Engaging map visualization through Emotional Design

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Abstract

Gustav Vasa association, among other things, works to inform the public about Strängnäs interesting background about Swedish history and cultural heritage. Their purpose is to promote Strängnäs as an interesting travel destination to visit and teach visitors about Swedish history during the 15th to 17th century specifically. Their objective is to promote and deliver this information through interactive and innovative platforms in order to attract a younger target group, but also to engage the user’s interaction. This research contains the strategies and methods needed in order to create a digitally interactive and cultural map of Strängnäs, that would achieve both visual engaging and guiding purposes.

Under this research, multiple methodologies were performed in order to get a more in-depth knowledge about the Swedish domestic traveller needs, preferences, motivations and behaviours before and while leisure traveling. In addition to that, theories from emotional design, rhetorical, storytelling and cartographic visual techniques among others, are presented to give this thesis a base to visually engage and guide the users. The data collection methods used in this research has been both as observations, interviews with Gustav Vasa association, tourist centres in Eskilstuna, Västerås and Strängnäs and with the target group, with the purpose of gather data relevant as this research´s basis. Along with these, user testing methods such as A/B testing, think aloud and usability testing were conducted as to evaluate the resulting design concepts from the data collection methods. This thesis resulted in that a combination of both emotional and rhetorical theories, and both flat and skeuomorphic design styles, created an engaging and persuading visual content. This concluding in making users want to interact with the map´s visual and textual context within the map´s digital interaction. The use of visual concepts that could be associated by a both visceral and reflective level of design (Norman, 2005) concluded in a stronger engaging response from the users, as well as, the use of visual rhetorical theories within the map´s visual content. Finally, the use of storytelling techniques both in visual and textual context lured the user to interact with the information provided by the design.
Preface

First, I would like to dedicate this thesis to myself, who has been working so long, so hard and so far, to get where I am today, unemployed and with an enormous amount of stress. Anyway, I feel enormously proud of myself, for being who I am and where I am, surrounded by people who I am madly in love with.

Daniel, without the strength, courage, love and understanding you have shared during these long years I wouldn´t be here. I wouldn´t, or if I would it wouldn´t be as “sane” as I am today. Mom, if it wouldn’t for your constructive criticism, laugh and craziness I wouldn´t have been able to laugh at my failures and welcome the endless self-criticism a designer is always doomed to do.

My peers, companions and rivals…thank you, thank you for sharing these three years of intensely stressful but also fun times. You are my inspiration, my goal and purpose for keeping doing what I love most, to create.

And finally, but not least important, to all the teachers and mentors who have taught me the tools necessary to accomplish what I have done during these studies, for their patience, caring and support. You are awesome.

Thank you and Hasta la vista, babies!
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Introduction

Below the basis for this thesis research will be explained in order to serve as an introduction for the thesis content. Under this chapter both a background information of the collaboration partners, problem statements, objectives, goals, research question and the research scope and limitations will be explained.

1.1 Background and Collaborative Partner

Gustav Vasa association is a non-profit organization, that is both political and religiously impartial and resides in Strängnäs municipality. The association is composed by genuinely and actively people that are interested in Swedish and more specifically Strängnäs history heritage. The organization´s aims are:

1. To actively promote Strängnäs as a place of interest for tourism, where many interesting aspects within Swedish architectural history, culture and environment under the 15th to 17th centuries can be visited and first-hand experienced.
2. To promote the information through interactive and innovative platforms that represent the cultural heritage in order to attract the user through interesting knowledge.

Nowadays, tourist maps are possibly one of the most common cartographic documents that we can find when traveling to foreign or different places. According to cartographic visual theories supported by the International Cartographic association (ICSM, 2018), they are many types of maps, which are classified according to their intended functionality and content. Gustav Vasa´s association needs an interactive digital map of Strängnäs, to show in their webpage, with the objective to attract people and motivating them to visit cultural or historical points of interest within Strängnäs municipality. In addition to it, the requested map had to not only to accomplish an aesthetic purpose, but it would have also to visually guide the user through the different places. The need for a digital map comes from the lack of an engaging digital map of Strängnäs municipality, that combines both visual information about the historical places in, their background information and how to localize them.

1.2 Problem statement and objectives

The objective with the map, according to Gustav Vasa association, was to attract and guide the user though the maps content, in order to promote
Strängnäs due to its interesting historical heritage. It was therefore decided to focus on how to visually engage and guide the user through a compelling aesthetic, in order to motivate the user to interact with the design and hopefully make them want to visit Strängnäs.

The problem statements stated at this point were:

- What historical or current events could motivate the users to choose Strängnäs as an interesting vacation or traveling site?
- Which preferences or motivations had the users during traveling or visiting different cities?
- How should the information be shown in order to make it more appealing to the users?
- Which combination of methods and theories would be needed to create a visually compelling and guiding map?

1.3 Aims and Research Questions

The aim of this thesis research has been on how to better visualize a map’s visual content in order to make both visually appealing and guiding to the user. This with the purpose of providing a truthful and engaging information about Strängnäs many historical events and places of interest. Another aim has been to motivate the user’s interaction with the map with help of theoretical context based on perception and cognitive theories. Since the aims and objectives are inter-related, the research question is:

- How can the visual content of a digital map be designed, in order to make it both visually engaging and guiding?
- How can a cultural map of Strängnäs be illustrated in order to motivate the user’s interaction based on the map’s aesthetics?

1.4 Scope and Delimitations

Since the main objective of this thesis is to visually engage and guide the viewer through the map, it has been focused on how a map’s aesthetics can be designed in order to appeal and persuade the user’s engagement. Other subjects as how to engage the user through interface interaction haven’t been addressed in this research thesis, due to the limited frame of time provided. However, since one of the purposes is to motivate the user to interact with the map’s interface due to its aesthetics, strategies in interactive design and principles of interaction have been followed as to accomplish a certain level of interaction within the interface.
The textual content presented in relation with the illustrations and provided by Gustav Vasa association, have whatsoever not being used as an object of this research study. The textual content provided though, has been modified in order to better complement the visualizations using rhetorical concepts.

The media decided for this project will be as a digital interactive map in the Gustav Vasa association webpage. The decision was made as a result of a lack of a physical place where it could be displayed in physical form as a traditional paper map or brochure. The lack of social media accounts from the association itself also delimited the platform to their webpage.

1.5 Thesis structure

Below follows a short describing summary of planned contents within the thesis:

Chapter 1 (Introduction) introduce a brief summary on the background and framing of this project (the project’s objective, goal, display and chosen media). A list about the main problems and questions that will be research and answered later, as the thesis follow. And finally, the objectives and specific aims and the scope and delimitations of the project.

Chapter 2 (Theoretical context) it contains relevant theories chosen during the analysis of the empiric data that will be explained, within the project context and area of relevance.

Chapter 3 (Data collection methods) explicates the methodology used in the research, the reason of the chosen method and it process. Both reflections about the methods used and a visual summary of the empirical data results.

Chapter 4 (Data Analysis and Comparison) describes the execution of the methods, the empiric data and discusses and compares the results obtained.

Chapter 5 (Results) describes and explain the design culminated from the results gathered through the data collection methods and user testing.

Chapter 6 (Conclusions and Continuation) a summary of the project design process, conclusions of the thesis, comments on their relevance for the thesis and personal suggestions and thoughts.
2. Theoretical context

This chapter presents the theoretical context which have been used for the thesis research, chosen due to their relevance with regards to the goals of this project, visual engagement and guiding. First the theories used to visual engagement and persuasion will be presented and followed by cartographic theoretical techniques. Finally, a summary of other theories and principles that have been used in order to explain the decisions made towards the layout and interaction of the graphic content will be addressed.

2.1 Emotional design

According to Norman (2005) emotional design is a cognitive theory that parts from the premise that both usability and aesthetics can correlate. Norman (2005: 19-20) describes emotional design as the one who strives to elicit an emotional reaction/connection from/to the user with the intention of influence the user’s perception. To do so, Norman explains that there are three levels through which the human form this emotional connections: the visceral, behavioural, and reflective levels. Norman (2005: 67) describes that the visceral level appeals to our initial reaction towards a products appearance, such as based on the products brightness, form and highly saturated primary colours. The author explains that it can be easily studied by putting people on front of a design and observing their reactions. Norman explains that this level of connection basically studies the engagement of the senses. The stronger the reaction the bigger its engagement. The second level, the behavioural (2005: 67-70) refers to the usability of the product itself, how well it performs the intended function, understandability, usability and physical feel. According to Norman under this level we will form a better opinion about the usefulness of the item itself. The third and final level, the reflective design (2005: 83-84), cover the products message and meaning of its use. It determines how it makes us feel or remember when holding it, using it or looking at it. It is all about the personal remembrances something evokes. It is to say, the stronger the remembrance, the stronger the emotional value and engagement will be.

This theory is intended to be applied onto the visual design of the map, since it defends the idea of improving the user’s visual engagement through certain perception levels. As the author refers (2005: 20) the conscious use of this theory during the design development, can help the designer achieve a stronger reaction from the user and lead to a deeper engagement through the design.


2.2 Rhetorical theories

Rhetorical theories have been seen also relevant during this project due to its function and how it can be used according to Janne Lindqvist (2016) to achieve the objective of attracting and persuading the user by the maps visual content. The rhetoric is quoted by Janne Lindqvist (2016: 63) as “[...] the art of discovering what can convince and persuade, what can affect.”

Furthermore, Lindqvist (2016: 82-83) describe three persuasive means into the textual concept, called: ethos, pathos and logos. Lindqvist describes ethos as what helps a speaker appear trustworthy to the audience, such as that persons authority, experience or status. Pathos is described as to express the feeling we want to influence, by the methods or feelings we use to achieve the desired reaction from the audience. Logos is defined as the evidence or arguments we use to refute and persuade the audience with. According to Lindqvist (2016: 83) these persuasive concepts are likely to help us persuade the audience if we use them in our speech, text or visual content. This will be used accordingly due to this thesis objectives.

Another rhetorical concept used under the idea generation phase of the visual content and prototyping was, what Cooper et al. (2014: 301) quotes as a visual metaphor, “[...] signals a function: a picture used to represent the purpose or attributes of a thing”. Cooper et al. (2014: 301) explains that the problematic in the use of visual metaphors, is that as a representation of something, it can be translated by the users in many ways. The authors explain that our comprehension depends on:

- if we are used to see or interact with them by previous experience.
- if it requires a certain precognitive understanding of them by language or culture and such.
- the context they are used.

Visual metaphors have been used to represent everyday concepts within the design aesthetics, with the intention of visually engaging the user, in addition of creating emotional connections by reflective levels of design.

