Design and development of a web application for Vihdin-Nummelan Kylähistoria Ry with WordPress as a Headless CMS and React

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Laurea University of Applied Sciences

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Business Information Technology
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Laurea University of Applied Sciences **Abstract**
Degree Programme in Business Information Technology

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In a constantly changing world, organizations of all types are expected to keep up with the advancements of technology. It is especially true for those websites and applications which are purely informative in nature, as their operation depends on catching the attention of visitors. With this in mind, Vihdin-Nummelan Kylähistoria Ry - a non-profitable organization as of 2019 - contracted Laurea University of Applied Sciences to create a mobile application for their data collection of local history.

This project was first taken on by Markus Salonvaara in 2018, who in his thesis concluded, that a progressive web application developed with Polymer or React would be a feasible solution. After him, the authors of this thesis re-evaluated the situation and detected the following problems: the design of the current website is out-of-date and it should be modernized; its implementation does not include a database, which makes the transfer of data collection more difficult; and the content of the new application should be maintainable without professional IT skills. To overcome these obstacles, the authors of this thesis decided to develop a web application based on a headless CMS (WordPress) and React.

The goals of this thesis are to develop a web application, which is compliant with best practices of web design, user friendly, cost as little as possible, and is maintainable with minimal IT skills. The risks include unforeseen costs, lack of time, insufficient developing skills or resources, and inability to evaluate the success of the project due to lack of previously collected user data.

The development work had been conducted according to the Systems Development Life Cycle framework, which was implemented in an agile way. During this process, the required information was gathered through interviews with the client and benchmarking of websites with a similar purpose. Then, a functional prototype was created with Figma before the hands-on implementation using WordPress and React could start. The web application was finished until a functional pilot state, which could be used while further development is done. Training material in video format was also created for the administrative personnel.

While the developed web application met the set goals, some of the planned features were not added to the application. Those and some other modifications could be done during future development, including the complete transformation of the current solution into a mobile application. However, the application will require continuous maintenance as any other software. This maintenance cannot be provided by students nor by Laurea UAS. Therefore, the client company needs to decide independently how maintenance can be organised for the application.

Keywords: web application, headless CMS, WordPress, React

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1 Introduction

Salonvaara (2018) compared different types of mobile applications with their pros and cons, then suggested a solution for the client company. He concluded that a progressive web application (PWA) is the most suitable choice because it is platform-independent, can work offline, capable of using some native APIs (Application Programming Interface) and does not have to be present in Google Play or App Store (Wikipedia 2019b). As development tools, Salonvaara listed Polymer, ReactJS, Webpack and suggested Polymer as the best option.

The authors of this thesis studied the previously done research and its outcome. However, solutions used for further development differ from the ones suggested by Markus Salonvaara. The reasons for this change and the choice of other development tools are explained in the respective chapters of this work.

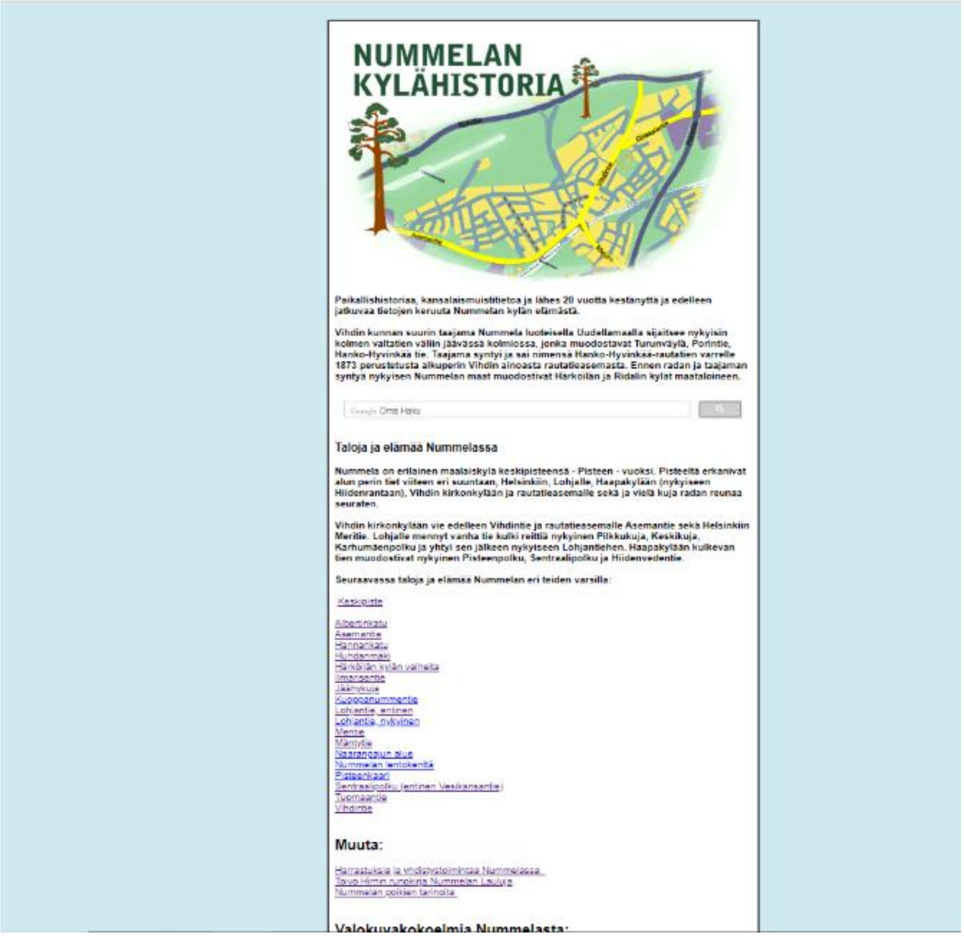
1.1 The organization

Vihdin-Nummelan Kylähistoria Ry (registered in 2019) is a non-profitable organization based in Vihti. It was founded in 1990 and, at first, worked as a volunteering group at Community College of Vihti. At the time, it was called "Koti-Nummela group" and its purposes were different. From 1999, the group members started to gather historical information about the village as a hobby. The idea initially was to upload these documents to the Internet and share them with the public, which seemed to be innovative at that time. Later, Veikko Helle - previous minister, parliament speaker and expert of village history - decided to gather historical information systematically: organized by streets and houses. He also created a few maps for this purpose.

For 16 years (until 2015) the collected information was stored on the servers of Helsinki University with the help of Ritva Miettinen and Raimo Parikka who worked there. Through the years, a very large collection of photographs and texts were gathered, and the Group got support from different organizations, such as The Ministry of Education, Länsi-Uudenmaan Osuuspankki, Länsi-Uudenmaan Säästöpankki, etc. In 2002, it received recognition for its work from Kansan Sivistysrahasto as well. There were 4 exhibitions organized in the Library of Vihti which showed photographs and texts to the public. In 2015 group stopped its collaboration with The University of Helsinki due to the retirement of Raimo Parikka. From then onwards the new persons responsible for its activities are Eeva-Liisa Tapio, Armi Salenius and Heikki Lindfors. Also, the website was moved to the Vihti municipality's server and currently available at http://historia.vihti.fi/koti-nummela/ (Miettinen no date). Heikki Lindfors is also a contact person for this Thesis Project.

1.2 The project

The organization has been collecting historical information and updating the website since 1999. While the content of the website expands constantly, the technology used remains unchanged. Due to the lack of a professional IT team, the maintenance is currently done through a software called "KompoZer" which is an open-source HTML editor with the last version-release form 2010 (Wikipedia 2019a). This may have seemed to be a good solution many years ago, but with technology always moving forward now it is not viable anymore. Consequently, the organization needs a new solution that can be easily maintained without deep technical knowledge. Another important factor is that alongside Web Development techniques, Web Design principles have advanced considerably. For example, now there are research-driven best practices, such as the placement of content elements which is based on where users usually expect to see them on the webpage. By not following these principles, the organisation is exposed to certain risks, for example, users may not find their way around the website (Horton and Lynch 2017). Figure 1 illustrates the current design of the website and Figure 2 provided by Horton and Lynch (2017), illustrates the common expectations of users about content elements on a webpage. Based on these, it can be seen why the current web site can benefit from a redesign.



NUMMELAN KYLÄHISTORIA

Paikallishistoriaa, kansalaismuistitietoa ja lähes 20 vuotta kestänyttä ja edelleen jatkuvaa tietojen keruuta Nummelan kylän elämästä.

Vihdin kunnan suurin taajama Nummela luoteisella Uudellamaalla sijaitsee nykyisin kolmen valtatien väliin jäävässä kolmiossa, jonka muodostavat Turunväylä, Porintie, Hanko-Hyvinkää tie. Taajama syntyi ja sai nimensä Hanko-Hyvinkää-rautatien varrelle 1873 perustetusta alkuperin Vihdin ainoasta rautatieasemasta. Ennen radan ja taajaman syntyä nykyisen Nummelan maat muodostivat Härkölän ja Ridalin kylät maataloineen.

Taloja ja elämää Nummelassa

Nummela on erilainen maalaiskylä keskipisteensä - Pisteen - vuoksi. Pisteeltä erkanivat alun perin tiet viiteen eri suuntaan, Helsinkiin, Lohjalle, Haapakylään (nykyiseen Hiidenrantaan), Vihdin kirkonkylään ja rautatieasemalle sekä ja vielä kuja radan reunaa seuraten.

Vihdin kirkonkylään vie edelleen Vihdintie ja rautatieasemalle Asemantie sekä Helsinkiin Meritie. Lohjalle mennyt vanha tie kulki reittiä nykyinen Pilkkukuja, Keskikuja, Karhumäenpolku ja yhtyi sen jälkeen nykyiseen Lohjantiehen. Haapakylään kulkevan tien muodostivat nykyinen Pisteenpolku, Sentraalipolku ja Hiidenvedentie.

Seuraavassa taloja ja elämää Nummelan eri teiden varsilla:

Keskipiste

Albertinkatu
Asemantie
Hannankatu
Huhdanmäki
Härkölän kylän vaiheita
Ilmarientie
Jäähykuja
Kuppaanummentie
Lohjantie, entinen
Lohjantie, nykyinen
Meritie
Mäntytie
Naarangojun alue
Nummelan lentokenttä
Pisteenkaari
Sentraalipolku (entinen Vesikansantie)
Tuomaantie
Vihdintie

Muuta:

Harrastuksia ja yhdistystoimintaa Nummelassa
Toivo Himin runokirja Nummelan Lauluja
Nummelan poikien tarinoita

Valokuvakokoelmia Nummelasta:

Figure 1 Current design of the Nummelan Kylähistoria website

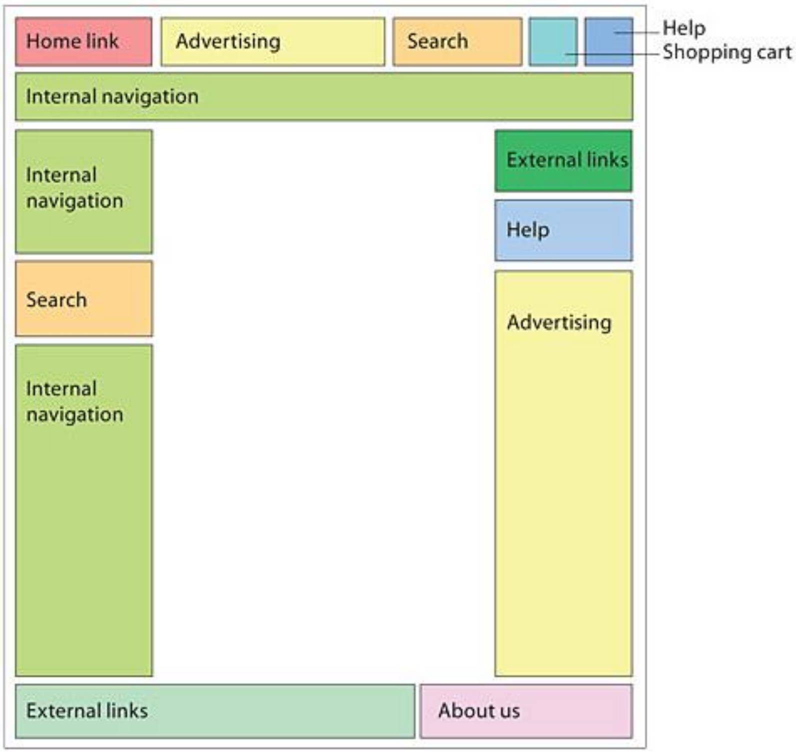


Figure 2 Placement of interface elements on the website according to users' expectations

In addition to these design issues it worth mentioning that the current website is not responsive either. This means that it looks the same on every device and does not adapt to different screen sizes or resolutions. Which is why on a mobile phone it does not look very appealing. Responsive Web Design is one of the most crucial characteristics for a website in the modern world, and this needs to be implemented on the Nummelan Kylähistoria pages as well (HTML Responsive Web Design no date).

The final issue to be mentioned is in the website structure. According to Horton and Lynch (2017), the structure of a website needs to be not to shallow nor too deep. It means that the users could browse the website and understand its contents easily without confusion. Currently, the Group's website structure looks like the bad examples given by experts in their work and for this reason, it should be changed. Figure 3 provided by Horton and Lynch (2017), illustrates this current structure of the website.

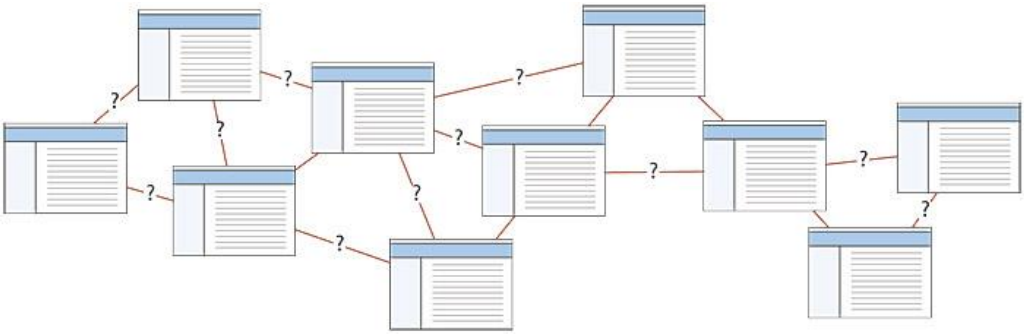


Figure 3 Bad example of the website structure

Salonvaara (2018) in his thesis aimed to find a solution for building the location-based mobile application. But, considering all issues listed above during a meeting with the client and supervisors it had been decided that the renovation of the current website is more necessary for the organization. Moreover, a website or a web application developed with modern technologies will be responsive and mobile-friendly. Also, it should be possible to implement additional features, such as a map, for showing locations of the historic houses.

1.3 Project goals

The main objective of this project is to design and develop a modern web application for the Vihdin-Nummelan Kylähistoria Ry. A new web application needs to meet the requirements of the client, such as the possibility to maintain it without technical skills and low or no costs. The web application also needs to have a map for showing historical houses on it, and, possibly, to indicate the current position of the user. Furthermore, it needs to follow the best practices of modern web design: responsiveness, understandable structure, necessary interface elements placed according to users' expectations, etc.

Due to the shortcomings of the current implementation, it would not be possible to transfer all content from the old website to the new one during this project. For this reason, it was agreed that the new web application will have only a sample data added and, after the training, the organisation could continue with the transfer of the content independently.

The project deliverables are a prototype of a new web application (with mobile and desktop view), a pilot version of the web application with sample data and training materials for the organization on how to use the new system.

1.4 Project risks

There are certain risks involved in this project. Since this is a bachelor's thesis, the authors may not have a sufficient level of expertise required for the development of the final product. Due to that, learning activities are a big and time-consuming part of the working process. This is also one of the reasons why this project is carried out by two students. Because of the same reasons, the delivery of a fully satisfying and functional product may not be possible. A further risk is that the project may fall behind schedule.

Form the organizations' point of view there is also a risk of having unplanned costs such as web hosting fees, which most likely will not be available for free. If these costs are not possible to pay due to a lack of financial resources, the web application could not be launched. Also, as the organization is working only on a volunteering basis, transferring the content from the old website to a new one may require additional resources because it will need a considerable amount of manual work, is often problematic to do only with volunteers. For this reason, this process may also generate additional costs.

The final risk may be connected to the general usage of the new web application. Due to the lack of data on the current implementation, there is no clear understanding of how the renovation of the website will affect its usage. Specifically, there is no information on who, how and how often use the current website. Therefore, it will be difficult to understand whether the number of people using it increased or declined after the changes. To remedy this issue in the future, there should be tools introduced for this purpose and possibly a marketing strategy would be needed for the organization as well. These, however, are not in the scope of this thesis.

2 Research and Development Methodology

2.1 Methods of information gathering

2.1.1 Interviews

According to Modell (1996), “The interview is the primary technique for information gathering during the systems analysis phases of a development project. It is a skill which must be mastered by every analyst. The interviewing skills of the analyst determine what information is gathered, and the quality and depth of that information”. In our case interviews were used to gather information about the client company, to understand existing problems of the client and to gather requirements for the future product to be developed.

2.1.2 Benchmarking

BPIR (Business Performance Imporvement Resource no date) defines benchmarking as “a systematic process for identifying and implementing best or better practices” and defines two main types of it: formal and informal benchmarking. Out of which the latter is preliminary and often unconsciously done, while the former is deeper and can be measured based on performance data or best practices. Performance benchmarking is a quantitative method and it gives reliable information about competitive organizations, which later can be used to set new targets in financial and non-financial areas of company-operations. Another form of formal benchmarking however is more qualitative, and it means the identification, caption, analysation, and implementation of best practices.

There are several methods to do best practices benchmarking and at professional companies many times they are done based on benchmarking codes and conducts. The benchmarking in this thesis, however, will be done by observation and comparison of websites, which will be based on best practices discussed in the Web Style Guide (Horton and Lynch 2017) and the Usability Heuristics (Nielsen 1994).

2.2 Systems development life cycle (SDLC)

The framework used for this project is the Systems Development Life Cycle (SDLC) described by Rosenblatt & Tilly (2017) through five main development phases:

- Systems Planning
- Systems Analysis
- Systems Design
- Systems Implementation
- Systems Security & Support

Each of these phases is an integral part of all development processes and often used by IT professionals alongside other methods or alone. In the past, they were often implemented one after the other, using the waterfall method shown in Figure 4 provided by Rosenblatt & Tilly (2017). In recent years – especially in projects which involve coding – the agile method is preferred, shown in Figure 5 provided by Rosenblatt & Tilly (2017), as it allows a more user-centered development process.

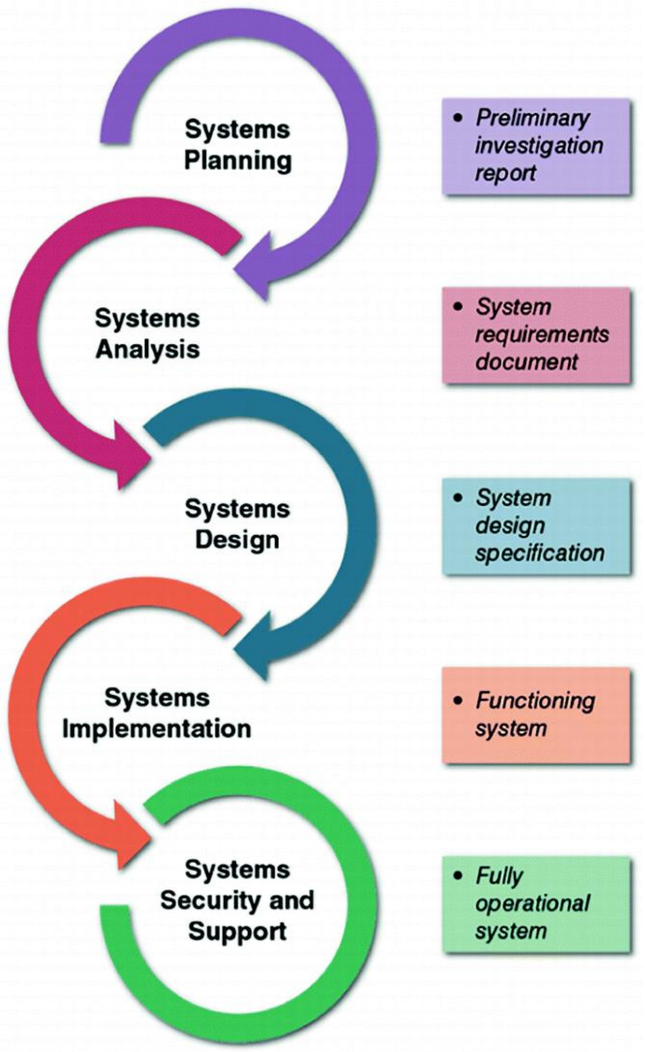

Systems Planning
• Preliminary investigation report
Systems Analysis
• System requirements document
Systems Design
• System design specification
Systems Implementation
• Functioning system
Systems Security and Support
• Fully operational system

Figure 4 Development phases and deliverables of the SDLC with the use of the waterfall method

2.2.1 Systems planning

The first phase starts with the request of a new system, which is followed by a preliminary investigation and a feasibility study. The system request usually encloses the need for a new system (or changes in the existing one) and already gives a brief description of the problems which initiated that need. Then, a preliminary investigation is made, which includes the feasibility study. The result of this investigation decides whether the change or the development of a new system is necessary and concludes its feasibility on the technical and business side.

2.2.2 Systems analysis

The system analysis phase consists of the requirement gathering and modelling of all necessary information for the development. The gathering includes features for achieving user satisfaction and technical functionality and often involves interviews, observation, sampling and document reviews. Then gathered information is analysed for clarification, after which the final requirements can be modelled.

2.2.3 Systems design

The main purpose of the design phase is to create a functional prototype. The basis of this prototype is the result of the systems analysis and its result is a model that can guide the coding process. The realization of a functional prototype also helps to reveal further details of the application architecture and aids the logical design of the code structure.

2.2.4 Systems implementation

Once the functional prototype is finished, the actual implementation can begin. This phase includes the construction or coding of the system, as well as the testing and the training of future users. At the end of this phase, the system is fully functional and ready for use, serving all requirements previously established. To ensure this, the system is tested by users, then if necessary, the operating personnel is trained, and a final evaluation is conducted for assessment.

2.2.5 Systems security and support

The final phase is continuously running throughout the life of the system and its purpose is to ensure a secure and satisfyingly operational system. This phase includes security updates, general maintenance and the addition of necessary features if the need emerges.

2.3 SDLC - Agile approach

As mentioned before, the SDLC framework is often used alongside other development methods. As it is often used in IT, the authors of this thesis use the agile method, which modifies the circular, phase-to-phase structure of the SDLC to one which could be better illustrated in

Figure 5. This means, that the agile method consists of several open-ended numbers of iterations, which often go through all the SDLC phases. This development method allows the prototype to evolve to a final product based on constant user and client input, which ensures that the fully functional system is to their satisfaction. The agile method is also tending to be faster compared to others, as there is no need to wait for user feedback until the end of the development cycle and the prototype only needs to be updated during its creation, instead of rebuilding several times. (Rosenblatt, H. & Tilley, S., 2017.)

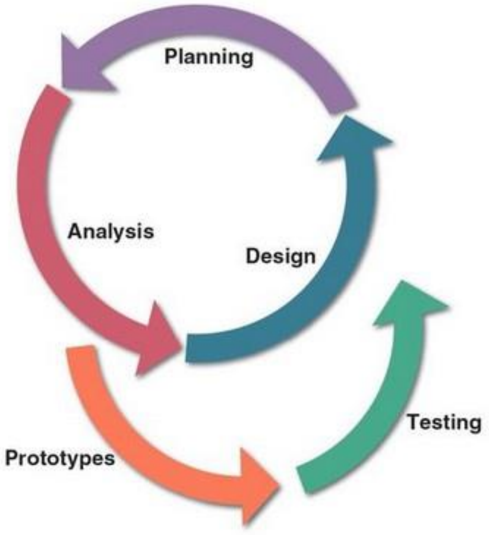


Figure 5 SDLC implemented with the Agile development method

3 Used technology and tools

This chapter discusses the technologies and tools used during the work on this project. Alongside with theoretical basis, the choice of named tools and technologies will be clarified. Their functionality in the context of this project will be explained as well as how do they fit into SDLC with the agile development method which is described above.

3.1 Figma

Figma is a tool for designing interfaces with prototyping features. It is cloud-based and works from the browser, which means that all projects saved online and available from anywhere. Due to that, the Internet connection is required to work with it. However, it has a desktop version, which makes it possible to download the project and work on it locally. Figma has many advantages, for example, it is platform-independent and has a great collaboration feature for team-based projects enabling all team members to work at the same time on the same project and see changes in real-time. Because it is cloud-based, project and all changes saved online automatically, team members do not need to use other tools for it. Getting feedback from the client is also easy with Figma because projects can be shared through the Internet link and the client can leave comments using the commenting feature available (Bracey 2018).

According to the Design Tools survey (Palmer 2018) in which participated about 2800 designers, Figma was the second most popular tool for User Interface (UI) design in 2018. The most popular tool in 2018 was Sketch, but it works only on the Mac operating system, which is why it was not suitable for this project. The authors of this work have both Windows computers. That is why Figma was the tool of choice for this project. Figure 6 provided by Palmer (2018) illustrates which tools for UI design were the most popular in 2018.

