
Afterwards the different collected insights were compared and discussed. During the observations, we each took photos of SMK and the visitors at the museum to document what we saw. In the following we will describe our observations. Firstly, we will shortly present the physical space.



The Physical Space

SMK is divided into two buildings; the original building from the 1800 and the extension that was built in the nineties. In the old building, the visitor finds collections from 1700-1900 and in the new building the visitor finds the contemporary exhibition, in other words the museums modern art department. Both buildings have two main floors. Although the two buildings are separate entities, they are linked by footbridges connecting them on the first floor.

Walking into the ground floor of the museum, the atrium connects you to all parts of the museum such as the shop, the exhibitions, the cloakroom, the information desk etc. and into the new extension.
When entering the new building the visitor is met by stairs leading down to the museum café and a sitting area with a view over H.C. Ørestads Park. Apart from few modern artifacts, walking down the big spacious hall, you will find the Young People's Art Lab. The Lab functions as a space or a community of young volunteers collaborating with the museum staff, with the common vision of making art relevant for young people.
The first floor is reserved to the museum's permanent exhibitions both in the old and new building. Going up the stairs from the entrance, visitors find three out of four permanent exhibitions: Danish and Nordic Art 1750-1900, European Art 1300-1800 and French Art 1900-1930. In the new building visitors find the permanent contemporary art exhibition Danish and International Art after 1900.
In the basement visitors can hang their belongings in the cloakroom or go to the restroom. Here, they also find the museums cinema, that is preserved for art film screenings, and in some occasion visitors find special exhibitions.
In addition to the four permanent exhibitions, SMK currently has three special (time limited) exhibitions: Mark Leckey in the basement, Nordic Highlights on the ground floor and What Lies Unspoken on the first floor.

Entering the museum

The visitors entering the museum were of different genders and ages. The majority, at the current time, were middle-aged or above. Another big group was people below 30 such as students and school classes. Moreover, most of the visitors did not come alone, they either came with a partner or in groups. The visitors entering to museum were not drawn to the information area, where they could buy a ticket. They either went to the staff or to the stand with all the brochures by the stairs. The staff situated at the entry of the exhibition, guided people to the wanted location of the information, wardrope or to specific exhibitions. The 'entry hall' seemed to be used as a place for relaxation between different exhibition, a landing place upon arrival, a place to wait for meet-ups and as a last stop before exiting the museum again.

Photos from observations in the entry hall

At the exhibitions

SMK has a variety of exhibitions, situated at different locations in the museum. They are separated by areas and spaces, such as the entry hall, the corridor on the first floor and the great hall between the new and the old building. The ambiance of the museum changes from exhibition to exhibition, as the sound level, lighting and amount of people differs. For example some exhibitions were dominated by schools and students on excursion with their study institution. In general, many people explored the art in groups or in pairs.

Some separating to explore the art, and subsequently meeting again to talk about the experience, while others walked around in pairs reading the informations boards, viewing the art pieces and talking with each other. Very few people came alone. Many people took pictures of the art with phones and cameras.
At all the exhibitions spaces the staff seemed not be guiding visitors, as opposed to the staff by the entry hall, they only made sure that people did not get to close to the art.

The exhibition located in the intersection between the new and the old building is the exhibition of Danish & International Art 1900, a small collection of the contemporary art. The exhibition differs from the other collections as it uses other medias such as sound and sculptures. Visitor walked around the sculptures and engaged with the sound pieces through headphones.
When moving from exhibition to exhibition visitors are met with different empty spaces. Walking from the old to the new building, visitors find a great hall. This we found to be completely empty. This can partly be because of the reconstructions going on in the museum. However, people would enter this space, then turn around and go back to the old building as they saw no one else there.

Information, audio and interaction.
In the exhibitions, several of information possibilities are offered to the visitors. There are the art piece tags hanging by each painting, information boards at the entry of the exhibition and around the exhibitions, and there are a few digital devices providing information about the specific paintings and about the context of the exhibitions. On the first floor, visitors are met by a wall with information leading in different directions and this confused some of the visitors. Furthermore, the SMK Highlight earphones, are hanging on the wall ready for the guest

to use, however, many guests walked pass these without noticing the earphones. When entering the two main exhibitions on the first floor, you find a table with a touch screen, where guests get a thorough explanation about some of the art pieces. Most guests did not use the screen. Furthermore several tables and screens with audio are placed around the exhibitions, yet these did not seem to attract any attention from visitors.


Photos from observations in exhibition space

The observation showed that the museum was dominated by an older generation and a younger one. This can be due to timing, and thus it could be interesting to see whether this changes during weekends, how the dynamics of SMK works then and how people interact with each other. Furthermore, observations were conducted as reconstruction of the contemporary exhibition took place, which meant that a big part of the museum was closed down and this probably impacted the amount of visitors and the visitors' behavior.

Observation showed that visitors had a hard time finding their way when entering the museum, and consulted staff for directions. Observations also showed that most visitors came with a companion, which indicated that museums visits should be seen as a social experience. What we found interesting is the dynamics that was created between the visitors in the small contemporary exhibition, that allowed them to interact both with the art piece and with each other. Somehow sharing that interaction with someone else, in this case what seemed to be a friend, created a "joyful" atmosphere/experience. This generated attention towards that particular piece of art and other visitors got curious as to what was going on.

Observation also showed that many of the digital information devices located around the exhibitions were not frequently put to use, and visitors did not notice the different information opportunities such as the audioguide.

KEY FINDINGS

- Most visitors come with a companion
- Visitors explore the art in pairs
- Visitors seperate from group og companion to explore the art alone
- Wayfinding when entering the museum seem to be problematic
- Most visitors did not use the digital devices in the exhibition

Sample interviews

To get in-depth insights in the visitor's museum experience, we conducted six semi-structured interviews with visitors in SMK. The goal of the interviews was to find out, what the guests valued in relation to the museum, why they used/ visited the museum, and how. The interviews lasted around 5-10 minutes and the participants were made aware that they would be audio-recorded yet remain anonymous. All interviews conducted, were based on an interview guide made prior to the interviews (Appendix H). These were made in order to have a common approach to the visitors, so we could compare the participants viewpoints. The interview structure also allowed some freedom so we could ask about specific subjects when necessary (Bloomberg et al., 2002).

The questions of the interview, which addressed both SMK specifically and museums in general, were divided into four main themes and each theme contained a number of questions. This helped us maintain an overview of the findings. The four themes were: Visitors relationship towards SMK, the museum experience, a personalized experience and the future museum. We sought to get many different perspectives on the matter, and therefore sought out visitors from different age groups and genders. The six respondents were mainly women (4/6) in the age group 19-70, consisting of 4 locals, 1 Danish tourist (visiting from Jutland) and 1 tourist from Germany. We conducted the interviews on two different days, however in the same time frame. The first round of interviews were conducted after our observation on Wednesday (08.02.2017) and the second round took place the following Friday (10.02.2017).

NAME	GENDER	AGE	DATE	PLACE
Respondent 1	Female	19	08.02.2017	Cloakroom
Respondent 2	Female	76	08.02.2017	Hall
Respondent 3	Male	38	08.02.2017	Exhibition
Respondent 4	Male	50	08.02.2017	Exhibition
Respondent 5	Female	70	10.02.2017	Exhibition
Respondent 6	Female	25	10.02.2017	Exhibition

Table 2. Table of Interviewed museum visitors

In the following we will present and describe insights retrieved from the interviews.

Relation to SMK & the museum experience

Relation to SMK

In the interviews it was clear that the participant had different reasons for coming. Our respondents were very diverse and thus was their relation to SMK. Some came often, while others had heard of the museum through their social network. Others were tourists and found that SMK was convenient to visit and some came simply because of the beautiful buildings.

A Learning experience

When the participants were asked why they chose to visit museums, we found many of the respondents wished to get enlightened in some way and gain new knowledge and perspectives of the culture and society (Appendix I). One respondent expressed that he came to *"(...) get enlightened, try to learn, or get an understanding of the world we live in" (*Appendix F). To this respondent, the

museum experience was an opportunity to learn and to expand his knowledge. This statement seem to count for several of the respondents as well. It was important for some of the respondents to gain further knowledge than they already had (Appendix H; Appendix F). In relation to these responses, It seemed that the visit and experience was about learning and gaining an understanding of the world.

Not just about the aesthetics

Moreover, respondents expressed the importance in receiving more information than the 'obvious' or more than what they could access or see. Here, several respondent pointed out that they wanted to get more knowledge about the artworks rather than to simply get what was written on the art plaque, where the title and the year is presented. One respondent expressed *"If you just stare at some art without any kind of information as in a text, a video or something else, then the art becomes less exciting"* (Appendix H). This respondent felt that just viewing art in its plain form, without any kind of explanation, seemed to impair the experience.

It was important for several of the participants to gain an understanding of the context of the painting, hereby knowing something about the history, the art period or art style (Appendix D, Appendix E; Appendix H). Furthermore, one respondent also felt that, important for the art experience was understanding what one could see in the particular artwork, and expressed that understanding the symbolic of the elements was an important part of the experience (Appendix H). From the interviews it seemed that many visitor sought an art experience extending beyond an aesthetic impression. The respondents, wanted a perspective of the art that they could provide themselves and wanted to know more than what was available to them.

A zen experience

Several of the respondents addressed the notion of experience and explained, that they came to the museum to get a good or inspiring experience (Appendix I & Appendix E).

For some of the visitors they expressed that the museum experience for them is special and they wish to get in a 'different state of mind'. One expressed that she came to the museum *"(...) To get information flowing, and get out of my head"* (Appendix D). Other respondents expressed that they went to the museum to experience something that could inspire them or get their minds on a different trail of thoughts (Appendix G, Appendix I). One respondent also expressed that seeing the art and walking through the museum gave him a specific feeling and made him calm (Appendix I). Talking to the visitors it seemed that the museum visit was an experience of the mind as visitor did not solely come to learn and see, but also to escape their daily thoughts - creating a form of zen.

A social experience

Talking with the participants it also became clear that the museum visit was a social experience as most respondents were sharing their experiences with a companion or in groups. Several respondent felt that it was important to be able to share their thoughts with someone else. One respondent expresses: *"I like to have a companion, because I want someone to share the experience and the art with, so I can share my immediate impression of the art, because sharing it on the spot is a different experience than taking it with you home and having to retell it to others that weren't there and did not experience it with you"* (Appendix F). While another expressed that the experience of the art was simply greater if sharing it with a companion (Appendix G). The museum visit being a social

experience, seem to confirm what we had observed prior to the interviews. Being able to share the experience was an important personal need and somehow enhanced the visit.

A personal visit

Interactivity

When asked about what could enhance or create a better experience, several of the respondents stated that a higher level of interactivity with the art could give a new dimension to their way of perceiving it, and ultimately enhance the experience (Appendix D; Appendix F). Simply viewing art pieces was unengaging and therefore did not fulfil theirs needs and as one respondent expressed: *"I think some people miss out on the art experiencing because it becomes so static (...) (...) if there was something like a touchscreen, hvor i could enter it and touch it, i mean that's what we all want. When you see something, you want to go to it and touch it and feel the texture"* (Appendix F). According to these visitors, not being able to engage with what could be viewed, seemed to become a demanding experience, as visitors had to read long boards of informations before understanding what they were looking at.

Self interpretation

We found that the necessity of interpretation and 'self-interpretation' when viewing the art to be a returning subject and that the museum should support the visitor's way of viewing the art rather than hindering it. One respondent expressed that the audio guide hindered her from interpreting the art herself or relate to it and she felt for example that the audio guide only provided one way of understanding art:

"we get a really confined perspective of the world and i wish there could be a museum where I could see a billion more perspective of art" (Appendix D).

Another respondent expressed that is was important for her, to be able to walk around quietly and make her own interpretation of the art (Appendix G).
In general enabling the visitor to create their own personal meaning and relationship to the art was expected from several visitors.

Noise and disturbances

Another insight gathered from the interview was that noise and disturbances was an issue at the museum (Appendix E; Appendix G). Noise kept one respondent from experiencing and thinking about the impressions of the art (Appendix G). Another respondent addressed the noise as irritating and a disturbance, however one also emphasized that being around other people, was also part of the experience (Appendix E).

Memorabilia

Many of the participants collected memories from the museum visit in the form of pictures taken with their phones or brochures from a specific exhibition. One respondent (appendix G) would keep these in a calendar as a reminder of the experience and the specific day. Another respondent took pictures to show to others (Appendix G) and some took photos for a personal archive for their favorite art pieces (Appendix H).
Collecting evidence of the visit seemed like a natural activity the same way one takes photos to remember a special occasion or buying a souvenir on a holiday. The photos functioned as memorabilias that documented a personal experience.

From noise complaints to virtual realities

Addressing the notion of a future museum or how the museum could somehow improve, the answers addressed the aspects such as noise or having to navigate through crowds (Appendix E & Appendix H). Answers also addressed the subject mentioned in the sections above, like allowing self-interpretation, making exhibition more interactive and providing better information. Other answers were also more politically orientated and addressed the social problems in making visitor pay an entry fee for entering the museum, as visitors currently do (Appendix F). One Respondent felt that paying to go to a museum, divided the society, and the museum wrongfully made a profit for what initially already belong to the public (Appendix F). Finally, one respondent felt that museum in the future should be able to unite and combine the traditional culture institutional practices with modern technology in way that would create virtual worlds filled with exciting experiences (Appendix I).

Museum experience and visitor needs

From our sample interviews we found several interesting insights about the visitors values, needs and thoughts. The respondents had different thoughts about what a museum visit and experience meant to them. Our findings point to three main types of experiences: A learning, zen and a social experience, one not excluding the other.

To some the visit was a learning experience, and visitors came to expand their knowledge of the culture and art. They wanted to get educated and gain an understanding of the world. Respondents wanted more than just an aesthetic

Learning Experience

Zen Experience

Social Experience

and sought to understand the context and perspectives of the art and to gain an understanding about the specific features of the art piece. To other respondents the museum visit was an opportunity to escape and get in a different state of mind, experiencing a form of zen, to others the museum experience was also regarded as a social visits as the majority of our participants came with a companion, where they expressed the need to share it with others.

Addressing the more personal museum experience, it seemed that visitors had different needs. Some found that the exhibitions lacked interactivity and felt that the art was unengaging and the experience static. Others saw a need for being able to interpret the art themselves by creating their own personal meaning and relationship with the art. In addition we found that, some respondents wanted to understand the art. To other visitors noise in the museum was a problem, that distracted their experience and prevented them from fully captivating and sensing the art. Lastly, We found that many visitors took photos of the art, using them as personal memorabilias that they could revisit later.