2.3 Storytelling techniques

In addition to Lindqvist’s rhetorical theories, Gustav Freytag’s pyramid of dramatic structure was applied in the visual content as to help structure the visual narrative. This theory was used with the purpose of: a) help convince the user about the veracity of the visual and written information the design communicates, b) to visually engage the user through persuasive concepts supported by the rhetorical theory and, c) to create an entertaining visual narrative that attracts and lead the user through the maps visual information.
Granath (2006: 104) describes Freytag’s dramatic arc divided in five parts: *exposition, rising action, climax, falling action, and dénouement.*

![Freytag’s pyramid.

The *exposition* is described as the introductory part where the character, places, plots and so on, are presented. Followed by, the *rising action* are described, as a series of events that builds the background story towards the turning point in the narrative, the *climax*. The *climax* could be described as the point of biggest interest, where a certain action or information is presented in order to create a stronger reaction. After this stage, the *falling action*, is explained as where the conflict is resolved, leading to the *denouement*, the final stage when the plot is resolved.

According to Granath (2006: 104) a dramatic narrative can help the speaker or the transmitter (in this case the designer) to tell a story with the goal of catching the audience's interest. In this case, it will be applied through the maps visual content and the maps interface interaction.

Narrative voices have been used in order to lead the user through the textual context and to engage the user through the visual narrative intended. The narrative is quoted by Abbot (2008: 223) as “The representation of a story (an event or series of events)”. The narrator voice (Abbot, 2008:1567) is described as the voice that narrates a story. The author further explains, that there are three different narrator voices, distinguished as *first, second and third person*. The *first-person* point of view is defined as a participant narrator, referring with “I” and “we” pronouns. Where the narrator is commonly seen as the protagonist of the story. The *second person narrator* is explained as having a point of view where the narrator participates with the audience, making them part of the story, and by using pronouns as “you” of “yours”. Finally, the *third person narrator voice* is identified as an uninvolved character outside the narrative world, that explains the events and characters through a third person perspective. Referring the character in third person “he”, “she”, “they” and so on, where the audience
is made instead the character. Abbot, (2008: 1568) further explain that an omniscient third person narrator, refers to the narrative voice that is perceived as having privileged knowledge of the characters, places, thoughts and events in the story.

2.4 Cartographic design principles

Furthermore, the maps visual design and its guiding objective, will be based on the field of cartographic theories supported by the International Cartographic association (ICS) and the Intergovernmental Committee on Surveying and Mapping (ICSM). According to National Geographic encyclopaedia (2011) and supported by the ICS and ICSM “a map is a symbolic representation of selected characteristics of a place, usually drawn on a flat surface”. ICSM (2018) describe different kind of maps depending on their functionality. Just the general reference map and the thematic map will be explained due to their relevance to this project.

According to ICSM (2018) a general reference map is the one that show important physical features of an area with the purpose of aiding the discovery of locations. On the other hand, ICSM (2018) explains the thematic map as one that represents a theme or topic. Combinations of these two map types are, according to them, seen in tourist maps, where a general reference map is combined with a thematic one, since it aids visually the user through the area but also highlights certain places of interest that the user might like to visit.

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According to National Geographic encyclopedic entry about map visualizations (2011), maps are usually visualized from a 2D perspective and shown on a flat surface from above. According to both ICSM (2018) and National Geographic (2011), explains that this way of visualizing a map is usually easier to read and understand by the users since the scale that determinates the relationship between the distance of the map and actual distance between places are easier to comprehend.

This last theoretical concept about the map visualization display will be taken in consideration in this project due to the map’s functionality: to visually guide the user through the map and show the distance between the different places of interest. Both thematical and general purpose visualizations will be use since the maps functionality will be to: a) visually guide the user through important physical features of the area with help of roads and green areas, b) aiding the user to discover Strängnäs places of interest, c) to visualize distance, and d) to visually represent a topic or theme, a cultural/historical tourist map of Strängnäs.
2.5 Other theoretical approaches

*Other theoretical context has been used in this thesis research as to explain some aspects about the choices made in the layout and hierarchy between elements. In addition to it, while not being an object of study under this research, interface interaction techniques have been used in order to be able to evaluate a real-time reaction from the user while interacting with the map’s design and visual content. A brief description about the gestalt psychology principles, fundamental principles for design and interface design principles will be described below as to give the reader a better understanding of its use.*

2.5.1 Gestalt psychology theory

Gestalt psychology laws (Ware, 2012: 181) are described as the rules that describe the way patterns are visually perceived by the viewer. These laws are classified in eight different design principles: *proximity, similarity, connectivity, symmetry, closure, relative size and finally figure and ground*. The principles of *proximity, similarity and connectivity* have been used in order to motivate decisions within the layout of the different graphic elements within the design as to accomplish a more comprehensive, understandable and structured visual information. A description of the design principles used under the prototyping phase are explained below:

- *Proximity* (Ware, 2012:181) is described as the forms we perceived as belonging together because of they are being grouped or positioned next to each other. (Ware, 2012:181)
- *Similarity* (Ware 2012:182), are the similar elements that tend to be perceived as being grouped together.
- *Connectivity* (Ware 2012:183) by connecting various thing in groups by a line.
- *Symmetry*, (Ware 2012:185) however is an organizing principle, where things grouped symmetrically are perceived as a visual whole.
- *Closure and common region* (Ware 2012:186), is described as perceiving a closed contour as a whole object, and the perception of being able to divide regions of space by inside or outside a contour. A region enclosed by a contour becomes a *common region*.

2.5.2 Fundamental principles of interaction

According to Norman (2013: 10) there are six fundamentals to principles of interaction, that are important in order to being able to discover what a product does, how it performs and what actions are possible with it. It is why, these principles of interactions: *affordances, signifiers, constraints, mappings, feedback and conceptual model*, have been used in order to create a basic interaction within the maps interface, in order to evaluate the user’s perception towards the different graphic elements when being interacted together.
Norman (2013: 11) defines an *affordance* as the actions possible with and towards a product while a *signifier* (Norman: 2013: 13) is described as the signs that are perceptible by the user. The *mapping* (Norman, 2013:20-21) concept is describe as the relationship of the elements we use and how they interact with each other. The *constraints* (Norman, 2013: 85) are explained as the physical, logical, semantic and cultural restrictions towards the operations that can be performed with, within and towards a product. While the feedback is quoted by Norman (2013: 23) as “[…] a reaction, response or result from an action.” Within the constraints interactions, two of them have been used and classified as a *semantic* and *logical constraints*. The semantic constrains (Norman, 2013: 129) are explained as the constraints that rely upon the knowledge we have of the situation we are in, in this case the visualization of the places of interest and the absence thereof of other elements, limiting the users action to only them. In the other hand, the logical constrains (Norman, 2013: 149) are quoted as “[…] the logical relationship between the spatial or functional layout of components and the things that they affect or are affected by”. Finally, a *conceptual model* (Norman, 2013: 25) is described as the ability we have assigning meaning to things, it is to say, how we understand the relationship between what the model represents, its function and outcome (Norman 2013 :99-100).

### 2.5.3 Interface design strategies

In addition to the already explained above, there are different strategies described by Cooper et al (2014: 251) needed in order to create effective interactions that go well with the user flow. This has been used as a basis as to support the decisions made within the maps intended usability and interaction within the map’s visual context. The list bellow summarizes the steps needed that according to Cooper et al (2014:251) are fundamental for a successful interface interaction:

- Follow users’ mental models.
- Less is more.
- Let users direct rather than discuss.
- Provide choices rather than ask questions.
- Keep necessary tools close at hand.
- Provide modeless feedback.
- Design for the probable but anticipate the possible.
- Contextualize information.
- Reflect object and application status.
- Avoid unnecessary reporting.
- Avoid blank slates.
- Differentiate between command and configuration.
- Hide the ejector seat levers.
- Optimize for responsiveness but accommodate latency.
3. Research methods

In this chapter, the methods used in this project will be discussed. The analysis of the target group, the data collection methods used, and the method used for data analysis will be described and explained. It will be followed by a description of the methodologies used in a later stage of the design process, during the prototyping and evaluating stage of the artifact.

3.1 Target group

After identifying the information problem and the research question in this project, it was necessary to start focusing on identifying whom the target group was, it is to say whom would be affected by the information according to Larsson (2014: 181). From a first observation about the Gustav Vasa association context, their webpage information and objectives, the target group was presumed as all webpage visitors that most probably had an interest about Gustav Vasa, Strängnäs history or Swedish history in general. Since the target group was a difficult one to approach due to the lack of information about whom exactly visited the webpage, it was decided to target a more approachable group that could be related and relevant to research upon.

The target group addressed in this research, consists on a selection of Swedish citizens with a cultural or historical interest that had culture as a motivation when traveling to recreational destinations. The identification and selection of participants took place prior to when the interviews were made, by asking the participants their most usual motivation for travel and where selected due to be the target group audience of this research.

The age of the participants on interviews and user testing has varied between 22 to 55 years old. The age has not been a priority in this project since it has not seemed relevant, though the intention of having such a wide age range in the participants, has been to see if there were any differences between interest or motivations while traveling. The intended design was not to be adapted for languages other than Swedish, since the collaborative partner have determined the Swedish language as a priority.
3.2 Methods for Collecting data

The data collection methods that have been used in order to get valuable information about how to collect relevant data about the thesis objectives, goals and limitations and the target groups preferences are: Participant observation (2016: 304) and personal and group interviews (Denscombe, 2016: 293) on the target group, tourist centres and the collaboration partner.

3.2.1 Observations

Shadowing (Hanington & Martin, 2016: 158) has been used under this research, as an observational method were the researcher take notes and gather information about the environment, situations and the natural behaviour of the people, without interfering directly with the situation.

The purpose to use this approach has been to get relevant data that could be used in order to know: a) if the places of interest were able to be visited inside, b) about their location, entrance and exit points c) to gather visual information about the building and its premises and, d) to observe and get an insight about the city’s layout.

Later in this study, during the prototype phase in case 5 and case 6, a participant observation method was used in combination with other methodologies in order to examine how the users interacted with the prototype, but also to see and document their first reactions. Denscombe (2016: 293) explains that there are several different approaches to observations, that can be more or less participatory and with a more direct or indirect approach. Denscombe (2016: 293) points out that the participant observation is often used as a data gathering method that can be done in the early stages of a design process as to create an understanding for the users needs, behaviour and, lifestyles and culture in their natural environment. According to many methodologies described by Hanington & Martin (2016) it can also be applied in combination with many other methods with the purpose of helping the researcher evaluate a designs usability, reaction and functionality. This by letting users interact with the created artefact while researchers make direct or indirect observations of the situation.