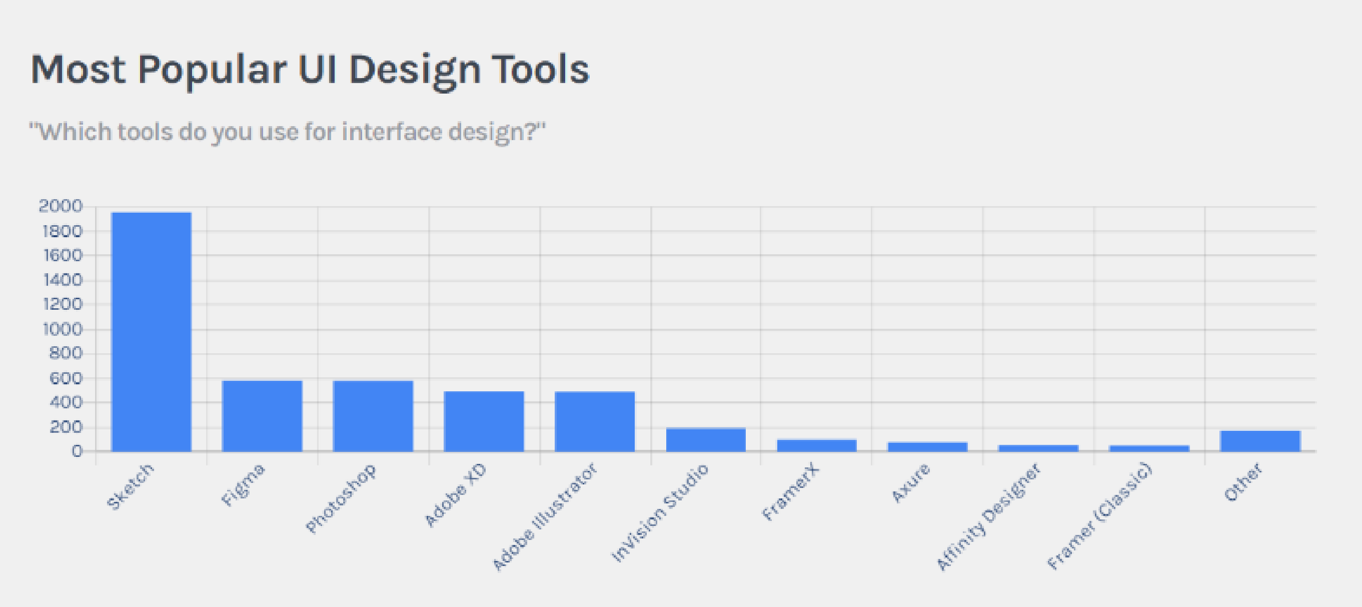
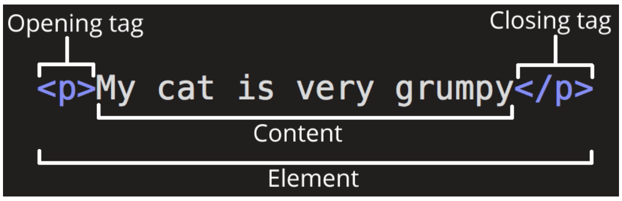


Figure 6 The most popular UI design tools in 2018

Other reasons why Figma has been chosen as a UI design and prototyping tool for this project were: possibility to use it free of charge, necessary collaboration features and ability to share projects with stakeholders through the internet link. In accordance with SDLC and agile development method, UI designs and prototypes of the website went through several iterations of design, tests and analysis phases until the result was satisfying.

3.2 HTML

According to Mozilla Contributors and their HTML basics (2019), Hypertext Markup Language (HTML) is a markup language, that is used for structuring content of a webpage. For example, a webpage can have images, paragraphs, tables, bullet points, links, etc. To distinguish between these different types of content, structuring is done with the help of HTML tags. Content wrapped in different tags form elements that look and behave in the desired way. Figure 7 (HTML basics 2019) shows the example of an HTML element.

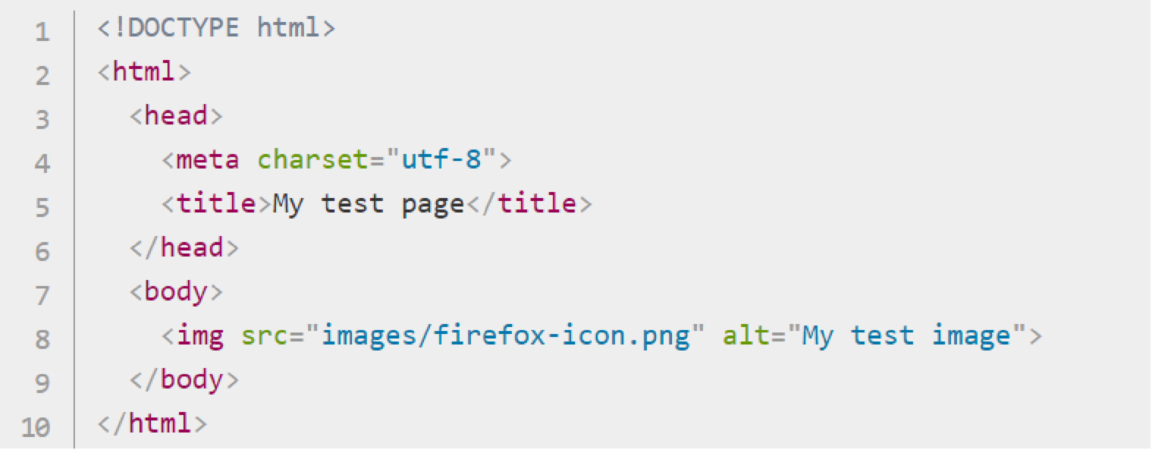


```
<p>My cat is very grumpy</p>
```

Figure 7 Anatomy of an HTML element

As can be seen from Figure 8, the HTML element typically consists of an opening tag, closing tag and content in between. However, some elements do not require to have a closing tag, neither have content, for example, <img>.

It is possible to place elements inside of other elements, this is called nesting. In fact, the HTML document consists of nested elements and they form its' structure. Figure 8 (HTML basics 2019) illustrates the anatomy of an HTML document.

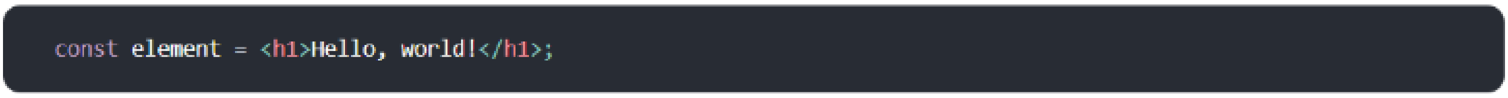


```
<!DOCTYPE html>
<html>
  <head>
    <meta charset="utf-8">
    <title>My test page</title>
  </head>
  <body>
    <img src="images/firefox-icon.png" alt="My test image">
  </body>
</html>
```

Figure 8 Anatomy of an HTML document

The latest version of HTML is HTML5 (first released in 2018) which includes new elements and APIs (Application Programming Interfaces). New elements of HTML5 are semantic elements, attributes of form elements, graphic elements, multimedia elements. New APIs include HTML Geolocation, HTML Drag and Drop, HTML Local Storage, etc. Some old elements were removed from HTML5 (HTML5 Introduction no date).

Because in this project User Interface (UI) of the website is built with React, HTML elements are used in JavaScript. This is called JSX (JavaScript XML) and it is extended syntax of JavaScript. JSX converts HTML elements into React elements which are then rendered into the DOM (Document Object Model). DOM is an API for HTML and XML documents; it defines the structure of a document as objects and makes it possible to access and manipulate them (Introduction to the DOM 2020). Figure 9 (Introducing JSX no date) shows an example of JSX.

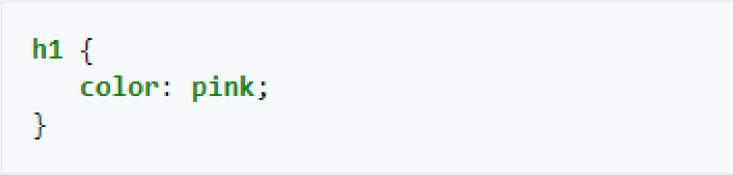


```
const element = <h1>Hello, world!</h1>;
```

Figure 9 Example of JSX

3.3 CSS

Cascading Style Sheets (CSS) is the stylesheet language that is used to create a layout of HTML or XML documents. Together with HTML and JavaScript, CSS is one of the core technologies used on the Internet. With the help of CSS, it is possible to separate styles from content into a .css file which can be shared between several pages or used across a website. Having a presentation in a separate file makes it easier to control how content is rendered on different devices, screen sizes, and readers. CSS syntax uses the English language and consists of lists of rules. Each rule formed by selectors and declaration blocks. Selectors describe to which element(s) of the document this rule is applied. Declaration blocks are formed by declarations inside of braces. Each declaration consists of property and value applied to it. Figure 10 provided by Wikipedia (2020a) gives an example of CSS rule where the colour of the document's header declared as pink.



```
h1 {
   color: pink;
}
```

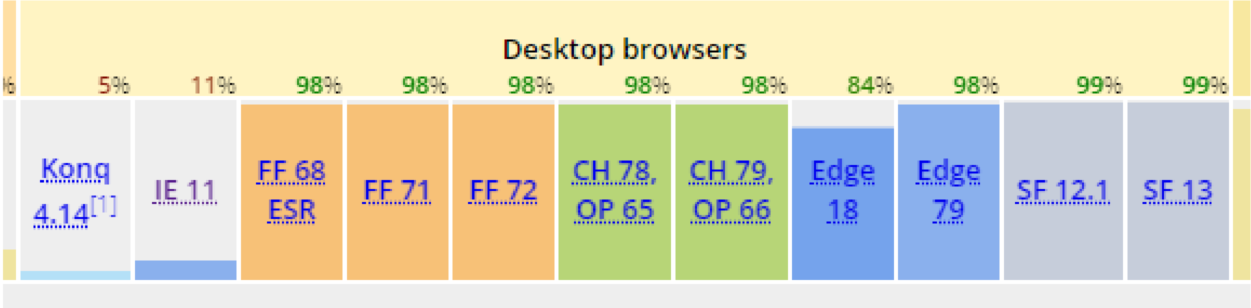
Figure 10 Example of CSS rule

Properties and their possible values described in the specification of CSS administrated by the World Wide Web Consortium (About W3C no date). However, compared to the specifications of CSS 1 and CSS 2, version CSS 3 does not have a large document describing every feature anymore. Starting from CSS 3 features are added as modules. And the latest CSS 4 version basically is just an addition of a few such modules to already existing standards (Wikipedia 2020a).

3.4 JavaScript

JavaScript is a scripting programming language primarily used for adding interactive and dynamic functionality to webpages. In this case, JavaScript runs in the browser on the client-side. However, JavaScript can be also used as a web server programming language. In this case, it runs in the environment outside of the browser, for example, Node.js (About JavaScript 2020). Applied to this project JavaScript used only on the client-side.

ECMAScript is a JavaScript standard. Most of the modern browsers support ECMAScript 5.1. And older browsers ECMAScript 3. Saying that it worth mentioning that from version ECMAScript 6 that was published in 2015 standard updates yearly. The current draft version is consequently ECMAScript 2020. Figure 11 taken from ECMAScript 6 compatibility table (no date) illustrates the issue above. Not all browsers support the latest standard of ECMAScript. For example, Internet Explorer supports only 11% of all features.



Desktop browsers

Konq 4.14[1]	IE 11	FF 68 ESR	FF 71	FF 72	CH 78, OP 65	CH 79, OP 66	Edge 18	Edge 79	SF 12.1	SF 13
5%	11%	98%	98%	98%	98%	98%	84%	98%	99%	99%

Figure 11 ECMAScript 6 support by desktop browsers

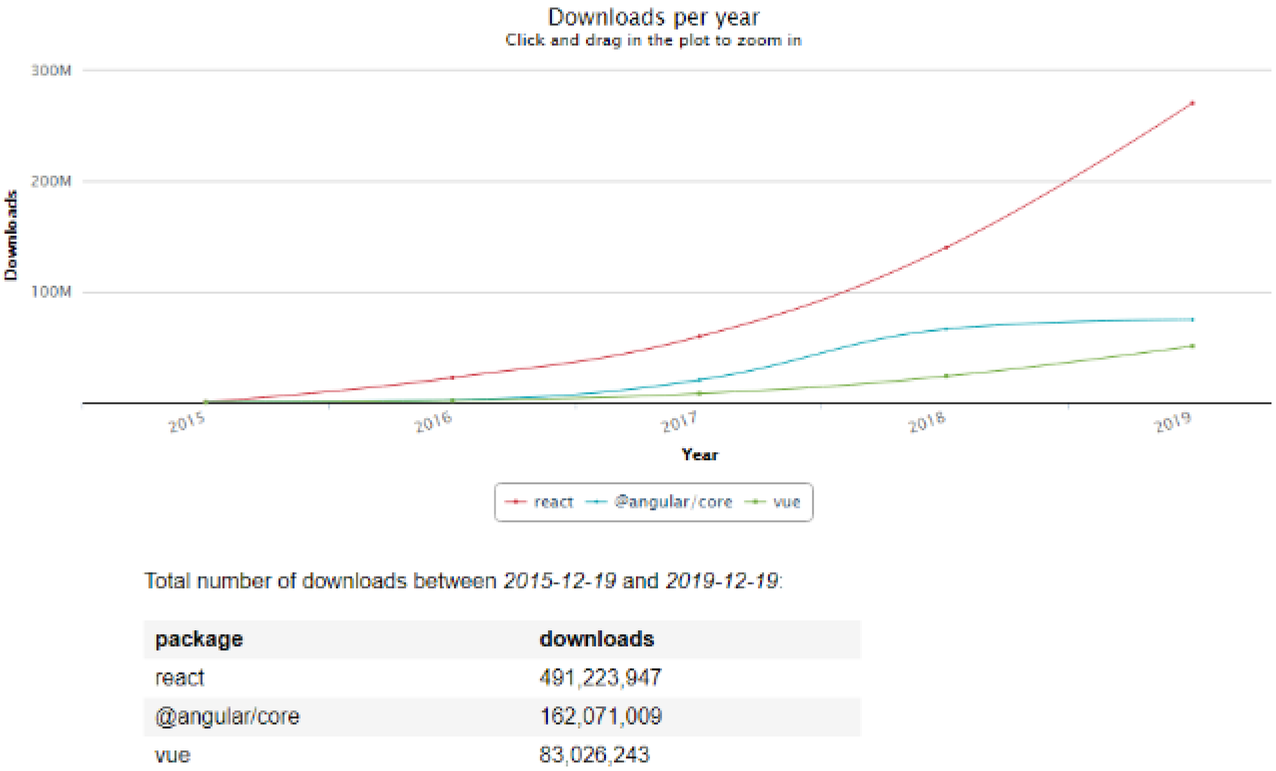
However, in this project during the development process, ECMAScript 6 features are used. It is possible to do so because the code before deployment is transformed into an older version of JavaScript. This kind of transformation called transpilation and configured automatically in React applications that were created with create-react-app. Also, one can change configurations if needed (Luukkainen no date).

HTML, CSS, and JavaScript are the core technologies of web development. In this project, they are used as in any other web development project.

3.5 React

React is an open-source JavaScript library that helps to create user interfaces. React is declarative. It means that interactive UIs are made by creating views for application's states. When data in state changes React will update and render only those components where it happened. This makes the behaviour of the code easier to predict and debug. React application is component-based because it's UIs formed by components with own state. "Learn Once, Write Anywhere" ideology of React allows adding new React features without changing the current code. With the help of Node, code can be rendered on the server. React Native makes it possible to create mobile applications for different platforms having one codebase (React no date).

React was created by a Facebook software engineer Jordan Walke. In 2011 Facebook deployed it on the newsfeed and later in 2012 on Instagram. Since 2013 it is open-sourced and maintained by Facebook together with some companies and individuals. React 16.0 was released in 2017 and updated to version 16.8 that introduced the latest features in 2019. In 2017 license policy has been changed to a clearer MIT License (permissive license) from questionable Apache License, which gave developers more confidence to use the product (Wikipedia 2020b). Since then the popularity of React has grown rapidly. Figure 12 illustrates the growth in downloads of three the most popular web frameworks/libraries: React, Angular and Vue. It can be seen that downloads of React have grown continuously over the past few years and it is currently the most downloaded and used JavaScript library (Vorbach no date). Therefore, the choice of React for this project is self-evident.



Total number of downloads between *2015-12-19* and *2019-12-19*:

package	downloads
react	491,223,947
@angular/core	162,071,009
vue	83,026,243

Figure 12 Downloads statistics for React, Angular and Vue

REST API

API is an application programming interface. It is used in programs for communications between parts. API typically has documentation were explained how to use it and what can be done with it. In web development API usually means client-server communications where structure and format of request and response messages are specified. Web APIs usually use HTTP for requests, responses can be in JSON format or XML, for example (Red Hat, Inc no date).

REST stands for Representational State Transfer. It is a style of software architecture that was described by Fielding (2000) in his dissertation. According to the dissertation, REST has 6 constraints it needs to follow: client-server, stateless, cacheable, uniform interface, layered system, code on demand(optional). This paper does not go deep into all the details of these constraints. In short, the idea is that every piece of information in REST philosophy is a resource and each resource regardless of its' type (image, document, collection, etc.) has a unique identifier – URL in our case. Using these identifiers or links client can navigate from one resource to another. Each resource in addition to a unique link to itself has a representation of its' state. Representation includes data with metadata that describes the data and links to other resources where the client can proceed to. This representation should be self-descriptive, meaning that the client can understand how to process the message by data format associated with it. Resource methods are used to execute different operations. In our case, they are HTTP GET/PUT/POST/DELETE methods. For example, the HTTP method GET used in this project to fetch a single resource or collection of resources. Described above very shortly explains the uniform interface constraint of REST (Fielding 2000).

REST API provided by WordPress gives access to REST endpoints, which contain different types of content data. Data can be sent to these endpoints or received from them in JSON (JavaScript Object Notation) format. By using different parameters in queries one can control response or request handled by API. These parameters described in the documentation. So, by using WordPress REST API client can send requests to endpoints to receive, create or modify data from outside of the WordPress site itself. In our project though, the main usage is fetching the data for displaying it (REST API Handbook no date).

3.6 WordPress

WordPress is a popular CMS (Content Management System), it is used in more than 35% of all the websites. The main reason for that is the simplicity of usage for people without technical skills. Anyone willing to start a blog or create any type of website can do that with WordPress. It is free to use for any purposes including commercial, modify and distribute it, thanks to GPL license. As a consequence of popularity, WordPress has a very large community and finding support is easy. These and other free good features do not come, of course, without limitations. For example, the free version has access to 3 default themes and if one wants to change the design there are other themes available, some of them paid. The same applies to plugins. Popular and most valuable plugins are not free. There are paid package plans too for different types of needs. From the developer’s point of view, WordPress offers many possibilities. Developers can create plugins, themes, or customize anything in the desired way. It is very flexible (Features no date).

WordPress has been around since 2003 and went through many updates and releases of new versions. The latest version of WordPress is 5.3 which was released in November 2019. In version 4.7 (2016) were introduced REST API Content Endpoints (History no date). With REST API it is possible to access the content of the WordPress site externally. In short, it means that developers do not depend anymore on PHP, which was the main programming language used with WordPress so far. Instead, they are free to choose any technology that they are willing to use, for example, JavaScript. WordPress REST API makes it possible to create interactive applications for web, mobile or other existing or future platforms that use the same content from WordPress but look different (McCollin 2020).

For this project, WordPress has been chosen because of its’ simplicity for non-tech users. Popularity also was important criteria together with the large support community. WordPress in our case plays the role of the backend and used for managing content. With REST API it is possible to access that content and use it with React, the most popular JavaScript library for building User Interfaces. This way of using WordPress is called “headless CMS” (sometimes it is called “decoupled CMS”, which differs slightly) because by default it has templates to display content, but they are not in use. Instead, a separate web application made with React takes care of fetching needed data and displaying it. Having this kind of implementation also allows us to reuse the codebase and later create a mobile application. Figure 13 illustrates this concept (Saltis 2019).

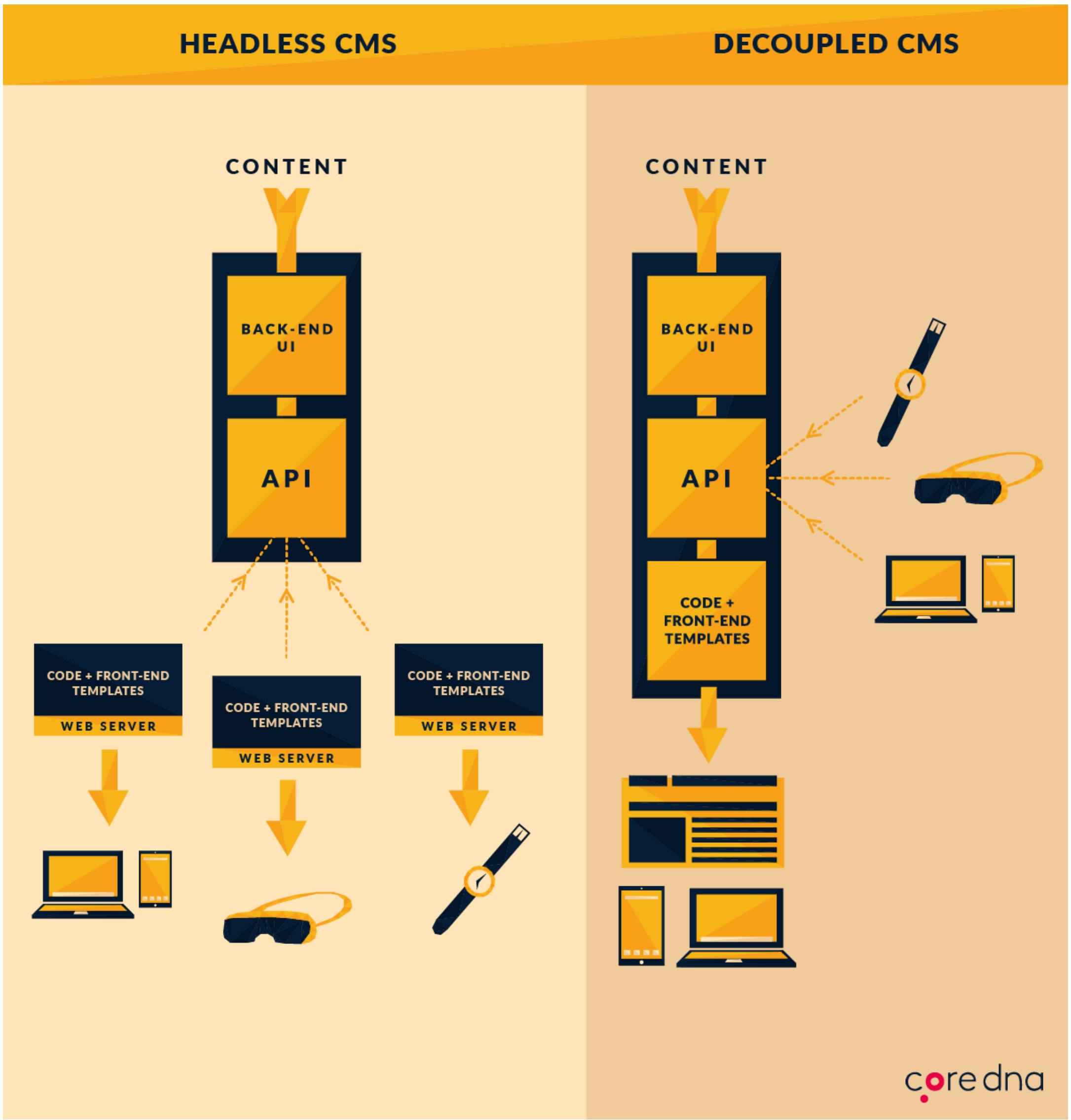


Figure 13 Headless CMS and decoupled CMS

3.7 Deployment and hosting

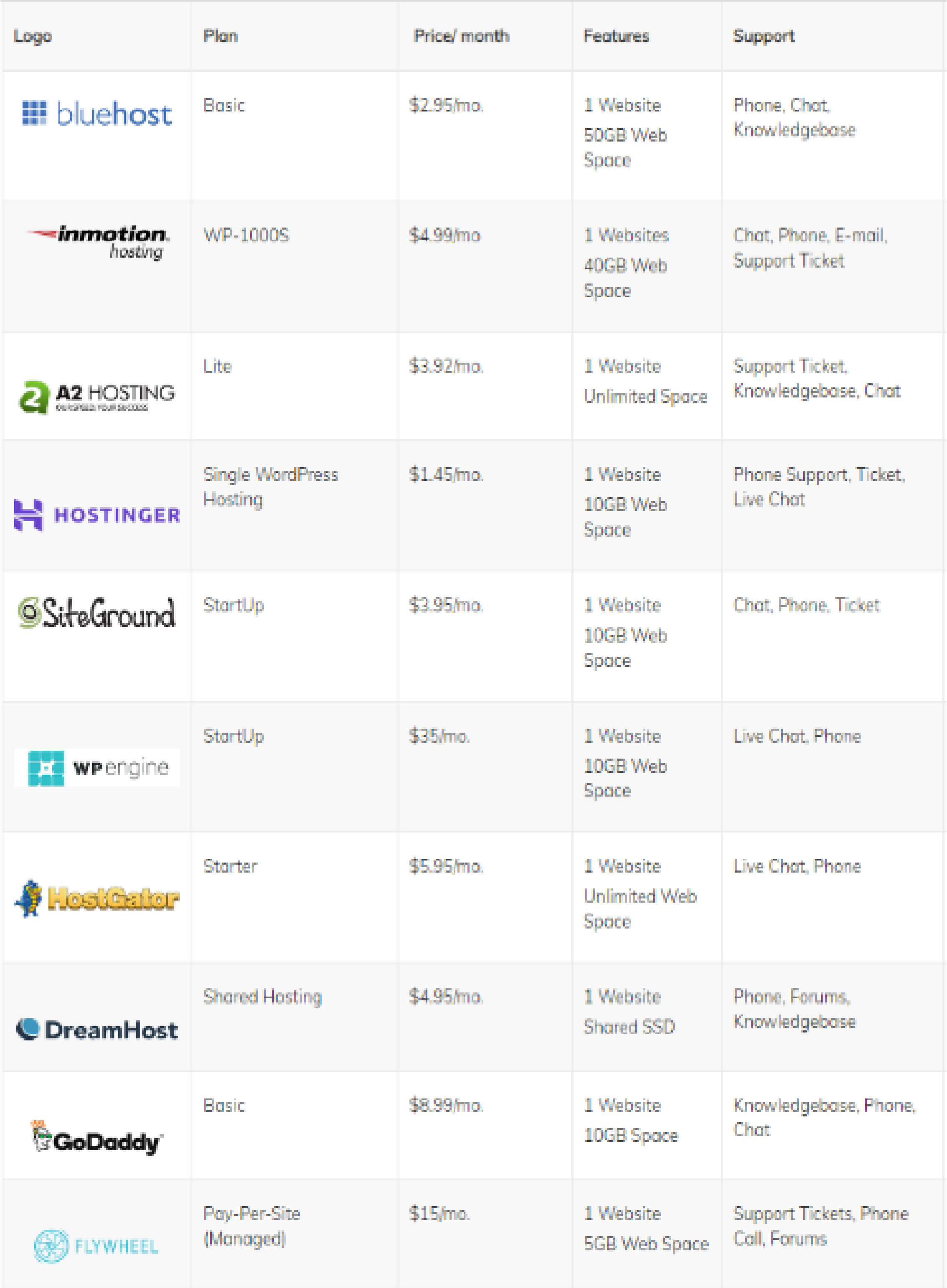
To make our web application available to its’ users it needs to be moved to a remote public host - a web server. This process of moving files and other activities needed for successful work called deployment. When files are stored on a web server and accessible on the Internet it means they are hosted. Hosting providers together with space usually offer other services, such as backups, malware scanning, support, etc. Web hosting types vary depending on the server’s technology. For example, shared, VPS, dedicated and cloud hosting. The company should choose hosting service depending on own needs. For this project, the relevant choice would be shared or cloud hosting. Shared hosting is the cheapest solution, without difficult configurations and suitable for small companies with little traffic. However, being shared with many other users can negatively affect server performance during peaks in traffic or due to bad code. This problem can be resolved by choosing cloud hosting which is like shared hosting but instead of using one physical server it uses a computer network. On the other hand, cloud hosting prices are often not fixed but depend on traffic volume. VPS (Virtual Private Server) is more expensive and requires configuration adjustments done by professionals that is why it is not suitable. Dedicated hosting (the whole server) is not suitable either because it is not only the most expensive but as the name suggests better suits bigger companies (HostingFacts Team 2018).