Findings from observations and interviews

The observation of visitors and interviews with SMK employees and visitors provided a deeper insights into the museum practice, problematic areas of the museum experience and the museum visitor's expectations and needs. We had both been informed about the mentioned areas from an organisational perspective, from 'floor'-employees and from visitors, showing different, but also similar findings and insights. To gain an overview and to visualize these findings we created a *service blueprint* showing the museum experience in relation to a museum visit. The service blueprint can be a good tool to use in relation to this, in that it visualizes the value creation between the service provider and the customers and reveals touchpoints of customer behaviour and business processes and offers (Kalbach & Kahn, 2011).

"Connecting together all of the different touchpoints in a service experience, as well as aligning the needs and wishes of all of an organisation's stakeholders, can become very complex very quickly, which is where service blueprinting comes in" (Polaine et al., 2013 p. 91)

We used the blueprint to get an overview of the points of interaction between visitor and the museum to establish a possible visitor experience. Furthermore, it gave us a good overview of possible problematic areas and interactions - hereby pointing to possible areas for improvement.
The blueprint on the following page shows the visitor actions and journey, the backstage actions of the museum and the visitor's experience. The blueprint is divided into three stages of the visit, showing the touchpoints and visitor experience related to the museum visit: Before the visit, which entails the activities before the visitor enters the museum, during the visit, which details activities during the visit in the museum and after the visit, which is connected with the activities after the visit. The blueprint incorporates the main findings from both observations and interviews with staff and visitors showing the experience in good (green text) and bad (yellow text) categories. See next page.

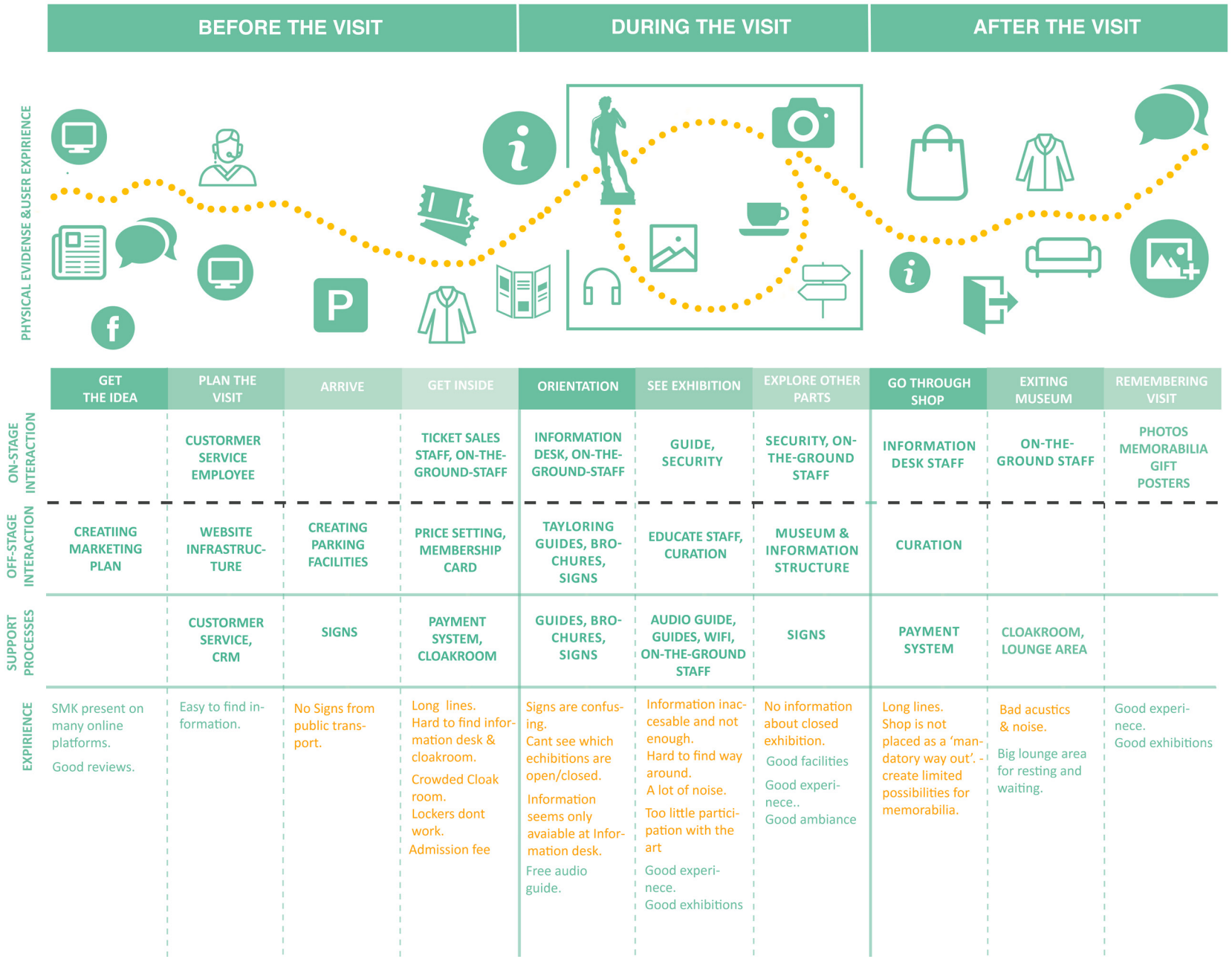


Fig. 4. SMK Service Blueprint & Visitor Experience (see Appendix K)

Before the visit: There is no signs that shows in which direction the museum is located when using public transportation. Also, when getting inside the building, the visitor enters a big hall, here there is very little information to be found which creates some confusion as to where the cloak room is or where to buy tickets. When buying their tickets, visitors have to go through the shop and SMK's service information desk, which often has long lines and the visitor gets frustrated.

During the visit: Currently half of the museum / exhibition is closed and under construction and nowhere does SMK provide their visitors with this information, which creates a great amount of frustration, especially if the visitor came to see that particular exhibition. The guests have a hard time understanding the museum "flow" and where the exhibition begins. They get insecure and often ask staff for help to find the "right" way. Another point is that the information about the artwork seemed insufficient, and visitor consult staff when they want to know more about an art piece. Although the museum offers an audio guide, often the visitors find it insufficient as this only provides information about selected artworks. Here, the visitors have to ask the staff in the reception in order to get the knowledge/information they seek. There is too little interactivity in the exhibition connecting the art and the visitor. Furthermore noise and acoustics in the museum is a problem.

After the visit: The shop is not placed by the exit as such, like in many other museums such as Arken or Louisiana, and therefore it can be easily forgotten. This creates limited possibilities for the museum to provide memorabilia. There is a limited amount of staff, which means longer waiting time can occur if wanting to purchase anything from the store. The reason behind this is, that the staff in the shop are the same staff that provide visitors with information about the artworks. This means that servicing each guest/visitor can take time, thus creating a line and impatient visitors. When collecting your belongs once again the cloak room is often crowded with very little space, which is quite stressful. Moreover, if visitors choose to sit and relax for a while in the lounge in the main hall, which is quite spacious, they experience very bad acoustics and this creates a great amount of noise, which disrupts their 'resting'.
Through the blueprint and interviews we have found, described and visualized several different problematic areas, however, we cannot deal with all of them as such. Our next step is therefore to narrow the problem down and scope our research to one point of failure.

5.2 Problem setting

In our contextual research we chose to adopt a problem-setting approach (Schön, 1993). As the blueprint and the interviews findings show, it's especially activities during the museum visit that causes trouble for the visitors. During the visit, visitors have several different needs and expectations to the museum experience that seem unfulfilled. We found that there were many aspects that could be the starting point of a new service, and many opportunities we could explore. For example wayfinding, or the issues of delivering information about the museum in general, such as opening hours, ticket prices etc. However, during the interviews with visitors and staff we found that, there has been a particular emphasis on the information downfalls and opportunities between the visitor and the artwork. We found that both visitors and staff seemed to find the information displayed insufficient. Therefore, we sat out to explore the connection between the visitor, information and the artworks.

Having found our area of focus and on the basis of our service blueprint and our findings, we formulated a design problem, that we wanted to explore.

> The design problem: *The museum does not provide its visitors with sufficient information about the artwork during the visit.*

Pains and gains

As earlier mentioned, cultural learnings increase the visitors' historical and cultural awareness. But they should also motivate the visitors to think, discover, support and make meaningful connections with the heritage artefacts by themselves (Zhang, 2015). Our research showed how SMK's current information about the art did not fully meet the visitor's needs. One could say, that the service of delivering and providing museum visitors with information was considered to be limited. Here, practical access to information about the artworks, did not match their desire to gain knowledge beyond the obvious. Regardless of SMK providing various ways, (through staff members or on their website) access to information about the artworks, the overall visitor experience showed that, they often found themselves wanting more information. A service should therefore enhance the museum experience and let the visitor access more information about the artifacts, with little effort required.

A new concept will be developed with the purpose of reframing the idea of gaining knowledge within a museum context, where it proactively helps the visitor instead of it being a complicated process. We are aiming to design a digital service, where the visitor can personally choose or discard when to access information about the artworks. For a new design we started categorizing the pains and gains in relation to the design problem. We did this by using (Osterwalder et al., (2014) *Value proposition canvas*. We then prioritized pains and gains also to illustrate what was crucial to address in our new service concept. These insights are highlighted on the figure below, where those in dark green are not addressed by SMK, while those in light green should be optimized.

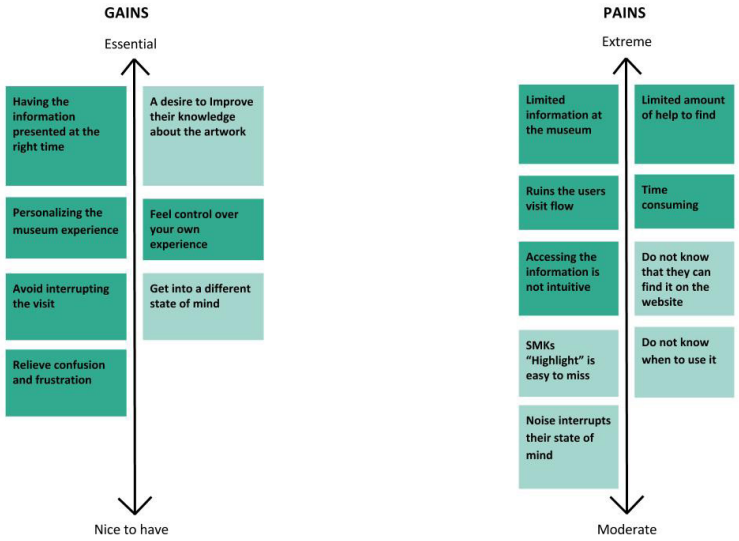


Fig. 5 SMK, pains & gains. See appendix R

We used these findings as a basis when developing our ideation process with the goal of creating a new value proposition, that was directly targeting our insights regarding the crucial pains and gains (Osterwalder et al, 2014).

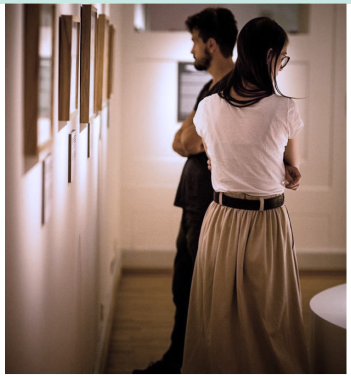
Before moving forward with the ideation and concept development, we found it important to know who we were designing for and to understand the values and goals of this user. We employed personas as a tool to guide the further design process. By employing personas, we could both identify the visitor's' current experience in museum and their needs. This would also give us further insights on how the visitor makes use of the museum and to understand the user. In the following we will present our use of personas and the personas created.

5.3 Personas: The museum visitor

In order to conceptualize our findings and understand the user, we are designing for, we developed and used personas. According to Nielsen (2014), personas give designers a mental model of a particular kind of user and therefore allowing them to predict users behaviours. Moreover, this method evokes empathy with users and thus prevents designers from projecting their own desires, ideas or needs onto the particular situation or project (Floyd et al., 2008). However, in order to induce empathy, the persona description has to be as close to a 'real' person as possible, so one can fully understand the person's needs and desires and therefore predict their actions (Nielsen, 2014).

Employing personas became a way for us to perceive our empirical evidence with empathy which allowed us to better understand the user when designing a new service. Empathy is a powerful tool in a design process as It enhances designers ability to process and perceive information (Battarbee et. al, 2014). "Empathy supports the design process as design considerations move from rational and practical issues to personal experiences and private contexts". (Kouprie et al, 2009, p. 438). Empathy in a design process can be strengthened through the use of personas.

We created three personas based on our findings. We do however realize that many more usertype and personas are present at the museum. However, based on our findings we narrowed it down to three different personas: The social visitor, the playful and the art curious visitor.

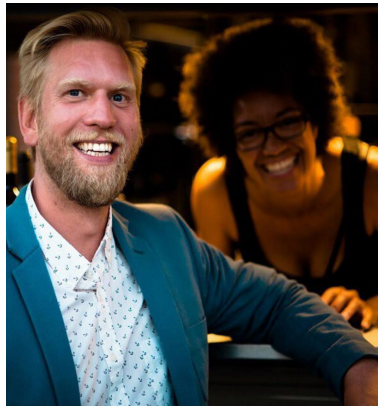


THE SOCIAL

Emilie and Jesper are a young couple in the late 20's. Both of them are students and currently living separately in Copenhagen. They go to museum when there is an exhibition or show that particular spike their interest or because they are looking for an activity to do on a Sunday. They also often seek experiences and events in the city (for example: food festivals/events, music events, film festival and such), however they are not necessarily first movers. Going to museums and other cultural events is something they often do together and like doing together. They make a day of it, and do not solely come to see the art, but to eat or have a cup of coffee in the museum cafe.

Generally they are very interested in new ways to interpret what is in front of them. They like to see art from different perspectives rather than experiencing it in one way. They like to walk around in the museum space and talk, not just about the art, but about also about other things. The museum provides them with a space where they can be together and escape daily routines.

To the couple, the museum is and should be a new cultural experience. The museum is also a social experience or an experience you are able to share with a companion. The museum is a 'get away' where you can escape daily routines and thoughts.



THE PLAYFUL

Jens, is a 36 year. He is self employed and he lives in a small two-bedroom-apartment in Copenhagen, with his girlfriend and their 4 year old daughter. He does not always go to the museum for a specific exhibition, but goes to experience the ambiance and the different art pieces. He goes to the museum several times a year and often goes to concerts or other happenings in the city.