3.2.2 Interviews

This method was applied on the target group, the Gustav Vasa association and three different tourist centres in order to gather relevant data as a foundation for this thesis research and as to guide the decisions needed in order to continue with the next step of the research process, idea generation and prototyping. Hanington & Martin (2016: 102) explains that interviews are a fundamental data collection method to gather information about prior knowledge, opinions,
attitudes and perceptions from the customer. Interviews can be structured, semi-structured or unstructured according to Denscombe (2016: 266). In this research a semi-structured interview approach was used, since according to Denscombe (2016: 266) it is described as a structure where the researcher has a distinct subject that is going to be approached with a list of questions that need to be answered. In addition to it, this structure is described as a flexible one where participant may voice their thoughts and may develop their answers. Due to having a specific subject to discuss and knowing the importance of the target group thoughts and possible meaningful insights that might appear during the interviews, a semi-structured interview approach was used with the intention of: 1) getting a deeper knowledge about the users wants, needs, motivations and behaviour, 2) to get an understating about which visual information would be needed in order to improve the maps functionality and 3), to evaluate the target group reactions, thoughts and interactions with the prototype. Under a later phase in the research process, during the idea generation and prototyping, the interviews were combined with A/B testing, think aloud and usability testing methods.

While the interviews to the target group and association were made as group or individual interviews face to face, the interviews conducted with the tourist centers were made by phone due to lack of the possibility of time scheduling. The decision to interview other tourist centers rather than just Strängnäs was made to compare and discuss their different results and to see if the tourist behavior had a certain pattern. Denscombe (2016: 267-268) explains that while a personal interviews can be a good method to use since the researcher can focus on just one person at the time, group interviews have the advantage to increase the number and selection of participants involved in the research and thereby contribute to a greater variation of experiences and opinions during the survey.

3.2.3 Prototyping

Hanington & Martin (2016: 138) quotes “Prototyping is the tangible creation of artifacts at various levels of resolution, for development and testing of ideas within design teams and with clients and users.”

According to the authors, prototypes can vary between low to high fidelity prototypes. Low fidelity prototypes are mostly used throughout the early ideation phase or process in form of paper-based sketches or mock-ups in order to change and test during the design development. In the other hand, the high-fidelity prototypes are usually closer in appearance and functionality they are to the final product. This are basically more useful during the evaluation phase of the product since it is usually tested on users, who could now give a more complete feedback based on aesthetics, form, usability and form. The
prototypes were made in vector graphic design with a combination of both flat and skeuomorphic design, further explained and described. Spiliotopoulos et al. (2018: 1) describe flat design as a design methodology that focuses on the simplicity, bright colours and clean lines with 2D illustration techniques, whilst skeuomorphism design is described as a style that imitates familiar materials or objects to invoke a sense of familiarity in the user. Spiliotopoulos et al. (2018: 1) quotes “a skeuomorphic designs are intended to help the users understand how to use a new interface by allowing them to apply their prior knowledge about the real-world objects it contains.”

During the idea generation phase of this research, based on the results obtained from the data collection methods, it was conducted a low fidelity prototype testing, the prototype development can be seen in Annex 7. The intention with the low fidelity prototype was to identify and sort among the different design concepts that strongly engaged the interest of the users. The decision to make the low fidelity prototype testing in vector graphic design instead of sketching on paper was with the intention of directly ask the user about their thoughts and opinions with regards to how the color and style was perceived. It may seem that the prototypes in this case, were high fidelity ones due to their relative finished appearance, but neither their interaction or usability could be tested in this phase and therefore are suggested as low fidelity ones. The low fidelity prototypes made and tested on this phase were both the concepts of the different buildings or places of interest based to their historical or cultural relevance in Strängnäs, the maps style and other graphic components forms and aesthetics.

In a later phase of the research process, a high-fidelity prototype was made with the purpose of evaluate the users first reactions towards the artifact’s aesthetics, usability and interaction. This with the intention of seeing if the created design achieved the objectives intended with the map, to engage and guide the user within the maps interface. The high-fidelity prototype was also design in vector graphic design, while its interface interaction was developed in Animate CC.

3.3 Methodology used for user testing

During the prototyping phase of the artefact in this research process, three different user testing method have been used in combination with interviews and observation, Think aloud (Hanington & Martin, 2016:180), A/B testing (Hanington & Martin, 2016: 8) and usability testing (Hanington & Martin, 2016: 194). The purpose with the user testing methods with both low and high-fidelity prototypes were to evaluate the user’s preferences and behaviour towards the prototypes.
3.3.1 Think aloud testing

Hanington & Martin (2016: 180) quotes that “Think-aloud protocol is a method that requires participants to verbalize what they are doing and thinking as they complete a task, revealing aspects of an interface that delight, confuse, and frustrate.” According to the authors, it is an evaluative method that affords the researcher with a try-and-true approach to see the task process being resolved by the participants, but also to be able to identify pros and cons of the prototype or product tested.

In this research, think aloud testing has been used during both low and high-fidelity prototypes. Low fidelity prototypes, it was used in combination with an A/B testing version as to know the first thoughts about the created designs and determine which one visually engaged the user the most. On the other hand, during the evaluation of the high-fidelity prototypes, the think aloud testing was combined with a short interview and what Hanington & Martin (2016: 194) names for a usability testing. This combination of methods seemed relevant to evaluate, compare and discuss the reactions, preferences and behaviours of the users towards the maps design and interaction.

3.3.2 A/B testing

A/B testing is described as a method were two versions of the same design or concept are tested in order to see which one performs better towards the designs goal (Hanington & Martin, 2016: 8).

In this case, this method has been modified and adapted to test the intended goal, were the users had to choose between three or more concepts, and point out which one they experience as more visually engaging or interesting due to their personal preferences. The intention of this test was to determine the most visually engaging concept designed based on theoretical contexts and empiric results.

3.3.3 Usability testing

This method has been used in addition with an interview, were the user was asked some questions in conjunction with their interaction and behavior with the maps interface. The intention of using this method has been to get an in-depth information about the user’s impressions with regards to the aesthetics, interaction and usability of the high-fidelity prototype.

Usability testing (Hanington & Martin, 2016: 194) is a method used during the evaluating phase of the artifact. With this method the researcher observes and evaluates the customer’s ability to perform certain functions that are linked to the use of the artifact, in this case, the maps interface. During this time, the researcher takes notes on feedback from the users. The researcher takes notes
about which parts of the structure and interaction need to be changed or possible upcoming problems in line with what he/she observes. This method helps the researcher evaluate the users behavior towards the artifacts usability. In addition to it, it is helpful for the researcher since it can later improve the artifact and test it receive feedback and so on.

3.4 Methods for Analysing data

According to Denscombe (2016: 344) there is many ways of analysing data to help the researcher describe, explain and interpret data. As stated by Denscombe there are two terms applied in data analysis, qualitative and quantitative research. The qualitative use words or visual images to analyse and catalogue the data and its associated with the researcher’s involvement, whilst the quantitative uses statistical tests, using rather numbers to the analysis and tends to be associated with impartiality.

The data in this thesis is analysed through a qualitative research analysis method. Due to the limited timeframe for this project, the quantitative data was excluded, according to Denscombe (2016: 349), as valuable as it can be it is difficult to handle when having a limited timeframe or lack of economical or technical resources. Instead it has been focused on qualitative data collection methods, with the intention of optimizing time the best way possible but also to get a better insight about what the user needs and wants that the design needs to meet to fulfil the project’s goals.

This qualitative method has been used both to analyse the observations, interviews and prototypes made during the research process of this thesis. The interviews made during this research process have been transcribed, analysed, compared and discussed in relevance to the thesis research. In addition to it, notes taken during observations and other user testing methods, such as think aloud and A/B testing have been summarized, interpreted and discussed. The purpose with the analyse of data has been: a) to search after relevant information that could lead to an answer to some of the problem statements made in the beginning of this thesis, b) to hopefully have an insight about the target group preferences, motivations and needs and, c) to find relevant data that could help determine which theoretical path to follow.

3.5 Methodological criticism

Denscombe (2016: 264-268) describes the advantages and disadvantages of using interviews as a data collection method. While this method can offer a way to gain a more in-depth data and valuable insights from the interviewed, it can on the other hand, be difficult due to a lack of time, budget, logistical and
ethical aspects. It is acknowledged that the result from these performed methods may have been different if the amount of the participants questioned had been wider, since every person have their own interest, conditions and prior knowledge. To use a shadowing (Hanington & Martin, 2016: 158) approach, can be relatively cheap to carry out, where few resources are needed in order to perform it. However, it can be time consuming and impartial, since it is based on how the observer, in this case the researcher, experience and perceive the environment and behaviours around it. The sources referenced in this research, have been judged as genuine and credible since the authors are acclaimed as researcher notable within their field of studies and relatable to the theoretical context within this research thesis.

The interviews made were carried out with ethical aspects in mind. Research must, when it comes to people, contain an approval from everyone involved (Denscombe, 2016: 423-447). Were the participant must be informed of the purpose of the study, who is standing behind the research, that their participation is voluntary and that they can at any time interrupt or withdraw from their participation. The approval by the participant have been done verbally before the interviews took place and was informed that they would be named in the attached papers, but that no other personal information would be referred.
In this chapter a summary of the empirical studies, their research process, the methodology used for the analyse of data and the results are explained and discussed.

Below a table of the different methodologies used under the research process is presented. Their purpose and data analysis method are described as to give an overlook of the cases that are addressed later under this chapter:

<table>
<thead>
<tr>
<th>Case</th>
<th>Purpose of data collection</th>
<th>Collection method</th>
<th>Data use and analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case 1</td>
<td>To determine and identify Gustav Vasa Association objectives, goals, target group and preferences with the design.</td>
<td>Discussion, interview</td>
<td>The association interests, needs and background information shared about the historical places of Strängnäs. Qualitative analysis and interpretation to guide the next step of the process.</td>
</tr>
<tr>
<td>Case 2</td>
<td>Documentation valuable logistical information about historical places interest and user behaviour.</td>
<td>Participatory Observation</td>
<td>In order to record valuable information about relation distance between places, locations and exits of the different places of interest.</td>
</tr>
<tr>
<td>Case 3</td>
<td>Documentation of valuable data about most visited places and questions/information asked from travellers.</td>
<td>Personal Interviews by phone with three different tourist centres.</td>
<td>Qualitative analysis and interpretation were made in order to get a better understanding about Swedish domestic travellers’ behaviour and compare with next step of the process.</td>
</tr>
<tr>
<td>Case 4</td>
<td>Documentation of information about the target groups behaviours and motivation, while planning and visiting places of with historical interest.</td>
<td>Group interviews to target group</td>
<td>Qualitative analysis and interpretation of the information was made in order to understand the target groups preferences and behaviours, in order to guide the next step of the process.</td>
</tr>
<tr>
<td>Case 5</td>
<td>Documentation of user testing on low-fidelity prototypes.</td>
<td>Combination of Interviews, A/B testing and Think aloud test</td>
<td>Qualitative data analysis was made to research about degree of visual engagement and better performance in/towards the user.</td>
</tr>
</tbody>
</table>
The cases below, will describe the processes that had led to the upcoming results. They have been classified into different groups: the results from data collection methods and the results from the prototyping and evaluation tests. Below the first four cases will be explained since they are the ones which determined the organizations objectives and goals with the design and the target groups preferences. These results were needed in order be able to establish the basis on which the research resolves and in order to continue with the next step of the process, the idea generation and prototyping phase.