The characteristic of our implementation is that we have WordPress as a headless CMS and React web application. Those are two parts that can be hosted separately or use the same hosting service. If they use the same hosting service, WordPress can be hosted on subdomain admin.mysite.com, for example, or mysite.com/api. This may be a good solution for now considering costs for only one hosting service instead of two. On the other hand, having these two parts hosted separately is more secure because the content will be hidden in another place than the presentation of it.

According to WordPress.org (Requirements no date), Web hosting needs to fulfil certain requirements to be compatible with WordPress. Requirements are the following:

- PHP 7.3 or greater
- MySQL 5.6 or greater OR MariaDB 10.1 or greater
- HTTPS support
- Nginx or Apache with mod_rewrite module is recommended to have, but enough that server supports PHP and MySQL

WordPress also officially recommends three hosting service providers that were tested and proved to work nicely. They are Bluehost, DreamHost, and SiteGround (WordPress Web Hosting no date). However, there are many more good hosting service providers and the choice range is very large. For example, other companies make their own ratings. Table 1 provided by ThemeGrill Editorial (2019) lists and compares the top 10 web hosting companies for WordPress. As we can see, choices are plenty and the price range varies.



Logo	Plan	Price/ month	Features	Support
bluehost	Basic	$2.95/mo.	1 Website 50GB Web Space	Phone, Chat, Knowledgebase
inmotion hosting	WP-1000S	$4.99/mo	1 Websites 40GB Web Space	Chat, Phone, E-mail, Support Ticket
A2 HOSTING	Lite	$3.92/mo.	1 Website Unlimited Space	Support Ticket, Knowledgebase, Chat
HOSTINGER	Single WordPress Hosting	$1.45/mo.	1 Website 10GB Web Space	Phone Support, Ticket, Live Chat
SiteGround	StartUp	$3.95/mo.	1 Website 10GB Web Space	Chat, Phone, Ticket
WPengine	StartUp	$35/mo.	1 Website 10GB Web Space	Live Chat, Phone
HostGator	Starter	$5.95/mo.	1 Website Unlimited Web Space	Live Chat, Phone
DreamHost	Shared Hosting	$4.95/mo.	1 Website Shared SSD	Phone, Forums, Knowledgebase
GoDaddy	Basic	$8.99/mo.	1 Website 10GB Space	Knowledgebase, Phone, Chat
FLYWHEEL	Pay-Per-Site (Managed)	$15/mo.	1 Website 5GB Web Space	Support Tickets, Phone Call, Forums

Table 1 10 Best WordPress Hosting Services for 2020 – Compared

Dealing with most of these service providers should not be difficult. For example, first in the list Bluehost has automatic WordPress installation and updates, promising security and customer support (Bluehost inc no date).

To move WordPress from the development server to another server there are official step-by-step instructions provided. Documentation is quite large and explains in detail how to move WordPress and what pay attention to. It is advised to start by backing up existing files and database then export them again and import them to the new server. Instructions provided by Wordpress.org (Moving WordPress no date), are the following:

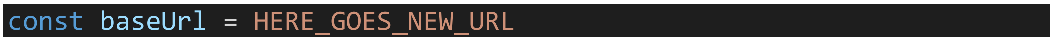
“Moving a website and changing your domain name or URLs (i.e. from http://example.com/site to http://example.com, or http://example.com to http://example.net) requires the following steps – in sequence.

1. Download your existing site files.
2. Export your database – go into MySQL and export the database.
3. Move the backed up files and database into a new folder – somewhere safe – this is your site backup.
4. Log in to the site you want to move and go to Settings > General, then change the URLs. (i.e. from http://example.com/ to http://example.net) – save the settings and expect to see a 404 page.
5. Download your site files again.
6. Export the database again.
7. Edit wp-config.php with the new server’s MySQL database name, user and password.
8. Upload the files.
9. Import the database on the new server.”

Alternatively, migration plugins for WordPress can be used. For example, ‘All-in-One WP Migration’ or ‘Duplicator’ can extract all existing files of WordPress which then can be installed on another server. Both plugins have good ratings, documentation and video tutorials to follow. Using migration plugins will make the process much easier. However, not all plugins are free to use (Adnyana 2019).

Before deploying React application to the server there are several steps heed to be done:

- Change ‘baseUrl’ in the files of the ‘services’ folder of React application to the new WordPress URL after it was installed.



```
const baseUrl = HERE_GOES_NEW_URL
```

- Get a new Google Maps API key. This can be done on Google Cloud Platform Console. One needs to create a project for which the API key will be needed. Then go to APIs & Services > Credentials> Create credentials > API key. After new API key has been created it must be restricted to one HTTP address (our React app). Key can be copied from the 'Credentials' page. (Google Developers 2020).

- Create a new EmailJS account at https://www.emailjs.com/ and connect it to the email service that will be used for sending messages from the contact form. Go to 'Email Templates' section and create a new template with the following content:

```
New message from {{senderName}} with email {{senderEmail}}:

{{message}}
```

  Then, add an email address where emails will be sent. This can be done using the form next to the created template in the field 'To email'. 'Service ID', 'Template ID' and 'User ID' from the EmailJS are needed for the application to work.

From the steps above application needs to have the following environment variables:

```
REACT_APP_GOOGLE_MAP_API_KEY=Your_Google_Map_Api_Key

REACT_APP_EMAILJS_USERID=' EMAILJS_User ID'

REACT_APP_EMAILJS_TEMPLATEID=' EMAILJS_Template ID'

REACT_APP_SERVICE_ID=' EMAILJS _Service ID'
```

During the development, these variables are stored in the .env file in the root directory of the project and .env file is added to .gitignore file content. This is needed for security reasons, so API keys are not shown when program files are pushed to the service like GitHub. However, during the build time, these variables are embedded in the code. So, they can be seen if application files are inspected (Sutherland 2019).

The ideal way to prevent this would be to build a server-side of the application which will have those API keys. Client-side of the application then can send a request to the backend. Backend gets all needed data, formats it and sends it back to the client. This is out of the scope of this Thesis and can be considered as a part of future development for this project. In our current situation, the Google Maps API key must be restricted to only one HTTP address, which is the address of React application. Therefore, it can be used only by this application and even if stolen it will not work from anywhere else.

The same can be done for EmailJS, but this is a paid feature. However, the EmailJS API key only triggers email sending and it does not itself contain credentials, which is similar to how backend would work (EmailJS.com no date).

For the React application choice of the server's software is just a matter of taste. To deploy the React application developer needs to follow steps listed in the official documentation (Deployment no date). If the application uses React Router, and in our case it does, some additional configurations need to be made. The goal of these configurations is to route all requests to index.html file. The following example illustrates a configuration in the case when the Apache HTTP Server is used. This needs to be in the .htaccess file in the "public" folder.

```
Options -MultiViews
    RewriteEngine On
    RewriteCond %{REQUEST_FILENAME} !-f
    RewriteRule ^ index.html [QSA,L]
```

Then perform the following steps:

1. Using command-line interface (CLI) in the project folder run npm command "npm run build" that will create a production build in the "build" directory inside of the project.

2. Copy the content of "build" folder to space on the server

3. Set up the server so that index.html served to the visitors. Configure paths to /static/js/main.<hash>.js

In case if WordPress resides in the subdirectory, more configurations are needed.

4 Hands-on development and practical implementation

4.1 System planning

Preliminary investigation and feasibility study included in the system planning phase of SDLC were previously done by Salonvaara (2018) in his thesis work. After receiving the request from the client, he collected and analysed information about the client's needs, challenges, and resources. Then he discussed possible technological solutions with their advantages and disadvantages. He states that the situation with the database needs to be cleared out and as a technological solution suggests developing a progressive web application using React or Polymer. Also, he mentions that the lack of budget and time limitations are the main challenges for the successful realization of the project. However, he states that the project is feasible and to be continued in collaboration with Laurea UAS.

4.2 System analysis

4.2.1 Requirements gathering

Requirements for the future system were gathered during the interviews with the client and using benchmarking. Interviews were held in Laurea UAS premises in the form of a conversation with prepared questions. Participants of the interviews were students Larisa Pyykölä and Edina Petróczki, from the client-side Heikki Lindfors and Armi Salenius, Thesis supervisor Jouni Takala and technical adviser Paresh Rathod. Table 2 includes the interview questions with answers.

Question	Answer
What is the organisational strategy?	Vihdin Nummelan kylähistoria Ry is a non-profit organization run by volunteers. The goal of the organisation is to gather and share historical information about Nummela village using the website. In the future, the plan is to continue information gathering and website updates.
Why we are doing this project?	Currently used technology is old, the website is not mobile-friendly and UI lacking some important elements such as navigation. Therefore, a renovation is needed.
What is the project about?	The organisation would like to have a mobile-friendly solution and, in the future, the mobile application. The main feature should be a map that shows the location of historical houses and the user's location.
How does this solution addresses key issues?	With the new solution, users can easily access content on their mobile phones. The map helps to locate historical houses in the village. For the organisation there will be no need to continue using outdated technology.
How big is the budget?	No budget. However, planning to apply for EU funding.
What are the alternatives?	Use the existing Nomadi app for adding own routes in there. Limited to this app solution.
Who are the users of the current system?	No information.
What kind of resources the organisation has?	Only volunteers.
Technical experience in the organisation?	No technical experience or minimal. WordPress is a little bit familiar.
What is the timetable for the project?	The number of possible working hours is limited to the Thesis project duration. Which are 400 hours for each student. The organisation does not have a deadline.

What t are the risks of doing or not doing the project?	Currently used HTML editor “KompoZer” can eventually stop working. Website continues to be not a mobile-friendly with poor UI
How the success of the project will be measured?	The project is successful when the prototype, a pilot version of the new system and training materials are delivered to the client. The pilot system has required features and mobile-friendly. The client can use the new system without technical skills.

Table 2 Interview questions with answers

For the benchmarking 3 websites of villages have been chosen: Fiskars, Nora, and Sigtuna. The aim of the benchmarking was to learn how other websites with similar themes use Best Practices of web design and Nielsen’s 10 heuristics for user interface design. Each website was observed as a mobile and desktop version and applicability or not the applicability of Best Practices and Nielsen’s heuristics documented. Conclusions are made as follows: the best navigation method is the combination of the top navigation and other alternative navigation forms, the layout should be consistent and accessible in every detail regardless of circumstances, the footer should contain all necessary information and no more, the colour contrast and font-size recommendations should be followed at every small detail, font sizes and content rendering to screen ratio should be precise, page loading time also should be considered, hamburger menu-style should be avoided and alternative solutions should be used, content should be rearranged in a way, so it is readable regardless screen size. Full benchmarking data is available in Appendix 1.

4.2.2 Modelling of information for the development

As a result of several interviews and benchmarking requirements for the product were gathered and documented. Table 3 represents the requirements:

Requirements	
Users of new application	The general public, Finnish speaking
Usage of new application	When end-users are interested in the local history they can find and read information about it using the application.
Functionality	End users can see historical houses located on the map, read content, send messages using the contact form, find and read other types of content using the navigation menu.

	Administrators can create, edit or delete content and images, add new administrator users.
Technical skills of administrators	Easy maintenance without specific technical knowledge
Features	- a map that shows the location of historical houses - navigation menu - contact form - geolocation - search
Content	Texts, images, map
Platforms	Mobile, desktop, tablet (responsive)
Costs of ownership	No or minimal

Table 3 Requirements for the new system

4.3 System design

The system design phase turns the previously collected information into a detailed, partially functional model, which satisfies the expectations of the client and future users alike. During this process, the developers might detect further user needs or practical requirements not mentioned before, and they also can find unexpected design flaws that could hinder the coding work. When this phase ended, these requirements and design details fully realise a system architecture and prototype with functional elements, which later easily can be translated into program code during the implementation.

4.3.1 Establishing functionality

All functionalities originate from the previously listed client requirements and design practices. The final design needs to be mobile and user friendly, accessible, intuitive, consistent, modern, and easily manageable in the future without the need for specific technical knowledge. The web application needs a generally accepted layout (header, navigation, main body, and footer), option for returning to previous pages without entering the menu, logical structure and hierarchy of content, possibility of contacting the operating organization and accessing specific information when needed.

When the general structure and hierarchy of the web application was designed, to ease the data transition in the future, best practices and the old website were both considered. The old website however mostly organises the data through a list of hyperlinks, without having modern navigation. As this layout does not follow current practices, tab navigation with home, about and contact pages are added to the web application structure, while the less crucial content is grouped into three logical categories: history (with main functionality), pictures and others. A footer is also added with additional contact information and copyright detail.

Some of the functionalities, such as search options within the web application content or newsfeed about updates were present in the old website, while others, such as a contact form or breadcrumbs for ease of navigation are newly added. The main functionality – a map with pins representing house locations - was requested by the client, but the specification of actual implementation details is left to the developers. For usability concerns, a dropdown selector is added above the map with an additional list of houses below it. This way - in case the map API disfunctions or the user is confused regarding the purpose of the map - the content still can be accessed.

Further details of the prototype design are discussed in a later section (4.3.5)

4.3.2 System architecture

As it was described before, our implementation consists of two parts: headless CMS (WordPress) and React web application. The administrator can add, delete, edit or view posts using WordPress Administrator panel provided by default. To access it, the administrator needs to have a web browser and know login and password. Administrator does not need to have programming skills, or a deep understanding of HTML nor how WordPress works. However, to understand how content structured and what it consists of is crucial for successful work. Structure of the content described in the following subchapter. The second part of the implementation is a web application done with the React JavaScript library. Application loads to the web browser after end-user types the website address into the browser's address bar. When loaded, the application looks and functions similarly to the website. However, it is a single-page-application, which just rewrites the content of the same page depending on a user's activity. End-user can navigate in the application using buttons and tabs, view content and interact with the map. To load needed content in response to a user's actions, the application sends requests to the WordPress part and gets responses with needed data in return. Then it processes the data and displays it. Map functionality implemented using Google Maps API. Similarly, when a user interacts with the map application sends requests and gets needed data in the response. The contact form uses EmailJS platform service. When end-user clicks ‘send’ button next to the contact form, the application sends a JavaScript object containing the inputs from the form to the EmailJS. EmailJs is connected to a Gmail account that is used for sending emails. The application is responsive and works on devices with a web browser and an Internet connection (ex., desktop computer, mobile phone, tablet). Figure 14 in a simple way describes the implementation of architecture and communications between parts.

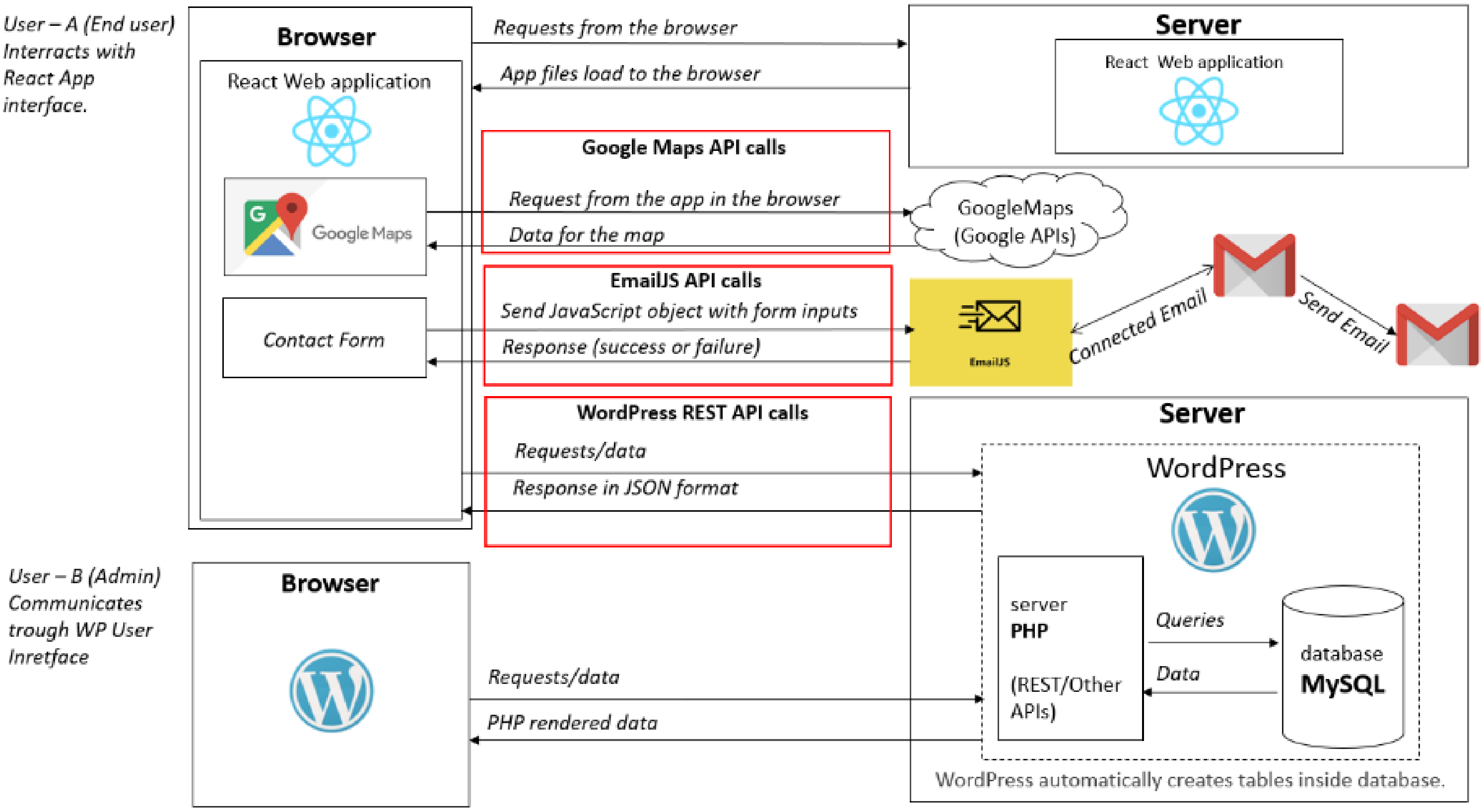


Figure 14 Implementation architecture. Headless WordPress + React web application

4.3.3 Structure of content in WordPress

For the administrator users it is crucial to understand how content is structured in WordPress, how posts are categorized and what are the limitations. The following Table 4 describes posts available, their categorisation, compulsory actions to be completed and limitations.

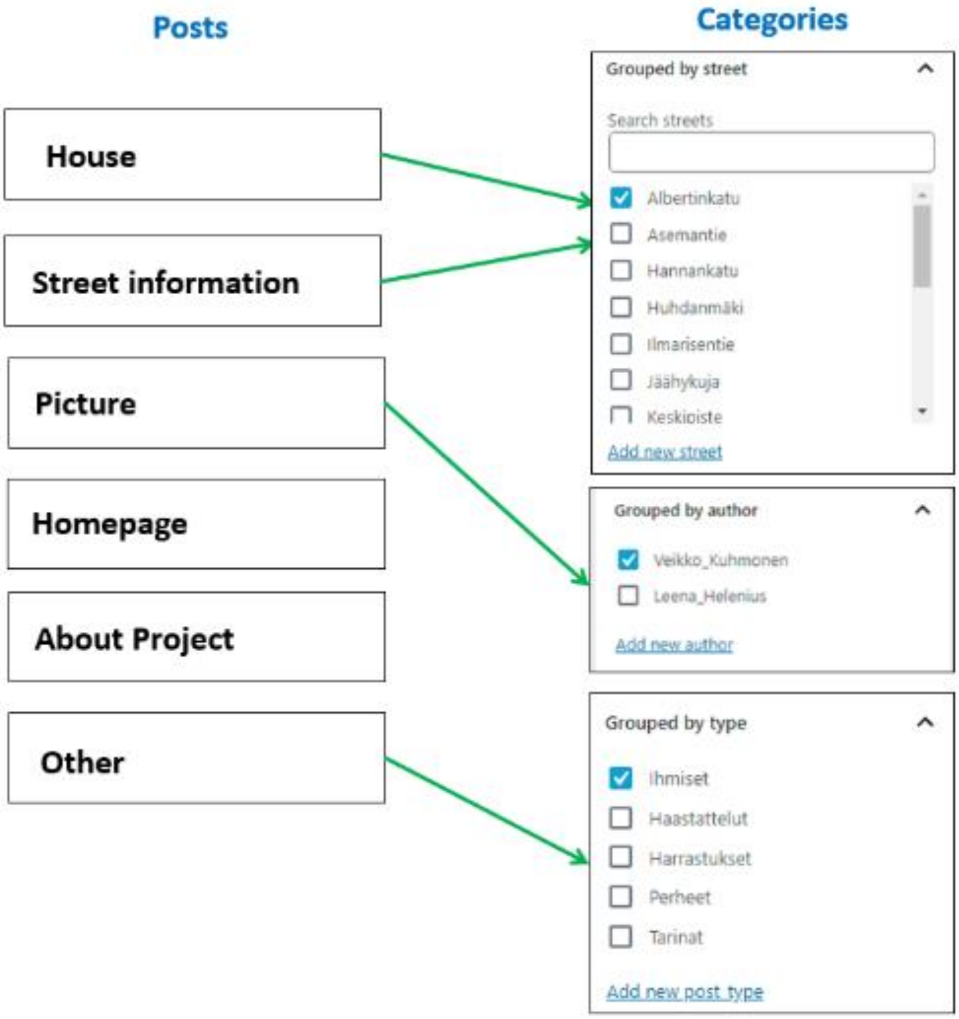
Post type	Categorisation	Compulsory actions	Limitations
House	By street	- Add a title for the house - Add house properties (address, longitude, latitude) - Choose a featured image	- Do not add images through the URL. If URL stop existing, the image will not be available anymore - If not all compulsory actions performed, React application will not work

		- Choose the street from available categories or add a new one if does not exist	
Street information	By street (same as above)	- Add a title for the street - Choose a featured image - Choose the street from available categories or add a new one if does not exist	- Do not add images through the URL. If URL stop existing, the image will not be available anymore - If not all compulsory actions performed, React application will not work
Picture	By author	- Add a title for the photo post - -Choose a featured image - Choose the author from available categories or add a new one if does not exist	- Do not add images through the URL. If URL stop existing, the image will not be available anymore - If not all compulsory actions performed, React application will not work
Other	By type	- Add a title for the post - -Choose a featured image - Choose the type from available categories or add a new one if does not exist	- Do not add images through the URL. If URL stop existing, the image will not be available anymore - If not all compulsory actions performed, React application will not work
About Project	No categorisation	- Add a title for the post	- Possible only modify and update the existing post. No new posts of this type. - Do not add images through the URL. If URL stop existing, the image will not be available anymore
Homepage	No categorisation	- Add/Modify title for the news block - Add/Modify the content of news block	- Possible only modify and update the existing post. No new posts of this type. - Do not add images through the URL. If URL stop existing, the image will not be available anymore - The title is not shown in React App.

Table 4 Posts available in WordPress, their categorisation, compulsory actions to be completed and limitations

It is good to remember that if the administrator tries to add design to the posts it will not be displayed in the application. The React application has its own styles and does not understand styles created using the WordPress content editor. It only understands HTML tags, automatically added by the editor, such as <p></p>, <h1></h1>, <img>, etc. Content in these tags displayed accordingly. That is why the administrator cannot create own design for the posts.

React application only understands post types from the table above, so the administrator can add only posts of these predefined types. Adding new custom posts is not possible, the application will not display them. That is why the only way to add new types of posts is to use the “Other” post type. The administrator can create a new post and new category of “type” for it. The post will be displayed on the “Other” page under its category in the application. Figure 15 illustrates post types and their categories that the administrator user of WordPress can utilize. As we can see “House” and “Street information” posts use the same category - “Street”. In fact, this is how React application knows which houses and streets belong together. This is needed for the map to show house marks appropriately. Post types “Homepage” and “About the project” do not have categories and can contain only one post each.



Grouped by street

Search streets

☑ Albertinkatu
□ Asemantie
□ Hannankatu
□ Huhdanmäki
□ Ilmarisentie
□ Jäähykuja
□ Keskioiste

Grouped by author

☑ Veikko_Kuhmonen
□ Leena_Helenius

Grouped by type

☑ Ihmiset
□ Haastattelut
□ Harrastukset
□ Perheet
□ Tarinat

Figure 15 Post types and their categories in WordPress

4.3.4 Colour scheme

Colour and contrast are one of the most important elements of modern web design because they determine whether the user can distinguish between elements or letters and background. When carefully chosen, these components of the visual aesthetics aid accessibility or the detection of curtail information (Horton and Lynch 2017). The World Wide Web Consortium (Web accessibility initiative no date) suggests the use of contrast both in terms of saturation and colour choices on the palette. Out of several colour schemes, the most recommended choice for text readability is the achromatic palette (black and white), as this ensures the most accessible design regardless of device capabilities. The second most favourable solution is the monochromatic scheme, which uses the previously mentioned palette and the shades of another colour (W3.CSS Color Schemes no date). Monochromatic colour schemes are advantages for many reasons. They not only ease the design process by not allowing colours to clash or provide an elegant, minimalistic and peaceful outlook but also aid in emphasizing important elements (Naldz Graphics 2019). For these reasons, this web application was also designed through a monochromatic colour scheme.

As no specific request was made by the client, the specific colour in the scheme was inspired by an artwork created specifically for the old website:

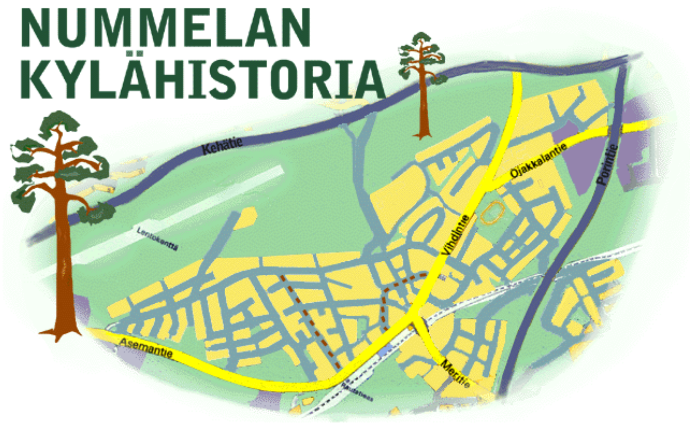


Figure 16 Map illustration of Nummela made by Leila Peräkylä.