He likes the more modern exhibitions, where the artist used many different medias and where one can get close to the art piece for example through sound or touch. He likes to dig deeper into the specific art pieces, and likes to feel engaged and included in the museum and exhibition. He finds that the tradition museum experience less inspiring and 'static' and feels that you learn and experience more if you engage on a different level. The museum provides him a small haven, where he can have fun, see new perspectives and get out of his mind. He likes to make his own opinion about the art, and do not use the audio guides. Furthermore, he often brings a friend or two when he goes to the museum.

For Jens, the museum is a place that gives new perspectives and a place for participation and engagement. It is a place where you can learn and see new thing with different mediums to convey art and meaning. The museum is a combination of a learning, culture and creative experience.

THE ART CURIOUS

Martha, is a 52 year old teacher, living with her husband, two teenage sons and a their dog in a small house in the suburbs of Copenhagen. Besides spending time at work and on her family, Martha enjoys staying 'active' and likes to do things on her own, without the help of others. She likes cultural experience and she goes to museums or other cultural institutions monthly and often visiting with her family or a friend. She usually visits museums for a specific exhibitions but enjoys exploring other art exhibitions present at the museum, however in her own paste.

Martha wants to be able to get a s deeper insight in art, the art context and the art pieces she is seeing. Her need is to know more about the specific art pieces and finds inspiration and identification in the life of the artist, in the art and in the art style. She shares her impression with whomever she is visiting with and likes to talk about what she has experienced or learned, and she often takes photos of art pieces she finds particularly interesting. She appreciates being among other people at the museum, but needs a calm environment to interpret the art and take in the impressions. She often google's information of her phone, especially if she can't find it at the museum. For her, reading the long plaques of information in the exhibition can easily be disturbed either by other visitors or noise. Martha is interested in the curated information, however in a relatable or less academic form.

To Martha the museum is a special experience. It is a place of history, culture and education, where she learns about art periods, techniques and cultural heritage that taps in and adds to her prior knowledge. The museum is also a place to go with a companion, as the experience is better shared with others as you can talk about what you see.

5.4 Target visitor: Art curious for a learning experience

Moving forward in the design process we needed to defined the specific visitor we were designing for. We chose to work with the last persona as a target visitor, The art curious, in that we wanted to focus on a usertype that viewed a visit to the museum as a learning experience. We found that The art curious' interest in getting a deeper insight into the art and art history, and the user type's exploratory behavior created good foundation for our design focus. Also the user's interest in expanding existing knowledge was a value we wished to explore further.

The specific target user was also chosen in that the user was a frequent visitor of museums, this means that we are not trying to attract a new user group, but that we are seeking to improve the experience for the users already coming to the museum. The particular target user was also chosen as we found that they would have a higher motivation towards seeking and using systems that would fuel their knowledge. However, viewing the design solution in relation to the other users could also be relevant, as the a new service and design should embrace more than one user group. However, this will not be addressed in this project.

Now that we had narrowed down our target user, we could then begin exploring design solutions catering to the needs of this visitor.

6. CONCEPT DEVELOPMENT

In this chapter we will present the process of our concept development. The goal of the concept process was to develop new design ideas, based on the findings and insights done in previous research. We sought to develop a concept and design solution that would comply with the chosen visitor's needs and experience. In the following we will describe our development process from ideation to choice of specific service-concept.

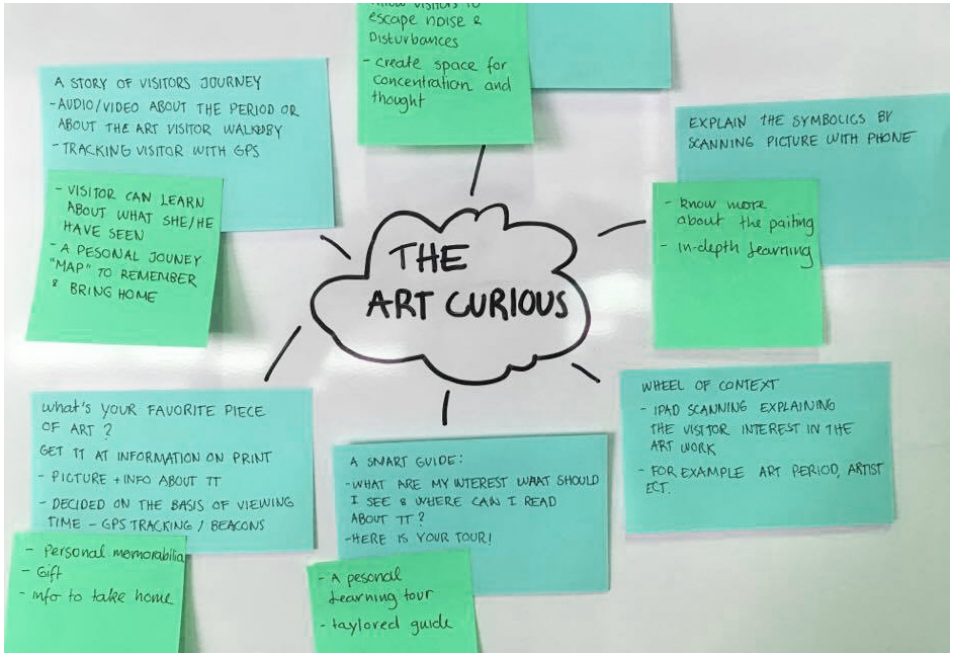
6.1 Ideation

Now that we had identified our target group and the frame of our design problem, we moved from researching the field onto a more design-based research process, and as Buchanan (2000) expresses: *"Design is the human power of conceiving, planning, and making products that serve human beings in the accomplishment of their individual and collective purposes."* (Buchanan, 2000, p. 9)

Our ideation process was about conceiving our findings in the goal of satisfying the target visitors needs. We sought to compare different ideas against each other in that it would increase *(...) likelihood that the outcome will be bolder, more creatively disruptive, and more compelling"* (Brown 2009, p. 67).

We started our ideation process by brainstorming and creating a mindmap over ideas. Our brainstorm was inspired by Tom Kelly's (2001) principles for The perfect brainstorm, which meant that we aimed to develop ideas, writing them down, before 'shooting them down for practical or other reasons. Afterwards, we continued by picking out the ideas with most potential.

We selected two ideas, and quickly did sketchings of them to explore and question their potential even further. This process, is also called elaboration, and was used to outline the ideas as an attempt to visualize the intentions behind them and served as a way to open up for dialogue (Buxton, 2007). As our design problem focuses on the access to the information about the artwork, the ideas selected aimed to solve this current challenge. Once visualized, it was both easier to understand the design solution and how it intended to solve the particular problem making it easier to find improvements and thus make them better or discard them.



Mindmap of brainstorm

In the following we will present the three ideas we chose to explore, and point out the values created with each idea. As part of our iterative process the ideas will be compared in relation to state of the art, where the purpose is to make sure that each idea is evaluated.

Idea 1: The Wheel of Context

The idea is that next to an art piece, you can find a screen, an iPad, that gives you in depth information about the art piece in question. Here, the visitor can choose what to get more information about by going into a topic of interest, as the information would be categorized into different themes such as: about the artist, the art style, what do you see, the colors and the technique.

Sketch of Wheel of context

Value: The idea is to select SMK's most popular artworks and provide the user with information about these selected artworks. With this screen put up next to the artwork, the visitor chooses what kind of information they would like to know more about, rather than being overwhelmed with too much information. This device makes any kind of knowledge accessible and easy to find as it's categorized into different themes or subject. We chose this idea as it provides meaningful information and the visitor can choose the information based on what interests them.

Evaluation: We mentioned in our contextual research that SMK provides an audio information guide about selected artworks called Highlights. The selected artworks are the most popular and well known artworks. When evaluating this idea, we found 'The Wheel of Context' to be very similar to SMK's Highlight service, as it only provides information about selected artworks. Although 'The Wheel of Context' gives the visitor easy access to information and the visitor chooses what kind of information to receive based on their personal interests, having an iPad next to every artworks is simply not possible, so it would only be selected piece and therefore not solving the design problem.

Idea 2: Behind the scene

This idea is based on an app that allows you to scan the art piece, and zoom into a specific area or motif to gain more knowledge about the symbolism behind it. The goal with this particular app is to focus on the motifs and the interpretation that follows. The visitor decides which area of focus they would like to know more about, the meaning behind the motif and why they are important to understand when looking at the artwork as a whole.

Value: Most visitors today are owners of a smartphone. The goal here is to make an app, where the visitor can scan the artwork and then zoom in to choose what they would like to get an in depth understanding about the different symbols, elements or motives in the art piece. This app gives them knowledge beyond the obvious, but also allows the visitor to explore the art based on what motifs they find interesting.

Sketch of Behind the scenes

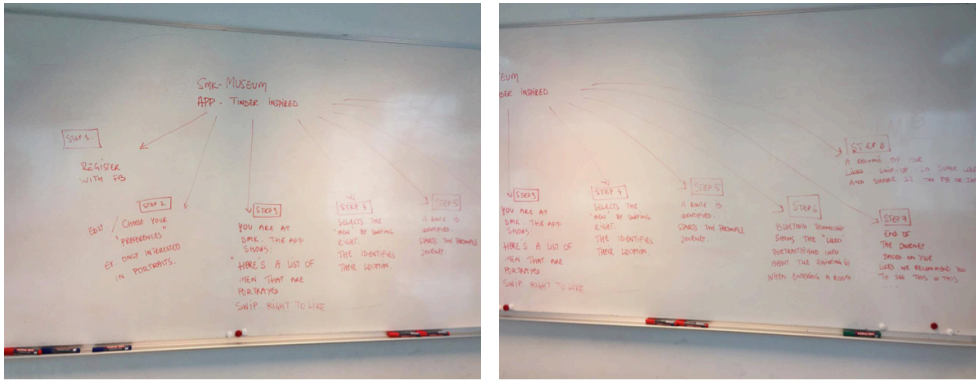
Evaluation: When evaluating this idea, we came upon another app that is very similar to 'Behind The Scene' made for Cleveland Museum of Art, called ArtLens. ArtLens helps visitors to explore the artworks on display in the galleries and incorporates the device's camera that enables the visitors to scan objects on the artwork, where the app then provides the visitors with content about the work. Although ArtLens only provides this feature for selected artworks, the app had to many similarities with our idea.

The two selected ideas seemed to both have potentials and downfalls. While they seemed to fulfil some of the target visitor's needs, there were already similar solutions. Therefore, we went back and did another brainstorming session. The session ended out in the idea of art dates.

Idea 3: Art Dates

The idea is that the visitor goes on a date with the art. When the visitor enters the museum, by using this app they get an overview of the different artworks. Here, they swipe right if they wish to see the specific artwork and once they swipe through all of them, the app creates a guided tour based on the visitor's swipes. Once the visitor starts the tour and is standing in front of the artwork, he or she receives content about the artwork in question. By the end of their personal guided tour, the visitor receives a resumé of all the artwork they have been through and he or she can share it with their network or take it with them home as a souvenir.

Value: The first value with this idea is that the visitor is present with different art pieces and then chooses the art they would like to see, and the app creates a tour that fits accordingly. This way the visitor does not have to look for the artwork or find it on their own. Moreover, once in front of the artifact, the visitor receives content or information about the artwork, as the app uses location-based technology. By receiving a recap of own tour, the app also takes into account the experience after the visit.



Sketch of Art Dates structure

Evaluation: When looking for apps that provide curated tours, we were overwhelmed with how many possibilities there are. One example is The Smithsonian Museum in Washington DC, where the visitors can plan ahead and receives information about the location and floor plan. Moreover, this app also provides the visitor with content about the different artifacts, such as behind the scenes work of the Smithsonian Museum's archives. On the other hand, when looking for similar apps we did not find examples of apps, where the visitor goes on a date with the art as a way to receive any given information, therefore, we saw a potential that could be explored. Given the evaluations of our design ideas, we chose to move forward with Art Dates, and explore it in depth.

6.2 From idea to a service concept

In order to reach a service concept, our further development of a concept was build around an iterative process. The task here was to move from idea to a viable service.

In the exploration of Art Dates, we found several elements that could potentially become a challenge for the visitor and for the design process.
We found that making visitor swipe through all of SMK's art before getting a suggested guide, would be an endless task. We contemplated that it could be a possibility to limit the number of artworks which the visitor could swipe through, however this would automatically exclude the visitor in seeing new artworks or artworks of her/his liking. Furthermore, we found it too big of a task to both test the concept of creating a tour and also to test the process of retrieving information once in front of the artwork.

Lastly, most prominent for the design problem was the process of the visitor retrieving information about the art. The goal of the concept was to create a service that makes knowledge about the artwork accessible and ready to consume for the visitor without having to visit the Information desk or consult the staff. Therefore, we chose to limit ourselves to focus on the access and retrieval of information once the visitor is in front of the art piece.

Before continuing we formulated several objectives of which the concept should follow. The objectives of the concept were:

- Support a learning experience
- Supporting a personal interest in art
- Invite the visitor to an in-depth engagement with art pieces
- Create a new way of retrieving information
- Create an information self-service
- Support the possibility for memorabilia
- Supporting participation through digital media within the traditional way of exploring art

Based on the formulated objectives we defined the service concept: ArtSwipe.

ArtSwipe

ArtSwipe draws inspiration from the digital concept, Tinder that allows users to swipe through different potential people in the search of a partner.
ArtSwipe is an app that allows visitors to swipe through the art pieces, either 'discarding' art or 'liking' it in the search of information. When visitors enters a room the app shows the artworks one at the time, as they are placed around the room.

The app is supported by beacons, where one beacon is placed at each room. Visitors swipe through all art pieces in that given room, either swiping right if they want to know more about the given piece or left if they don't. When visitors swipe right the artworks are stored in a collection where visitors can then access information about each art piece. Moreover, by storing all artworks in a collection, the visitor can later on download or share their collection with their network. This way visitor can not only get information 'on the spot', but also revisit information and artworks after exiting the museum.

The idea of having a collection that visitors could revisit, we found to be important to incorporate as nearly all visitors expressed during interviews, that they often take photos of artwork to look at them after exiting the museum. We also found that the museum does not particularly support an 'after-visit experience' as people don't have to go through the museum shop to buy memorabilias when exiting the museum, and visitor are not digitally in contact with SMK after their visit. Similar initiatives have been developed and tested at other museums. For example The Pen developed by Cooper Hewitt allowed visitors to digitally collect artworks when going through the Smithsonian Museum and the initiative has been quite successful in fostering an ongoing link between the museum and the visitors. The pen has in one year been distributed 154.812 times and 28 percent of visitors revisits their collected art pieces on the museum's website after the visit (Cooper Hewitt Labs, 2016).

ArtSwipe incorporates the same functions in that you can collect art pieces however focuses on content and context of the artwork as you can access information about the artifact. ArtSwipe is based on SMK's future plan about creating an art database, where paintings and art pieces are available for visitors to view, read about and download free.