Case 1

This case is summarized in Annex 1, where an unstructured interview with three representatives of the Gustav Vasa association was made. A semi-structured interview was conducted, in order to get relevant information about the associations interests, needs and goals toward the design intended but also get information about the target group to whom the design would be addressed, and to determine the areas of interest and places which should be visualized. Questions made by their objectives, goals and need for the design were addressed, as a petition to be in contact under the research’s time period.

Results

The following result is summary of the discussion with Gustav Vasa organization was summarized in: a) their need of a map that visually engaged the user with the intention of promoting Strängnäs as an important historical place to visit, b) a map that showed interesting information about the places background/past events or historical relevance and c) their enthusiasm for having an interactive map that could be displayed on their webpage.

No suggestions about the visual content was required or requested at this point, since it would have to be tested on the target group and based on relevant theoretical context.
Analysis and discussion

Due to the information documented during the group interview, it was analysed as a qualitative data and used as to guide the next step of the research process. The impressions gathered under the discussion, were that even if the associations interest led to focus on Gustav Vasas character (former king of Sweden of the 1500 hundreds) and period of time, Strängnäs municipality has a wider range of interesting historical heritage, that was interesting as well as to achieve their objectives. The map would essentially work as a tourist map showing historical places of interest that did not specifically had to do with Gustav Vasas character or period. Instead it would gather a handpicked place by the association, based on the places that they experienced as fundamental and interesting due to their historical and cultural background. The output from the discussion was used a basis for the research of this thesis.

Case 2

For each observed place, notes were taken.

An observation of the premises of Strängnäs municipality was made with help of a list provided about by the Gustav Vasa association. This list provided names and addresses to historical and cultural places of interest within Strängnäs. Prior to the observation was made, a planning and scheduling of the visit was made in order to visit the places while open to the public and collected and submitted in Annex 2.

Under the observation it was noted about if the places entrance were accessible or not, were they were located and opening hours if they have them. Every place was recorded by taking pictures of them and their surroundings. It was also noted the approximately amount of people located and their behaviour.

Results

The conclusions from the observation done in Strängnäs municipality were:

1. Most of the places weren’t accessible for the visitor with exception of Strängnäs church, Grassagården and finally the Windmill and Roggeborgen with needed previous booking.
2. The only place with displayed opening hours was Grassagården.
3. The maps provided and displayed around Strängnäs municipality were lacking visual information about how the places of interest look like and how to identify them.
4. The most amount of people was concentrated around the church, Gyllenhjelmsgatan, Grassagården and the townhall (rådhuset). A personal reflection as an observer was that these last-mentioned places were in a relative short distance to the town’s main street were shops,
coffee shops and restaurants are located. The church in this context was where the biggest amount of people was.

5. The observed people gathered in the church was of all ages, from toddlers to elders. Some of the observed people were perceived as tourists or at least new to the surrounding since they had both maps and were accompanied with a church guide. It was noted though, that the people surrounding these places took pictures.

Analysis and discussion
The relevant information gathered from this method was: 1) documented visual information of the different places, 2) if the interior of the buildings were accessible. While significant information was gathered to get a better understanding of the premises and area to visualize, other data was not deemed as relevant for this research. The amount of people in each place was not determined as a relevant data, due to the chance factors and lack of statistics. In the other hand, a common behaviour was documented and used as a former idea in the design. The behaviour observed in the people was the need or use to document visually the place of interest by taking pictures.

Case 3
In this case, semi-structured interviews by phone, were made to Eskilstuna’s, Västerås and Strängnäs tourist centre management. The purpose with these interviews was to gather data about visitors most frequented places within the counties and most frequented questions. The data presented below are the question made during the interviews, their answers are archived in Annex 3.

1. What is the most visited season in your cultural or historical places of interest?
2. What are the most attractive tourist places based on the amount of people?
3. What are the most common questions you get from tourists?
4. Where do most of the tourists come from? Domestic or foreign?
5. How do the tourists search for the information themselves, is it via your website, the physical tourist centre etc?
6. Do you know what motivates visitors to your tourist destinations?

Results
The results presented have been taken in consideration and compared to the results collected from the next step of the process described in Case 4. A conclusion was made by the most similar answers, and summarize bellow:

- Most visited seasons: Mid Maj until mid-September.
- People who visit the most: Mostly Swedes but also a variety of foreign travellers.
- The most visited places in order according to the Interviewers order or preference:
  1) Zoos or aquatic parks
  2) Historical or culture Swedish places with strong historical background
  3) Wildlife areas
- What the users ask more about in order of relevance:
  o “must to see” places
  o Locations, addresses.
  o about seasonal or weekend events in the area.
  o Opening hours

Analysis and discussion
The data collected from the tourist centres gave relevant data about what the traveller usually asked for during their stay or visit to these places and later compared to Case 4, where the target group was interviewed. Besides the already mentioned, the interview with the Strängnäs tourist centre, gave also an insight of the places that were most frequented in Strängnäs municipality. Due to the visitor’s different motivations to travel (nature, sports, cultural etc), the data gathered about the places that were not known for their historical or cultural relevance were excluded due to their lack of relevance within the map’s functionality.

Case 4
The interview was made to eight people between 22 and 55 years old with an historical or cultural interest, and specifically with a tendency of traveling for such reason. The way in which the group was chosen, was by asking multiple people about their main motivations of traveling. The methodology used was as group and individual semi-structured interviews. This case is transcribed in Annex 4 where the full answers can be read. This step of the process was intended as to get a in depth information about the target groups motivations, preferences and behaviour while leisure traveling. Below a list of the questions made is presented and later summarized.

1. What was the last leisure trip you did in Sweden?
2. Do you plan your vacation or travel to a location, in that case what do you do?
3. What is the information you seek or are most interest to know about when you visit of place of interest during your travel?
4. What would you describe is your motivation to/for travel?
5. Where do you find or search the information you need to the places you want to visit?

Results

The results obtained were:

1. More than a half of participants had visited municipalities near the capital such as Uppsala, Västerås, and Stockholm due to its interesting cultural and historical background.
2. Most of the participants responded that they usually planned beforehand, by searching for the information needed in order to get to the place of interest and its location.
3. The information most searched for according to the responses were:
   a. “must to see” places in the area.
   b. overall information of the place they intent to visit (opening hours, address, telephone and webpage).
   c. Google maps or other maps for navigation.
   d. Search for pictures of the places they would like to see.
   e. Transport and sightseen tours.
4. The people interviewed responded that their motivation to visit historical and cultural places of interest were due to their need of experience new things and discover new places.
5. The most used tools for searching data according to the user’s responses were Google maps for navigation and mapping purposes or by “googling” information about the place of interest in different databases.

Analysis and discussion

These interviews gave relevant data about the motivations and intentions of the target group while traveling and gave information about their behaviour before and during their stay while traveling to historical places of interest. It gave also data about what kind of information the target group usually search for and needed in order to engage them to stay in the same page instead of searching in different databases. The data gathered and used from this case was: a) their main motivation for traveling was to discover and experience new things, b) Their need for knowing the distance in relation with the hotel and other places of interest and c), opening hours, address and contact information. This method gave enough data to begin with the idea generation phase of this research and prototyping of the different elements needed in order to achieve the target group’s needs, explained in Case 5 and Case 6.
The cases presented below (Case 5 and 6), describe the methodologies and results obtained during the prototype development and evaluating test. These two cases were possible thanks to the data collection methods made prior and already explained above. Case 5 reflects upon the tests made after the first visual concepts were produced. These concepts are described and explained under the analysis and discussion of this case. In addition to the results obtained under the test made in Case 5, a high-fidelity prototype was made and tested in the target group, explained in Case 6.

Case 5

A semi-structured interview was conducted in combination with think aloud and A/B testing methods to six people between 22 and 55 years old. This in order to evaluate the first concepts made with the purpose to determine the target group preferences and which concepts accomplished the desired response, to visually engage. The designed concepts were the outcome of the results obtained from cases 1, 2, 3 and 4 in combination with relevant theories that supported or lead to how produce visually engaging designs. The concepts were based on trying to achieve emotional levels of design described by Norman (2005) and with use of visual metaphors (Cooper et al. 2014: 301).

The style chosen to visualize this concept where based on a combination of flat and skeuomorphic design, explained by Spiliotopoulos, Rigou & Sirmakessis (2018) as design styles trendy in User Interaction (UI) design nowadays and described as styles that visually engages and motivates the users interest in interacting with interfaces. Since the style and the feeling of the concepts were decided, concepts in vector graphic design were made since the beginning, the evolution of the concepts can be seen in Appex 7.

Five of eight illustrated places were tested. The places were visualized in four different concepts each and visualized by: 1) their physical representation, 2) the building´s roof, 3) the building´s entrance and finally 4), by an event or functionality made with Cooper et al. (2014: 301).

Not all the concepts could be visualized due to their function or by significant event, since many of them were interesting solely by being well preserved. In this case it was decided to follow another approach, were significant or physical characteristic aspects of the area or building would be visualized instead.
In the other hand, the visualization of the map itself, were based on Cartographic visual theoretical techniques found and supported by ICSM and ICS organizations oriented in cartography (map visualization and communication). The maps design (see Fig 3) was based on the results of Case 4, were the interviewers responded that Google maps was their navigation system preference and the already mentioned theoretical context. According to the target group, they liked to use Google maps in order to navigate and locate places of interest due to their experience with the system and understandable functionality. This representation of the map was supported by ICSM (2018) and ICS (2019) description about why maps where visualized from an above (bird view) perspective. According to them, this kind of visualization is easier to read and understand by users since the scale that determinates the relationship between the distance of the map and actual distance between places are easier to comprehend. These facts seemed relevant as to accomplish the map’s objective of visually guide the user to the different places. The purpose of this test was to get information about how the users experienced the maps aesthetics instead of its representations in addition to, know if the intended overall feeling was achieved. The feeling that was tried to be transmitted through the design was one of curiosity and nostalgia. This with the purpose of achieving what Norman (2005: 83-84) describes as a reflective level of design, that consists about the personal remembrances something evokes in the user and in how it can be used in a way to strengthen user engagement.
Results

The Visceral level of design, measured by the concepts that were chosen due to what the users perceived as more aesthetical pleasing, were the ones with high colour saturation and contrast. It was also concluded, that the concepts representing the places of interest, were chosen due to their remembrance to certain places that the target group have previously visited but also the feeling of curiosity that these visualizations provoked. The concept chosen of Strängnäs cathedral, Roggeborgen and Strängnäs windmill (Fig 4) were the ones below, by 4 of 5 people. The concepts are the showing the roofs (Fig 4). 