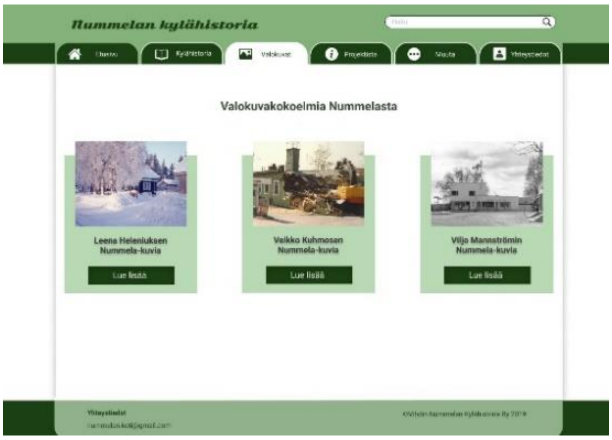
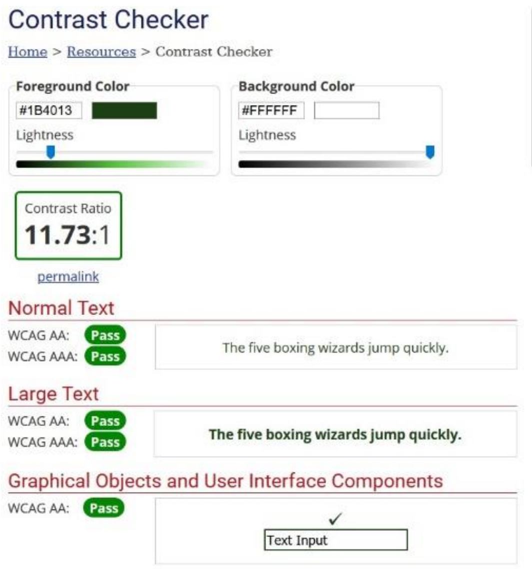

Nummelan kylähistoria
Etusivu
Kylähistoria
Valokuvat
Projektista
Muuta
Yhteystiedot
Valokuvakokoelmia Nummelasta
Leena Heleniuksen Nummela-kuvia
Lue lisää
Veikko Kuhmosen Nummela-kuvia
Lue lisää
Viljo Mannströmin Nummela-kuvia
Lue lisää
Yhteystiedot

Figure 17 Sample of the created prototype design

First, the colour was randomly selected with the help of an online tool (Bianchi 2018), which also suggested a palette for the scheme, but that did not seem to comply with the suggestions of the World Wilde Web Consortium. For this reason, the specific shades of the colour scheme were generated by Paletton, which can create palettes specifically for monochromatic web design (Paletton no date). To ensure universal usability, the colour contrast was also checked by WebAIM Contrast Checker, which is the most recommended web accessibility tool for this purpose (WebAIM no date).



Contrast Checker

Home > Resources > Contrast Checker

Foreground Color: #1B4013

Background Color: #FFFFFF

Contrast Ratio 11.73:1

Normal Text

WCAG AA: Pass
WCAG AAA: Pass

The five boxing wizards jump quickly.

Large Text

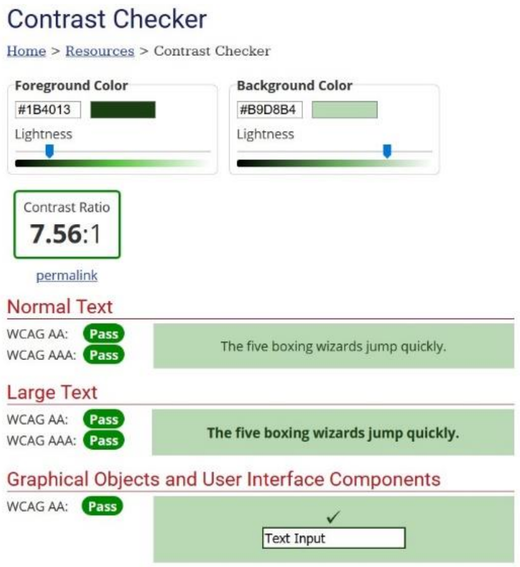
WCAG AA: Pass
WCAG AAA: Pass

The five boxing wizards jump quickly.

Graphical Objects and User Interface Components

WCAG AA: Pass

Figure 18 Screen capture from the colour contrast checking - Tab menu colours



Contrast Checker

Home > Resources > Contrast Checker

Foreground Color: #1B4013

Background Color: #B9D8B4

Contrast Ratio 7.56:1

Normal Text

WCAG AA: Pass
WCAG AAA: Pass

The five boxing wizards jump quickly.

Large Text

WCAG AA: Pass
WCAG AAA: Pass

The five boxing wizards jump quickly.

Graphical Objects and User Interface Components

WCAG AA: Pass

Figure 19 Screen capture from the colour contrast checking - Tile colours

4.3.5 Prototyping

As mentioned before, the prototype was created with Figma, which is a versatile and user-friendly design tool also allowing collaborative workflow. This way, the desktop, and mobile views can be developed simultaneously by both developers. Based on benchmarking and best practices, a tabbed navigation style is chosen for both views:

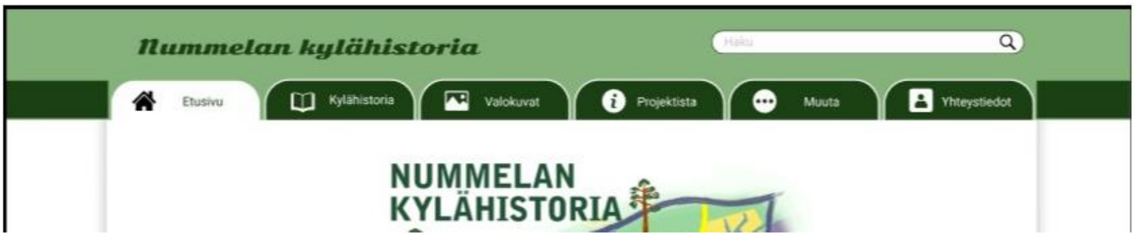
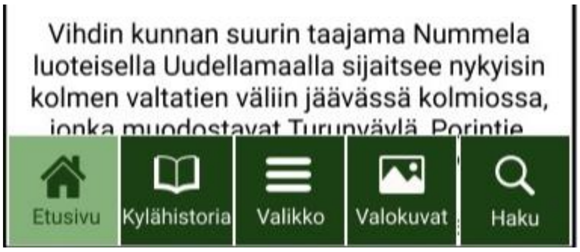
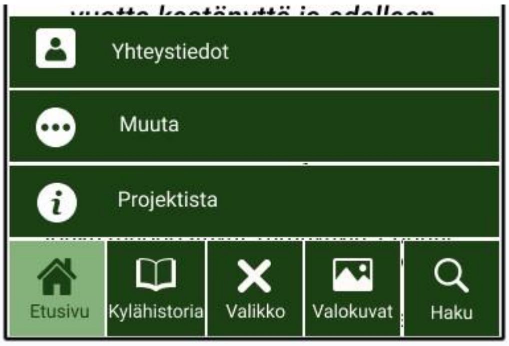


Figure 20 Tabbed navigation of prototype in desktop view



Vihdin kunnan suurin taajama Nummela luoteisella Uudellamaalla sijaitsee nykyisin kolmen valtatien väliin jäävässä kolmiossa, jonka muodostavat Turunväylä, Porintie

Figure 21 Closed tab navigation of prototype in mobile view (at the bottom of the page)



vuotta kestänyttä ja edelleen

Figure 22 Open tab navigation of prototype in mobile view

Tabbed navigation is a user-friendly solution, when there are only 2 to 9 content categories, as it resembles a folder-system commonly used in real life (Mullin 2019). It is easy to look through or access the content, as the tabs are constantly present on every page. Tabs are also commonly used in mobile user-interfaces, as they are self-evident, visually pleasing and help not only in design consistency but also in a content organization (Babich 2016a). Placing the navigation to the bottom of the screen in the mobile view also supports user experience, as this way they can navigate more comfortably during single-handed use. However, mobile tab navigation at the top level should have no more than 5 categories and any additional elements should be accessed through alternative ways (Babich 2016b). As Figures 21 and 22 show, the tab navigation in mobile view has a submenu in the middle, which can be opened and closed to access or hide further pages. It was placed to the middle, as that is the visually most noticeable point and it also maintains symmetry and helps to create a logical flow between the tab elements: submenu in the middle, main content on each side with least frequently used tabs in the corners. The navigation in both views is further helped by descriptive icons and colour changes indicate the current position within the web application.

The main functionality of the page is on the second tab. As Figures 23 and 24 show, both views there is a map, which shows the location of houses with information available. The houses are grouped by streets and those can be selected either from the dropdown menu above the map or the card - list below.

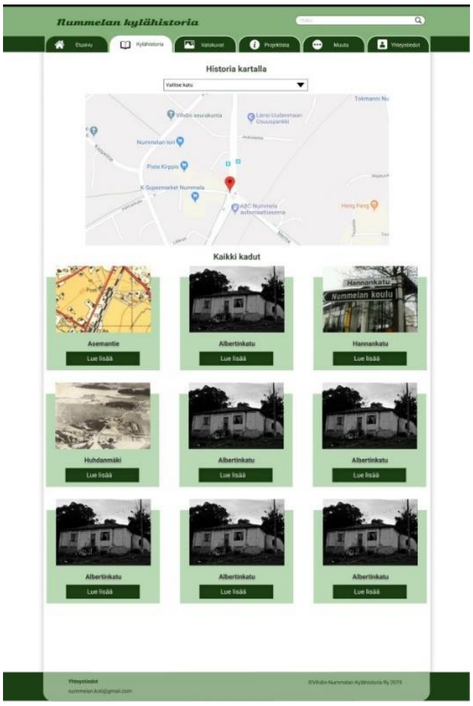


Figure 23 History page with main functionality (map) in desktop view

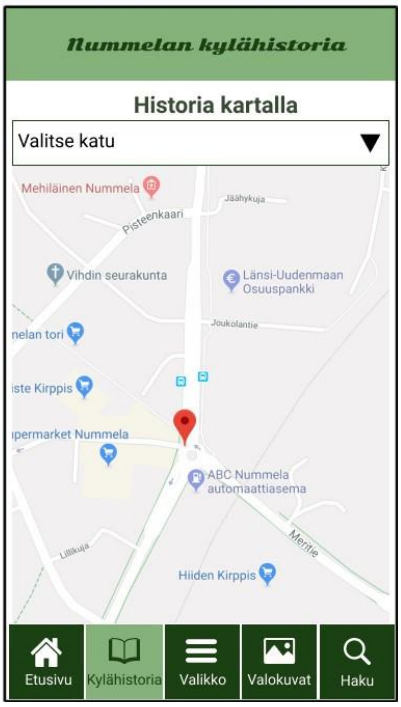


Figure 24 History page with main functionality (map) in mobile view

Once a street is selected, the map refocuses to show the house locations on that specific area. To aid design consistency, the pins representing the houses are custom-made according to the monochromatic colour scheme (Figure 25).

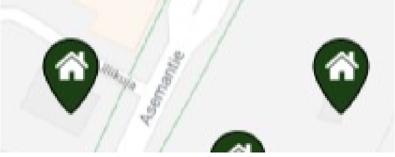


Figure 25 Example of custom pins representing house locations

Once selected, each street has a featured picture and introductory text below the map, which is followed by a card list of the houses. The tiles look the same as they do in Figure 24. The information about the houses can be accessed either by clicking on the pins, which reveals an information window with a button leading to the house-page or by selecting the corresponding cards below the map.

Figures 26 and 27 show an example of such cards. To ensure positive user experience and ease in navigation, the best is to aid every functional element of the design with visual aspects, such as pictures, colours, and secondary backgrounds. A similar solution to this card design was used in one of the benchmarked websites as well.

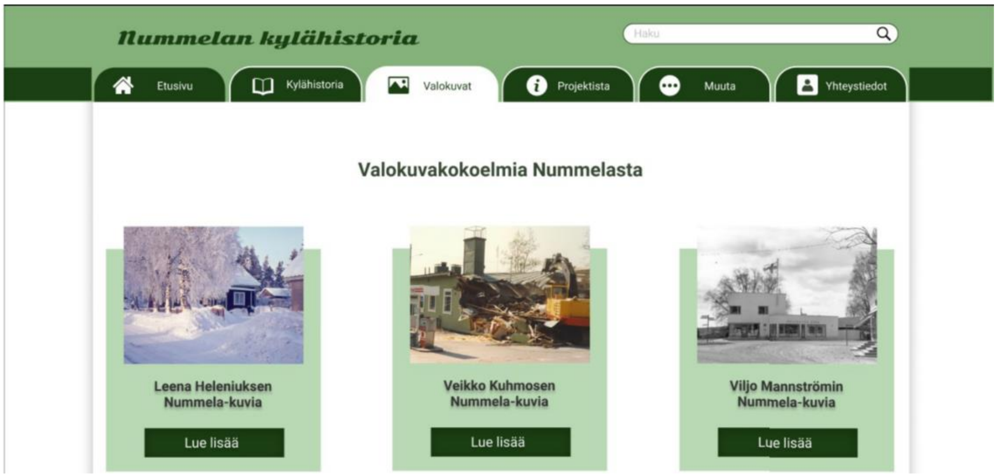

Nummelan kylähistoria
Haku
Etusivu
Kylähistoria
Valokuvat
Projektista
Muuta
Yhteystiedot
Valokuvakokoelmia Nummelasta
Leena Heleniuksen Nummela-kuvia
Lue lisää
Veikko Kuhmosen Nummela-kuvia
Lue lisää
Viljo Mannströmin Nummela-kuvia
Lue lisää

Figure 26 Desktop view of Pictures page

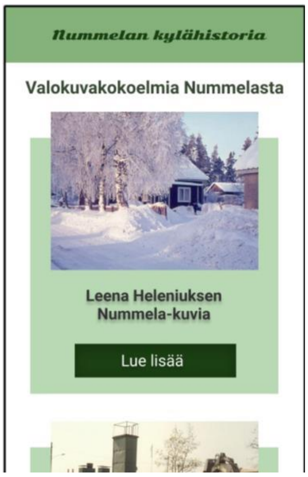


Figure 27 Mobile view of Pictures page

Regarding the overall design, several web design best practices (which ensure ease of content readability and responsiveness) are implemented. In the desktop view, a well-contrasted strip-like design was implemented with the main body restricted by a 10% margin on each side. While in the mobile view, the header toggles when the user scrolls down. All content adjusts to screen-size with having a view-point break for mobile devices where the elements also rearrange to a single-grid structure. In the mobile view, the search bar is also moved from the header to the menu and when clicked, it appears above the tabs to help single-hand usability. The breadcrumbs of the desktop version also change to a back button in the mobile view.

4.3.6 Prototype testing

According to Krug (2010), through the usability testing of prototypes it can be checked whether the user has a clear understanding of the basic website or application concept before further design development is done. When the basic concept is clear, the user can easily identify the purpose of the website or application and has no difficulty in finding the main content or its specific segments. The testing should start with a brief introduction of the test conductors, subject and process and it should be checked, that the participants selected have similarities with the user persona. Following the introduction, the prepared scenario should be explained, which can aid the user in understanding the tasks and the main purpose of the testing. While the participant should be allowed to speak freely, questions for guidance also can be asked. At the end of the testing session, the test-answers should be summarised and repeated to the user to exclude the possibility of misunderstandings. According to Krug (2010), in an ideal case, there were multiple testing rounds with more than one user at a time, but any other variation can bear satisfactory results.

This type of testing is typically done in a small scale, ideally with 3 and a maximum 4 to 5 users, as prior research did not prove that more participants would bring better test results (Krug 2010). For this reason, the further discussed test had 5 and 4 users for desktop and mobile versions, respectively. The preliminary user-testing of the prototype took place on 28/10/2019 from 10:30 to 12:30 in Laurea UAS and its participants were employees or students of the institution. Since the targeted user group was not defined by the client, these participants were selected based on general assumptions, according to which the desktop view could be used by all age or gender groups, while the mobile version is more likely to be utilized by younger individuals. The selection of the users, however, is not necessarily posing a problem, as the eventual users often are not identical with the ideal targeted ones (Krug 2010).

During the testing, the main concept of the web application was described, and the users were asked to comment on the main functionality and design, as well as to try to navigate through it freely. While Krug (2010) suggests the use of detailed task and scenario descriptions, they were not given to the participants in this specific test, as it seemed unnecessary for an initial prototype. However, the over-all user scenario was explained. As the table shows, most of the users did not find major flaws regarding the usability of the desktop view, and only minor issues were detected in the design. One elder user did not recognise the functionality of breadcrumbs, which hindered the backward navigation to previous pages, but liked the over-all design, and one young adult considered the design to be boring, while another only had subjective flaws with aesthetics. The remaining two users had no problem with neither of the aspects. The mobile view, however, showed more significant problems, as 3 out of 4 participants found the menu confusing and 2 did not know what should be done on the most important page of the application. While the menu-type was not problematic, its hidden segments and the order of elements provided confusion. On the other hand, the functionality of the main page with the map was not well-understood and the purpose of the drop-down element caused the most confusion. To remedy these problems, the order of the menu elements was modified, and the drop-down functionality was not decided to be hidden in the mobile view. The remaining comments were targeting the design and colour choices, but at those points, the wishes of the client were prioritised, since the users did not agree on what could be an aesthetic issue (Table 5).

Usability testing of the prototype - Desktop view	
User 1 (male, age ~60)	“back-to-page option is missing from ‘*Valokuvat’* page” “did not recognize the breadcrumbs – or new what they do” “liked the overall design”
User 2 (male, age ~65)	“pleased with design” “looks better than his own town’s” “had no issue with navigation, but there were features he did not try”
User 3 (female, age ~35)	“overall satisfied with the prototype” “would like to do something similar in her own project”
User 4 (male, age ~20)	“design is simple enough” “boring colour scheme”
User 5 (male, age ~25)	“text alignment is poorly done” “logo’s font type is boring” “no functionality issues seen”
Usability testing of the prototype - Mobile view	
User 1 (male, age ~20)	“the design is very simple, but overall good” “the tile-menu boxes could be round in the background, maybe would look less boring”
User 2 (male, age ~20)	“got lost at the map-page, did not know what to do about it. “There is a map, but no clue what to do with it or what it is for” “why is there a drop-down if there is a map”
User 3 (male, age ~25)	“had similar issues with the map-page” “menu is also confusing in the middle part and search option should be hidden” “colours look good”
User 4 (female, age ~20)	“had the same problems as well, especially about the menu.”

Table 5 Results of prototype usability testing

4.4 System implementation and deployment

4.4.1 Development

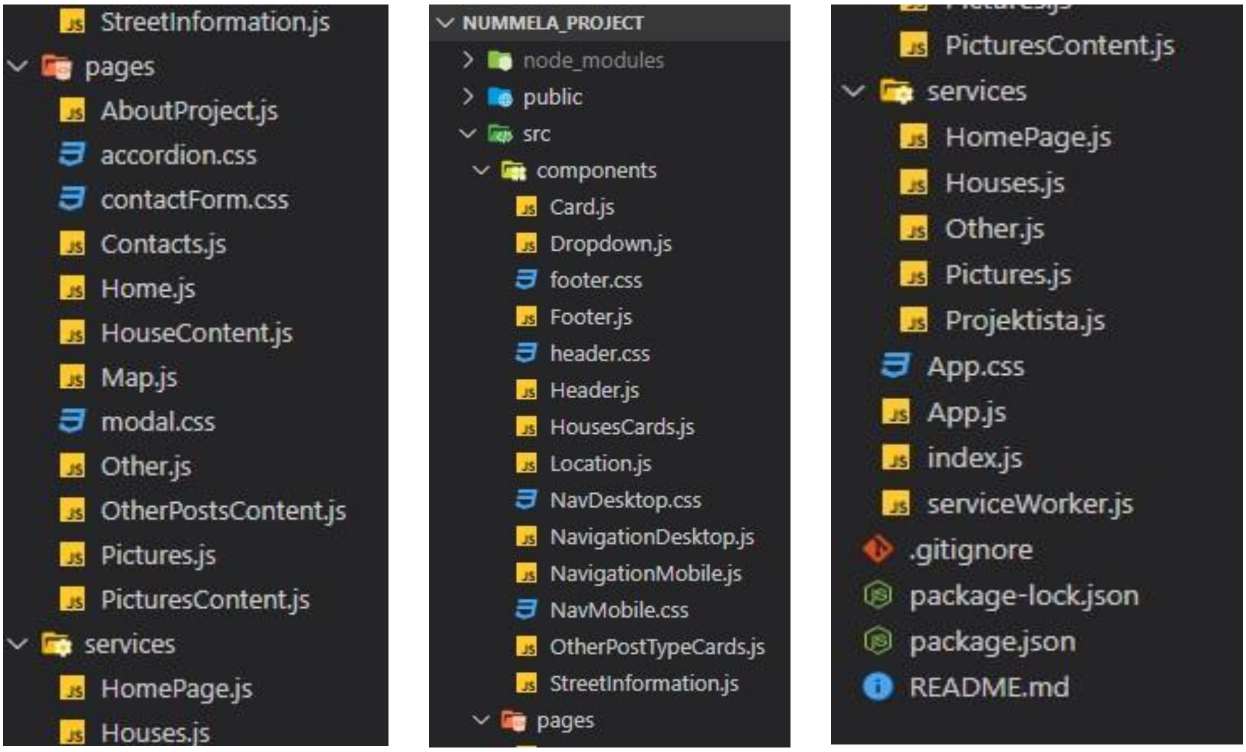
As previously mentioned, no hosting solution had been selected by the client. For the development purposes of this web application WordPress has been deployed on the Google Cloud Platform. It had been chosen because of the easy one-click installation and free trial period features. It also has been allowing access to WordPress in multiple computers regardless of location, unlike the local installation of WordPress would have. Heroku.com has been used for application deployment during the development phase, which also made it possible for the client to see the development outcomes during periodical meetings. While for version control and code sharing, the developers have been using Git and a private GitHub repository.

On WordPress, first, the Houses and Street Info post-types were created with the Streets taxonomy. The latter was used to connect and group the former two elements. To the Houses editor environment, some custom fields were added (street address and GPS coordinates), which appear as compulsory requirements at the bottom of the page. Then, for testing purposes, some of the data was copied from the currently existing website without changes. Editing was not necessary, because later every content going to be rewritten by a professional editor to fit the new layout of the web application. As the front-end development progressed, the additional pages (home, about, contact, pictures and other) were also created in a similar fashion, before the coding could commence.

During the development phase in WordPress, some plugins were necessary to be installed. These plugins were either provided additional features to the editor environment (such as the custom fields or featured image option), while others aided the data requesting through the WordPress REST API. It should be noted, however, that these plugins are not necessarily the best alternatives and choosing them mainly rooted in financial constraints. In the future, when funding allows, it might be beneficial to change some of these plugins to better functioning but payable options.

In the front-end development with ReactJS, Google Maps API had been used to provide map functionality and a third-party service called EmailJS had been installed, so the filled-out contact forms can be sent directly through emails without server coding needed. The emailing service requires 2 email addresses (out of which one is receiving the contact forms, while the other is used by EmailJS to send replies) and the Google Maps API needs a payable, autogenerated API Key, which also can be created in Google Cloud Platform.

The actual coding process will not be discussed in detail; however, the initial structure of the web application can be inspected in Figure 28



```
    StreetInformation.js
  ⌄ pages
    AboutProject.js
    accordion.css
    contactForm.css
    Contacts.js
    Home.js
    HouseContent.js
    Map.js
    modal.css
    Other.js
    OtherPostsContent.js
    Pictures.js
    PicturesContent.js
  ⌄ services
    HomePage.js
    Houses.js
```

```
⌄ NUMMELA_PROJECT
  > node_modules
  > public
  ⌄ src
    ⌄ components
        Card.js
        Dropdown.js
        footer.css
        Footer.js
        header.css
        Header.js
        HousesCards.js
        Location.js
        NavDesktop.css
        NavigationDesktop.js
        NavigationMobile.js
        NavMobile.css
        OtherPostTypeCards.js
        StreetInformation.js
    ⌄ pages
```

```
      PicturesContent.js
  ⌄ services
      HomePage.js
      Houses.js
      Other.js
      Pictures.js
      Projektista.js
    App.css
    App.js
    index.js
    serviceWorker.js
  .gitignore
  package-lock.json
  package.json
  README.md
```

Figure 28 Folder structure of web application: pages, components, services

4.4.2 Testing

As Timotic (2018) states, there are 6 basic phases of web application testing:

1. Functionality testing
2. Usability testing
3. Interface testing
4. Compatibility testing
5. Performance testing
6. Security testing

The first phase checks, for functionality issues, such as database connection and form submission. This testing is done by the developers to some level during coding, but an automated version done by the software is always beneficial. These programs, however, are not free. An alternative solution would be to use human testers with multiple attempts and data examples. This could be integrated into usability testing, which needs to be done only with a small number of users and does not necessarily require expensive software.

Interface testing would mainly check the interaction between the application and the web server, as well as would examine the error handling and messaging. This is just as crucial as compatibility testing, where different environments, such as browsers or screen sizes would be simulated. Performance testing, on the other hand, would examine the application functionality during various internet speed or amount of load and also equivalent with stress testing, which determines the maximum boundaries within which the program can function. After all this, only security testing is left. These tests are usually done through a third-party service provider or multiple software which are not demanding only in terms of time but also in costs.

Regardless, testing is an important part of programming and at some level, it should be conducted several times during the development process. Due to time limitations, however, in this implementation, there was no extensive testing done. As the project ended with an application in a pilot stage, which should be further developed in the future and before testing. However, during the system design phase, the functional prototype was tested by a small group of users and the implementation process included quick, manual testing of functionality, usability, and the interface is done by the developer.

4.4.3 Training of administrative users

Once the software is finished, the developers still must ensure that the administrative personnel can use it. As Vihdin-Nummelan Kylähistoria Ry does not have professional IT personnel, the administrative users of this web application need to receive training. While personal training cannot be provided in the future due to the time restrictive nature of a thesis project, the developers prepared training videos, which can be used by the client, when needed. These videos explain the login procedure, the layout of the WordPress Admin Interface, the editing and updating steps of each post type as well as their place or function on the user end, and caution for common errors during the content creation process. The videos had been created with the free version of Screencast O-Matic Screen Recorder and were posted on YouTube. The YouTube playlist and each video in it are unlisted, which means, that only those can view them, who are provided with the URL leasing. This link and the access to all videos through Google Drive was given to the client for future use.

4.4.4 Evaluation

There are many ways through which the success of a web application can be evaluated, but the final verdict always comes from the users, once the program is launched and operational in its real-life environment. Still, the professional evaluation of web applications is a crucial process, no matter how complex it can be. Đorđević (2017) suggests several criteria that should be met by a successful web application and also lists multiple services, such as WAMMI (Website Analysis and Measurement Inventory). These evaluations, however, are also conducted on the fully operational and deployed application.

As this project ends a pilot stage, such evaluations did not seem to be needed. The review of the web application through a meeting with the client seemed to be reasonable enough. During such a meeting, the client claimed to be satisfied with the overall operation of the application. There were some suggestions made regarding future development, which are mentioned in a later chapter (chapter 5).