Location based technology

The idea behind ArtSwipe is to make use of location based technology. With the rapid growth of smartphones, technologies such as outdoors localization, like GPS hardware and similar navigation systems have also witness a high progress and commoditization (Chawathe, 2008). While this development has made outdoors localization inexpensive and accessible, the progress with indoor localization has lacked back, as indoors environments tend to be more complex and GPS satellite signals are simply inaccurate (Chawathe, 2008).

However, a technology capable of augmenting indoor spaces at a low cost is the Bluetooth Low Energy (BLE) beacons (Martin et al; 2014). BLE is a wireless personal network technology that relies on a one-way communication, where it transmits data over short distances. The beacons can broadcast the data-packets or information that they have stored in set intervals or in a specific structure, as these packets are meant to be collected by devices such smartphones. In other words this technology, allows mobile apps to catch signals from the beacons in the physical world and then to understand their position on a micro-local scale, as seen in the picture below.

According to Gast (2014), beacons can determine the location within centimeters and by connecting the necessary information to the technology, this enables developers to create new types of experiences. Here, he continues by explaining that iBeacons is based on the proximity technology of "what is near you" rather than "where you are" and as a result an application can tell you whether you are near an item of interest. The proximity estimation uses the received signal, a number called the received signal strength indication (RSSI), which is the power level of the signal when it reaches the receiver (Gast, 2014). When using proximity technology, for example an electronic museum app knows what is near you by knowing the proximity information. The way beacons work it simple:

- Proximity range between 2-100 meters
- Mobile application gets notified when close to the beacon
- Opt-in technology

In their paper, Dhingra & Popli (2017) develop an application using beacon technology for the college Library. Here, they test five functions: 1. greeting students when arriving in the library; 2. send them updates at a specific location; 3. connect to research programs; 4. offer contactless knowledge and finally 5. offer library upsell.

The test shows that the technology sends notifications with information when walking through a specific area. Moreover, the test also showed that the beacon recognized where the user is, and if the user selects a particular book to either find or purchase, it informs the user with the location of the book and the fastest way to get there. Lastly, they were successfully able to add 'Popup alerts', where as soon as the user entered in a beacon range, they were notified with information regarding the latest editions and offers.

By incorporating this technology in ArtSwipe, the app will be able to understand in which room the visitor is, which provides SMK to send meaningful messages through the app to their visitors that could attract their attention. Moreover, by knowing the exact room the visitor is walking through, the app can identify which artworks that are exhibited in that room, and thus providing the visitor with a hyper-local and contextualized experience.

6.3 Value Proposition of ArtSwipe

ArtSwipe is an app that uses location-based technology to enable the visitor's access to curated information about the artwork and support the visitor's expectation towards a more personal museum experience.

In our development we view the concept ideas in relation to visitor pains and gains. It was important for us that SMK and their current values were implemented when developing the concept, which is why we do not wish to change the old way of experiencing museum, but rather to add value to the target group's museum experience. As shown in the figure on the next page, ArtSwipe has pain relievers and offers several new gain creators for the chosen target group (Figure 6). With our service concept, ArtSwipe, we moved from a simple idea towards a service concept, based on a set of objectives to meet the visitors needs. Furthermore, we addressed some of the crucial pains identified in our contextual research in order to turn them into gains. Moreover, with ArtSwipe we have also created new gains for the visitor that are not present in SMK's current service.

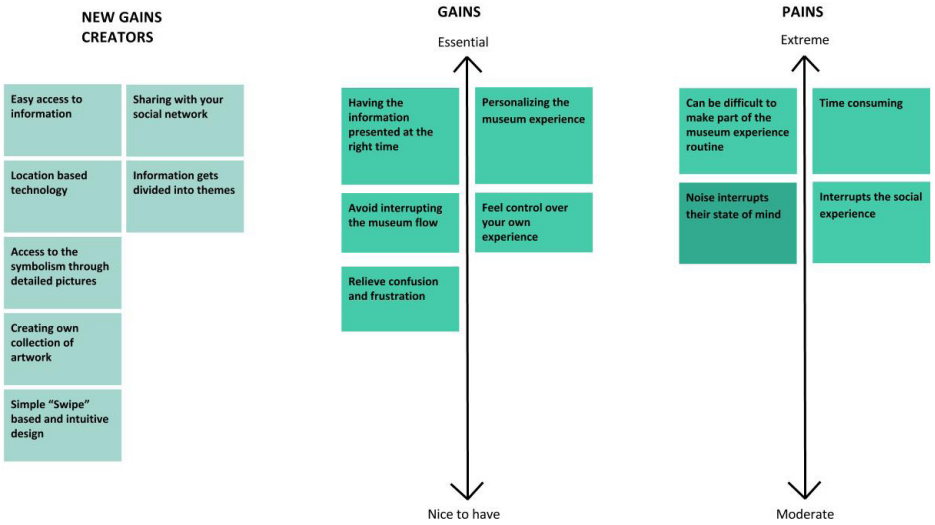


Fig. 6. ArtSwipe pains & gains. See appendix S.

In the following phase we will move forward by creating a prototype with the purpose of visualizing specific parts of our service concept.

7. PROTOTYPING

As the concept is set, we move forward by creating a prototype. We define prototype as *"any representation of a design idea, regardless of medium"* (Houde & Hill, 1997, p 8). Our definition is based on the fact that prototype is not the same as the final design. The purpose of our prototype is to test and visualise specific parts of our service concept.

Bucheneau & Suri (2000) have identified three different kinds of activities within the design and development process, where prototyping is valuable: *"Understanding existing user experiences and context"*, *"Exploring and evaluating design ideas" and "Communication ideas to an audience"* (Bucheneau & Suri, 2000). In our prototyping we wanted to know more about how visitors seek information and what is important in the way they receive information. We also wanted to explore how the visitors experienced using the prototype and felt about the design idea. With the prototype we were looking for more than a 'yes or a no answer', however, narrowing it down to how the design idea could affect the museum experience. To defined a more specific purpose of the test we were inspired by Houde & Hill's (1997) framework for prototyping.

According to Houde and Hill *"Selecting the focus of a prototype is the art of identifying the most important open design questions"* (Houde & Hill, 1997, p.1). When prototyping, one must define a purpose of the prototype in order to develop it. Furthermore, setting a focus of the prototype can help ease the challenge of building a prototype that will provide feedback from users on the most important design questions. Houde and Hill's (1997) framework consist of a three dimensional model showing the important aspects of designing an interactive artifact.

The three dimensions are: Role, which refers to how the artifact will function in a user's life, Look and Feel which refers to the sensory experience when using the artifact and Implementation, which refers the technicalities and functionalities behind the performance of the artifact. *"Each dimension corresponds to a class of questions which are salient to the design of any interactive system"* (Houde & Hill, 1997, p. 3). The model also shows the Integration which is situated in the middle of the triangular representation. When a designer has examined the different dimensions of a given artifact through prototyping, the design solutions can be integrated into the design, which can enable an even more complete and specific round of user tests (Houde & Hill, 1997).

For our prototyping proces, focus was between the Look and Feel and the Role of the prototype.

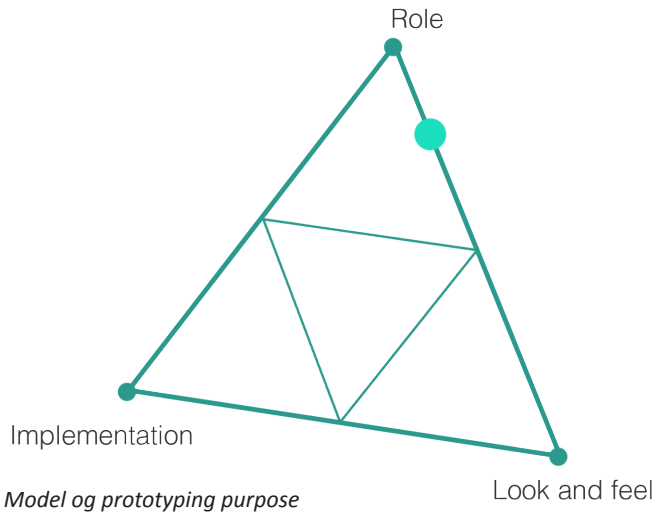


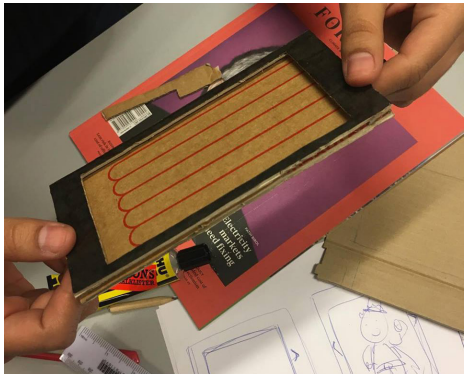
Fig. 7. Model og prototyping purpose

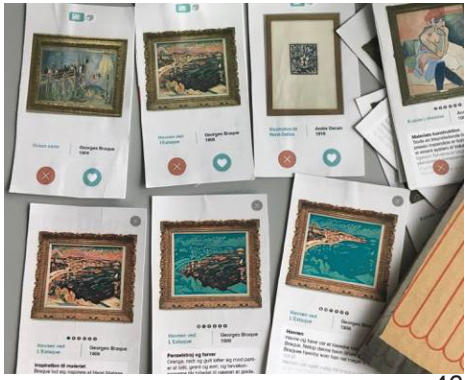
The Role: The design solution was meant to give the museum visitors access to information about artworks, and we particularly wanted to know whether and how this was of use to visitors and if they could benefit from the design idea and how. We also wanted to know if the design seem to align with their expectations and needs.

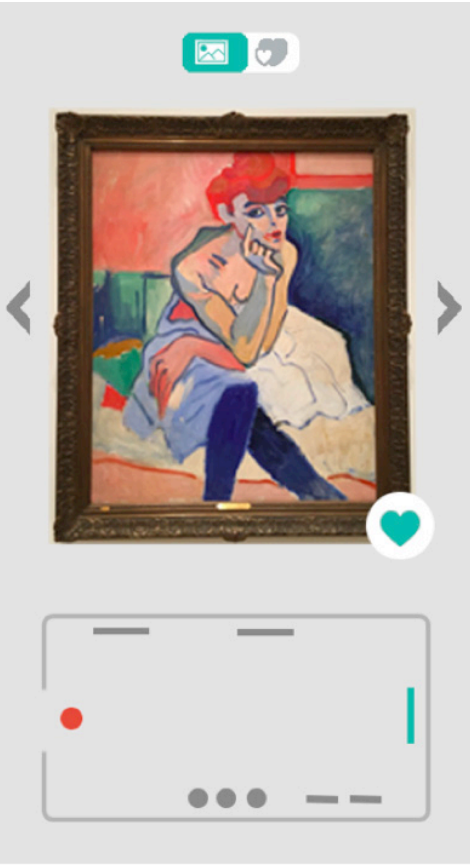
The Look and Feel: As the design solution is a new way of receiving and retrieving information about the artworks, we wanted to know about the experience of a smartphone-enable information service - how it would feel using a service in this way.

The prototyping process provided inspiration, confirmation and rejection of ideas (Bucheneau & Suri, 2000), as we explored options and challenges of the given design (Houde & Hill, 1997, p.368).

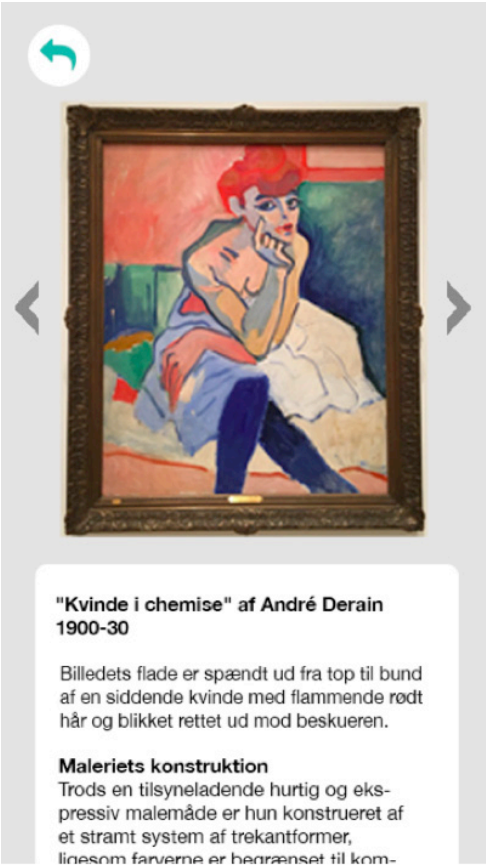
Before creating our prototype, we found it necessary to conduct a short observation, in order to choose the area and art pieces that would be suitable for our prototype. As the observation took place on a Friday and during a highly visited time, we quickly decided to choose a space that was quiet and that featured maximum ten pieces of art to simplify the prototype design and limit distractions for the test user. We also chose art pieces, where we had access to information and knowledge about the featured pieces. Therefore, we chose to focus on the first room in SMK's permanent exhibition, French Art 1900-1930.
The developed prototype was of low fidelity. The prototype consisted of a phone formed in cardboard and different paper 'screens', that could be switched in and out of the phone. The Prototype wasn't a functioning system, but a mock-up of how the system would look.



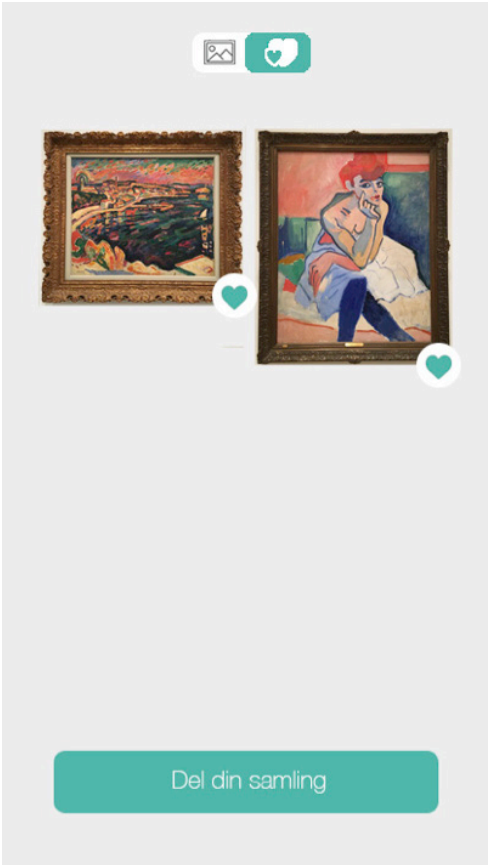




Prototype 1.0: Screenshots of start interface.