The most repeated comments were: “I want to know what that building hides” to “it makes me want to visit it and see for myself how it looks like”.

Fig 4. Results from concepts.
The *Grassagården* (Fig 5) concept were chosen due to the feeling of “cosiness” that they evoked and personal remembrance associated with excursions made in childhood or with family.

![Fig 5. Grassagården.](image1)

The town hall (rådhuset), the customs house (tullhuset), Lillagatan and the Gyllenhjelmsgatan (Fig 6) were not tested until the high-fidelity prototype of the map, explained in Case 6, was made. Unlike the rest of the concepts made until now, these were based on representing the most characteristically architectonical aspects of the places, due to their limited background story and truthfulness about significant events.

![Fig 6. Gyllenhjemsgatan, Town house, Lillgatan and customs house.](image2)

The reflective level of design was measure by the personal remembrances they evoke and how it made the users feel. According to Norman (2005: 83-84), the stronger the positive feeling a design evokes, the greater the interest will be to interact with it. The feelings aroused by different concepts were experienced as positive, since the users perceived the concepts as fun and visually appealing to look at, interesting and to recalling childhood memories. The maps guiding visualization purpose was perceived as easy to understand and to follow. Its style, colour and form were perceived as interesting and associated with tourist maps and to old maps found in atlas. The overall perception of it, was as visually engaging because of its old looking style accentuated by the cursive...
typography. At this point the typography chosen was due to accentuate an old looking feeling and later used to strengthen the visual narrative.

Analysis and discussion
The data analysed were mostly done by observing the users first reaction towards the design, asking them about their feelings, thoughts, memories or associations awaken by the most relatable concept. This with the intention to evaluate the visceral level of emotion that, Norman (2005: 67) describes as what appeals to our initial reaction towards a products appearance and can be tested through observing the user first reaction. Norman (2005:67) explains that this level of connection studies the engagement of the senses. It is to say, that the stronger the reaction, the bigger the engagement will be. In addition to it, the already explained reflective design (Norman, 2005:83-84) would also be tested in order to measure which concept achieved a stronger level of remembrance and be used in order to visually engage the user as well. The purpose of this analyse data, would be to use the result as an input to decide upon the next step of the process, as well as to guide and determine some aspects of the decisions of the design.

The prototype concept was made by a mix of different travel agencies webpage and navigation concepts such as TripAdvisor and booking.com. The prototype was intended to be associated with modern navigation and way showing systems oriented to a general public.

Case 6
This case summarizes the high-fidelity prototypes test made and its results. The test was conducted on three people within the target group, between 27 and 45-year-old. The users were asked to interact freely with the map while explaining their thoughts aloud (think aloud test), while being observed and later interviewed. After the interaction with the maps interface, a few questions were asked corresponding the feeling they got about the interface functionality, aesthetics and usability.

1. How do you experience the aesthetics of the design?
2. What brings you the strongest visual attention in a map? (rank them)
3. How have you experienced the behaviour of the interface? Have you experienced anything as difficult or challenging to understand to use? And in this case, what and how would you like to be changed in order to achieve the desirable response?
4. Is there anything that bothers you about the aesthetics, layout or interaction?
5. What is your impression of the design? Does it make you feel or remember something, and in that case what?

Results
The results from the high-prototype test conducted (Annex 6), concluded that some elements of the layout of the map needed to be changed in order to succeed.

A summary of the responses is presented below:

1. Appealing and playful due to the colour scheme, style and form.
2. The legend visualized on a piece of paper concept, followed by the buildings and the headline.
3. The text shown when hovering on the buildings, drew most the attention since the information indicated something of interest without showing too much. The less liked was that there was no information whatsoever that indicated that they could interact with the legend.
4. One of the participants highlighted the need of strengthening the indication of which building they had clicked on, in relation with the information that appeared on the left side of the map.
5. It was an overall positive impression, that the users associated with past travel experiences and associated with treasure hunts maps and amusement parks, where something exiting could be experienced.

Analysis and discussion
The combination of observation, interview, think aloud and usability testing, was used in order to evaluate the user interaction and behaviour towards the map’s aesthetics and interface interaction. The results made by this test, were
implemented and its results concluding in the prototype further explained and described under Design.
The results obtained from how the maps aesthetics were perceived and experienced were overall positive, indicating that the colours, style and forms implemented were perceived as visually pleasing and engaging. Though, some elements would be needed to be changed in order to have a better visual hierarchy between elements. The usability towards/with the map were perceived as positive since the participants responded as to being easy to understand its use. Though, some changes within the interaction had to be made in order to create a stronger indication of some functions within the maps interface, in this case the use of the legend. This few inputs from the hierarchy were addressed and change in order to improve the design and to optimize the user experience.

Results relation to problem statements
At the beginning of this thesis, it is mentioned which questions are needed to answer in order to being able to achieve the needed results to accomplish the design expectations, objectives and goals. Bellow a list will describe and explain the results in relation to the problem statement. The methods used in this thesis and the results from them are showed, to explain what data had been used in order to guide the next steps of the process towards the artifact’s design.

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Problem statements</th>
<th>Methodology</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visually engagement and motivation</td>
<td>What historical or current events could motivate the users to choose Strängnäs as an interesting vacation or traveling site?</td>
<td>Interview with Gustav Vasa association (Case 1).</td>
<td>Places and interesting events were chosen and provided by Gustav Vasa association. That list is summarized in Annex 1 and compared to the places mentioned from the Tourist centre in Strängnäs.</td>
</tr>
<tr>
<td></td>
<td>Which preferences or motivations had the users during traveling or visiting different cities?</td>
<td>Interview with Tourist centres and Target group (Case 3 and 4)</td>
<td>Their motivation was: To discover something new or different by describing or seen something different or totally specific from the place in question.</td>
</tr>
<tr>
<td>Question</td>
<td>Information Needed</td>
<td></td>
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<td>-------------------------------------------------------------------------</td>
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</tr>
</tbody>
</table>
| What information would be needed to be displayed in the map in order to fulfil the targets group needs and wants? | - Visualization of the different places of interest location and their address.  
- Opening hours and entrance costs.  
- Visual Information about the hotel’s location.  
- Distance measure.  
- Parking locations and green areas.  
- Photos done by other travellers. |
| How should the information be shown in order to make it more appealing to the users? | Use of theoretical context.  
User testing: Combination of interviews, think aloud and A/B testing (Case 5).  
- Emotional design and visual rhetoric to visually engage the user through compelling visualizations and narrative.  
- Interface perception theories and storytelling techniques to create a compelling visual narrative and interface interaction that is easy to understand, follow and use by the user.  
- Results from user testing explained under Prototyping and evaluation results. |
| Guiding purposes                                                        | How to visually guide the using according to cartographic techniques?             |
| Use of theoretical context and user testing (Case 5)                    | - Cartographic theoretical context on how to best visualize a map due to its functionality. |
5. Design

This chapter describe and explain the design culminated from the results gathered through the data collection methods and user testing.

The visual content to be displayed on the map was based by the results from the interviews done to the Gustav Vasa association, the tourist centres and the target groups (Case 1, 3 and 4) transcribed from Annex 1, 3 and 4 and based on theoretical context. Finally, this result culminated on a series of different design concepts that were tested (Case 5) on the target group and chosen and applied on a high-fidelity prototype (Case 6) where in order to evaluate the user behaviour towards the design aesthetics and interaction.

The overall feeling that the design was intended to accomplish was of discovery and personal involvement (see Fig 8). This decision was made due to the responses about what motivated the user to travel to historical/cultural places and interpreted as a goal to help engage the user through the designs visual content.

Fig 8. Design.
5.1 Form, style and color

The overall style or technique used in this design was: vector graphic design in a flat and skeuomorphic style combination. Spiliotopoulos, Rigou & Sirmakessis (2018) describes both design styles, as two main trends in the User Interaction (UI) design nowadays.

![Fig 9. Finished concepts.](image)

Since they are both trendy at the time and used by designers due to the results in engaging and motivating the users interest in interacting with the interfaces, it was decided to use a combination of them two and the results made by Spiliotopoulos et al. (2018) research.

Bergström (2016: 261) points out that, colours play a big role since they create a “mood” (feeling or emotion) and can visually attract the viewer. The colors used in the design, were chosen due to creating an old looking feeling and good contrast in relation to the different graphic elements in order to be visually distinguished. This was achieved by having a warmer color scheme in the maps background (Fig 11) and a cooler color scheme in the building visualizations (Fig 9). It was accentuated by a warmer effect created on the maps surface and positioning the building concepts over it as to give them a subtle contrast.

Places of interest

The places of interest visualize on the map are the result of: a) the use of flat design b) cognition and perception theories that justify and explain how to visually engage and persuade the user and c), by user testing evaluation (Case 5).
The concepts for the places of interest that needed to be visualized were supported by cognitive and perception theories. According to Larsson (2014: 199), images create a greater effect on the user than just text. In this case, the visual representation of the different places was initially designed in different concepts that were based on the buildings physical appearance, their most significant standout exterior characteristics (since most of them couldn’t be visited in the inside) and by their functionality or main significant event (Case 5). The designs (Fig 10) were intended to achieve a stronger visual engagement through a visceral level of design (Norman, 2005: 67). According with the results gathered from Case 5 and 6, the intended objective was accomplished using clean simple forms, colours and effects. The concepts used in this design, were the result of what the users experienced as more visually engaging and interesting.

The maps guiding visualization
While a flat design style was used for the visual representations of the places of interest, a skeuomorphic design was used in the maps visualization (Fig 11), the legend and the revealed photos visualization concepts. In this case it was chosen to visualize the map and the graphic elements already mention, with the intention of achieving what Norman (2005: 83-84) describes as a reflective level of design, it is to say, a design that evokes the personal remembrance within the user.

The visualization of the map was based on what ISCM (2018) and National Geographic (2011) support being the best way to visualize a map depending of guiding and distance relation purposes, where the layout is showed from above. This with the intention of creating a resemblance with tourist maps and Google maps visual representation, that is according to the target group, the navigation that they most usually used.
Other visual graphic elements

As already explained, the results gathered from the interviews of the target group (Case 4) and tourist centres (Case 3), concluded in the need of including information about hotels and parking locations. This in order to accomplish the target group needs but also due to the maps functionality and usability to search, find and understand where different places of interest to the user were located. It was decided to create a legend to show where these places were located in the form of a ripped piece of paper (Fig 12). This design was intended to accentuate the overall feeling of discovery and personal experience or involvement in the user. The same decision was made due to the visual representation of the two revealed photos in the left corner (Fig 13). This concept was based on the results made from the observed user behaviour (Case 2) and response from the target group (Case 3), about making pictures while traveling, something that could be associated with the action itself, and with the need of the target group to see how the actual place or surroundings looked like.