4.5 System security and support

4.5.1 Security

Security of the WordPress part of our implementation provided by WordPress and its Security Team which continuously working on improvements in the security of software. Also, the Security Team provides recommendations to the authors of themes and plugins. It is advised that developers use APIs carefully and make sure that the server configured correctly. For administrators, it is important to use a strong password for accessing WordPress. Regular upgrades of WordPress version and its plugins are also in the responsibilities of administrator users. Upgrades are very important because they contain security updates. However, minor updates of WordPress are done automatically without any actions from the administrator users if this feature is not blocked. WordPress software takes care of OWASP (Open Web Application Security Project) Top 10 security risks that web applications can have: "Injection, Broken Authentication and Session Management, Cross Site Scripting (XSS), Insecure Direct Object Reference, Security Misconfiguration, Sensitive Data Exposure, Missing Function Level Access Control, Cross Site Request Forgery (CSRF), Using Components with Known Vulnerabilities, Unvalidated Redirects and Forwards" (Rosso 2015).

React application can be considered secure in our case. It does not have authentication or user management of any sort. REST APIs of WordPress usage is limited only to HTTP GET requests and cannot cause harm. However, as was mentioned before, during build all API keys and URLs used for HTTP requests are embedded in the code that is used by the browser, consequently, they can be discovered and misused by someone. That is why Google Map API key must be restricted to only one HTTP address (address of our React application), so it will not work from anywhere else if stolen. If someone will try to send HTTP DELETE, POST, etc. requests to the WordPress REST API endpoints they will be not successful because this kind of requests require authentication. Meaning that only logged-in administrator user can do changes or delete/add data. Another solution would be to use CORS (Cross-Origin Resource Sharing) mechanism and only allow requests from one certain origin (our React application). Modifications related to CORS can be included in the future development of this project. EmalJS, as it was said before, is relatively safe to use. API key does not contain credentials and used similarly as if there was backend. It is possible to restrict the API key to only one HTTP address, however not for free. EmailJS has IP base rate limits that used for spam prevention done by bots. Additionally, it is possible to implement reCAPTCHA tests that will allow only humans to send emails. It can be considered as a part of future development (EmailJS.com no date). In the future, it will be beneficial for security to build a server-side of React application. After that, there will be no need to use EmalJS service and Google Maps API could not be discovered by the end-users.

4.5.2 Maintenance

Maintenance is very important and the most cost-consuming part of SDLC. Costs of maintenance in the SDLC can be as high as 67% of all costs. Figure 29 provided by Schach (1999, 11) illustrates this statement.

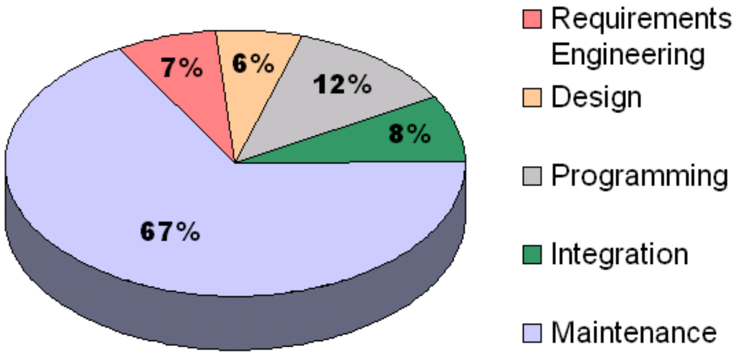


Figure 29 Approximate relative costs of the phases of the software life cycle

Maintenance can be of different types: Corrective, Adaptive and Perfective. During the Corrective maintenance bugs and other issues of the software are fixed. Adaptive maintenance takes care of implementing new technologies that prevent software from being outdated. Perfective maintenance is a type of maintenance when changes are made based on users' input on how to improve the system. Also, Emergency maintenance can be added as another type. It is similar to the Corrective type but not scheduled. So, the reasons why maintenance is required may be the following: functionality improvements, correction of technical or design issues, technology updates, overall evolution of the system. People who have too little knowledge in IT may think that maintenance only needed for fixing errors. In reality, most of the maintenance does not have anything to do with errors and concentrates on adapting to new technologies or making the performance better. It can be said that expenses of maintenance are reasonable if benefits outweigh the costs, when changes are necessary for the system to work or changes need to be made because of some legal issues. As we can see maintenance is crucial for the software to survive in a world where technology constantly changes. Therefore, any developed software needs to be maintained either by IT specialists who work for the company or provided by outsourced professionals. Either of these solutions involves expenses that can be big (Nexhati 2017).

Our implementation is no exception from said above. Continuous maintenance is needed for it to survive in a reality where technology advancement happens very fast. Unfortunately, due to the specifics of this project, neither students nor Laurea UAS can provide it. The consequence of maintenance absence can be seen in the current solution used by Vihdin-Nummelan

Kylähistoria Ry. Software is outdated, website UI does not reflect modern standards, functionality wanted by users is missing. It needs to be decided how maintenance will be organised for new implementation so it will not happen again.

5 Future development

Future development of the project can be divided in following categories: features that have not been implemented during the first iteration, new client requirements and ideas, other possible improvements.

Features that have been prototyped but not implemented during the first iteration:

- Back button
- Breadcrumbs
- Search
- Content of posts divided into two columns

New client requirements and ideas:

- Instead of the “About the project” and “Other” tabs in the navigation, there should be different tabs referring to more important content (e.g. hobbies or people). The “About the project” content should be moved or linked to the home page instead.
- At the info page of each house, there should be link to additional information (Families, Firms Jobs). This should be under the info about the house.
- Idea: The displayed content should different on different devices. On mobile, there should be less information displayed (short version of the text) while on the desktop all the text could be seen.
- Change WordPress language from English to Finnish: including the post type names as well.

Other possible improvements:

- Build a server-side of the application that will handle API calls. After that EmailJS service used for the contact form functionality can be replaced with its back-end code.
- If it is decided to continue using EmailJS, it will be beneficial to implement reCAPTCHA tests.

- Modify REST API calls that only needed fields are returned. For example, ‘http://your_wp_website/ index.php/wp-json/wp/v2/streets?_fields=id,name’ will return only IDs and names of the streets, while currently all information from the endpoint is returned. The application does not need all information; it may affect performance.

  - If it is decided so, make modifications to CORS which will allow responses to only one address.

  - It is advised to install a paid plugin to WordPress for organizing the media gallery. For example, “Filebird”.

  - Change fonts and their sizes in React application (need to be discussed with the client to choose a suitable one).

  - The map needs to show some houses on first load (during the prototype testing it was confusing for the users that map is empty)

  - Consider using ‘react-device-detect’ module instead width of the screen to distinguish between desktop and mobile.

  - Create 404 user-friendly page.

  - Change style of the dropdown menu next to the map. The width should be changed depending on the device (100% on mobile, and about 50% on desktop). It should appear on top of the map when open.

  - Make a strategy on how SEO principles can be implemented. If it is possible at all.

  - Add Google Analytics to the React application, so it will be possible to get data about the users and their behaviour in the future.

As we can see, already after the first cycle of development there are quite many ideas and new requirements to work with. This is a normal part of the agile approach where after each development cycle there are new requirements and features to implement and bugs to fix. Due to time limitations, this project only went through one cycle.

6 Conclusion

Specifics of this project were that Vihdin-Nummelan Kylähistoria Ry is run by volunteers only and does not have financial resources nor deep technical knowledge. Therefore, the costs of the solution had to be as minimal as possible and people without technical skills needed to be able to work on the content independently. Another requirement of the client was that the solution needed to be mobile friendly and, in the future, could function as a mobile application. Considering all the constraints and requirements it was decided to use WordPress as a Headless CMS for managing the content and React application for displaying it. WordPress was chosen because of its popularity and simplicity for non-tech users. The choice of React was based on the fact that it is nowadays the most popular JavaScript library and makes it possible with some work to convert React application into Progressive Web Application or mobile application in the future. As a working method Systems Development Life Cycle was used which included several stages: planning, analysis, design, implementation, security, and support. These stages included following actions: requirements gathering, modelling of information for the development, establishing functionality, system architecture design, structuring of content in WordPress, colour scheme choice, prototyping, prototype testing, development.

As a result of our work prototype of mobile and desktop application, a pilot version of the application and training video materials were delivered to the client. The client was satisfied with the work and willing to continue collaboration with Laurea UAS. However, the pilot application was not deployed to the server of the client's choice. Moreover, to provide further maintenance by Laurea UAS or students is not possible. Therefore, this paper discusses topics related to deployment, security, further work and maintenance, but there is no solution to how this can be organised with the constraints that the project has. As it was discussed before, any software requires continuous maintenance and support. Without it, over time the application will get outdated and Vihdin-Nummelan Kylähistoria Ry very likely will end up in the same situation as it is now. Meaning that technology and solution made with it will become so old that it will be difficult to use it. Consequently, before continue working on the project it needs to be decided how maintenance and support will be organised. If there is no possibility to do so, other solutions need to be found or the project needs to be dismissed.

This is not uncommon for NPO (Non-profit organizations) to be in a situation like this. According to the research done by Sontag-Padilla, Staplefoote and Morganti (2012), the main challenge of NPOs is to be able to balance financial sustainability. It means that there should be enough financial resources for the organization in a long and short period of time, so it is possible to react quickly to different events (Bowman 2011). There are many reasons why it is difficult to have financial sustainability. For example, dependence on not stable funding like grants that come and go, not having proper branding and marketing activities, not enough promotion activities and volunteers in the community, etc. Even though the organization does not bring profit it needs even more attention than for-profit businesses. Not only the financial aspects need to be cleared out but also impact on society. What is the mission of the organisation and its projects? Does the organization accomplish own goals? Is it worth to continue activities for the current costs (Bell, Masoka, and Zimmerman, 2010)? To address these and other questions detailed analysis needs to be done for the Vihdin-Nummelan Kylähistoria Ry and strategy for further actions developed.

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Figures

Tables

Appendices

Appendix 1: Benchmarking

A user experience-based design is crucial, as it can drive away customers or keep them interested longer. While design aesthetics and overall user experience are always subjective to some extent, competitor benchmarking can be a sure and easy way to establish a baseline, define best practices in real-life implementation, and identify weak design choices in a specific environment (Mosley 2017). Carina & Gregg (no date) suggest doing this benchmarking in four main steps:

- identifying competitors
- benchmarking functionality (e.g.: interactions and understanding of website structure)
- benchmarking marketing choices (e.g.: use of social media)
- benchmarking design layout (e.g.: use of images based on branding and best practices)

Mosley (2017) also suggests the use of online benchmarking tools, as they can test responsiveness and other mobile-centred design features faster and more accurately, then conventional observation methods. For this reason, this benchmarking also uses two tools for establishing mobile friendliness: RankWatch (no date) and SiteChecker (2019). These online tools were selected randomly via browser search engine listing, as the most recommended options created by Google and W3s were not available or functional, and many other solutions were not giving detailed results. RankWatch and SiteChecker on the other hand provide details for their scores and do not use the same criteria for evaluation, which gives more credibility to their results.

Identifying competitors:

Organisations, such as Vihti-Nummela Village History Group, are scarce even in Finland and many of those have equally out-dated websites, which are not suitable for comparison, because they do not follow current practices regarding usability and best practices of web design. There are however similar projects with more recently designed websites as well, such as open-air ethnographic museums or tourist-attracting small settlements. As Vihti-Nummela Village History Group collects data which is specific to an area rather than a time-period, it seemed to be more logical to compare websites about tourist-attracting settlements and not open-air museums.

Three websites were chosen for benchmarking:

The website of Fiskars Village (2019), which serves as a Finnish example and was selected because it was created and maintained by Fiskars Group. This would theoretically mean, that the website got more than enough funds both financially and technologically and has the potential to be a well-built example.

The other two websites were randomly chosen from the list of Touropia (2019) and they are the tourist information pages of Swedish towns Sigtuna (Destination Sigtuna no date) and Nora (Visit Nora no date), which are frequently visited by foreigners and locals as well.

Best Practices

Best Practices of web design and development are an informal collection of guidelines and commonly used solutions or elements, which are – as a whole or in parts – are followed by all professionals. The most well-known practices are collected, published and revised by the W3C (2019) as various standards and are commonly taught by educational institutions worldwide. Such standards and best practices are described in the further subsections, which were described by Horton and Lynch (2017) in Web Style Guide.

Universal usability combines the accessibility and usability principles into a single design approach which reduces functional limitations and raises user satisfaction regardless individual circumstances. Accessibility design is guided by the Web Accessibility Initiative (2019) and it ensures that the website is usable for every user at an equal level and without loss of information. On the other hand, the usability standards, such as the 10 heuristics of user interface design (Nielsen 1994), ensure a user-centred design, which effectiveness is guaranteed by both qualitative and quantitative measures. The main universal design principles are:

- Equitable use (*accessibility*)
- Flexibility in use (*platform independency*)
- Simple and intuitive use (*easily understandable design layout*)
- Perceptible information *(effective communication of necessary information*)

Heuristics

Nielsen’s 10 heuristics for user interface design (Nielsen 1994) are probably the most used principles for usability evaluation. They help to detect and avoid design flaws and usability issues without being specific. The lack of detailed instructions avoids the restriction of the creative process and ensures that these principles remain timelessly true. These heuristics are:

1. *Visibility of system status:*
   This principle means, that the status of a process or action should always be clear and visible for the user.

2. *Match between system and real world:*
   The design elements and functionalities should resemble solutions and images which the user is familiar with based on its experience from the real-world environment.

3. *User control and freedom:*
   This heuristic means, that the user should be have the chance to control its actions, including error recovery and prevention or other forms of changing in action-course, when it is applicable.

4. *Consistency and standards:*
   The design should ensure, that the user does not encounters unexpected wordings, element-positions or actions, which could be achieved by following often-used design standards.

5. *Error prevention:*
   Those errors, which are foreseeable, should be prevented before they could happen.

6. *Recognition rather than recall:*
   The user should be able to navigate through the website without the need of memory-recall or extended thinking.

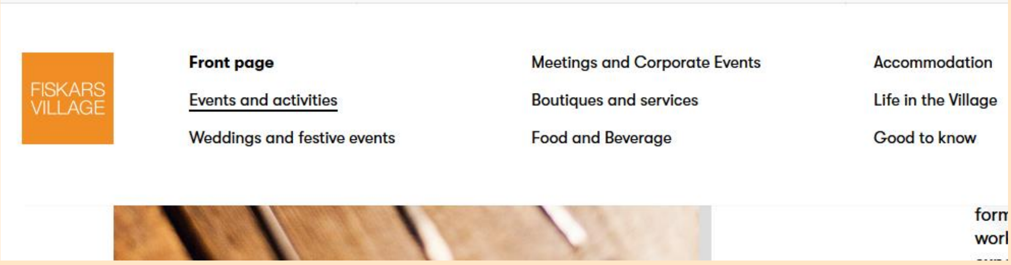
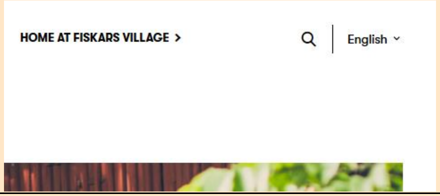
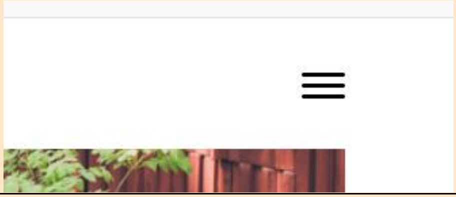
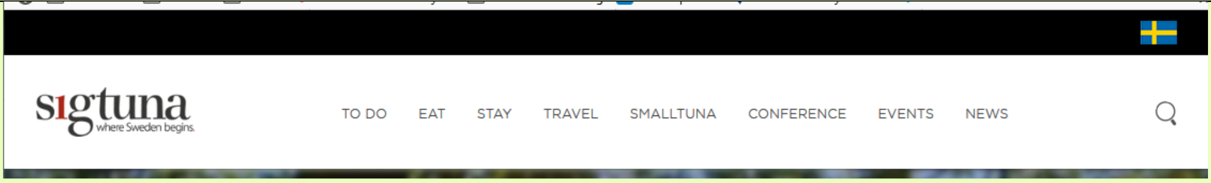
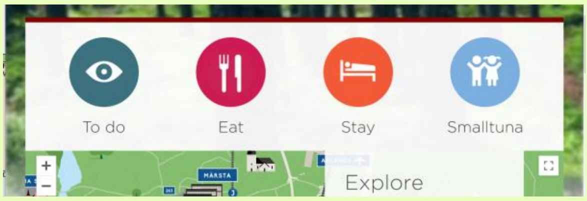
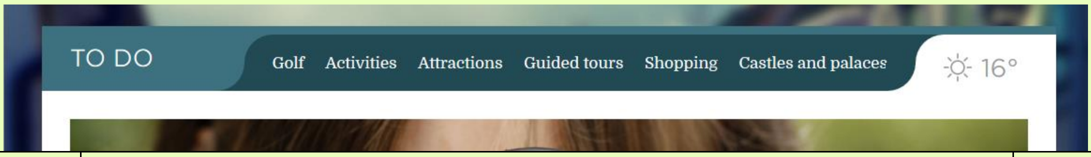
7. *Flexibility and efficiency of use:*
   Both new and experienced users should be able to reach their goals with maximal satisfaction, which means, that the option for tailoring often accruing actions should be available, but not necessary to use.

8. *Aesthetics and minimalist design:*
   In terms of information presentation and visual design, the user should not be provided with unnecessary details which could be destructive.

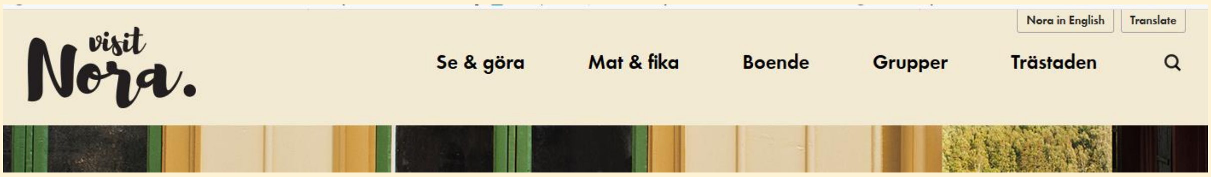
9. *Help user recognise, diagnose and recover errors:*
   All errors should be recoverable. To aid this, all error messages or hints should be easily understandable, helpful and useful for the correction process.

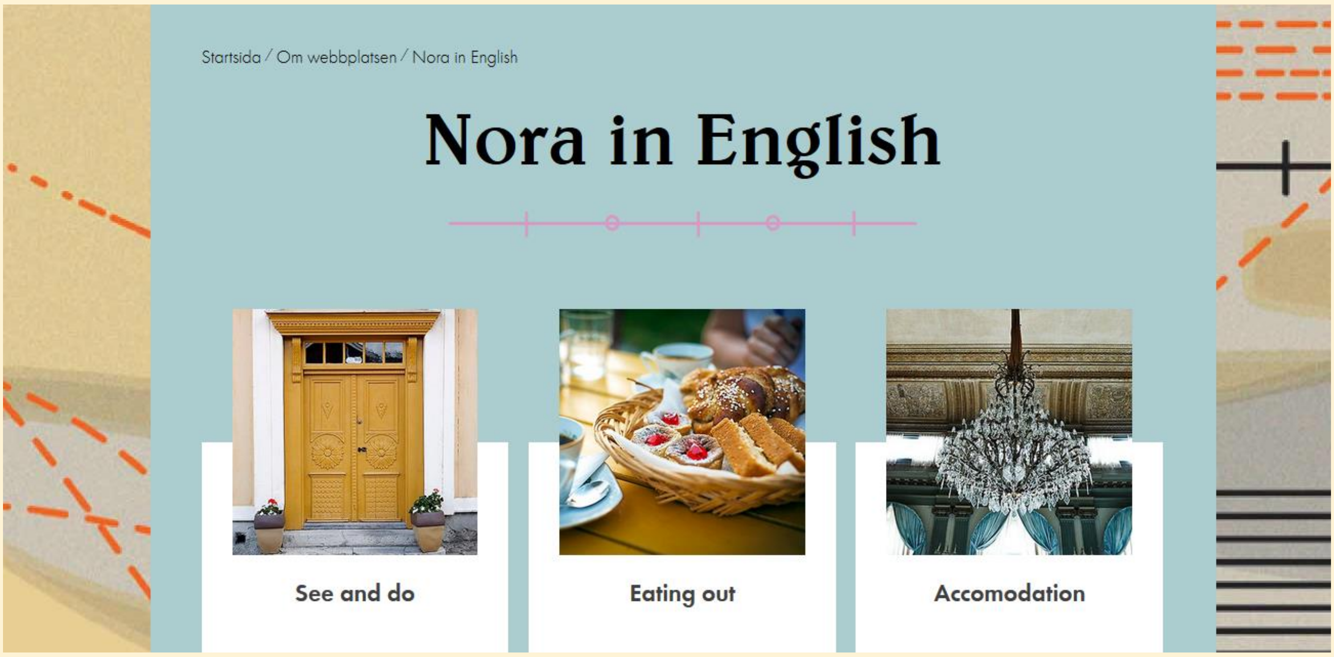
10. *Help and documentation:*
    While documentation should not be necessary, when it is present, should be simple, concise, easily detectable and specific.

Desktop view:

Navigation		
Fiskars Village		
 FISKARS VILLAGE Front page Events and activities Weddings and festive events Meetings and Corporate Events Boutiques and services Food and Beverage Accommodation Life in the Village Good to know form worl  		
Best Practices	Equitable use	Applied
	Flexibility in use	Applied
	Simple and intuitive use	Not applied
	Perceptible information	Not Applied
Heuristics	Match between system and real world	Not Applied
	Consistency and standards	Not Applied
	Aesthetics and minimalist design	Applied
Comment	The menu-type (collapsible “hamburger” menu) is not recognisable for many users, especially on a desktop view. For this reason, it is not simple and intuitive or matching the real world and used standards.	
Destination Sigtuna		
 sigtuna where Sweden begins TO DO EAT STAY TRAVEL SMALLTUNA CONFERENCE EVENTS NEWS   TO DO Golf Activities Attractions Guided tours Shopping Castles and palaces 16°		
Best Practices	Equitable use	Applied
	Flexibility in use	Applied
	Simple and intuitive use	Applied
	Perceptible information	Applied
Heuristics	Match between system and real world	Applied
	Consistency and standards	Applied
	Aesthetics and minimalist design	Applied
Comment	This navigation type is more conventionally used, therefore also expected by the user. It is also reinforced by alternative navigation options, which are also consistently present.	

Visit Nora

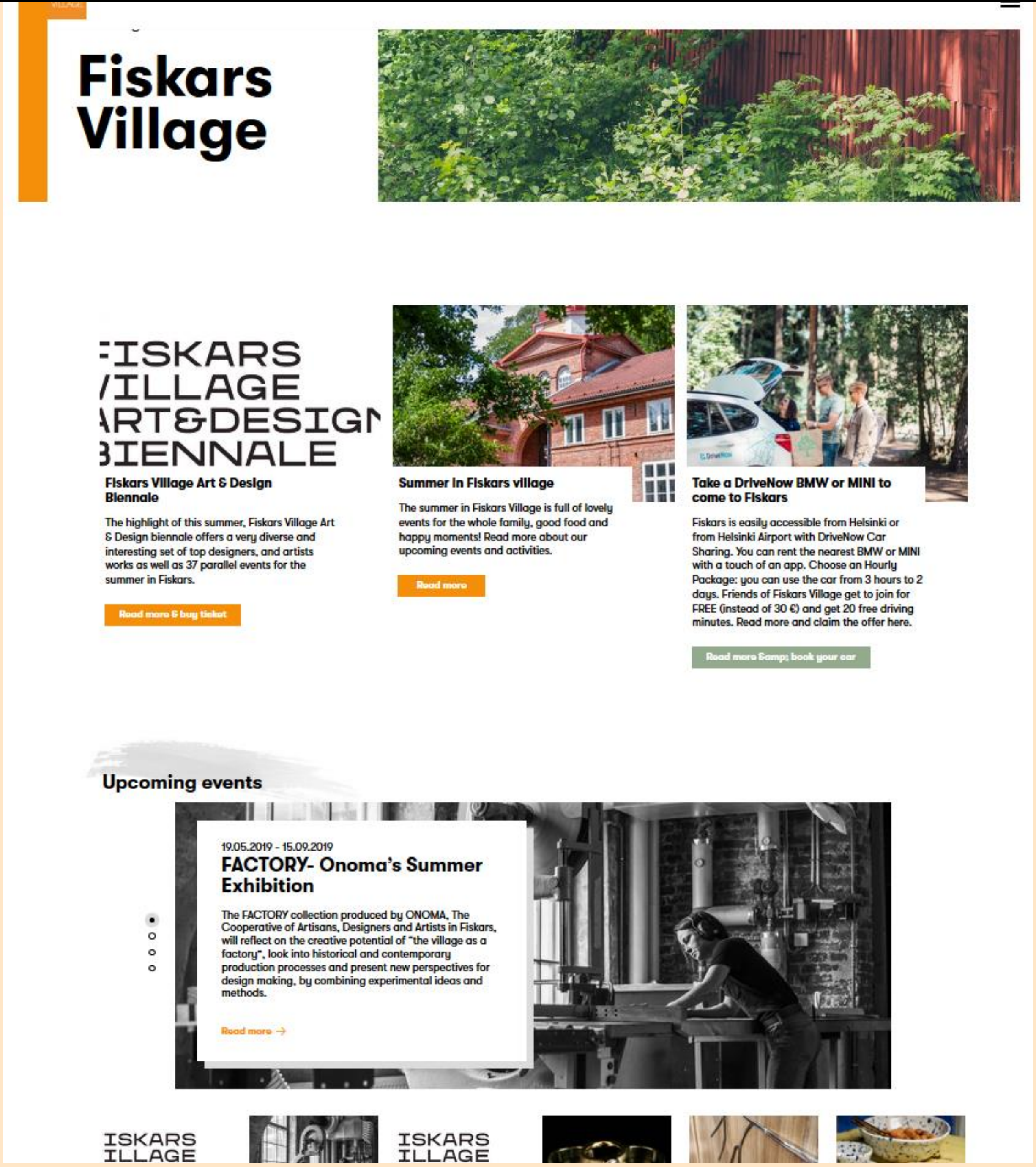




Best Practices	Equitable use	Applied
	Flexibility in use	Applied
	Simple and intuitive use	Applied
	Perceptible information	Applied
Heuristics	Match between system and real world	Applied
	Consistency and standards	Applied
	Aesthetics and minimalist design	Applied
Comment	This one-layer navigation on the top is also conventionally used. The pages also have breadcrumbs and tile-style sub-navigation on each page, which are minimalistic, intuitive and the former one aids error recovery during navigation.	
Conclusion	The best navigation method would come from the combination of the last two examples: top navigation with breadcrumbs and other alternative navigation forms. The tile-style navigation is also visually attractive and easily detectable.	