Prototype 1.1. screenshot of specific artwork information



Prototype 1.2. screenshot of 'Your collecion'

Describtion

The pictures show the interfaces of the app. The first image shows the interface for swiping right or left to the art-work, Kvinde i chemise. The interface shows the painting and below a map showing where the painting is situated. The second image shows the interface for accessing information about the specific painting. The third image shows 'Your collection' of all the art pieces a user had liked.

Sketchboards

Before creating a prototype, we used the sketch boards to identify the main stages or scenarios the visitor goes through when visiting the museum while using ArtSwipe. The boards illustrate the visitor's interaction with the prototype when visiting the museum. These sketch boards served as storyboards that we used when designing the prototype (Greenberg et al, 2012).

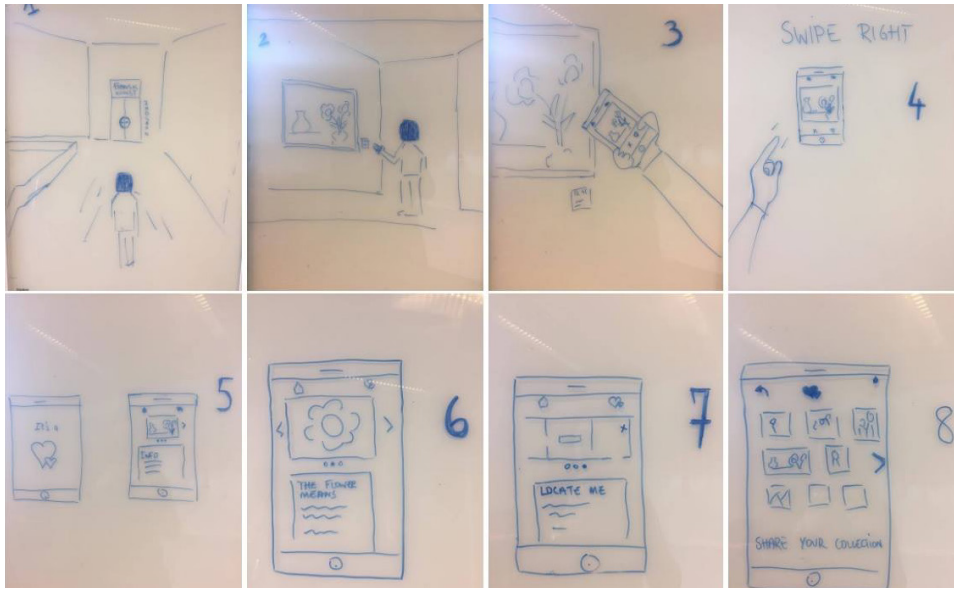


Image shows a Storyboard for ArtSwipe

The storyboard show the visitor entering an exhibition room. The user uses his/her the app ArtSwipe which shows the artwork one at the time and the visitor swipes either left or right. The user can access information (6) about the artworks and access his/hers collection of liked artworks, Your art collection (Din samling) '(8). In the shown scenario the user has to first 'like' or 'discard' all the artwork in the given room to access information about specific works. However the user can go back and forth between the artworks, should he or she change their minds.

7.1 Testing the prototype

In order to find out how our first prototype can create a positive attitude towards this new museums experience, it is central to understand the visitor's experience when using it (Kaasinen et al., 2010). This will provide us with insights on how to optimize the prototype, in order to develop a service that satisfies the museum visitors. This information can be gathered through visitor-product interaction with the service prototype by conducting small user tests (Kaasinen et al. 2010). Thus, for our next step we find it necessary to conduct user tests with visitors at SMK and as Kaasinen et al. (2010) describe *"User evaluation is an essential part of human-centred design and human-technology interaction research. The aim is to study how users will accept new products and services and influence design decisions accordingly" (*Kaasinen et al.2010, p. 11).

To get a better understanding of the design solution and to know how the visitor makes sense of the concept, we tested the prototype with five 'test-users' at the SMK. Test users were recruited from our network. The test users were chosen because of their convenient accessibility, proximity to us and time constraints of the project process. Out of the recruited test-users we chose participants that had an interest in art or visited museums for the same reason. We chose participant that were from Denmark and that knew or had been to SMK previously. We conducted three rounds of user tests. First round consisted of two test with two different participants. In the first round our goal was to test the usability of the prototype and the accessibility of the information. On the basis of insight from these test the prototype was adjusted and a new round of user test was carried out - this time with one participant. Here, our goal was once again to test the usability, the accessibility of information but also what kind of information that should be provided and whether this matched the user's needs or expectations.

All tests were audio-recorded to ensure the accuracy of our findings. During the test one of us conducted the test, while the other observed and took notes for further questions after the test was done.

The test

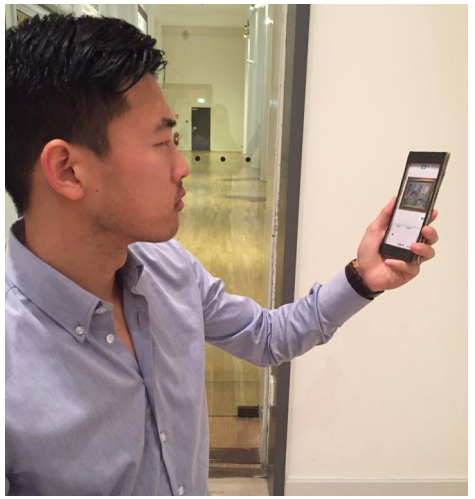
The test was introduced with a short description of the concept idea and the prototype. Hereafter the user was informed that they had to complete three task while using the prototype. Users had to:

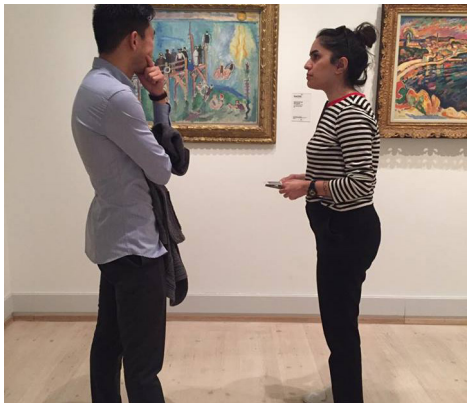
- Like or save two art pieces
- Find information about the two chosen art pieces
- Find your collection and share it with your friends

To make the process easier and less time consuming, we selected two art pieces in advance that the participants had to select for the first task. The two art pieces were called: “Kvinde i chemise” by André Derain (1900-30) and “Havnen ved L’Estaque” by Georges Braque (1906).
During the tests the users were asked to think out loud, in order to guide us through their thoughts, reasoning and actions when using the prototype and completing the tasks. We found this method helpful, as it gave us information about the user’s state of mind and their thought on the design and how to complete the tasks. However, as the method thinking-out-loud did not come naturally to our users, we found it necessary to ask them questions while testing the prototype. This helped them elaborate some of the difficulties and challenges they faced while using the ‘app’, but also created a dialogue which made the process more ‘natural’. After the task and test of the prototype was completed the participants were asked to elaborate on the use of the prototype and their feelings towards the concept.

NAME	GENDER	AGE
Test person A	Female	24
Test person B	Male	34
Test person C	Female	29

Table 3. Table of test persons round one and two..





In order to get an overview of the insights gathered from the tests, we created an affinity diagram and organized the findings into themes (Kawakita, 1982). This helped us understand and gain an overview of the the insights and the challenges that the users went through during test 1 and test 2.

Affinity diagram

User test - first round

Decoding the interface

As mentioned earlier, in the first prototype the user had to swipe or like through all artworks within that particular room, to finally get to the information site of the 'liked' art pieces.

However, they could also choose to directly go to their 'liked' art collection and get the information about the artworks, instead of swiping through the entire room of art. In the test, we discovered that this what hard for the users to understand. When entering the exhibition and going through the first screenshot (see prototype 1.0), both users started of by 'clicking' on the art image to solve the first task.

When they both realized that this did not take them to the information site, they tried to click on the figures under the art image. Both of them seemed quite confused, and it took them a while to understand that they had to either like or swipe to the left to go to the next picture.

Test person A had a hard time decoding the start interface of the app. Especially the lower part of the screen showing a map of which painting she was looking at (see prototype 1.0). Test Person B also had difficulties understanding the map. However other parts of the interface such as using the top button to navigate from the start screen to 'your collection' seemed easy to understand for Test person A.

Instant information

As Test person A were walking around the exhibition and found the first chosen artwork that they had to 'like', she did not understand why she couldn't receive the information instantly and why she had to swipe through all of the artworks in that particular room, before getting to the information she seeked. She felt that she should receive information instantly and did not want to go back once again to know about the painting. Test person B also expressed some frustration towards not being able to access the information instantly and referred to it as going through "unnecessary" steps to get to the relevant part. It was more important to him, to access information then to make his own collection.

More information

For both users it took them a while before they understood that they would find the information of the chosen artworks under their "liked collection". Once they figured out how to get the information site, once again, both participants tried to click on the picture and expressed a desire that the picture should have extra features. Test person B stated how he would like to be able to zoom in and out of

the pictured art work on the app, as it was something he cannot do in real life. In addition, he expressed that it would be a nice feature that the symbolism or extra details about the artwork could be explained using the affordance of the digital device. For example being able to click on the different element of the painting. Test person A expressed that she would like more information about each painting. she found it interesting to know more about the art period, the artist or the artist thoughts behind the painting. Test person B expressed a desire of not only getting an interpretation of the chosen artworks, but also to get recommendations to other artists that either used similar techniques or other artworks from the same artist at SMK or that are not exhibited in SMK.

Your collection

Test person A liked the idea of having her own art collection saved and being able to take it with them home. By having her own art collection, she could always go back and easily find the artwork and access its information at any given time or space without 'actively' looking for it. However, she expressed a desire to be able to choose which artworks she wanted to share with friends - as she did not necessarily want to share all the art pieces she had liked.
Test person B liked the collection feature, but felt like it should be more universal and that you should be able to include paintings from other museums as well.

Smartphone enable

Test person A liked receiving the information on a phone and liked the idea of an information service that was independent of others. Test person B expressed that it could be disturbing using a smartphone as one could be prone to look at phone instead of the artwork in front of them. However, both seem generally positive towards the solution as information about the entire collecting was available in their pockets.

Audio or text

Test person A expressed that audio should be included as an option, so she can look at the artwork while receiving the information. This was important for her as other visitors often blocked the information boards during highly busy visit hours. Furthermore, she found it important as she could better concentrate and block noise out. However, the choice between audio or text seem to depend on the character of the visit - and she would not choose audio if she visits the museum with a companion.

KEY FINDINGS

- Information access should be instant
- Images of the artwork should do more
- Audio guide should be included as an option
- Recommendations to artwork og simular of same artist
- Get into a different state og mind

Reflections

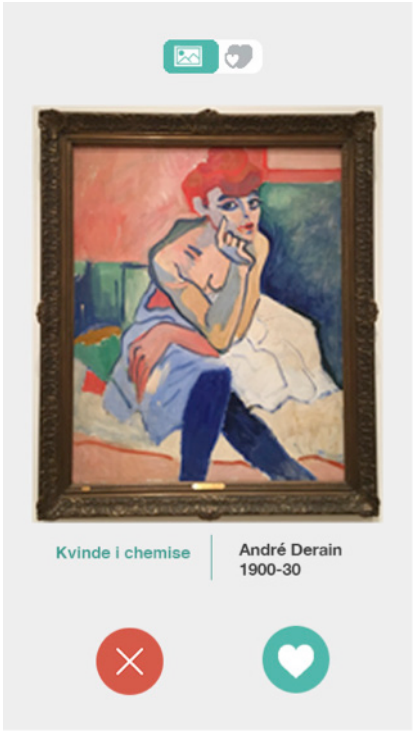
The user test revealed several different key insights as mentioned above. We found that there were aspects of the prototype that the test users liked, and there were aspect that they felt could be improved. However, we also found, that the app in its current state resembled in many ways existing apps on the market like the Rijksmuseum app and app, Useeum. In Rijksmuseum's app the visitor receives their information by entering the digital code on the art piece, where they can hear the information about the artwork and can 'like' it to create their own collection. In the app Useeum they use a combination of location technology and digital codes that sends the visitor to the information about the artwork either as audio or by text. It was therefore quite clear for us, that if there are apps similar to our prototype already on the market, there is no need for yet another one. This means that in order to distinguish our service, from the two apps mentioned above, the app should have features that gives the visitor a different experience.

Noticeable was also that the usability of the prototype and the design choices, did not fully match the needs of the test persons. The prototype contained unnecessary steps, that seemed to confuse rather than simplify the information flow. What our participants stressed the most was that, although making information accessible, it should be instant and easy to access. We found that using one beacon per room could became a challenge, and this required that we changed it into having beacons by every art piece.
A desire both participants stated was that, the artwork images should be more than merely illustrations of the given artwork and that the prototype should provide more detailed information about the artwork using the affordances of the digital media, hence making the experience more dynamic. Moreover, Test person B also expressed a desire to get recommendations to other artworks from the artist or similar artists. Therefore, we decided to make a prototype 2.0 where we modified and changes and some features according to the findings mentioned above.

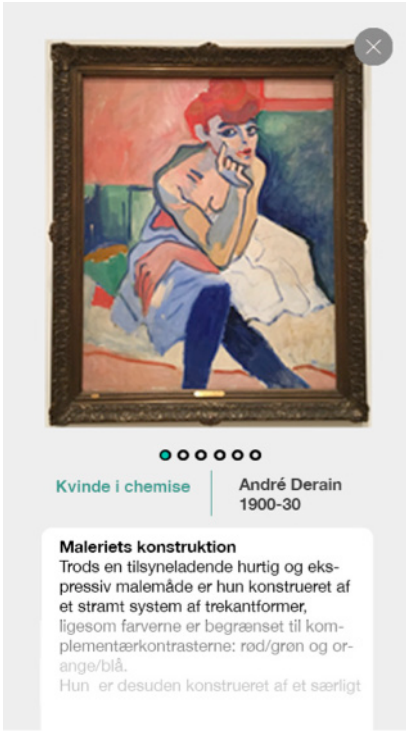
User test - second round

Prior to the second round of user test, we modified the prototype by changing some features in the design; The visitor could now access information after liking an art piece, and did therefore not have to go through every piece of art before being able to read about specific works. Moreover, we found it necessary to have beacons by every art piece, in order for the the information to be presented at the right time.