Both concepts are made in skeuomorphic style, a design that uses visual metaphor in order to mimic everyday things. The concept design intention was to be associated with what the traveller does: taking pictures and sharing them. Since the trendiest and second most used social media in Sweden is Instagram according to surveys done by The Swedes and the Internet by Internet.
Foundation (2018), it was decided to make it look alike to an Instagram post that the user could associate with.

The symbols used and located in the legend, are found in many map visualizations, used as to pinpoint places of interest. Since they would be accompanied with text as well, there purpose would serve as a visual reference for the user, to highlight where the locations of those places where. In addition to it, they were chosen to be designed that way with the assumption of that many people would identify them from previous knowledge, since they are common to see in maps. The icons situated below the photo are related to the media that is trying to mimic, Instagram.

The idea of visualizing a digital map in a style and form that resembled a paper map instead, was due to achieving what Norman (2005: 83-84) describes as reflective design, explained under Case 5.

The overall feeling intended through these concepts were to transmit curiosity and a feeling of nostalgia. This intended to be achieved by the assumption, that certain products could be associated by the traveller, such as, photos and personal notes.

5.2 Text and narrative

The text was provided by Gustav Vasa association, summarized and transformed to a what was intended as a narrative that would give the user a “sneak peek” of what the place of interest could offer. The narrative created by visual and written content has been intended to persuade the user of the contents truthfulness and veracity and to engage the user towards and through the content itself. According to rhetorical theories, explained by Lindqvist
there are certain persuasive means that can help persuade the audience if we use them in our speech, text or visual content: ethos, pathos and logos.

The rhetorical concept ethos is applied in conjunction with visually graphic elements and within the text. The use of Strängnäs municipality shield of arms besides the descriptive headline, is used to support the veracity about the visualization and location of the place shown and described in the maps interface (Fig 14).

The ethos (Lindqvist, 2016: 82), concept is also applied and supported visually when the place of interest is clicked on and both its picture and descriptive text is showed (Fig 14), strengthening the trustworthiness of the visual information. The pathos (Lindqvist, 2016: 82-83), concept has been intended with the use of both narrative voices and the style use in order to create a feeling of discovery and personal involvement. The narrative voices used were:

The first-person narrative voice (Abbot, 2008:1567) where the visual narrative is to be interpreted through the handwritten notes while hovering over the places and, in the other hand, by the map’s graphic content resembling things we travel with or could be associated with traveling like the map, photograph
and list (according to results of Case 4). According to the results obtained from Case 6 and archived in Annex 6, the use of this first-person narrative voice engaged the user interest.

A second narrative voice is also found in the design, in the form of a third person omniscient narrator voice (Abbot, 2008:1568), that rather gives voice about the facts of each background story from the places of interest. This third-person narrator is used in order to make a more appealing narrative, that engages the user through giving it access to relevant knowledge about the most interesting aspects of each place or events of their story (Fig 15). This background information, as already told, has been provided by Gustav Vasas association based on what they as experts has seen as relevant. The content structure has been modified in order to create a more appealing approach through *ethos, pathos and logos concepts*. The use of this third person omniscient narrator voice supports both *pathos and logos* (Lindqvist, 2016:83) rhetorical concepts, where results proven to work as to engage and persuade the audience about the visual and textual content.

![Strängnäs Väderkvarn](image)

Fig 15. Reference to *Pathos and logos*.

Storytelling theories have been used in order to help lead the visual visual narrative in order to be comprehensive and structured. In order to describe how the maps narrative should be interpreted, it will be explained bellow with the help of Freytag´s dramatic arc:

The visual dramatic curve (Granath, 2006: 104) followed in this design has begun by an *Exposition*, explained as the introduction of the design and its first impression according to what it is meant to represent, a map and it´s functionality. The aesthetics of the map in this case has been used in order to create a visual narrative intended to give the user a clue about what the map is
about and to visually engage the user. The *Rising action* begins when the user reads about where the area of the map corresponds to, and visually gets information about the functions and the information the map has to offer. The *climax*, in this case is found when the user clicks on the buttons and gets a direct response back, in form of a descriptive text and image that leads the user to the *falling action*. This stage corresponds to when the user interacts with the information offered in form of the text and images. Part of the narrative is intended to be finished by the user itself by visiting in person these places of interest. It is why the *denouement* is not explained or tried to be explained in this narrative, since it is intended to be finished by the actions and experiences of the user itself.

### 5.3 Typography

The typography used in this map was both serif and script. The typography used has been used in different fonts and sizes due to creating a better hierarchy of the elements but also to highlight the different narration voices. According to Hellmark (2006: 25), there are factors that can convey a better readability or legibility. The author points out that the correct use of colour and font size, can give a better emphasis to the background and can mean a better readability and legibility.

Serif was used in the information background text for every place, streets and title texts due to their high level of legibility and readability (Bergström, 2016: 129). In addition to that, it was used as a mean to create a certain old feeling that would hopefully make a better congeniality with the maps style and strengthen Strängnäs old historical context. The latter supported by what Bergström (2016: 122) explains about how letters are good at telling and creating a certain mood.

![Strängnäs Väderkvarn](image)

*Fig 16. Typography.*

In addition to Serif, Script were used where the mouse hovers through the maps visualizations (Fig 17), the maps legend (visualized as a piece of paper) and on the visualization of the older revealed photos. Script typography was used due
to make a difference in a) the storytelling voice, b) create a better contrast and hierarchy and, c) to better associate certain elements with their respective context.

![Map Image](image)

**Fig 17. Script.**

### 5.4 Interaction and usability

*Although the focus of this thesis research has not been the study about how interface interaction could be used as a method for visual engagement, it has been required to develop certain basic aspects in order to: a) give the user an idea of how the map itself could work, b) how the different elements would interact with each other and c), how the different graphic elements when interact with, would be perceived by the user.*

Fundamentals principles of interaction by Norman (2013: 10) have been used in order to create a basic interaction within the maps interface, in order to evaluate the user’s perception towards the different graphic elements when being interacted together. The **affordance** in this design have been identified, as the maps visual representation. The maps visualization has been assumed to be understood by western population, since they are often illustrated in a 2D or 3D perspective from above. This supported by headline message that speaks about its functionality and area of visualization. The **signifiers** are represented textually in this case, by the introductory text found under the headline and the legend, signifying the possible use within the interface. The **mapping** or relation between the different elements are mostly related to when one of the visual elements of the map or legend are clicked and a complementary text and picture is presented. Both text and picture are in relation to the visualization clicked and accentuated by the visualizations illuminated background. Both **constraints** and **feedback** are correlated to each other in this design. The constrains identified as being the lack of feedback, outside and within the maps interface. This are classified in both **semantic** and **logical constraints**. The semantic constrains (Norman, 2013: 129) are explained as the constraints that rely upon the knowledge we have of the situation we are in, in this case the visualization of the places of interest and the absence thereof of other elements, limiting the users action to only them. In the other hand, the logical constraints (Norman,
2013: 149) are quoted as “[...] the logical relationship between the spatial or functional layout of components and the things that they affect or are affected by”. In this case, the logical constraints are identified as the limited functionality or interactions possible outside the maps interface, it is to say not being possible to interact with the white or space area outside the maps design. The feedback is identified as the reaction generated by the hovering over function and the response made by clicking the buttons (showing text and picture). Finally, a conceptual model (Norman, 2013: 25) is described as the ability we have assigning meaning to things, it is to say, how we understand the relationship between what the model represents, its function and outcome (Norman 2013:99-100). The icons visualized in the map’s legend, signifying with help of text what each icon represents, could be described as a conceptual model that we can identify with previous use of navigation systems as Google maps. The maps visualization is also identified as a conceptual model understandable by the user according to tests made and explained in Case 5.

In addition to the already explained above, it has been used a list about different strategies described by Cooper et al (2014: 251) needed in order to create effective interactions that go well with the user flow.

The fundamental principles of interaction (Norman, 2013) in combination with Coopers list of interface design strategies, resulted (Case 6) in an understandable interface functionality by the target group and easy to interact with.

5.6 Layout
The layout of the different graphic elements has been designed and positioned in order to create a good balance in hierarchy and colour between the different visual elements, in addition to create a more understandable and compelling visual narrative. According to Bergström (2016: 235) a practical and logical layout is required to make the user understand and follow the reading direction of the contents. The information is structured in three different vertical columns with an asymmetric composition, that according to Bergström (2016: 233), can help achieve a dynamic feeling, where no vertical or diagonal axis exists. This has been achieved by the position of the different graphic elements and by their contrast in shapes and colours in relation to them.
The visual hierarchy (see Fig 18) of the different visual contents in the design, have been made by a) using *gestalt principles* of design (Ware, 2012: 181), b) by using sharp contrast in colour against different graphic elements and the background and c), by using different typography sizes and thickness. Carter et al. (2007) explains that a visual hierarchy is achieved by the arrangement of different elements from the most prominent to the least prominent, but that also the spatial relationship with other elements can influence an elements importance towards each other.

The header found on the top left, received a larger font size and a brighter color with the intention to give it a bigger attention in relation to the rest of the text found when being introduce at first to the maps design. In combination to it, a graphic element in bright red, has been arranged in order make the eye focus towards that part of the design. The introductory text beneath the header, has been arranged just under it, in a smaller font, towards a darker background, to guide the viewer attention to it as a visual thread to follow.

The revealed photograph design and legend in the form of a piece of paper, has been intentionally made in a white background in order to both represent the texture associated with the real products appearance but also to deliberate distinguish them to the rest of the graphic elements. This in order to signify the user about their different functionality towards the rest of elements displayed.
To not jeopardize the hierarchy between the different elements, it was decided to just show the information that was requested when the user clicked on a certain button. It is to say for example, to just show the parking spots icons on the map surface when once clicked in the legend, but now showing them otherwise, as to not jeopardize the hierarchy between the rest of the elements displayed on the map. The same occurs while clicking on the places of interest, the information displayed from the legend disappears and the information corresponded to the visualization, highlights on the left by both visually and textually. This created in order to make a better hierarchy of the information that the user perceives while interacting with the maps interface. Finally, the information that turns up while clicking on the places of interest, are positioned on and under the introductory text that welcomes the user when meeting the map at first. This decision to place both picture and the background story corresponded to the visualization there, was due to the lack of space in certain areas of the map, but also placed there as a visual guidance where the user could predict where all the information corresponded to the visualizations would be.
6. Conclusion

The research study, that has been described in this thesis, was carried out in order to answer the following questions: How can the visual content of a digital map be designed, in order to make it both visually engaging and guiding? How can a cultural map of Strängnäs be illustrated in order to motivate the user’s interaction based on the maps aesthetics?