General Layout

Fiskars Village



Fiskars Village

FISKARS VILLAGE ART&DESIGN BIENNALE

Fiskars Village Art & Design Biennale

The highlight of this summer, Fiskars Village Art & Design biennale offers a very diverse and interesting set of top designers, and artists works as well as 37 parallel events for the summer in Fiskars.

Summer in Fiskars village

The summer in Fiskars Village is full of lovely events for the whole family, good food and happy moments! Read more about our upcoming events and activities.

Take a DriveNow BMW or MINI to come to Fiskars

Fiskars is easily accessible from Helsinki or from Helsinki Airport with DriveNow Car Sharing. You can rent the nearest BMW or MINI with a touch of an app. Choose an Hourly Package: you can use the car from 3 hours to 2 days. Friends of Fiskars Village get to join for FREE (instead of 30 €) and get 20 free driving minutes. Read more and claim the offer here.

Upcoming events

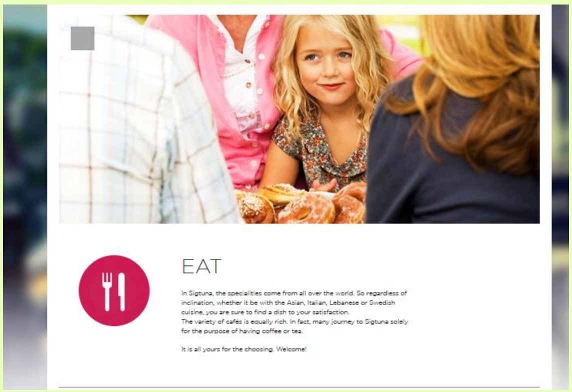
19.05.2019 - 15.09.2019

FACTORY- Onoma's Summer Exhibition

The FACTORY collection produced by ONOMA, The Cooperative of Artisans, Designers and Artists in Fiskars, will reflect on the creative potential of "the village as a factory", look into historical and contemporary production processes and present new perspectives for design making, by combining experimental ideas and methods.

Best Practices	Equitable use	Not applied
	Flexibility in use	Applied
	Simple and intuitive use	Applied
	Perceptible information	Applied
Heuristics	Match between system and real world	Applied
	Consistency and standards	Not applied
	Recognition rather than recall	Applied
	Aesthetics and minimalist design	Applied
Comment	The general page layout is consistent with almost all best practices but does not follow accessibility rules regarding colours or font-size.	

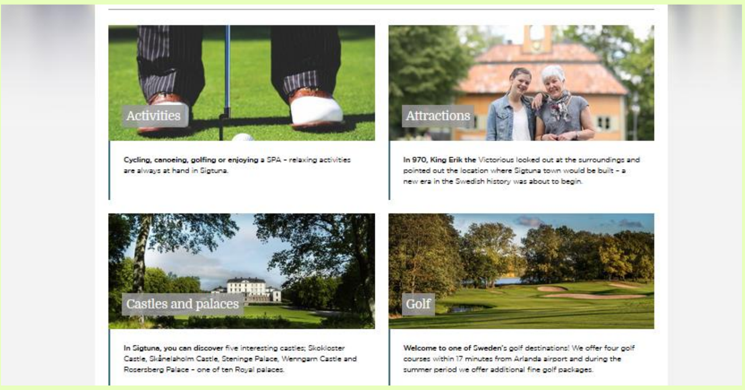
Destination Sigtuna



EAT

In Sigtuna, the specialities come from all over the world. So regardless of inclination, whether it be with the Asian, Italian, Lebanese or Swedish cuisine, you are sure to find a dish to your satisfaction.
The variety of cafés is equally rich. In fact, many journey to Sigtuna solely for the purpose of having coffee or tea.

It is all yours for the choosing. Welcome!



Activities

Cycling, canoeing, golfing or enjoying a SPA – relaxing activities are always at hand in Sigtuna.

Attractions

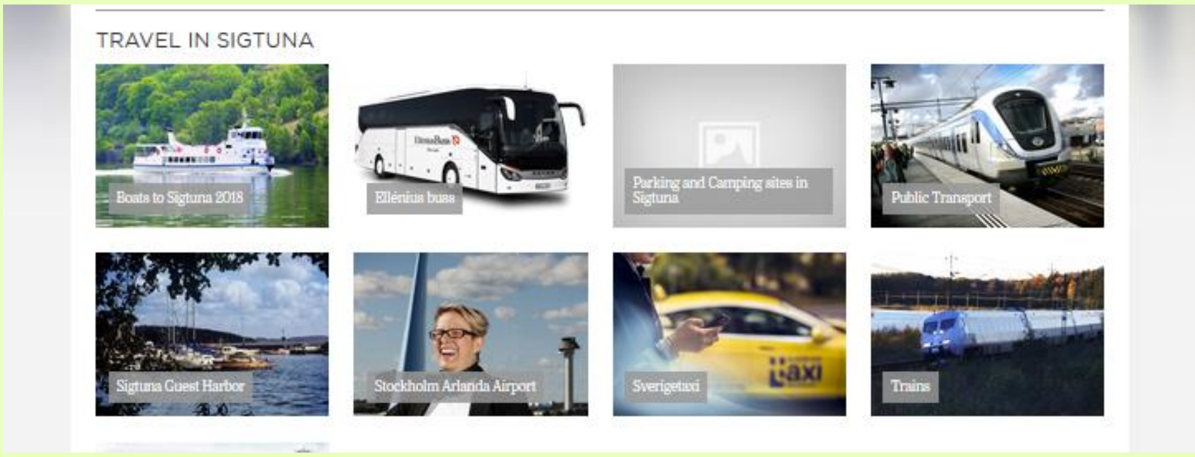
In 970, King Erik the Victorious looked out at the surroundings and pointed out the location where Sigtuna town would be built – a new era in the Swedish history was about to begin.

Castles and palaces

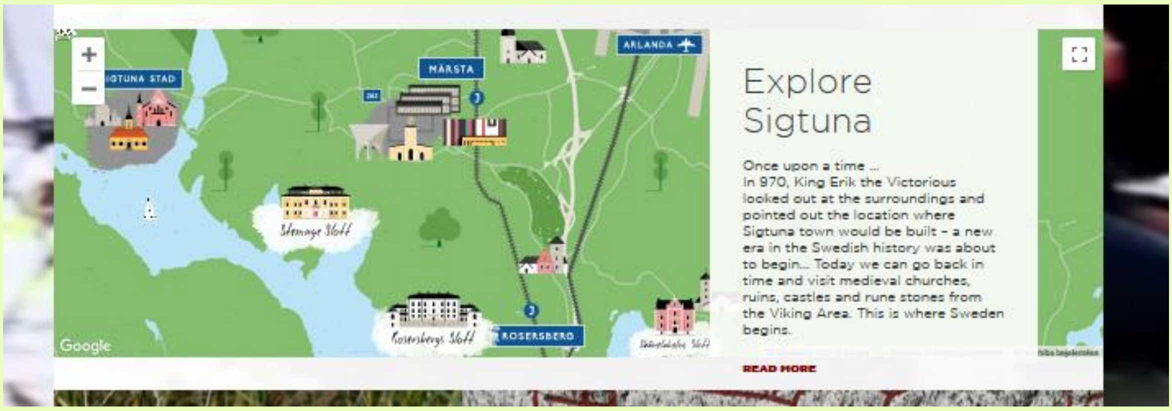
In Sigtuna, you can discover five interesting castles; Skokloster Castle, Skånelaholm Castle, Steninge Palace, Wenngarn Castle and Rosersberg Palace – one of ten Royal palaces.

Golf

Welcome to one of Sweden's golf destinations! We offer four golf courses within 17 minutes from Arlanda airport and during the summer period we offer additional fine golf packages.



TRAVEL IN SIGTUNA



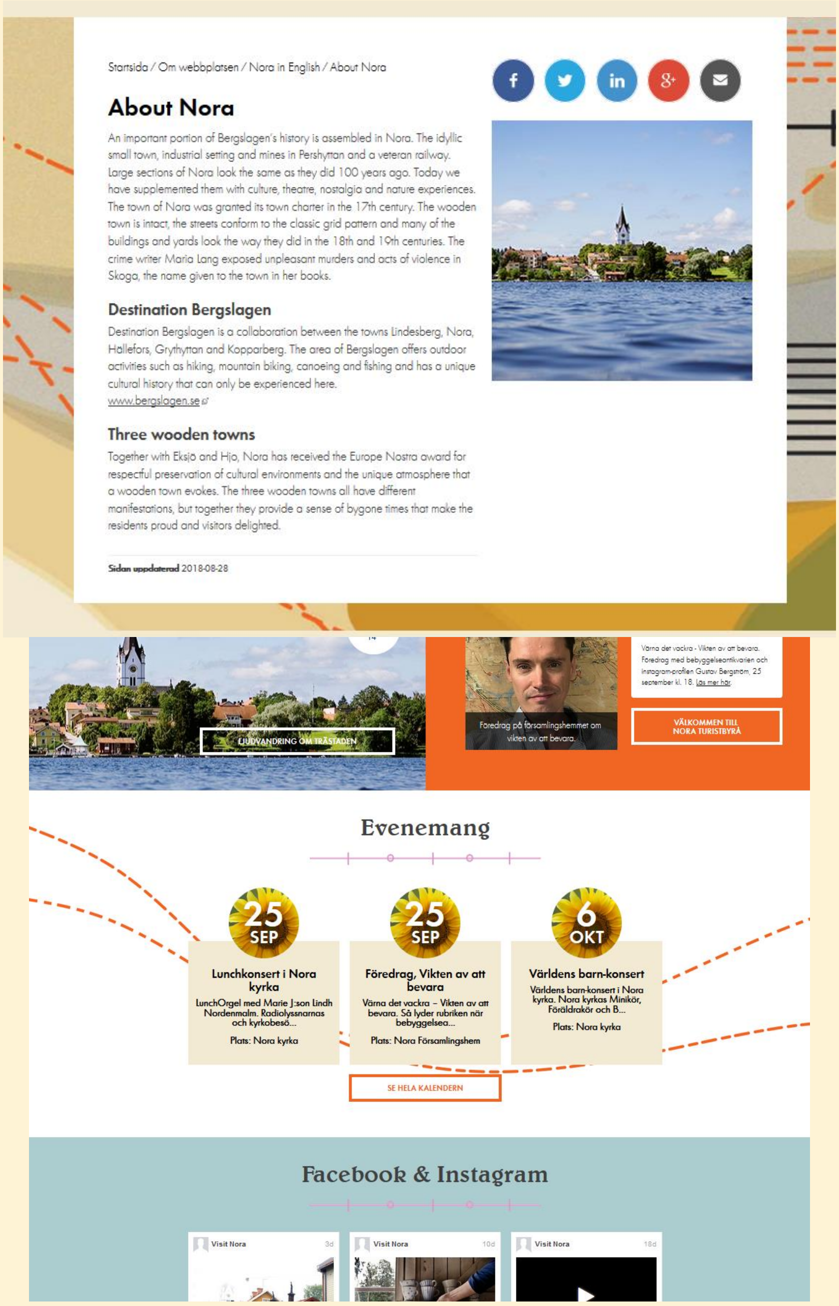
Explore Sigtuna

Once upon a time ...
In 970, King Erik the Victorious looked out at the surroundings and pointed out the location where Sigtuna town would be built – a new era in the Swedish history was about to begin... Today we can go back in time and visit medieval churches, ruins, castles and rune stones from the Viking Area. This is where Sweden begins.

READ MORE

Best Practices	Equitable use	Not applied
	Flexibility in use	Applied
	Simple and intuitive use	Applied
	Perceptible information	Applied
Heuristics	Match between system and real world	Applied
	Consistency and standards	Applied
	Recognition rather than recall	Applied
	Aesthetics and minimalist design	Not applied
Comment	The website has a very consistent layout. The home page is the only exception, which displays multiple layout forms – including a map. This enables quick navigation helps the user to find needed information, while also makes the website more visually appealing. At some parts, there are some issues with the colour contrast and the video element slowed down the loading.	

Visit Nora



Startsida / Om webbplatsen / Nora in English / About Nora

About Nora

An important portion of Bergslagen's history is assembled in Nora. The idyllic small town, industrial setting and mines in Pershyttan and a veteran railway. Large sections of Nora look the same as they did 100 years ago. Today we have supplemented them with culture, theatre, nostalgia and nature experiences. The town of Nora was granted its town charter in the 17th century. The wooden town is intact, the streets conform to the classic grid pattern and many of the buildings and yards look the way they did in the 18th and 19th centuries. The crime writer Maria Lang exposed unpleasant murders and acts of violence in Skoga, the name given to the town in her books.

Destination Bergslagen

Destination Bergslagen is a collaboration between the towns Lindesberg, Nora, Hällefors, Grythyttan and Kopparberg. The area of Bergslagen offers outdoor activities such as hiking, mountain biking, canoeing and fishing and has a unique cultural history that can only be experienced here.
www.bergslagen.se

Three wooden towns

Together with Eksjö and Hjo, Nora has received the Europe Nostra award for respectful preservation of cultural environments and the unique atmosphere that a wooden town evokes. The three wooden towns all have different manifestations, but together they provide a sense of bygone times that make the residents proud and visitors delighted.

Sidan uppdaterad 2018-08-28

Värna det vackra - Vikten av att bevara. Föredrag med bebyggelseantikvarien och instagram-profilen Gustav Bergström, 25 september kl. 18. Läs mer här.

Föredrag på församlingshemmet om vikten av att bevara.

Evenemang

25 SEP
Lunchkonsert i Nora kyrka
LunchOrgel med Marie J:son Lindh Nordenmalm. Radiolyssnarnas och kyrkobesö...
Plats: Nora kyrka

25 SEP
Föredrag, Vikten av att bevara
Värna det vackra – Vikten av att bevara. Så lyder rubriken när bebyggelsea...
Plats: Nora Församlingshem

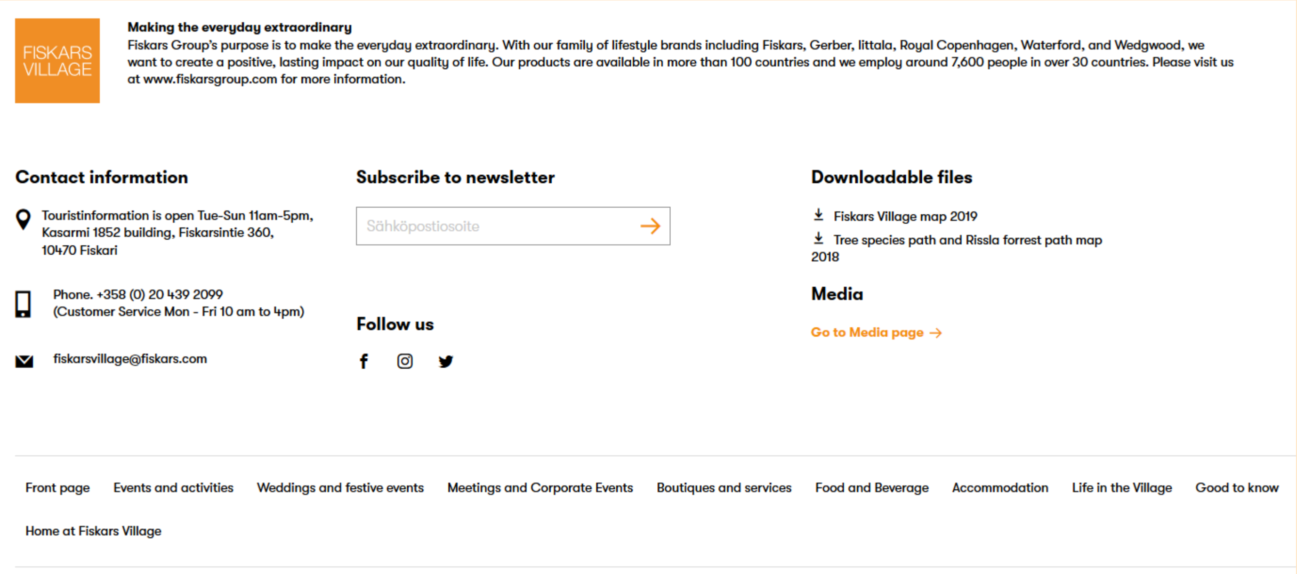
6 OKT
Världens barn-konsert
Världens barn-konsert i Nora kyrka. Nora kyrkas Minikör, Föräldrakör och B...
Plats: Nora kyrka

Facebook & Instagram

Best Practices	Equitable use	Applied
	Flexibility in use	Not applied
	Simple and intuitive use	Applied
	Perceptible information	Not Applied
	Match between system and real world	Applied
	Consistency and standards	Not applied
	Recognition rather than recall	Applied
	Aesthetics and minimalist design	Applied
Comment	Here as well, the colour contrast is not good enough for accessibility and the provided content is significantly different depending on language selection (much less info in English).	
Conclusion	The layout should be consistent and accessible in every detail regardless of circumstances (e.g.: language choice, disabilities or technical restrictions, such as slow internet connection)	

Footer

Fiskars Village



FISKARS VILLAGE

Making the everyday extraordinary
Fiskars Group's purpose is to make the everyday extraordinary. With our family of lifestyle brands including Fiskars, Gerber, Iittala, Royal Copenhagen, Waterford, and Wedgwood, we want to create a positive, lasting impact on our quality of life. Our products are available in more than 100 countries and we employ around 7,600 people in over 30 countries. Please visit us at www.fiskarsgroup.com for more information.

Contact information

Touristinformation is open Tue-Sun 11am-5pm,
Kasarmi 1852 building, Fiskarsintie 360,
10470 Fiskari

Phone. +358 (0) 20 439 2099
(Customer Service Mon - Fri 10 am to 4pm)

fiskarsvillage@fiskars.com

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- Fiskars Village map 2019
- Tree species path and Rissla forrest path map 2018

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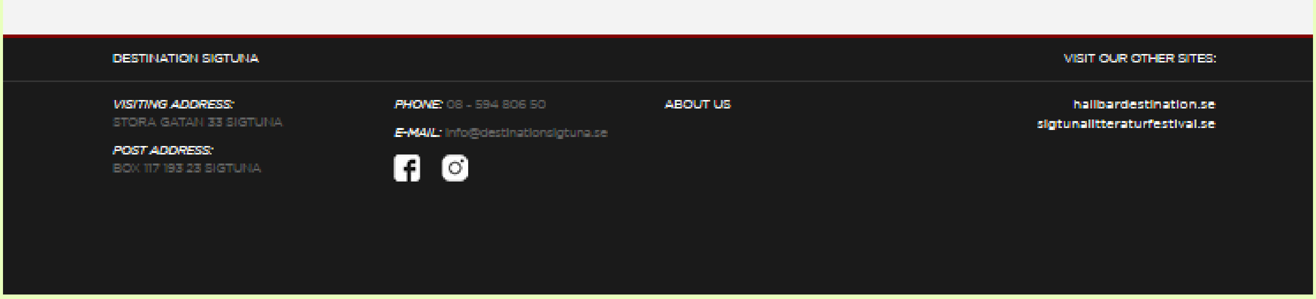
Front page | Events and activities | Weddings and festive events | Meetings and Corporate Events | Boutiques and services | Food and Beverage | Accommodation | Life in the Village | Good to know | Home at Fiskars Village

Best Practices	Equitable use	Not applied
	Flexibility in use	Applied
	Simple and intuitive use	Not applied
	Perceptible information	Applied
Heuristics	Match between system and real world	Applied
	Consistency and standards	Applied
	Aesthetics and minimalist design	Applied
Comment	The colour contrast at some functional elements are not enough, but all used content and element is conventional and mostly minimalistic. The footer might be a bit crowded however and the footer menu might be redundant.	

Destination Sigtuna



DESTINATION SIGTUNA

VISIT OUR OTHER SITES:

VISITING ADDRESS:
STORA GATAN 33 SIGTUNA

POST ADDRESS:
BOX 117 193 23 SIGTUNA

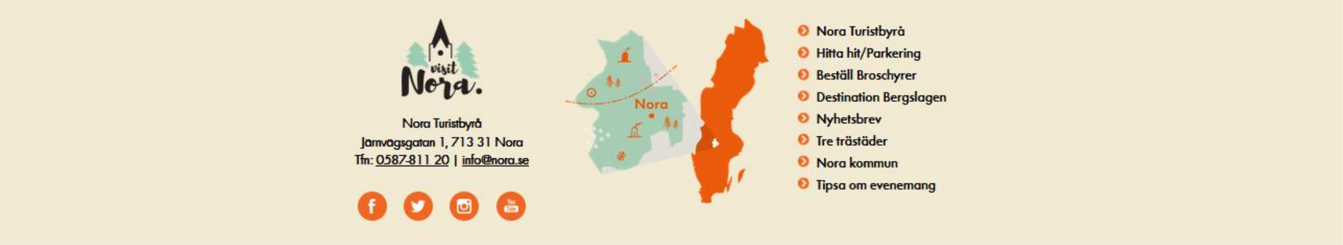
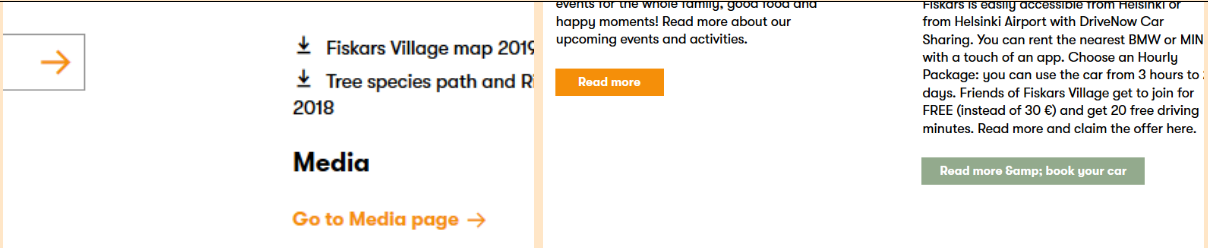
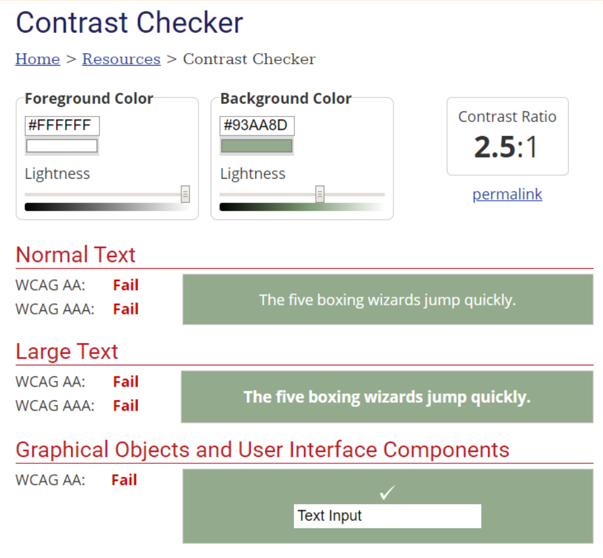
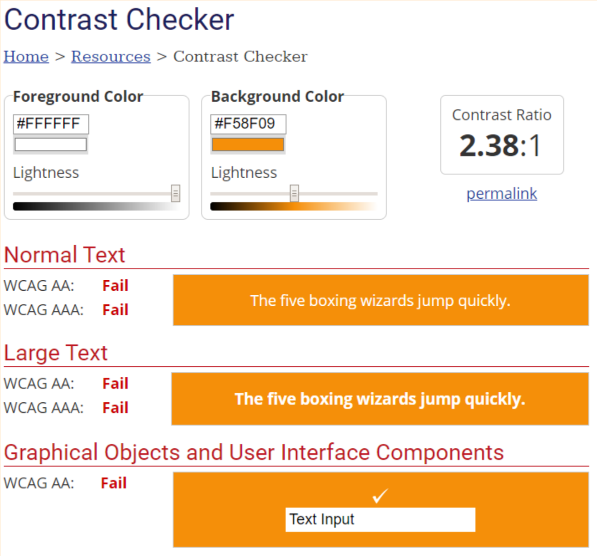
PHONE: 08 - 594 806 50

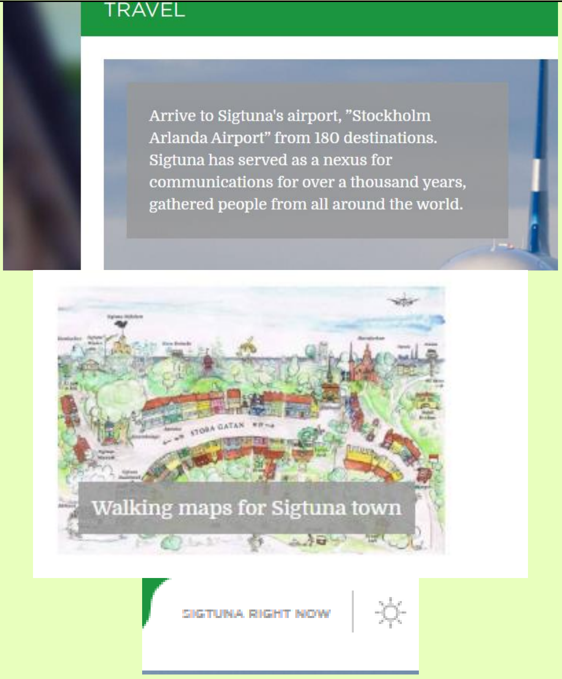
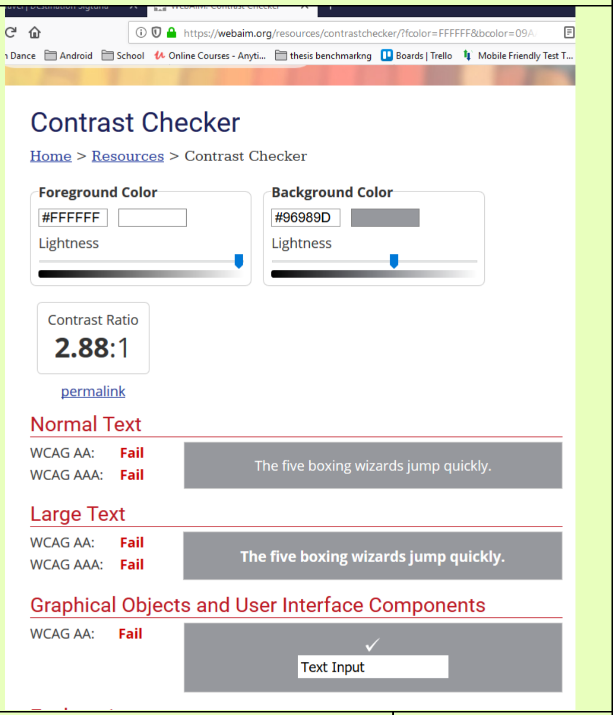
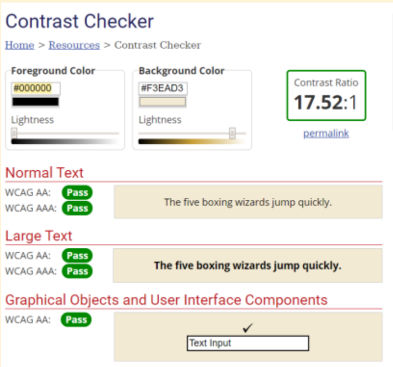
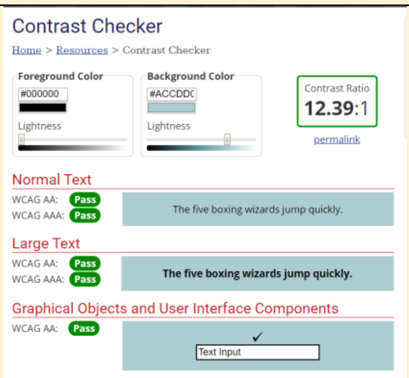
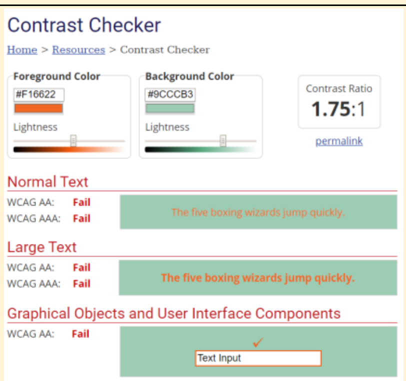
E-MAIL: info@destinationsigtuna.se