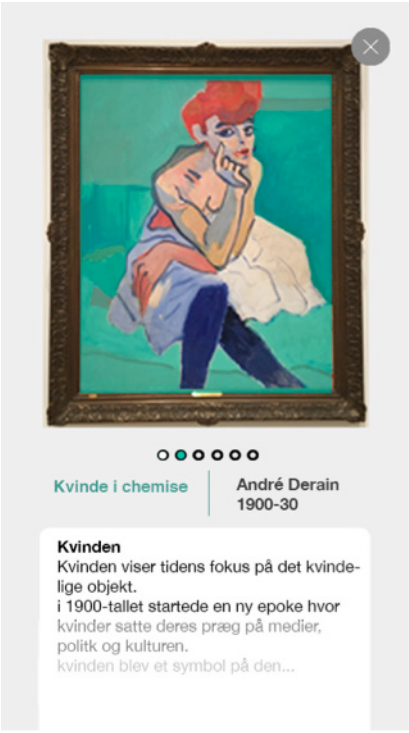
Furthermore, we added an in-depth explanation about each artwork. Visitors could now see further Information such as the story behind the motif, the brush stroke characteristics, the symbolism or more information about the artists. The details are shown as different screens, that the visitors can swipe through pointing to different aspects of the art piece.
On the next page is shown the new start interface of the app - where the 'map' is removed (prototype 2.0) and the interfaces when accessing information about a specific piece (prototype 2.0-2.3) . Images og the next page shows the interface for 'Kvinde i Chemise'. We found that these modifications could limit some of the confusion about the use of the app, and by improving the usability, the prototype could better inform the experience of recieving receiving information. In the following we present the findings from the second round of tests.



Prototype 2.0



Prototype 2.1



Prototype 2.2

Prototype 2.3

Usability

Test person C seem to have little trouble using the app. She swiped right and left in accordance with the given tasks. She also swiped between the different information at each specific painting with ease.

Being in the right state of mind

The test person expressed that she would appreciate an audio options for the information in the app. This she felt, enabled her to relax and concentrate about what she was there to see and do. Being able to relax seemed important to her. She also felt that being with other people at the museum could sometime disturb the information flow and museum experience as she would tag along with friend instead of closely reading the information boards.

Using a smartphone

The test person seem to like that information about the exhibition and artwork was available by the touch of a finger. It seem convenient to her that all information from the museum was right there in her pocket. She also expressed that the smartphone system was not an interference with the experience of viewing art in a museum. However, she felt that the information flow should be more fluent and she didn't want to spend all her time on the phone, and she felt like the pictures should 'pop up' as she went round the exhibition.

A personal relationship

Test person C expressed that information should be of a different form than what seem to be provided by the museum at the moment. Test person C expressed that information should be more detailed and entail more personal stories about the artist or painting - deviating from well-known facts about the style, period or artist. She expressed that this would create a different form of personal relationship between her and the artwork. She expressed a concern, that information was always portrayed as it 'should be' and not through a deeper look behind the scenes of the artist and painting. Test person C also expressed that she would like to be better informed about specifically interesting artwork. This, she felt could be facilitated by knowing which artworks other museum visitors had enjoyed and spend their time on.

Revisit artworks

Test person C liked being able to access pictures after the visit. She expressed that she would enjoy telling family about what she'd seen and it would also help her remembering names of artists and artworks.

Reflections

In our second test, we started of by making sure to distinguish our app from other museum apps. In our second prototype the information can be accessed instantly compared to the first prototype and the images serve more than just illustrations of the artwork, thus solving our goal to make information accessible. By highlighting parts of the images, the visitor gets more knowledge about the special symbolics in the artwork. In the first round of tests, the informants were more focussed on how they receive the information, while in the second our test person also focussed more on what kind of information she received. According to the test person C the information about the artwork seemed good, but she would like to add relatable facts that go beyond curated information.
While some design choices seemed to align with the first user test persons, we found that it was still insufficient, especially regarding the kind of information that the visitor receives. While the visitor did receive different kind of highlighted information, the test showed that it was not relatable enough and the information was generally homogeneous. With this feedback, we found that the prototype needed to be adjusted once again and modified according to the findings mentioned above.

KEY FINDINGS

- Getting information instant with as little effort as possible

- A desire to be able to form a more personal relation to the art

- Smartphone provides readiness

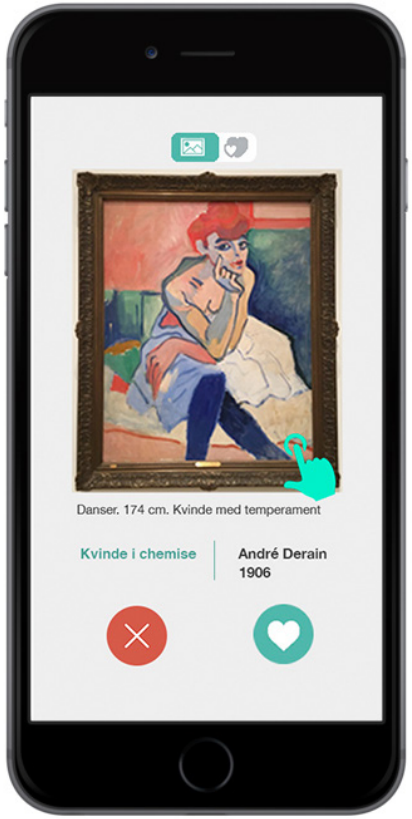
- Social interaction can disturb information flow and experience

7.2 Prototype 3.0

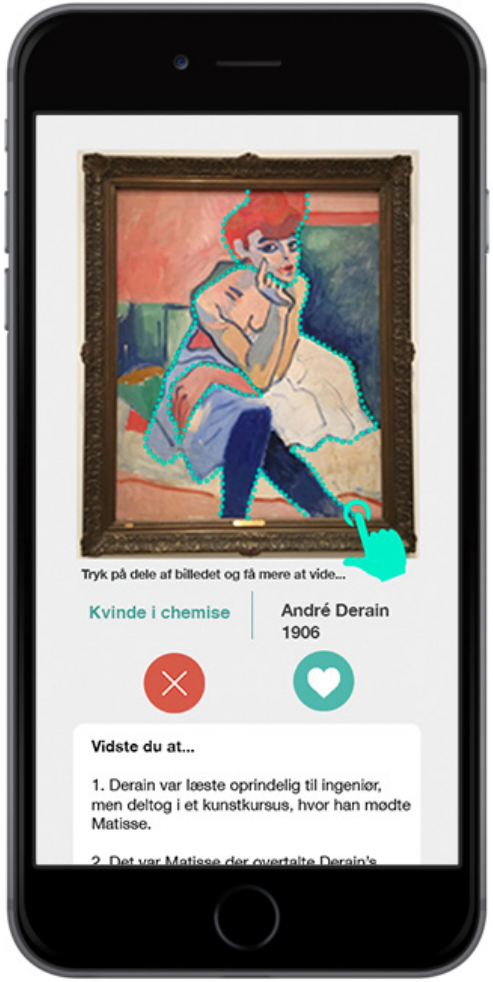
From our second round of tests, one of the key insights we gathered was that the information provided should entail mere personal stories about the artist or painting, or information that go beyond the regular curated narrative about the art period and artist.

In the new prototype we therefore chose to divide the information in the app in two layers. First layer is when the user presses on the painting, the user then acces three 'facts' (vidste du at...) in relation to the artist, the period or the art-work (see image next page, prototype 3.1. Also appendix Q).

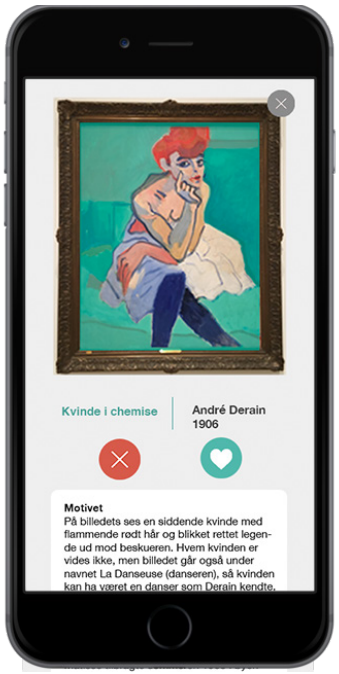
The second layer of information entailed more details about the piece, the art period and the artist. The user could now access this information by clicking on sections of the painting. This was a change from the last prototype, where detailed information where shown in predefined screens. We found it important to allow the visitor to explore how much information about the artwork they wanted to receive by clicking on highlighted parts of the image. Furthermore, having the user picking and choosing between areas could give the user a sense of actively participating in the information flow and make the experience of the app more dynamic and personal. To the right and on the next page is the new prototype pictured. The second image shows the interface for when pressing on a painting, here "Kvinde i Chemise (prototype 3.1). The two images on the next page (prototype 3.2 & 3.3) show the interface for when your press on a certain section of the picture. For this prototype only two sections are active - the woman's body and the face or hand. However, it's the intention in the finish product that every part of painting would be active and lead the user to information about that specific area.



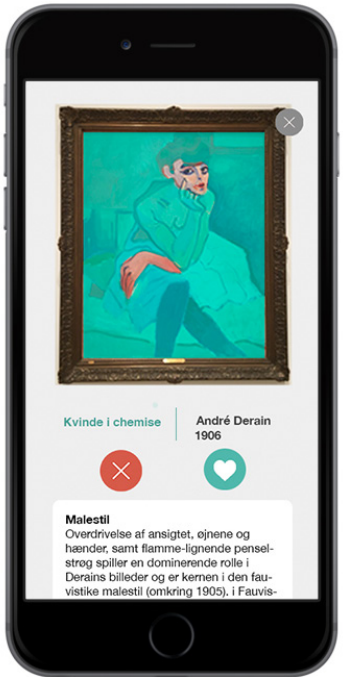
Prototype 3.0



Prototype 3.1



Prototype 3.2



Prototype 3.3

After deciding how to adjust the prototype, we went from a low fidelity prototype to more of a high fidelity prototype by creating a digital prototype using the prototype tool InVision. InVision is a prototyping tool created for designers. It allows one to quickly and easily create an interactive prototype that allows mobile gestures and transitions to occur if necessary and with no coding needed. We used this to create the swipe function, the like function and the tapping function, for example if the participants would tap the image they would immediately get directed to the information page etc. Our service concept is designed to be used as a smartphone app, by using this particular prototyping tool, we were able to conduct all tests on a smartphone (Invision Prototype). Although our prototype in our third test is interactive, it is important to emphasize that we do not test the aspect of the location-based technology with real beacons. However, we simulate the use of beacons, by guiding the user to the right screen when in front of a painting.

Third round of tests

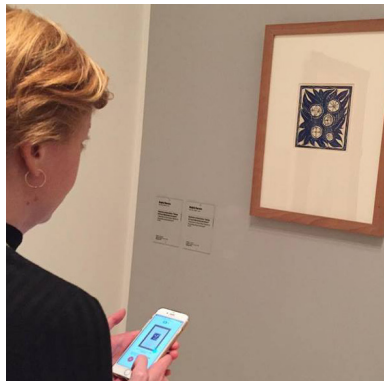
For our third round of tests we recruited two test users. As our prototype is based on the French Art exhibition, we wanted to recruit test users present at SMK, and in particular who were on their way into that part of the museum. However this process was more difficult than we initially estimated. Recruiting participants was exceptionally difficult and we found that most visitor were tourist or did not want to participate.

Due to the circumstances mentioned, we ended up recruiting two people, both female in the age of 32 and 69 (see table below). Test person E did not fully fit into our target group as the app is designed for an audience that is familiar with the ‘liking’ and ‘swiping’ trend, but we still found that her feedback about the information provided in the app, could be of relevance. Both users were familiar with SMK and enjoyed going to museums in general and did so frequently. The tests were conducted at SMK on the 12th May.

The value we wished to achieve with our third prototype, is to make information more relatable, to make sure that there are different kind of the information and that these above mentioned values meet the visitor’s expectation. Consequently, our goal with this test was to test: the usability of the prototype, the kind of the information and how it should be presented, and lastly whether using an app would support or disturb the museum experience.

NAME	GENDER	AGE
Test person D	Female	32
Test person E	Female	69

Table 4. Table of test persons round three



The test

Once again, the test was introduced with a short description of the digital prototype and the concept. Hereafter, the users had to complete four tasks while using the app, which was then followed up by a short semi-structured interview. Both tests lasted approximately 20 minutes. We used the interviews to ask the users in-depth questions regarding the information; how it is presented, the quality of it and if they found it to be relevant and useful.

The users had to complete following tasks:

- Find information about the two chosen art pieces
- Find information about parts of the painting
- Like or save the two chosen art pieces
- Find your collection and if you want share it with your friends (on Social media)

Again the main focus of the test was of the Role (Houde & Hill, 1997) of the prototype as we wanted to know if the new adjustment was of use to the user and if they could benefit from the design idea and how. In the following section we will present the findings from the user tests.

Decoding the interface

After giving test person D a brief introduction and explanation about the prototype, she proceeded on with the tasks, which she completed successfully. Generally, test person D seemed to decode the app easily and understood the different iconography as they reminded her of icons used in other familiar apps. Moreover, the hand next to the artwork image (prototype 3.1), made it easy for her to decode that by clicking on the image she would be forwarded to next page. Test Person E found that the interface should provide more of a guide for the user, and the interface of the app should indicate ‘what to do next’ or ‘where to go’ for the wanted information.

For test person D, when clicking on the first chosen artwork, she instantly saw that the image changed and was divided into highlighted areas. With the help of the indicative text under the image and the hand icon once again present, Test person D expressed that it was easy to figure out that she could click on the highlighted areas, which she did. Once she did that, she stated that she felt a desire to go back and click on the other highlighted areas.

The last task our participants had to complete was to like and save the two chosen artworks. While test person D had little difficulties completing the task, test person E found it a bit more challenging although completing it in the end. This can partly be explained with the fact that test person D is, as earlier mentioned, more familiar with “liking” as she is very active on social media. After liking /

saving the artwork, she expressed that it felt very intuitive that it gets saved to her collection and that the feedback notification ensured her that it was saved and commented it by saying *"Let's hope it likes me back"* (Appendix O)

In general it was two different experiences for the two test users.Test person D had very little trouble decoding the interface and navigating the app. While test person E had more trouble because she was simply not familiar with the iconography used and she did not feel completely at home before executing the task a second time. Despite this insight, we can not conclude on the usability in relation to the test with test person E, as she is not in our target group.

Information types

As our participant in the previous test expressed that the information should not just be academic but entail more relatable stories about the artist or painting, we decided to add less 'academic' facts and information either about the period or the artist. As show on the the image, prototype 3.1 the first layer of information in the app consists of three 'quick' facts about the artist. We also added text under each art piece telling personal facts about the piece (see protptype 3.0). Test person D found this to be quite funny, but she also pointed out that, the character of the information should depend on the exhibition and whether she came to see something specific or just to wander around. Furthermore, she felt like this could potentially disturb one's own interpretation and expectations of the art piece. Scrolling down she noticed that the three information facts and expressed that they seemed to be "entertaining knowledge mixed with something factually related to the artwork" (Appendix o). She expressed that the first layer of information (the three facts) spiked one's curiosity and the app made it easy for her to find the information when in front of the artwork - as an appetiser.