Based on theories and methods, the following conclusions have been drawn:
The use of graphic elements that resemble real-world objects in our everyday life, induce emotional connections in the user and leads to a deeper engagement with the design. To illustrate some architectonical aspects of the places of interest, are perceived as more interesting that to illustrate the whole of it, due to be perceived as a visual clue that the user might want to discover for himself. The application of both rhetorical and storytelling theories in the visual and textual context, creates an engaging, understandable and persuading visual narrative that leads to the users interaction within the maps content. To visualize the maps layout from a 2D, bird-view perspective, makes distance between locations and the location of the places of interest, easy for the users to understand. Colour, style and form can be used in order to, influence the viewers interpretation of the aesthetics towards a certain feeling, and to strengthen and lead the visual narrative. The users attention can be controlled by emphasizing certain graphic elements, by the use contrast-rich elements and by the feedback generated while interacting with the interface.

Discussion

The collaboration of the Gustav Vasa association in this project has been in order create a functional and engaging digital map design of Strängnäs. Through the collaboration with them, I have strived to make a design that both fulfilled the target groups needs and preferences when searching for information before and while their travel and, the associations requests and needs for the design. The results collected during this research have been seen as relevant if wanted to be used in other design media applications, such as mobile applications or in printed media. The results made about how visual engagement can be achieved by multiple cognitive and perception theories and user testing, are experienced as a helpful guide to be used in other researches with similar objectives or goals.

It is acknowledged that the reliability of this work could have been better or more accurate if more time have been provided. In addition to that, a use of a
quantitative data methodology could have provided an impartial data source, instead of personal interpretations of the collected data as done in this research. However, a combination of both would have been the best approach since the target groups personal opinions, comments and thoughts have also been seen as relevant under the research of this thesis.

In conclusion, the methodology, theoretical context used, and its resulting design has been interpreted as a way the design “can” be performed and accomplished. Moreover, it is intended to be developed accordingly to the feedback gathered when been sent live on Gustav Vasas webpage.
References

Printed sources


**Electronic sources**


**Image reference**


Fig 2-28 – Patricia Rodriguez. (2019).
Annex 1
A semi-structured group interview with three members of Gustav Vasa association composed by, Monika Eriksson Bertilsson (Leader/ spokesman for the association), Kalle Borg, secretary and Bertil Stensgård, resource person. The interview was carried out in Expresso house, Strängnäs the 21/Mars-2019, between 11:00 and 13:00. A list of questions was previously planned, since some aspects as the associations need for the upcoming design, their objectives, goals and requirements, needed to be defined.

Two weeks before the interview, I contacted the organization based on a publication they had made, in which they reported about the need of a digital map on their website. From this point, an interview with the organization was scheduled.

1. How you describe yourself as an organization and what would you say are your main responsibilities?
2. What is your need for digital map? Is there any room for a printed format?
3. What is the reason for the map?
4. Which do you consider is the purpose of the map?
5. What is the target group intended?
6. What is the intended goal?
7. What kind of information do you want to show on the map?

During the first hour and half of the interview, just Monika Bertilsson was present. The other two members came in and discussed the questions made, supporting the data already answered from Bertilsson´s interview.

1. “We are a non-profit organization, supported by donations mostly made by private sectors but also by Strängnäs municipality”. Bertilsson, explain that as their organization´s name indicate, they are composed by people that are highly interested and learned in Gustav Vasas life and the period between 15th and 17th centuries. Their responsibilities are defined as “to promote Strängnäs history background”.
2. The need of a digital map was because of their lack of a physical place where to distribute them and their intention of making an interactive
digital map instead that according to them, seemed as a more modern approach and appealing for a younger target group.

3. “Our need for a map comes from the lack of one that shows Strängnäs many historical/cultural places with an information background and that It is also visually engaging”. Bertilsson explains that Strängnäs municipality have a tourist map of the area, but that it is not, according to them, appealing or informative. After this answer, the map of Strängnäs municipality was searched for and shown to the interviewers as to help them point out the what they experience as shortcoming. The map showed below is the one they talked about and furtherly discussed:

Their comments were: “It doesn’t look appealing to me, it’s boring and overcrowded” (Borg). “The textual information has no structure and the visual information is unappealing” (Bertilsson). Bertilsson emphasize then, the goal of the association to make information interactive and aesthetic appealing in order to engage users.

4. “to focus about the touristy supply about Strängnäs and Swedish history, culture and environment in the spirit that characterized the 15th and 17th centuries” (Bertilsson). According to Bertilsson and Borg, the aim consists in catching the attention of a younger target group and to teach them about interesting areas and events around Strängnäs center. They also want to appeal to an older target group who is interested in deepening in Gustav Vasa’s time.
5. When asked for the intended target group, they answer are very different. Bertilsson implies that it should be applied on students in “my age” and younger, Borg and Stensgård highlights the need of targeting a group that visits the associations webpage but also a younger target group, referred as “younger than them”. It is decided after much discussion, to consider people who has any interest on history or Swedish culture, since it is them that are most likely to visit their webpage. This with regards of targeting a group between 18 and up.

6. Bertilsson, Borg and Stensgård agree that the objective and goal with the map is: To have a digital cultural map of Strängnäs that is both informative and engaging to look at, where a background information of the different places can be read about. This with the purpose of promoting Strängnäs as an interesting place for tourism.

7. At least two information levels, one where the place of interest is shown and another about their background story.

At the end of the interview, a list with the places of interest was provided by the association, and later a background information of each of them. The list below contains the places of interest chosen to be visualized:

- The customs house (tullhuset)
- Strängnäs Windmill (väderkvarnen)
- Strängnäs Cathedral (domkyrkan)
- Strängnäs Town hall (rådhuset)
- Grassagården
- Gyllenhjelmsgatan,
- Lillgatan
- Roggeborgen

Annex 2

The observation made in Strängnäs municipality was made specifically in the centre of the city in regards with the list provided from Gustav Vasa association. The observation was made from 11:00 a.m. until 16:00 p.m., with a previous planning of the material needed to use, consisted on a digital note pad, a camera, the tourist map found in Strängnäs municipality webpage and the Gustav association provided list. The observation started in Strängnäs town hall and ended in Strängnäs windmill. The notes taken under the observation are listed below:

1. Most of the places weren’t accessible for the visitor with exception of Strängnäs church, Grassagården and finally the Windmill and Roggeborgen with needed previous booking.
2. The only place with displayed opening hours was Grassagården since it is run by a private company also responsible for the windmill opening hours that are not accessible yet until the beginning of June.

3. It was determined from a personal experience as an observer, that the different location could be more or less difficult to find, mostly because the list provided hadn’t a description of the building or a picture of it. The most difficult building to find was the customhouse (tullhuset).

4. Regarding the surroundings of the places, it was found in some of them an information display poster with written and visual information about its background history.

5. The amount of people in this place varied from none to several dozen within the time frame I stayed and observed, between 10 to 25 minutes by place. The most amount of people was concentrated around the church, Gyllenhjelmsgatan and the townhall (rådhuset). A personal reflection as an observer was that these last-mentioned places were in a relative short distance to the town’s main street were shops, coffee shops and restaurants are located. The church in this context was where the biggest amount of people was.

6. The observed people gathered in the church was of all ages, from toddlers to elders. While some of them seemed to be tourists or at least new to the surrounding since they had both maps or were accompanied with a church guide, others were grouped for mass or catechesis. It was observed that the people that in this place, seemed as tourists, looked and searched for what it was seem as architectonical features from inside and outside the place. The second most visited place was Grassagården, an old preserved courtyard near the windmill, that works nowadays as a coffee shop and place of historical interest. The people gathered were also from all different ages, but were mostly composed by families, friends or couples. The people’s behaviour was very different from the church. Here they seemed livelier, since they talked aloud and energetically, while they were mostly whispering or quiet at the church. It was noted though, that in both places many people took pictures.

Annex 3

Three semi-structured interviews by phone, were made to Eskilstuna’s (Helen Strömberg), Västerås (Mikaela, support manager), and Strängnäs (Anette Lilja, manager) of the tourist centres. The purpose with these interviews was to gather data about visitors most frequented places within the counties and most
frequented questions. The data collected from the interviews was transcribed and summarize.

1. What is the most visited season in your cultural or historical places of interest?

   All of them responded: Mid Maj until mid-September.

2. What are the most attractive tourist places based on the amount of people?
   a. Västerås: Västerås cathedral, water park and Steam hotel.
   b. Eskilstuna: Parken Zoo, ReTuna, Rademachersmedjorna, Munktellbadet, Torshälla, Sundbyholm.
   c. Strängnäs: Strängnäs cathedral and windmill.

3. What are the most common questions you get from tourists?
   a. Västerås: Opening hours, “must to see” places and their locations and seasonal events.
   b. Eskilstuna: “Must to see” places and their location.
   c. Strängnäs: Accommodation tips and restaurant offerings and full day or multi-day “must to see” places.

4. Where do most of the tourists come from? Domestic or foreign?
   a. Västerås: 50% domestic, 50% foreign.
   b. Eskilstuna: Mostly domestic travellers.
   c. Strängnäs: 65% of Swedish visitors, and of the foreign ones, the German visitors dominate.

5. How do the tourists search for the information themselves, is it via your website, the physical tourist centre etc?
   a. Västerås: Mostly searched information by their webpage. They can’t support this information with statistics of any kind.
   b. Eskilstuna: 50% web, 50% info points.
   c. Strängnäs: Via web approximately 87,000 unique visitors and about 270,000-page views per year, physically by the tourist centre, 10,000 visitors per year.

6. Do you know what motivates visitors to your tourist destinations?
   a. Västerås: Västerås cultural and historical background and because it’s location near Mälaren.
   b. Eskilstuna: Variety of services, ranged from cultural to nature related, and its location near Mälaren.
   c. Strängnäs: Mostly, the cultural and historical attractions and several big events that take place during summer.
The tests performed and described below gather relevant data provided from interviews and user testing made on the target group. The target group was previously identified and sorted out, though asking people between 18 to 60 years old, if they had an interest or custom of traveling to historical or cultural places of interest, or if they had an active interest in Swedish culture and history. The handpicked selection of the participants was due to the target the group intended to be affected by the intended design. Around 35-40 people of all ages were asked and the ones who accepted to be part of the study were provided with information about this studies intention, distribution, their rights to be anonymous or withdraw from the interview at any time.

Annex 4

The interview was made to eight people between 22 and 55 years old within the target group, between the 14-17 Mars 2019. The way in which the group was chosen, was by asking multiple people about their main motivations of traveling. The methodology used was as group and individual semi-structured interviews. This step of the process was intended as to get a in depth information about the target groups motivations, preferences and behaviour while leisure traveling. Below a list of the questions made is presented and later their responses summarized.

1. What was the last leisure trip you did in Sweden?
2. Do you plan your vacation or travel to a location, in that case what do you do?
3. What is the information you seek or are most interest to know about when you visit of place of interest during your travel?
4. What would you describe is your motivation to/for travel?
5. Where do you find or search the information you need to the places you want to visit?