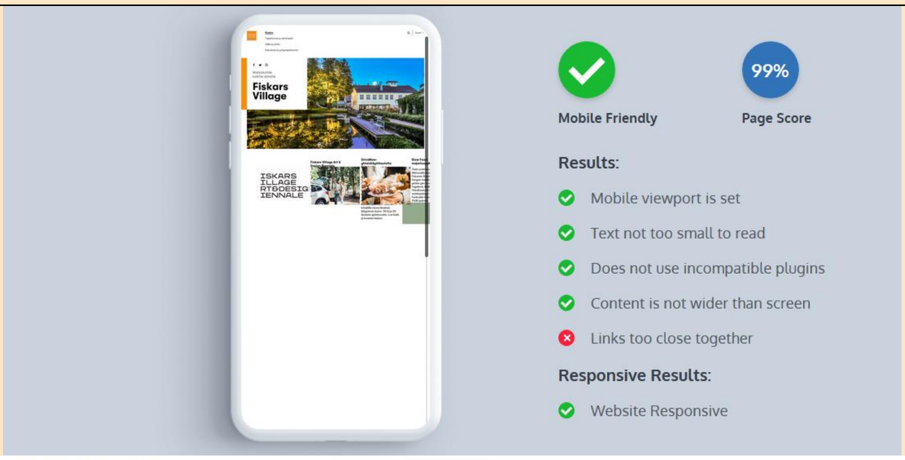
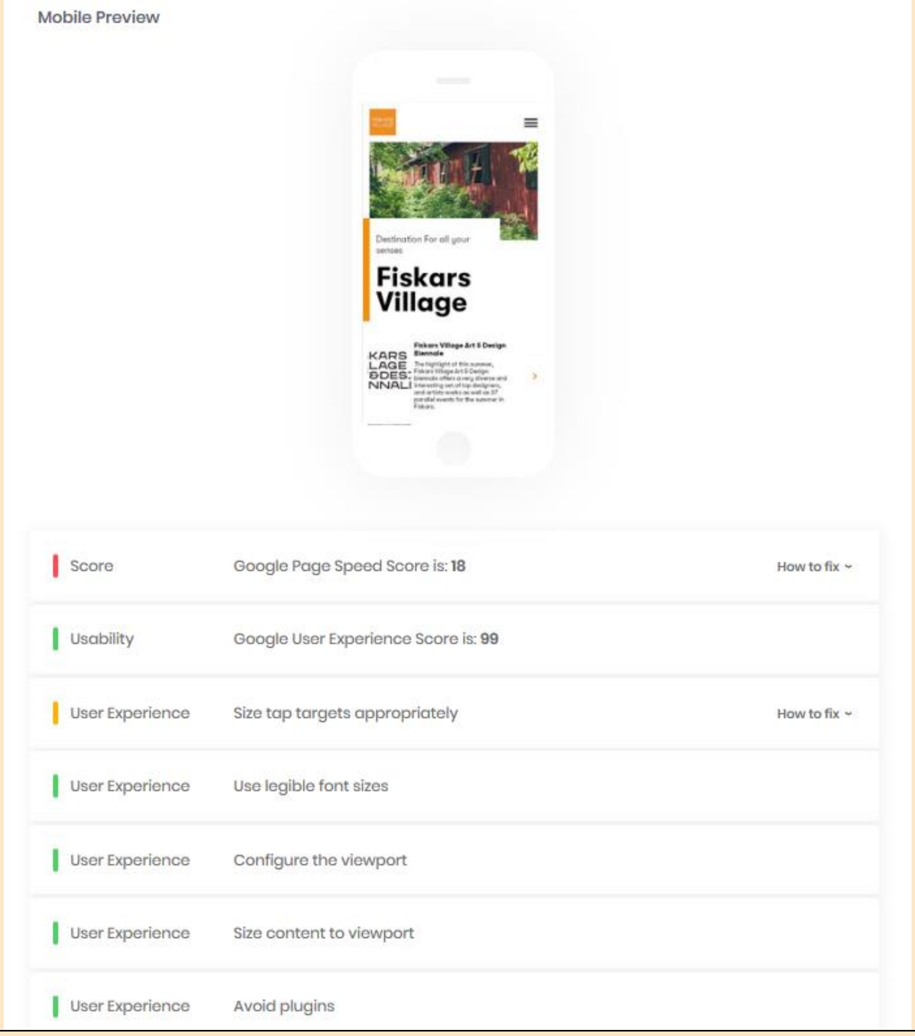
ABOUT US

hallbardestination.se
sigtunalitteraturfestival.se

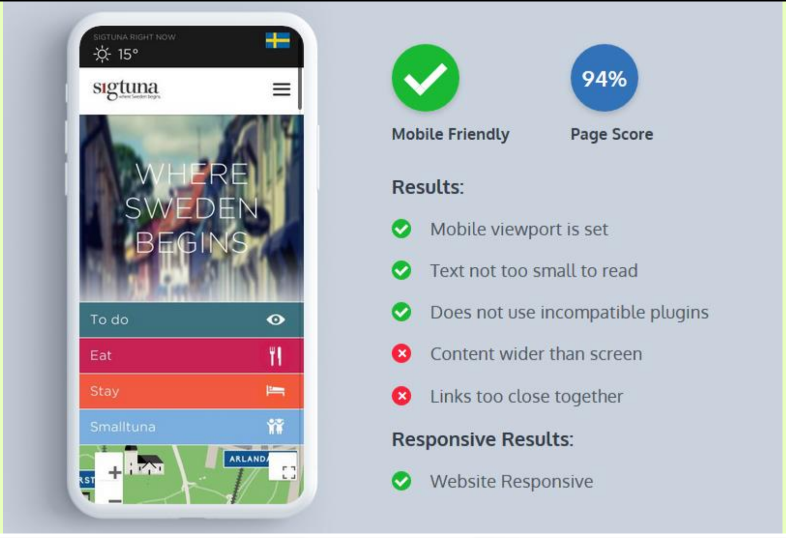
Best Practices	Equitable use	Applied
	Flexibility in use	Applied
	Simple and intuitive use	Applied
	Perceptible information	Applied
Heuristics	Match between system and real world	Applied
	Consistency and standards	Applied
	Aesthetics and minimalist design	Applied
Commnet	This footer is minimalistic and accessible. These are all compliant with what most people are used to find in the footer.	

Visit Nora		
 Nora Turistbyrå Järnvägsgatan 1, 713 31 Nora Tfn: 0587-811 20 | info@nora.se Nora Turistbyrå Hitta hit/Parkering Beställ Broschyrer Destination Bergslagen Nyhetsbrev Tre trästäder Nora kommun Tipsa om evenemang		
Best Practices	Equitable use	Not applied
	Flexibility in use	Not applied
	Simple and intuitive use	Applied
	Perceptible information	Not applied
Heuristics	Match between system and real world	Applied
	Consistency and standards	Not applied
	Aesthetics and minimalist design	Applied
Comment	The footer has a visually appealing, but simple design, but it is partially presented as a picture, which is not responding to keyboard navigation and not responsible enough. As it is in Swedish at both language options, not all the content is identifiable, but they seem to be standard information. The language restriction and inflexible rendering however is not up to standards	
Conclusion	The footer should contain all necessary information and no more. Also, they should be accessible and conventionally expected by the user.	
Colour Contrast		
Fiskars Village		
 Fiskars Village map 201 Tree species path and R 2018 Media Go to Media page → events for the whole family, good food and happy moments! Read more about our upcoming events and activities. Read more Fiskars is easily accessible from Helsinki or from Helsinki Airport with DriveNow Car Sharing. You can rent the nearest BMW or MIN with a touch of an app. Choose an Hourly Package: you can use the car from 3 hours to days. Friends of Fiskars Village get to join for FREE (instead of 30 €) and get 20 free driving minutes. Read more and claim the offer here. Read more &amp; book your car		
 Contrast Checker Home > Resources > Contrast Checker Foreground Color #FFFFFF Lightness Background Color #93AA8D Lightness Contrast Ratio 2.5:1 permalink Normal Text WCAG AA: Fail WCAG AAA: Fail The five boxing wizards jump quickly. Large Text WCAG AA: Fail WCAG AAA: Fail The five boxing wizards jump quickly. Graphical Objects and User Interface Components WCAG AA: Fail Text Input	 Contrast Checker Home > Resources > Contrast Checker Foreground Color #FFFFFF Lightness Background Color #F58F09 Lightness Contrast Ratio 2.38:1 permalink Normal Text WCAG AA: Fail WCAG AAA: Fail The five boxing wizards jump quickly. Large Text WCAG AA: Fail WCAG AAA: Fail The five boxing wizards jump quickly. Graphical Objects and User Interface Components WCAG AA: Fail Text Input	
Best Practices	Equitable use	Not applied
Heuristics	Consistency and standards	Not applied
Comment	Fiskars village uses white background and black text almost everywhere. However, the buttons and logo are orange with white letters or green with white text when hovered over. While the black-white colour pair is clearly readable for everyone, the button colours are not accessible.	

Destination Sigtuna		
 TRAVEL Arrive to Sigtuna's airport, "Stockholm Arlanda Airport" from 180 destinations. Sigtuna has served as a nexus for communications for over a thousand years, gathered people from all around the world. Walking maps for Sigtuna town SIGTUNA RIGHT NOW	 https://webaim.org/resources/contrastchecker/?fcolor=FFFFFF&bcolor=09 Dance · Android · School · Online Courses - Anyti... · thesis benchmarkng · Boards | Trello · Mobile Friendly Test T... Contrast Checker Home > Resources > Contrast Checker Foreground Color: #FFFFFF · Lightness Background Color: #96989D · Lightness Contrast Ratio 2.88:1 permalink Normal Text WCAG AA: Fail WCAG AAA: Fail The five boxing wizards jump quickly. Large Text WCAG AA: Fail WCAG AAA: Fail The five boxing wizards jump quickly. Graphical Objects and User Interface Components WCAG AA: Fail ✓ Text Input	
Best Practices	Equitable use	Not applied
Heuristics	Consistency and standards	Not applied
Comment	The entire colour scheme is well-contrasted monochrome/colour monochrome colour-pairs, which helps accessibility. The only colour-pair which is not contrasted enough is the one they use for small texts above pictures and at the top of each page for weather forecast indication.	
Visit Nora		
 Contrast Checker Home > Resources > Contrast Checker Foreground Color: #000000 · Lightness Background Color: #F3EAD3 · Lightness Contrast Ratio 17.52:1 permalink Normal Text WCAG AA: Pass WCAG AAA: Pass The five boxing wizards jump quickly. Large Text WCAG AA: Pass WCAG AAA: Pass The five boxing wizards jump quickly. Graphical Objects and User Interface Components WCAG AA: Pass ✓ Text Input	 Contrast Checker Home > Resources > Contrast Checker Foreground Color: #000000 · Lightness Background Color: #ACCDDC · Lightness Contrast Ratio 12.39:1 permalink Normal Text WCAG AA: Pass WCAG AAA: Pass The five boxing wizards jump quickly. Large Text WCAG AA: Pass WCAG AAA: Pass The five boxing wizards jump quickly. Graphical Objects and User Interface Components WCAG AA: Pass ✓ Text Input	 Contrast Checker Home > Resources > Contrast Checker Foreground Color: #F16622 · Lightness Background Color: #9CCCB3 · Lightness Contrast Ratio 1.75:1 permalink Normal Text WCAG AA: Fail WCAG AAA: Fail The five boxing wizards jump quickly. Large Text WCAG AA: Fail WCAG AAA: Fail The five boxing wizards jump quickly. Graphical Objects and User Interface Components WCAG AA: Fail ✓ Text Input
Best Practices	Equitable use	Not Applied
Heuristics	Consistency and standards	Not applied
Comment	While the footer and local menu has enough colour contrast for accessibility, the buttons don't. Some buttons are transparent-white, which switches to white-black during clicking or hovering, but others have an orange-green colour palette, which is distinguishable for people with good eye-site, but not with colour blindness. Accessibility should always be considered according to the W3 organization.	
Conclusion	The colour contrast and font-size recommendations should be followed at every small detail	

Mobile-friendliness		
Fiskars Village		
	 99% Mobile Friendly Page Score Results: ✓ Mobile viewport is set ✓ Text not too small to read ✓ Does not use incompatible plugins ✓ Content is not wider than screen ☒ Links too close together Responsive Results: ✓ Website Responsive  Mobile Preview Score — Google Page Speed Score is: 18 — How to fix Usability — Google User Experience Score is: 99 User Experience — Size tap targets appropriately — How to fix User Experience — Use legible font sizes User Experience — Configure the viewport User Experience — Size content to viewport User Experience — Avoid plugins	
Best Practices	Equitable use	Not applied
	Flexibility in use	Not applied
Heuristics	Consistency and standards	Not applied
Comment	Both Mobile-friendliness test gave a 99 score for Fiskars Village in mobile use experience and deemed the website to be responsible and mobile-friendly. The extremely low loading score might be due to the dynamic content display, which is not turned off on mobile view. Also, both tests found some of the clickable elements to be too small to use on mobile devices and Sitechecker gave a very low score on loading speed.	

Destination Sigtuna



Mobile Friendly

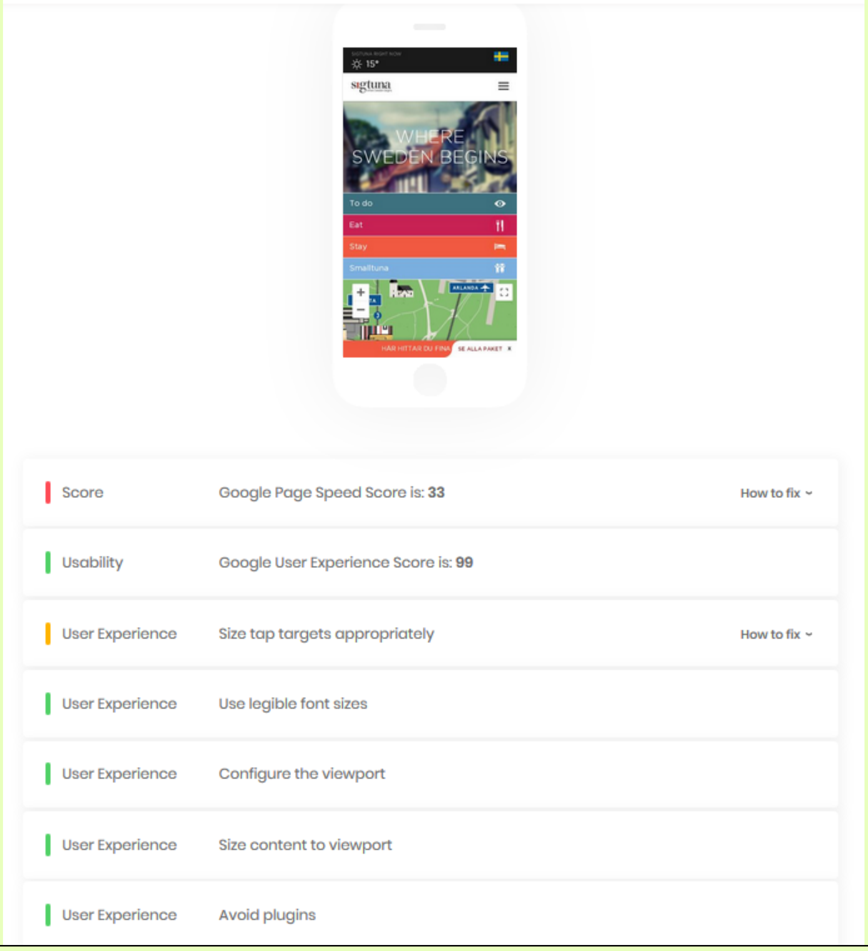
Page Score

Results:

- ✓ Mobile viewport is set
- ✓ Text not too small to read
- ✓ Does not use incompatible plugins
- ✗ Content wider than screen
- ✗ Links too close together

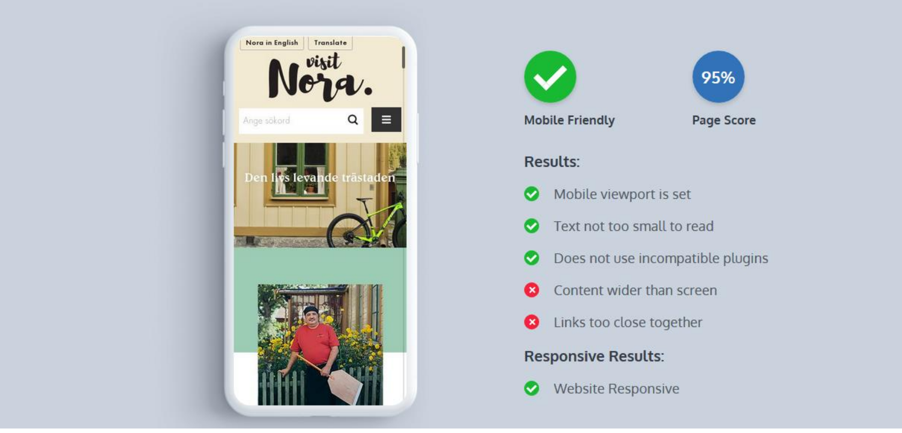
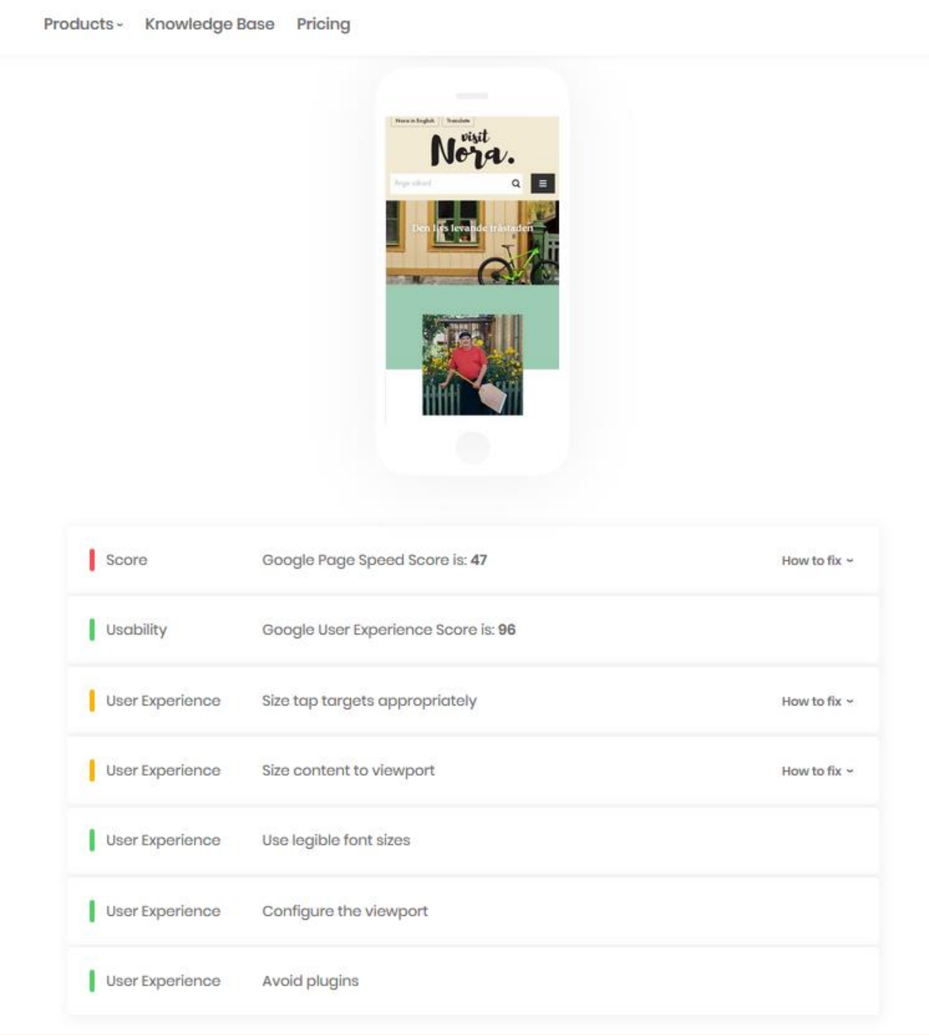
Responsive Results:

- ✓ Website Responsive



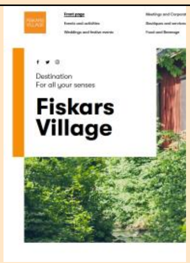
Score	Google Page Speed Score is: **33**	How to fix ⌄
Usability	Google User Experience Score is: **99**	
User Experience	Size tap targets appropriately	How to fix ⌄
User Experience	Use legible font sizes	
User Experience	Configure the viewport	
User Experience	Size content to viewport	
User Experience	Avoid plugins	

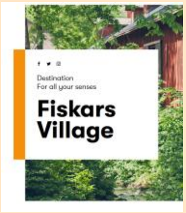
Best Practices	Equitable use	Not applied
	Flexibility in use	Not applied
Heuristics	Consistency and standards	Not applied
Comment	Sitechecker gave 33 points for loading speed and 99 for user experience on mobile devices, but Rankwatch only scored the page to 94%. The loading speed might be so slow due to the embedded video content on the top of the home page, which plays automatically. Such contents are not advised on mobile view. Content to viewpoint and link distance seems to be good on one test, while not optimal on the other. This might be just a technical error scouring during the test, as it is not noticeable on actual mobile devices.	

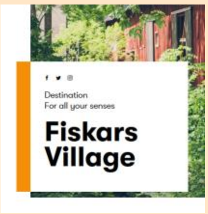
Visit Nora		
	 Nora in English Translate visit Nora. Ange sökord Den lilla levande trästaden Mobile Friendly 95% Page Score Results: ✓ Mobile viewport is set ✓ Text not too small to read ✓ Does not use incompatible plugins ☒ Content wider than screen ☒ Links too close together Responsive Results: ✓ Website Responsive  Products Knowledge Base Pricing Nora in English Translate visit Nora. Ange sökord Den lilla levande trästaden Score Google Page Speed Score is: 47 How to fix Usability Google User Experience Score is: 96 User Experience Size tap targets appropriately How to fix User Experience Size content to viewport How to fix User Experience Use legible font sizes User Experience Configure the viewport User Experience Avoid plugins	
Best Practices	Equitable use	Not applied
	Flexibility in use	Not applied
Heuristics	Consistency and standards	Not applied
Comment	In the case of this site, both tests found the same faults regarding mobile-friendliness: the content does not fit the screen size properly and some of the links might be too small to tap. Otherwise the website seems to render properly, just like the others. Rankwatch gave 95%, while Sitechecker scored this site to 96 and its loading speed to 47. That loading speed is the highest, but this website also displays less dynamic elements or content per page in general.	
Conclusion	Font sizes and content rendering to screen ratio should be precise, but the page loading time also should be considered.	

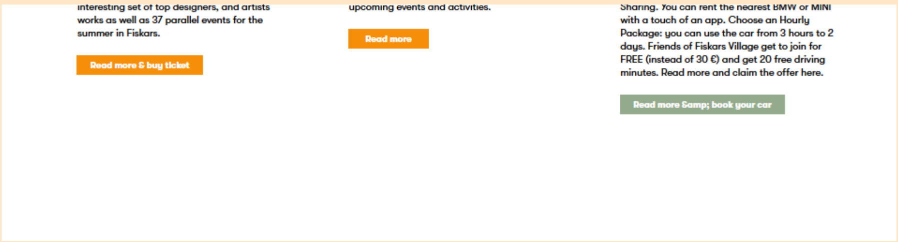
Other notable elements

Fiskars Village









interesting set of top designers, and artists works as well as 37 parallel events for the summer in Fiskars.

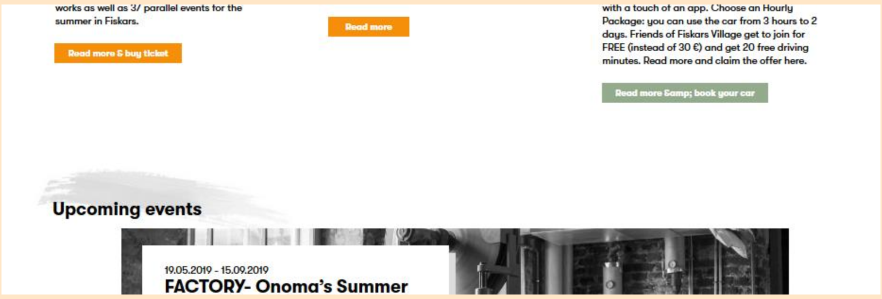
Read more & buy ticket

upcoming events and activities.

Read more

Sharing. You can rent the nearest BMW or MINI with a touch of an app. Choose an Hourly Package: you can use the car from 3 hours to 2 days. Friends of Fiskars Village get to join for FREE (instead of 30 €) and get 20 free driving minutes. Read more and claim the offer here.

Read more &amp; book your car



works as well as 37 parallel events for the summer in Fiskars.

Read more & buy ticket

Read more

with a touch of an app. Choose an Hourly Package: you can use the car from 3 hours to 2 days. Friends of Fiskars Village get to join for FREE (instead of 30 €) and get 20 free driving minutes. Read more and claim the offer here.