In the second layer of information we divided painting in sections, allowing the user to press of each section and access information about the specifics (see prototype 3.2 & 3.3). Test Person E liked that you could access the picture and then get a description of the elements and how they are related to the time period and artist. She was also positive towards the possibility to know more about the different aspects and circumstances of the art piece. She felt that the information provided in the app, served as a form of repetitions for her existing art knowledge. In addition, this would in many ways make her think differently about the art piece she was looking at.Furthermore, Test person E expressed that the information she got from the app would make her dwell in the painting: *"instead of just moving on i would return to the painting and think about once more. I wouldn't stare at my phone i would look at the painting"* (Appendix P).

For test person E, getting concrete information was very important, and she expressed that the text provided by the museum, seemed very vague and insubstantial. Although, she was simulated with the information provided in the app, she wouldn't mind receiving more information, as she saw herself as a visitor that is more curious than the average. However, we chose to discard this, as we do not wish to design for users that are beyond curious.

Test person D expressed that explaining the details of the painting is a very important feature for her. For example, when viewing the painting 'Kvinde i Chemise' by Andre Derain, she was drawn to know who the woman illustrated was and what her relationship to the artist was. Yet, she also expressed that using the app would depend on the character of the art and goal of the visit. Here, she

clarified by explaining that on one hand if she was looking for an aesthetic experience, using the app would be disturbing. On the other hand, if she was visiting to see a specific artist, she would consider it an advantage as the objective would be to get immersed in the art.

The layers of information

For test person D, deciding how much information she would like to receive was crucial for her, as too much information could be an overwhelming experience. Here she found it important that the user gets to decide how much information they would like to get or to simply save it for later. What was important for her was how profound the information was in the beginning. For her, starting with more general information, rather than in-depth interpretations about the artwork seemed to be a good experience, which was why she liked the three 'did you know facts' (vidste du at).

For test person D the first layer of information (the three facts) functioned as a good information barrier. She felt that getting all the information about the art piece at once, could disturb the art experience. To actively choose how deep one would 'enter' the art piece was an essential feature too.

Using your phone in the museum

We found that it was important that this was a optional feature to the museum experience. Test person D explained that, it can disturb the museum experience and it is important for her to be able to switch it off or mute it when necessary. However, if this is only an option or a feature that adds to the museum experience, she expressed that she could easily put the phone aside. For her using the app should be a kind of "second nature" to the museum experience.

Yet, for her the use of the app could potentially provide a dilemma, because knowing the app was available would make it hard not to use. This should be taken into consideration for the future design process of the prototype.

Test person E did not see the smartphone as a hindering for a good museum experience. She expressed that information was quite accessible and since she always carried her phone with her, this prototype was a good trade off for the socially isolating audio guide.

Collecting art

One thing test person D pointed out important for her, was the ability to save the artworks to her collection, which she found very appealing. This way she could with very little effort save the artwork and read the information about it, when it suited her. She also stated that this feature would probably be the one she would use the most, because it enables her to go back to the saved artworks and find the details or the information she found interesting whenever she pleased. This also gave her the opportunity to save the artworks easily rather than having to write the titles down on a piece of paper or taking pictures of the titles with her own phone. In addition, this was a desirable feature to use if she did not wish to read about the art during the visit. Furthermore, she expressed that saving the artworks would make it easier for her to revisit the painting and the museum again. *"(...) just the fact that you can remember: This is the photo i like, and it's in this museum, and if i go to this room, it's here. This way you can easily find it again."* (Appendix O).

We also found that this could help the visitor find their way back to the art pieces, for example test person D, often walks around searching for art pieces that she likes and have seen before in the museum, but has a hard time finding them.

For her adding such a feature to the app and making the location of the art visible or making the app notify her when she walked into the room of the painting, would enhance her museum experience. According to Test person D it was not only about collecting the art, but also about creating a map for the collected art, so she could find it again in future visits.

KEY FINDINGS

- Different layers information gives the user agency in that the user can decide how much they want to indulge in the art piece

- Explaining the details of the art pieces gives the visitor a different understanding of it, and make them dwell by the painting

- Using the phone for information two things: 1. The smartphone was a convenient device as you always have is with you. 2. the smarphone can disturb the art experience and provide a dilemma as the visitor seeks not to use it, but knows that information is available in the app

Reflections

Our third prototype test was in many ways a different kind of test as it was conducted on an actual interactive prototype. While the two first tests were conducted on a low fidelity prototype, this time the users could actually swipe, tap and like on the prototype. The response and feedback to the usability of the prototype was in generally positive and test person D managed to complete all of their tasks, with no difficulties.

One issue of concern is however that, one test person did not match our target group, which posed some complications in relations for the usability of the prototype as the user wasn't particularly familiar with the iconography in the prototype. An area of improvement regarding the usability was the desire to receive notifications that reminded the user of the 'next step' when looking for the information. However we can not conclude on this finding.

By changing the interface and the design in accordance to our findings in the second test, the information provided was divided in two layers, in an attempt to make the information more relatable and still provide meaningful information about the artwork. We found the test persons to enjoy both layers of information. Hence, with our current prototype we managed to make the information more relatable.

7. Prototype & Test Conclusion

Based on our persona 'the art curious' and our empirical data, our goal with the prototype was to facilitate the visitor's need to access information easily and according to their personal interest. In between each test, the prototype was modified in accordance with the feedback retrieved from the tests, to meet the user's expectations and needs. We found that the visitors in general liked the idea of having a dynamic way to receive information, which the prototype facilitated.

As a whole, the participants found the prototype to be useful and they were in general positive and liked the information provided in it, especially during the last test. Dividing the information in layers and making the information more relatable was an important feature. This distinction between layers came across as a guide to what the user is about to explore, tapping into their curiosity yet still given the choice to proceed or not.

Using a location-based technology made the app more relevant to use while in the museum, however it was also important to be able to turn it off when needed. Moreover, the visitors were especially positive about being able to create their own personal art collection, based on their likes or swipe, a feature that they expressed would help them remember the artworks after the visit.

Summing up, the majority of our participants found it very natural to use the phone and were in general positive about receiving information this way. However, throughout our tests, some participants raised the concern of it potentially becoming an element of distraction.
ArtSwipe managed to make information about artifacts accessible and the users found the information very relevant according to their expectations. However, making the app more intuitive was a point that seemed to be neglected, which is also why this should taken into consideration for the final design.

8. EVALUATION & DISCUSSION

In this chapter we will evaluate the concept and discuss the different design choices and methods used when testing the prototype. We will compare our concept to our defined objectives and look at the concept, design choices and methods critically.

8.1 Concept evaluation

In the 'final' concept, the test users found both the idea about accessing information of artworks and the function of collecting art, quite useful.
Developing the concept, ArtSwipe, we formulated certain objectives that the prototype and concept should fulfill, these were:

- Support a learning experience
- Supporting a personal interest in art
- Invite the visitor to an in-depth engagement with art pieces
- To create a new way of retrieving information
- Create an information self-service
- Support the possibility for memorabilia
- Supporting participation through digital media within the traditional way of exploring art

We found that the final concept supports a learning experience and a personal interest in art, as participants found their curiosity or questions about the motifs or the artist of a specific art piece, could be answered by using the app. However the learning experience was considered of different depth as one participant felt that more information should be available, while another felt that layers of information was good as you easily could get overwhelmed.

The layers of information seem to support their personal extent of interest in the art pieces and gave the user agency in that the user could decide how much they wanted to indulge in the art piece. We also found that the in depth explanation about the art piece could provide a deeper engagement with the art, as several participants felt that they could go back and look closer after reading the information. While the deeper engagement might be different than before, we cannot necessarily consider ArtSwipe as completely new way of retrieving information as our objective stated. Information available in the app is still in written text, and is therefore similar to the experience of reading a pamphlet og brochure about a piece. However, using the app visitors do not have to consult staff or google to access information, but they can do it in a way not used as such in SMK. This notion can also be seen in relation to the goal of creating a self-service that does not interfere with other visitors' museum visit.

We found that the possibility in creating a collection of the art that visitors found particularly interesting, supported the sense of memorabilia as visitors were positive about the fact that they could revisit the art after the museum visit.
The app, Artswipe, can be considering a layer of digital possibilities on top of the existing museum experience, as it does not, so to say, change the way of viewing art as visitors are currently doing in SMK. Given the above mentioned reflections, we find that the concept overall fulfils the given objectives from our concept development.

8.2 Design choices: Tinder and information layers

As previously mentioned, and obvious to the viewer, our prototype was considerably inspired by the dating application, Tinder. Our first idea with the TInder art app was to make the visitor swipe through all the art pieces of the museum and then receiving a 'dating tour' with information about the art. However, due to several constraints and the vast amount of art in the museum, we limited ourselves to only focus on swiping through art pieces in the same room as the visitor. This reduction, seemed to reduce the 'Tinderness of the app. In addition, one could argue that the Tinder aspect only seemed present through the appearance and placement of the icons and the comic proposal of making 'art tinder' did not come off. Neither did the visitors express any surprise about being introduced to a Tinder concept in the museum context. This might be due to the lack of Tinder-oriented information and functions in the prototype. What could have been a new way of introducing art providing somewhat comic character to the art experience, became much like other apps available on the market. This notion was also a discovery after our first round of user tests, where we found that both Useeum and the Rijksmuseum app had somewhat the same functions as ArtSwipe.

In the second and third edition of our prototype we added additional features, where we tried a different approach to the information. We provided detailed descriptions of sections of the art and we also 'layered' information making the first layer less curated and more relatable, and the second deeper and more art-orientated. This seemed to be a positive and useful feature for respondents of the second and third user test, who found it important to be able to decide themselves how much they wanted to indulge in the art, and who wanted more personal facts about the artworks. These mentioned features are also elements of how the ArtSwipe app differentiates itself from other apps on the market.

For example Rijksmusuem and Useum that also provide phones-base information however, in a museum curated language and style. One could hereby argue that a prominent finding is that information apps is not only about getting access to information but also about what kind of information should be included and how it should be presented.

8.3 The possibilities of the concept

The ArtSwipe concept in its current state exists in the form of a smartphone application. This design choice we found was the most useful and convenient solution, as users would be able to download the app without consulting staff or cause the museum any further expenses. However, during the design process we considered the different downfalls it could entail. Having the concept as an application for visitors personal smartphone means that users have to download the app before being able to use it, which might result in unvoiding to do so, as user could be reluctant to downloading foreign apps or simply not having the capacity on their phones. Furthermore, users have to learn how to use the app on their own. Another concern is whether the museum understands to communicate and market the app in ways that the visitor becomes aware of its existence. One solution to some of these concerns could be to have digital devices such as tablets available at the information desk, that visitors could borrow for their visit. However, this solution could be costly for the museum as it would have to buy and maintain the tablets. Another solution is to integrate the ArtSwipe functionalities in the existing web-based audio guide at SMK, however this would probably be a technological challenging task.

In a possible realization of the concept, it is therefore important to note that with the several scenarios in which the concept could be realized through, there are also several related issues one need to consider.

Another point is the idea of beacon technology. As the technology is based on BLE there are also some challenges when using it. In order for the visitor to be notified about the artwork through the app, requires that they install the app in order to it to catch the beacon signal and bluetooth to be on (Dhingra & Popli, 2017). In addition, as users can be automatically logged in when walking in a beacon zone this might potentially spook or disturb some of the visitors and risking to make them feel 'spammed', while for other visitors it might delight them. Another downside when using such technology is that it obviously requires investment and it can be complex to maintain. This can partly be explained by the fact that there is no centralized system to operate all beacons at the same time as they have no serial number (Dhingra & Popli, 2017). Moreover, although Apple argues that the iBeacon does not drain one's mobile device, Dhingra & Popli (2017) argue the opposite. As earlier mentioned, beacons activate at the use of range and deactivates when the user is out of range, despite this, due to the RSSI it almost never follows the precise range. This means that signals can be received although being away from the set of range and vice versa (Dhingra & Popli, 2017). With this said we can say that, although beacons have been available for some years, it is still a new technology with its challenges, which are important to take into consideration when developing an app that includes this technology. A way to ensure that SMK would benefit from such a technology in regards with the service-concept we have created is, to test the technology for example in a specific exhibition before implementing it throughout the whole museum.

8.4 Evaluating Test Method

One area that has been challenging throughout our tests was the general recruitment of test users. We found this process to be more time consuming than we estimated, which created some setbacks in regards to the project timeline. This aspect should be taken into consideration if future tests will be conducted. One way this could be solved is by recruiting test persons before the test, however this might require access to SMK's communication platforms, something we did not have access to.

As our test persons did not know how the prototype worked and due to the small size of the screen of the phone it was important that one of us followed the test person(s) throughout all the tasks closely. However, it was also important that the test persons were allowed to use the app in a way that intuitively made sense to them, in order to understand both the usability of the prototype, their interpretation of the prototype and what it serves. Our presence might have affected the test person's behavior.

When it came down to the practicalities we found that, although being introduced to how the prototype works, which artworks to like, and what tasks they had to complete, the test persons often got confused and seemed easily distracted by for example other visitors. This situation created some setbacks during the tests, because often the test persons were afraid to fail the tasks or were too eager to somehow please us, although we underlined during the introduction that nothing they did could be considered as 'wrong'. In the case of future tests this problem should be addressed and taken into account.
Although the the test had complications, it was a quick and easy way for us to see if the prototype functioned and if the concept was of use to the test persons.

8.5 Discussion of Findings

One prominent aspect when conducting any kind of research is the 'reliability'' of findings. First of all, doing qualitative research we realize that we can not generalize on the basis of our test results, as we are only doing a qualitative describing of world for a specific groups of individuals. We can only assume or suggest that the described world could be applicable to similar settings.
Secondly, it is important to look at findings as a result of the research circumstances. As previously mentioned, when conducting user test, we recruited test users from our own network. Test users or respondents in a given test og interview, can often be somewhat affected by the presence of a researcher (Blomberg & Burrell, 2012). This could also very well be the case for this research. Given test user's affiliation with us, test users' answered might have been affected in that they were seeking to help us. Even though, we firmly expressed to the users that critique of the test and prototype only was of help to us, test users might have been hesitant to express concerns as to not cause any trouble for the research.

Thirdly, another important aspect when evaluating findings, is to look at the possible explanation for answers given by test users or respondents. For example, through the prototype we explored if using a phone to receive information would disturb the museum experience. Here, we found our participants to disagree. While one seemed very positive and could see the potential of further development, another was quite hesitant and expressed that using the phone could pose a dilemma and potentially disturb the museum visit as they would look at their phone instead of the art.