The participants were: Karin Berg (55), Kerstin Morén (52), Andreas Morén (50), Erika Berg (26), Daniel González (29) Elina Larsson (23), Anna Eriksson (27) and Louis Karlsson (27). They are referred in this research by their initials.

1. KB: Stockholm
   KM: Uppsala
   AM: Stockholm
   EB: Uppsala

   AE: Västerås
   EL: Örebro
   LK: Stockholm
DG: Skultunna

2.

KB: “Yes. I check online for activities kind of tip list with must to see places”, tour operators’ offers”.

KM: “Yes, all from what I need to take with me to searching information about the place I am going to”.

AM: “Yes, I usually plan what I am going to visit or experience during my stay”.

EB: “No, I don’t plan anything other than the thing I need to take with me. I like to discover everything by self.

DG: “Yes I do, everything from restaurants near the place I will be staying, to opening hours to museums and other “must to see” places of interest.

AE: “Sometimes. Booking for hotels, entrance tickets that kind of things”.

EL: “If it is just one day, I don’t usually plan anything. I just go out and see for myself what is to offer”.

LK: “I don’t usually plan anything previously; I usually get some overall information when I am there from info points or the hotel”.

3.

KB:” Package experiences, things that do to near the hotel, museums and restaurants opening hours”, “[...] mostly things that re special to that place I am visiting”.

KM: “Opening hours, maps and usually reference pictures from other people”, “[...] and of course, where I am going to find them and how”.

AM: “Opening hours, references from other travellers and if anything might need to be booked”.

EB: “Mostly entrance prices, opening hours and how to get to the places of interest”.

DG: “The same as they said”. The participant refers to what earlier comments have been said.

AE: “Entrance prices, opening hours and maybe the places webpage”.

EL: “About the places background history, opening hours and if they cost anything”

LK: “Opening hours and where these places are located mostly”.

4.
KB:” To see something new, something different, but mostly to experience the culture”.
KM: “To learn and experience new things”.
AM: “To experience the culture and to see things that I ever seen before”.
EB: “I love to discover new things, mostly strange or unusual places whit an interesting background”.
DG: “For the sense of adventure, to discover and see new things.”
AE: “To meet new people and for my interest in art”.
EL: “[...] to feel like I am going for an adventure by discovering new things and places”.
LK: “Mostly for my interest in architecture, I love the feeling of knowing that I am part of history as well”, “[...] It feels like sharing a connection whit the ones before me”.

5.
KB: “Mostly search information through travel agencies and by” googling” the internet”.
KM: “Same here, though I usually search reference pictures as well through Tripadvisor.se or Google maps”.
AM: “By searching in the internet, mostly in Google maps”.
EB: “I usually go to info points or look in social media such as Facebook or twitter to look at the pictures other people have taken”.
DG: “Google maps and Tripadvisor.se”.
AE: “Social media and Google maps”.
EL: “I usually search for a list of “must to see” places and look for their location in Google maps”.
LK: “I usually ask for the information in the hotel or go to info points in the vicinity”.

Annex 5
The test was performed by asking the interviewers three simple questions, with the intention of knowing whom of those visualizations were perceived as more engaging or interesting, why and what it makes them think about. Four concepts were created for 4 of 4 different places of interest, the visualizations design was determined by different aspects, meaning and interpretation of the events or their functions. The visualizations from left to right describe: 1) a representative visualization of the building, 2) the building’s roof 4), the entrance door and/or main aspect of the building and 4), 2) a visual metaphor of the buildings main function or events. The three first concepts were based on representing architectonical aspects or more interesting aspects of the buildings. Another
The concept was shown, as to be the one based on how to visually represent the map.

The test combined a semi-structure interview, a variation of A/B testing (more than 2 concepts to choose from) and think aloud method. It was performed in six people between 22 and 55 years old, tested in groups of 2 and 4 people. The concepts made for each building were showed, one at a time to the participants. The participants were: Karin Berg (55), Daniel González (29), Kerstin Morén (52), Andreas Morén (50), Elina Larsson (23) and Erika Berg (26).

The questions were:
1. Do you experience any of these concepts as visually engaging? In that case, Which ones?
2. Could you describe what makes it visually engaging to you and if it makes you feel or remembrance anything in particular?

The results for each representation of the buildings were:

Strängnäs windmill concepts:

1. “Number 1 speaks to me the most. It is colourful and makes me think of wind power or windmills in the country, that I usually visited during my childhood. It makes me want to know more about that place”.
2. “Number 1 and number 2. Because of their colour but also because they give me a clear representation on what it is and its function. I would though, choose number 2 because it shows me a part of the building instead of the whole thing. What is the point of visiting it if I know exactly how it looks?”.
3. “Number 2 engage me the most. I think it looks interesting with the windmill’s blades. I think that I would like to know it is still working or not and how they work if so”.
4. “The number 1. Because of the colour. It makes me think about wanting to visit it and taking picture of it”.
5. “Number 2. Because of its colour and shape. It makes me think about Don Quixote’s story about its fight with the windmill. It takes me back to my childhood memories and it makes me want to visit it”.

Fig 20. Windmill Concepts.
Strängnäs cathedral concepts:

1. “Number 2. It makes me think about, what is it for roof? Where it is? And to which building does it belong too?”.
2. “Number 2. I think about a church, but which one? What happened there that it is so important. I would like to know more about some interesting event”.
3. “Number 2 engages me the most. It is a cool picture; it shows just a tiny bit and want me to see more of it”.
4. “The number 2. It is a cool church roof. I would like to see it for myself”.
5. “Number 2. It engages me visually rather than from its function or meaning. I am not a fan of churches or holly places, but I can appreciate their architecture and this picture makes it for me “.
6. “Number 2. It makes me think of wanting to know more about its history but also wants me to visit it and see how it looks inside”.

Roggeborgen:

1. “Number 1 or 2 speaks to me the most due to its colour”.
2. “Number 3. I think it represents a cool entrance, making me want to visit and look what hides inside”
3. “Any of them intrigues me. They make me think of the illustrations seen in app-games”
4. “Number 2 or 3. I don’t like the first one or the last, the first one has too many unnecessary windows for my liking and the last is too childish”.
5. “Number 2. It gives me the same feeling as the before shown to me. Like something I have to discover for myself rather”.

Grassagården:

1. “Number 1 and 3. I like fika! This place reminds me of the places I went as a child during the summers. It feels as a cosy place that makes me want to visit”.
2. Number 1 and 3 are really interesting to look at. They both speaks of the place functionality or feeling. It makes me think of Swedish summer fika and Swedish courtyard”.
3. “Number 2. I experience it as an old Swedish building where you can stop and chill for a while”.
4. “Number 2. Because of the colours, the coffee cup on the dark background is easier to appreciate”.
5. “Number 2. I like the feel of cosiness that it inspires me”.
6. “Number 4. I like the feeling it transmits me and the fact that a chair is illustrated, since it tells me that you can sit down and chill. The feeling I get by looking at it is of cosiness”.

Maps visualization:

1. “I like its colours and the form too. It reminds me of a treasure hunt map”.
2. “It looks like an amusement park map or something, I like the old feeling of it.”
3. “Really cool typography, it seems like an old map seen in old atlas”.

Fig 22. Grassagården Concepts.
4. “I really like the colours; they are really appealing. It makes me think of a game board”.
5. “It reminds me of an old treasure map or something like that”.
6. “I like the old feeling and that its looks like something out of a story”.

Annex 6

The high-fidelity prototype test was conducted on three people within the target group. The methodology used were a combination of a semi-structured interview, think aloud and usability testing. The people tested was: Daniel González (29), Louise Karlsson (27) and Maria Eriksson (44) in that order. These tests were conducted in Västerås the 24/05-2019 in the participants private addresses and not mentioned due to sensitive and protected personal data.

The users were asked to interact freely with the map while explaining or voicing their thoughts aloud (think aloud test), while being observed and later interviewed. After the interaction with the maps interface, a few questions were asked. Below the list of question and answers are addressed:

How do you experience the aesthetics of the design?

1. “I experience it as playful due to the style of the illustrations”.
2. “I think they are visually pleasing by its colours. I like the small illustrations in the map, they are really fun to look at”.

Fig 23. Maps concept.
3. “I think it is interesting and draws my attention. The design reminds me of an app-game or something. It makes you want to play with it”.

What brings you the strongest visual attention in a map? (it was later asked to rank them).

1. “The ripped paper on the top right corner, red logo on the top left corner and then the buildings”. González look at the different graphic elements before trying to use it. He tries to make the image bigger and then it seems as he realizes that it is a map he can interact with.
2. “The buildings, the ripped paper on the top right corner, the polaroid photo and finally the red logo”. One of the users first reaction is to click on the buildings.
3. “The legend on the top right corner, the buildings represented on the map, red logo on the top left corner”. The user clicks on the icons presented on the legend first followed by the buildings.

How have you experienced the behaviour of the interface? Have you experienced anything as difficult or challenging to understand to use? And in this case, what and how would you like to be changed in order to achieve the desirable response?

1. “At first, I didn’t notice that you could click on the map I thought it was a static image not an interactive one, but when I move the mouse over the buildings they highlight, giving me the indication that they can me clicked on”. Under the observation, González struggles at first with the interaction, it seems as he doesn’t understand the maps usability.
2. “I experience the map user friendly.” “[…] giving you some insight of the places with some words when you put the mouse over them”. “It was though not crystal clear that the “Parking” and “Hotel” are clickable”. Under the observation, Karlsson seems to struggle to find out that the legend is usable. The user stops over everyplace of the map and reads aloud all the text shown while hovering over the buildings.
3. “It was fun and intuitive to use, the phrases that appear when hovering over, draw my interest”. Eriksson seems to understand how to interaction work. She seems interested on the information background of the different places, and the information’s shown while hovering over.

Is there anything that bothers you about the aesthetics, layout or interaction?
1. “In some places the text that appears merges with the names of the streets”.
2. “When you click on a building it does not give you an indication which one it is, it might help to have some indication of which information is active”.
3. “I wouldn’t change anything, I found it fun and easy to use”. Through the observations it seems as she really enjoys it. She seemed to understand the maps functionality and how to use it.

What is your impression of the design? Does it make you feel or remembrance something, and in that case what?

1. “It makes me remember an older type of map, making me remember earlier holidays”. “[…] the style of the buildings makes it playful and draws my attention”.
2. “It remembers me of a map of an amusement park, with the buildings being the attractions”. “[…] makes me think of being on vacation”.
3. “I like it, it’s kind of remembers me of a treasure hunt map with those yellowish colours”. “[…] makes me remember the map for a zoo or an amusement park.”
Annex 7

Below a visual description of the different prototypes done until the first (Case 5) and second prototype (Case 6) were tested:

Fig 24. First concepts of style and colour scheme.
Fig 25. Concept development.

Fig 26. Concept development 2.
Fig 27. High-fidelity prototype used in Case 6.

Fig 28. Second high-fidelity prototype based on the answers from Case 6.