Subsequently, the use of a smart phone in a museum context is not a new method of interaction between the museum and the visitor, and as mentioned previously, many museums already use apps to communicate with their visitor.

One could also question the assumption about the phone being an interference, in that having information on a phone, is not very different than having to read a brochure or a plaque and does reading a brochure prevent people from looking at the art piece? Wr argues that Reading about the art during the museum visit can be considered part of the museum experience and the practice of visiting the museum.

This dilemma of the phone taking time away from the object of interest, is also been referred to as the heads down vs the heads up experience (Rung & Laursen, 2012). Rung & Laursen (2012) who researched and tested the tour/information guide, The Toulouse-Lautrec app at SMK refers to previously arguments of concern stateing, that devices such as PDAs are pulling attention away from the object and art piece of interest, and Rung & Laursen (2012) argues that this, must be considered when introducing an app at the museum. However, 'a heads down experience' can also "*(…) provide a scaffold for deeper engagement with the object rather than being a distraction from it as long as this experience is closely connected to the one you have when you look at the object itself"* (Rung & Laursen, 2012, p. 523).

While there are divided opinions about the use of a smartphone, and while one always should consider how digital applications affect the museum experience, the concern might not be placed on the phone itself. A study conducted on backpackers' use of smartphones when travelling, explored the pre-trip, on-trip, and post-trip perceived changes in mediated interaction attitudes towards using their phone when present with others (Silas et al., 2016).

Between backpackers, there seemed to be a common understanding that the authentic backpacking experience is as of the old days, where a limited access and

use of mediated interaction, made travellers focus on interacting with the local culture. However, today's backpackers bring digital habits from home, and the normal use of phones and social medias bring tension between the ideal travel style and modern methods of interactions (Silas et al., 2016).

The same way backpacking and travelling can be considered an unreligious pilgrimage that takes tourist from a familiar places to an unfamiliar, visiting the museum can be seen as an escape from daily life routines and schedules. This also seems evident in our interviews with SMK visitors , where visitors expressed that the museum was used for a small 'get-away' providing a form of zen experience. Like tourists, museum visitors might also strive for the authentic art experience, where they indulge in the art pieces and engage in a form of meditative, no-distractions journey of the mind. The divided opinions about the use of phone found in our interviews, might be an expression of the tension between the convenience and usefulness of the phone and the distractions it could bring in the hunt for authenticity and to connect with the surrounding world.

Fear of new medias used in a personal and cultural context, stretch back to the start of literacy. In ancient Greece, Socrates expressed concerns towards writing, as it would make the learner's soul forgetful and they would deviate from using their memories. This concern seems to have been repeated many times as new technologies provide adults and children with new way of acting and interacting. One concern in regards to the use of smartphones has also been directed at technology dependency (Silas et al., 2016). Among the travelling backpackers, there was a general concern about the addictive nature of the smartphones and they regarded the general use of their phones as a waste of time. However backpackers use their phones considerably on a daily basis during their travels to stay in touch with family members (Silas et al., 2016).

The perceived use of a smartphone when traveling through Asia or through a museum seem to be a result of the discourse of which the phone is placed in. The phone can represent an addictive device that takes your away from the authentic and ideal experience of your travels or interest in art, or it can be a device that reassures your relatives of your safety when traveling or gives you easy access to information when visiting the museum.
Like the study of smartphones used in the backpacking culture, the concern about the use of smartphones in a museum context, can both be seen as a result of the pursuit for the ideal museum experience and also as a cultural development and general worry, when new medias are introduced in new contexts and in new ways.

8.6 Personalisation and the personal museum experiences

For this project we sought to create an information service that would support a more personal museum visit. We knew that SMK since 2008 had been working with more user-centric developing methods and museum practice. However, we also saw that there were room to explore the use of digital devices in the museum practice even further making information services more accessible, personal and tailored to the visitors.
Examining previous literature, we found that personalization was slippery term with many different definition in different fields often described in terms such as customization; adaptation; individuation; consumer-centric and one-to-one relationship. As stated, we examined two central approaches to personalization in a museum context, hereafter choosing to explore the notion of a personalization through participation however, still supporting the existing way of viewing art. In the following we will reflect and discuss the notion of personalization in our design.

Designing for a specific group of people

Fan et al. (2006) explains that most definitions of personalization include purpose of personalization, elements that are personalized and the target of personalization. In our project, we implemented this by providing information access (purpose) through an app with different information layers (element) to a specific type of visitor (target), the art curious. Although, implementing these aspects, we still found ourselves to be challenged with Fan et al. (2006) definition of personalization being a process that changes with the purpose of its personal relevance to an individual or a group of individuals.

Both Falk (2013, March) and Simon (2010) addresses the museum experience being linked to the personal needs. Here, Falk (2013, March) continues by explaining that the museum experience should support and fulfill personal goals and needs as visitor come to the museum to fill these.
In our research process, designing a new service became a task of designing for a group of individuals. This means, among others things, that a more personalized experience was made in supporting the motivations for a specific groups of visitors. Also, our concept was set to cater for a specific experience (the learning experience) and in doing so, we sought to create a museum visit personalized to that specific experience. Personalization in this way, did not become a flexible service, changing for each individual, but a service tailored for a specific experience and visitor group. One could hereby argue that the personal experience only exist for certain users, as other won't will find their specific needs fulfilled when using the concept during a museum visit.

In this case, we agree with Simon (2010) who states that designing experiences for visitors is a complex process as visitors have different interests and that it is almost impossible to make everyone happy. Although we narrowed our focus down to one particular visitor type, the tests of our service prototype showed that visitors within that group have different expectations as well, calling for a personalization that draws upon customization and changing interfaces. This also goes hand in hand with Falk's (2013) explanation of the type of visitor, the Explorer, that goes to art museums. Here, he states that this type of visitor although being curious with a desire to fuel their learning, they are very self-oriented. They are only focused on what they find interesting and this means that pleasing an entire target group with one service, in our case the art-curious, was also difficult as the relevance of different steps, features or information differed from user to user. As Fan et al. (2006) claim, there is very little consensus on how best to characterize the personalization construct, and this was noticeable during our design process, as we often found ourselves not knowing if we had the right elements in our design to really personalize the experience.

Right information at the right time, layout and place

Aroyo et al. (2007) argue that personalization can be providing the user with the 'right information at the right time', which is also a way of dealing with information overload, a concern that Simon (2010) also raises. Our goal was in parts, to distinguish our prototype from the existing service at SMK, namely Highlights. Like Simon (2010) suggests, visitors should not be treated as passive consumers that want to be filled with knowledge, for example only receiving information about chosen artworks such as the current service, Highlights does. Rather they should be given the choice to actively participate by exploring the art information on their own as we suggest with our design. This we do, by using location based technology, where we give visitors access to information about any given artifact. Our results from the first round of test showed that the visitors would like the information to pop-up when in front of an artwork, making relevant information available in the right time, instead of having to look for it. Here, we allow the user

to click on the artwork they wish to expand their knowledge about, and therefore allowing them to choose when the app is relevant to use. The visitor gets the opportunity to learn something about what they are experiencing, at the time they are experiencing it. As Simon (2010) describes one way of personalizing systems and content, is through customization. As mentioned, our design personalization was not about changing the interface in accordance with a specific user profile, but allowing the user to actively select the knowledge they want to receive. Rather than providing visitors with a long text of information about the artwork like the current information boards at SMK, visitors are 'asked' to retrieve knowledge about the specific art piece of interest. Pulling out meaning rather than imposing it on the visitor, gave the visitor a form of participatory power.

The participatory power can also been seen in relation to the information available in the app. Here the visitor could choose how deep they want to dive into each piece providing the information layers. Also, visitors actively chose what they want to know more about, by tapping on highlighted sections of the painting. However, information in the app does not differ from visitor to visitor - for example offer information formatted for children or information curated from an individual's specific interests. Rather we selected predefined categories (based on respondents' expressed interest) that the visitor then actively can choose between (pressing on sections of the image). Personalization and participation did therefore not show in the form of customization but through active participation and retrieval of predefined information.

Important to note is also the character of information provided about the artworks. In the findings we saw a need for more relatable and easy information, deviating from the language style curated by the museum. This need was based on the fact that visitors wanted to form a more personal relation to the art work. In the prototype we provide three facts about the artwork or artist which visitors expressed a positive attitude towards.
Changing the information to a more easily consumable knowledge, indicates that personalization cannot only be seen in the methods, functionalities and structure of the concept but also in the semantics and the discourse of the personalised element.

Customization in the form of changing information according to the specific visitor is, however also present in our design. Simon (2010) argues that another way to address personalization is by having a recommendation system, based on the visitor's interest or their personal profiles. In our service-prototype we created recommendations to similar artworks in the museum, based on what the visitor looked at.Furthermore, we have also allowed the users to create their "own art collection", by liking their favorite artworks. The user takes his or her favorite artworks with them home and can access the information at any given time or simply share it with their social network. Here, the visitor creates a personal relationship to the art, as they create their own collection based on their personal favorites. This could also proved fruitful for SMK as it provides the museum with an overview of particular popular art pieces, and they can potentially customize tours, information, news and such based on the visitors' likes.

However, Bowen et al (2004) explains that merely liking might not be enough personalization. They continue by explaining that 'Personalized Web Galleries' allows the visitor to select images from the digitized collection to create a personalized Web galleries, accompanied by personal comments or descriptions, making the visitor become a sort of virtual curator (Bowen et al, 2004). Bowen et al. (2004) continue by describing that the personalization should be taken a step further, by for example giving the visitor personal space within the museum's page. They proceed by explaining that such an application would mostly be used by frequent visitors, where they can for example view their selections of images, articles or save information of relevance to them (Bowen et al. 2004).
In our case the visitors cannot leave personal comments or descriptions, although it can be argued that if they choose to share it with their friends they can leave a comment or description then. Nonetheless, this feature could increase personalization in our prototype and should therefore be considered when developing it further. Besides linking the visitor's own collection to their social media, the user might also benefit from getting this linked to their own personal page for example on SMK's website, this way we could also include information about their actual visit and link the visit with their post visit experience.

Having said that, as design researchers it was hard to figure when the service-concept provided enough personalization, whether we had incorporated enough personalization elements in the design and whether the users were aware of the elements of personalization that was provided in the prototype.

9. CONCLUSION

The focus of this project was create an information service that would support a personal museum visit. We knew that SMK since 2008 had been working with more user-centric developing methods and museum practice, However we also saw that there were room to explore the use of digital devices in the museum practise even further in making information services more personal and tailored to the visitors at SMK. In the following we will address our three sub-questions and answer our research question for this project.

Research question: How can we design an information service, that supports the personal museum visit?

What defines the museum as a service and what is the museum's strategy and future plans?

Like many other museums, SMK is a public service that provides access to cultural heritage as well as informing and educating the public about the cultural history and development. As a cultural institution, SMK's goal is, apart from improving conservation and research, to expand knowledge and use of cultural heritage at the museum. Part of the museum's strategy is to incorporate digital medias in the museum practice. Here, the museum are working on making their collection fully accessible on their website not only for people present in the museum, but also for remote users. In the museum, SMK offers different digital options such as an interactive screen in two of their exhibition and Highlight, an audio guide through their website. Although having implemented some digital initiatives, a core value of the museums strategy is to have a noninvasive approach, in other words that the digital strategy does not interfere with the traditional museum experience.

However, we also found that generally SMK wishes to include interactivity and participation when visiting the museum, that enriches the visitor's' museum experience as part of their future plans.

What are the museum visitors expectations and needs, and how can we characterize the museum experience?

Visitor needs were comprised from visitors expressed expectation, values, current behavior, what they felt lacked or was considered problematic in relation to the museum visit. Furthermore, needs were also defined by issues expressed by staff members in relation to their interaction with visitors.

In our research we found that visitors had many different needs, expectation and issues during the museum visit.

Visitors found that the exhibitions lacked with interactivity and felt that the art was unengaging and static.

Visitors saw a need for being able to interpret the art themselves, creating their own personal meaning and relationship with the art.

Visitor found noise in the museum was a problem and this disturbed their experience, preventing them from fully captivating and sensing the art.

Visitors needed more information in relation to two things; Providing easy accessible information about the museum in general, for instance wayfinding and providing accessible and more information about the artwork and art pieces at the museum.

Through an exploration of visitor expectation, needs and issues in relation to a museum visit, we could characterize the museum experience in three categories, one not excluding the other. A learning experience: Visitors came to expand their knowledge and learn about the culture and art in the museum. A zen experience: Visitor came to the museum to escape and get in a different state of mind, experiencing a form of zen. A social experience: Visitors came to the museum to share their experience with a companion.

Our focus of the design process became providing accessible and more information about the artwork and art pieces at the museum, hereby catering to the learning experience.

Which goals can we set for a design solution for and how can we fulfill them?
From exploration of the museum experience and visitors needs through observations and interviews with visitors and staff members, we formulated a set of objectives of which the design solution should fulfill.

- Support a learning experience
- Supporting a personal interest in art
- Invite the visitor to an in-depth engagement with art pieces
- Create a new way of retrieving information
- Create an information self-service
- Support the possibility for memorabilia
- Supporting participation through digital media within the traditional way of exploring art

On the basis of the formulated objectives we defined the service concept: ArtSwipe. The service concept was then tested through an iterative process with three round of user tests. Design choices were evaluated and further needs uncovered. This way we sought to secure the objectives of the design solution and user needs were met.

How can we design an information service that supports the personal museum visit?
We found that a new information service supporting the personal museum visit could be done by using a user-centered design approach. By using ethnographic methods we uncovered user needs, value, expectation issues and the type of museum experience we were designing for. Furthermore we uncovered which area of the museum experience an information service could become relevant. We developed the concept of ArtSwipe providing the visitor with better access and more in-depth knowledge about the art pieces.
The personal museum visit was supported by:

- The design of a mobile application supported by beacon technology that gave the user a dynamic way to receive information and provided the right information at the right time and place.

- Dividing the information into different layers that gave the user agency, in that the user could decide how much they wanted to dive in the art piece, thereby giving the user participatory power over the museum experience and information indulgence.

- Providing content deviating from the traditional museum language style, that provided the user with easier consumable knowledge. Herby indicating the importance of the information type and how information is be presented in relation to a personal museum visit.

- Enabling the users to create their own collection, as this provided visitor with something they could revisit and remember after the museum visit, hereby also customizing a part of the experience

We find, that the above mentions aspects could become applicable in similar situations or when working with a similar target groups in the museum context. We do however realise, that we can not generalise or give prescriptive knowledge, only provide inspiration to others working with similar goals or in a similar context.

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