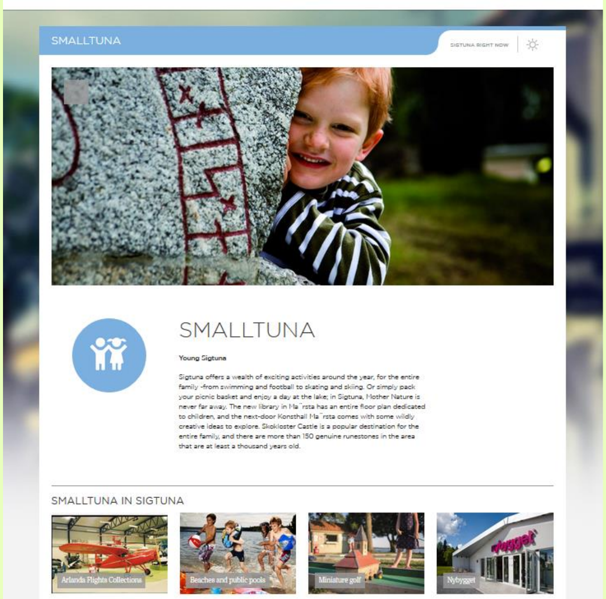
Read more &amp; book your car

Upcoming events

19.05.2019 - 15.09.2019
FACTORY- Onoma's Summer

Comment	Some elements follow the user while scrolling down on the webpage, while others appear at the bottom as the reader approaches downwards. Both dynamic effects are excellent ways to draw attention to the content.

Destination Sigtuna

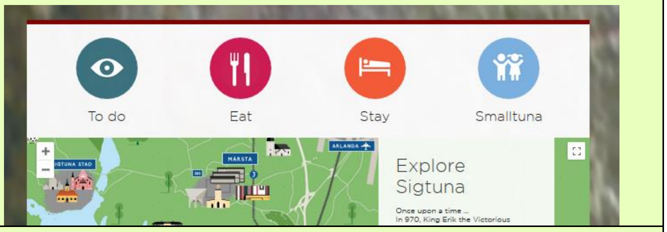


SMALLTUNA

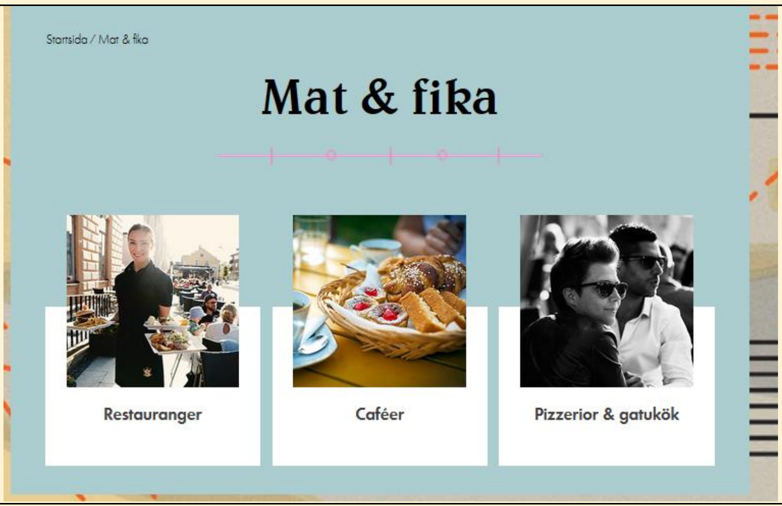
Young Sigtuna

Sigtuna offers a wealth of exciting activities around the year, for the entire family -from swimming and football to skating and skiing. Or simply pack your picnic basket and enjoy a day at the lake; in Sigtuna, Mother Nature is never far away. The new library in Ma¨rsta has an entire floor plan dedicated to children, and the next-door Konsthall Ma¨rsta comes with some wildly creative ideas to explore. Skokloster Castle is a popular destination for the entire family, and there are more than 150 genuine runestones in the area that are at least a thousand years old.

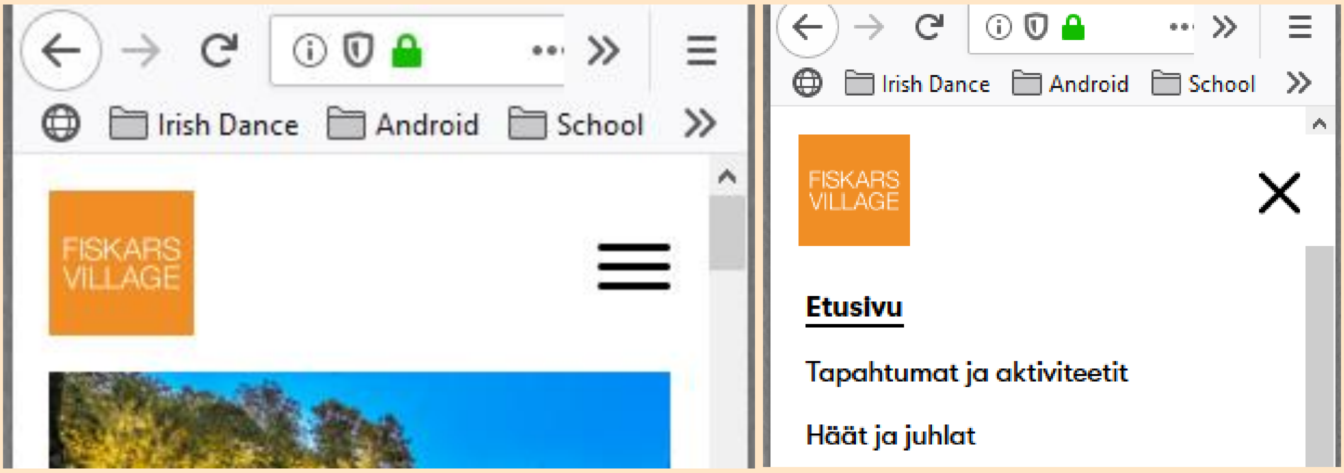
SMALLTUNA IN SIGTUNA



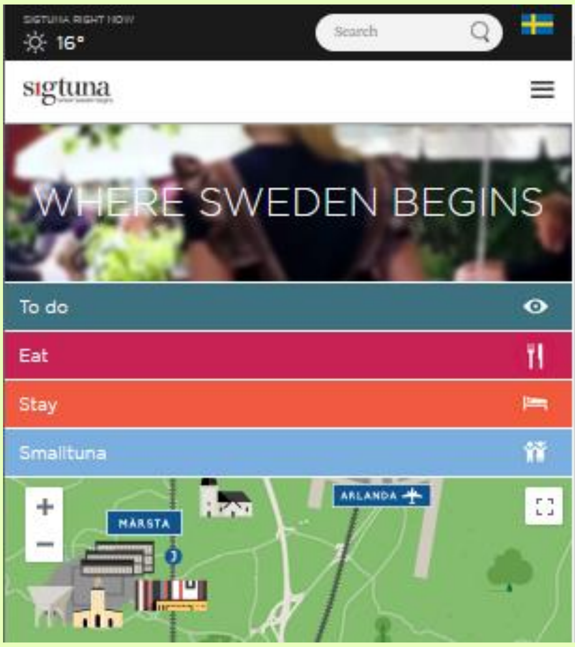
Comment	The most notable features of the website are completely consistent layout design and sub-menu for local content. The layout is so consistently kept, that the tab-feature is seen even on those pages, which do not have sub-menu. These design elements ensure easy navigation and feel of comfort in users, even when they visit the website for the first time.

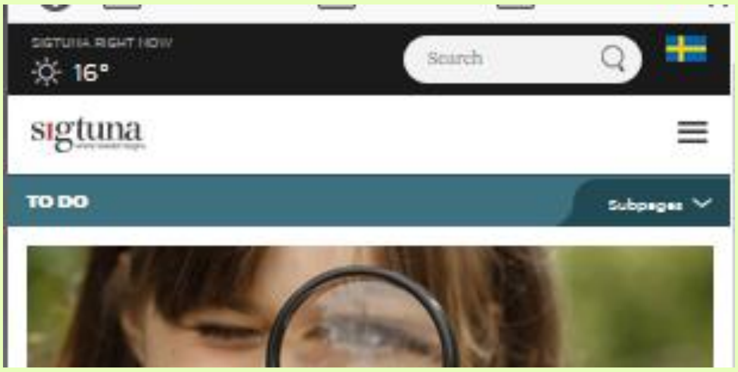
Visit Nora	
	 Startsida / Mat & fika Mat & fika Restauranger Caféer Pizzerior & gatukök
Comment	The best features of this website are: breadcrumbs and the design grid-based local menu. These features would be useful on any website.

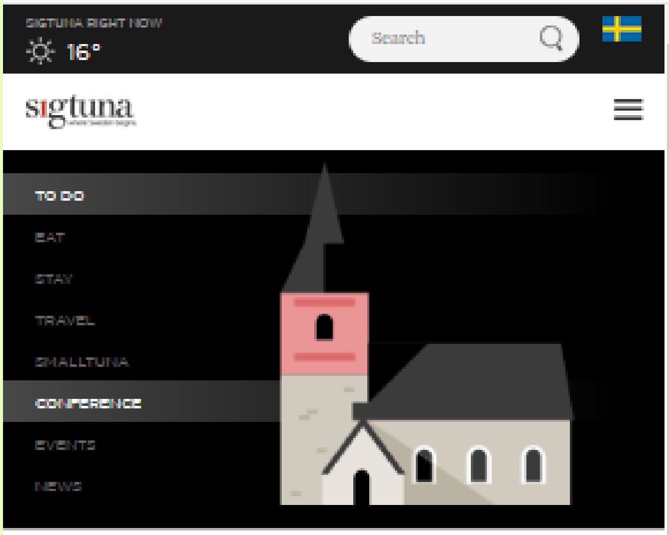
Mobile view:

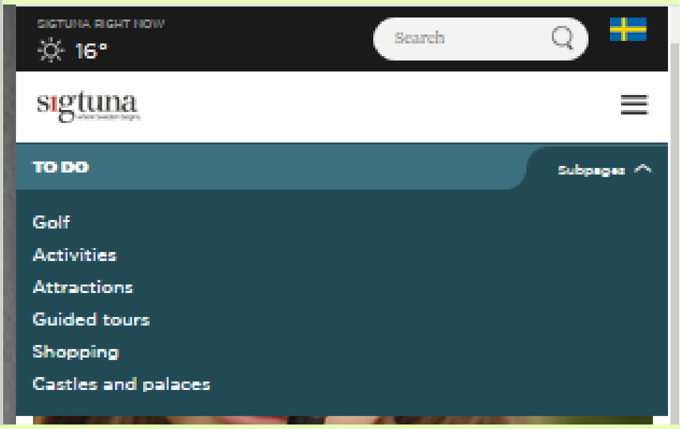
Navigation		
Fiskars Village		
 Irish Dance Android School FISKARS VILLAGE Etusivu Tapahtumat ja aktiviteetit Häät ja juhlat		
Best Practices	Equitable use	Applied
	Flexibility in use	Applied
	Simple and intuitive use	Not applied
	Perceptible information	Not applied
Heuristics	Match between system and real world	Not applied
	Consistency and standards	Applied
	Aesthetics and minimalist design	Applied
Comment	The design is almost the same as in desktop view. This solution is still not the most user-friendly one, but it is often used and consistent with the desktop version: minimalistic and accessible	

Destination Sigtuna

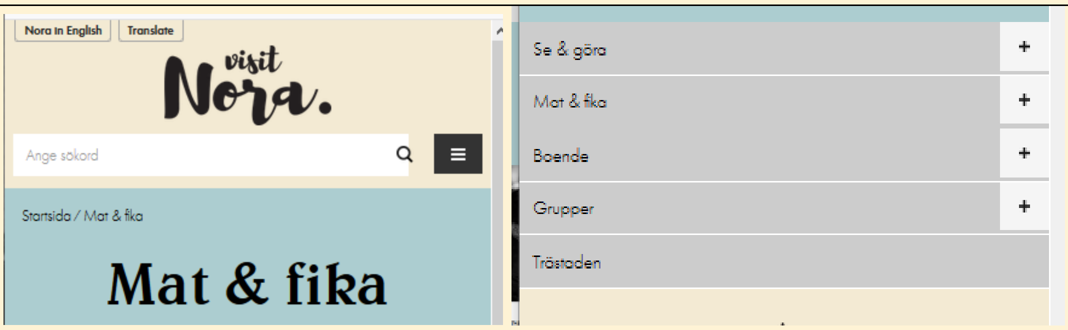
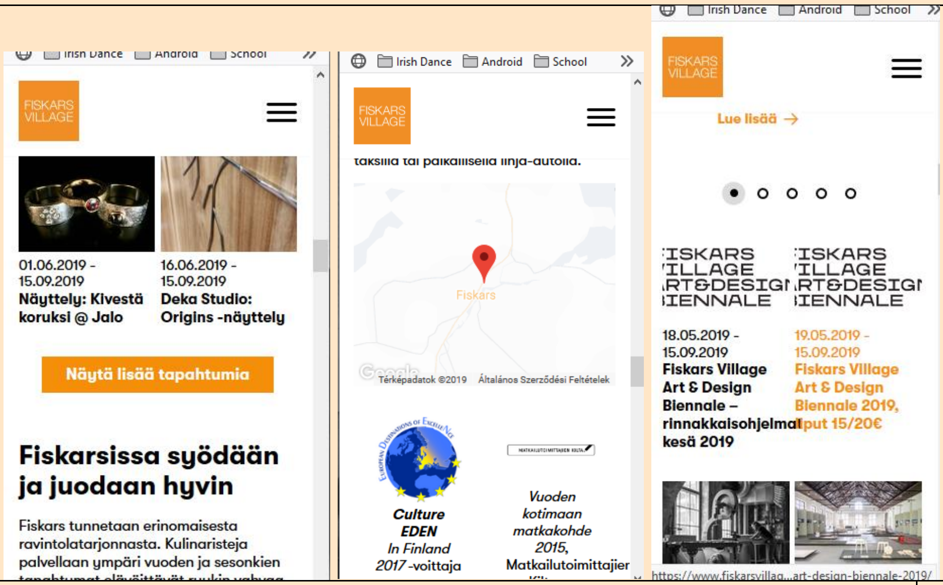




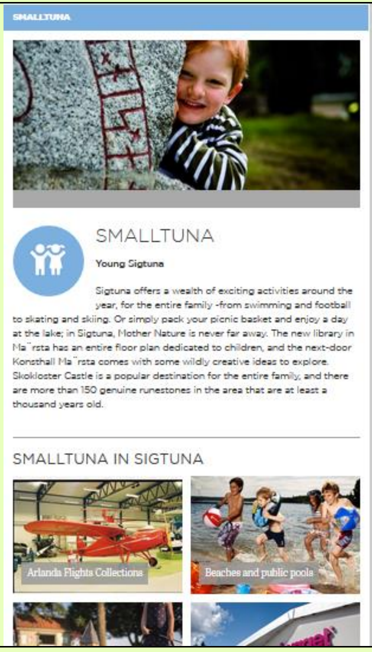




Best Practices	Equitable use	Applied
	Flexibility in use	Applied
	Simple and intuitive use	Applied
	Perceptible information	Applied
Heuristics	Match between system and real world	Applied
	Consistency and standards	Applied
	Aesthetics and minimalist design	Applied
Comment	While there is a hamburger menu, alternative menus are also available, which are in accordance with best practices. It is also plausible, that the design has small changes to fit the mobile screen, but otherwise consistent with the desktop version.	

Visit Nora		
 Nora in English Translate visit Nora. Ange sökord Startsida / Mat & fika Mat & fika Se & göra + Mat & fika + Boende + Grupper + Trästaden		
Best Practices	Equitable use	Not applied
	Flexibility in use	Not Applied
	Simple and intuitive use	Not applied
	Perceptible information	Not applied
Heuristics	Match between system and real world	Not applied
	Consistency and standards	Not applied
	Aesthetics and minimalist design	Applied
Comment	In mobile view, the menu changed to the often-used "hamburger" menu, but when it is clicked/taped on, the menu opens on the bottom of the page, before the footer section. That is an unusual solution and might be confusing for the users. In terms of colours, the drop-down menu is also not consistent with the general design, however it is minimalistic	
Conclusion	The hamburger menu-style should be avoided and alternative solutions should be used instead, but in a way that does not confuse the user.	
General layout		
Fiskars Village		
 Irish Dance Android School FISKARS VILLAGE Näytä lisää tapahtumia Fiskars Térképadatok ©2019 Általános Szerződési Feltételek Lue lisää → FISKARS VILLAGE ART&DESIGN BIENNALE 01.06.2019 - 15.09.2019 Näyttely: Kivestä koruksi @ Jalo 16.06.2019 - 15.09.2019 Deka Studio: Origins -näyttely Fiskarsissa syödään ja juodaan hyvin Fiskars tunnetaan erinomaisesta ravintolatarjonnasta. Kulinaristeja palvellaan ympäri vuoden ja sesonkien taksilla tai paikallisella linja-autolla. Culture EDEN In Finland 2017 -voittaja Vuoden kotimaan matkakohde 2015, Matkailutoimittajier 18.05.2019 - 15.09.2019 Fiskars Village Art & Design Biennale – rinnakkaisohjelma kesä 2019 19.05.2019 - 15.09.2019 Fiskars Village Art & Design Biennale 2019, liput 15/20€ https://www.fiskarsvillag...art-design-biennale-2019/		
Best Practices	Equitable use	Not applied
	Flexibility in use	Not applied
	Simple and intuitive use	Applied
	Perceptible information	Applied
Heuristics	Match between system and real world	Applied
	Consistency and standards	Not applied
	Recognition rather than recall	Applied
	Aesthetics and minimalist design	Applied
Comment	The content in the body of the website is arranged either in one or two column structures, as it is customary. At very small screen-size some components might collide. The colour scheme is the same, so the same accessibility issues appear.	

Destination Sigtuna

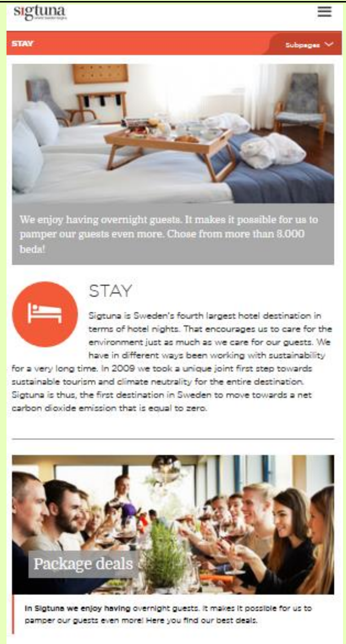


SMALLTUNA

Young Sigtuna

Sigtuna offers a wealth of exciting activities around the year, for the entire family -from swimming and football to skating and skiing. Or simply pack your picnic basket and enjoy a day at the lake; in Sigtuna, Mother Nature is never far away. The new library in Ma¨rsta has an entire floor plan dedicated to children, and the next-door Konsthall Ma¨rsta comes with some wildly creative ideas to explore. Skokloster Castle is a popular destination for the entire family, and there are more than 150 genuine runestones in the area that are at least a thousand years old.

SMALLTUNA IN SIGTUNA



We enjoy having overnight guests. It makes it possible for us to pamper our guests even more. Chose from more than 8.000 beds!

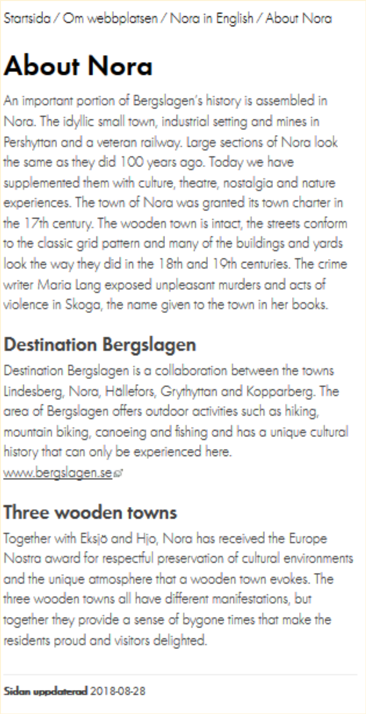
STAY

Sigtuna is Sweden's fourth largest hotel destination in terms of hotel nights. That encourages us to care for the environment just as much as we care for our guests. We have in different ways been working with sustainability for a very long time. In 2009 we took a unique joint first step towards sustainable tourism and climate neutrality for the entire destination. Sigtuna is thus, the first destination in Sweden to move towards a net carbon dioxide emission that is equal to zero.

In Sigtuna we enjoy having overnight guests. It makes it possible for us to pamper our guests even more! Here you find our best deals.

Best Practices	Equitable use	Not applied
	Flexibility in use	Not applied
	Simple and intuitive use	Applied
	Perceptible information	Not applied
Heuristics	Match between system and real world	Applied
	Consistency and standards	Not applied
	Recognition rather than recall	Applied
	Aesthetics and minimalist design	Not applied
Comment	In the body section, the same content layout is preserved, but the grid system elements now are arranged into one or two columns. This might be problematic during reading the labels, especially the ones which do not have enough colour contrast (as mentioned above). Bigger font sizes might be more beneficial.	

Visit Nora



Startsida / Om webbplatsen / Nora in English / About Nora

About Nora

An important portion of Bergslagen's history is assembled in Nora. The idyllic small town, industrial setting and mines in Pershyttan and a veteran railway. Large sections of Nora look the same as they did 100 years ago. Today we have supplemented them with culture, theatre, nostalgia and nature experiences. The town of Nora was granted its town charter in the 17th century. The wooden town is intact, the streets conform to the classic grid pattern and many of the buildings and yards look the way they did in the 18th and 19th centuries. The crime writer Maria Lang exposed unpleasant murders and acts of violence in Skoga, the name given to the town in her books.

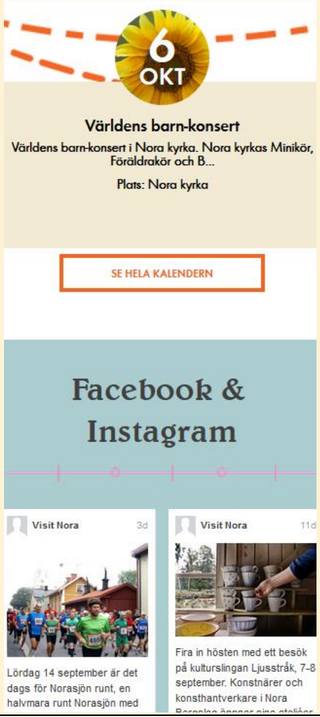
Destination Bergslagen

Destination Bergslagen is a collaboration between the towns Lindesberg, Nora, Hällefors, Grythyttan and Kopparberg. The area of Bergslagen offers outdoor activities such as hiking, mountain biking, canoeing and fishing and has a unique cultural history that can only be experienced here.
www.bergslagen.se

Three wooden towns

Together with Eksjö and Hjo, Nora has received the Europe Nostra award for respectful preservation of cultural environments and the unique atmosphere that a wooden town evokes. The three wooden towns all have different manifestations, but together they provide a sense of bygone times that make the residents proud and visitors delighted.

Sidan uppdaterad 2018-08-28



Världens barn-konsert

Världens barn-konsert i Nora kyrka. Nora kyrkas Minikör, Föräldrakör och B...

Plats: Nora kyrka

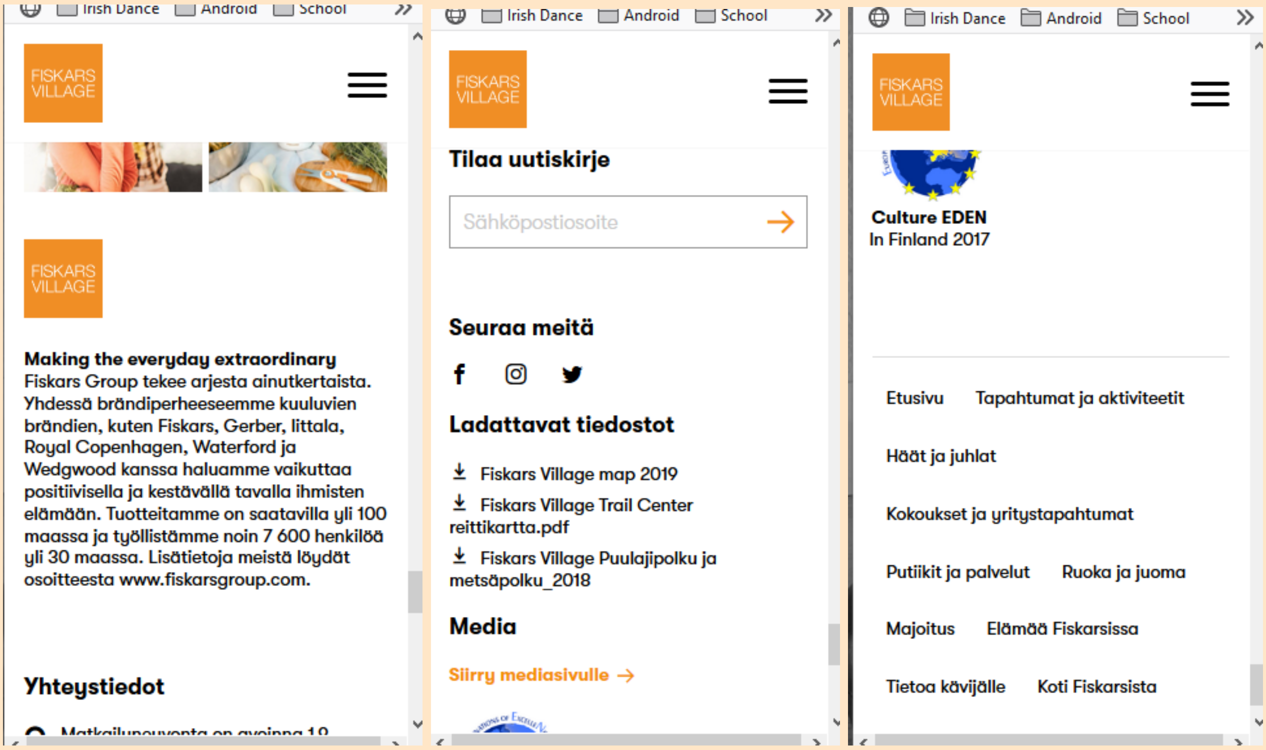
Lördag 14 september är det dags för Norasjön runt, en halvmara runt Norasjön med

Fira in hösten med ett besök på kulturslingan Ljusstråk, 7-8 september. Konstnärer och konsthantverkare i Nora

Best Practices	Equitable use	Applied
	Flexibility in use	Not applied
	Simple and intuitive use	Applied
	Perceptible information	Not applied
Heuristics	Match between system and real world	Applied
	Consistency and standards	Not applied
	Recognition rather than recall	Applied
	Aesthetics and minimalist design	Applied
Comment	In the body section, the contents are the same as in desktop view, but rendered into one or two column sections. No other change is made.	
Conclusion	The contents should be rearranged in a way, so they are readable regardless screen size or disabilities. Font sizes should also be changed, if needed	

Footer

Fiskars Village



Making the everyday extraordinary
Fiskars Group tekee arjesta ainutkertaista. Yhdessä brändiperheeseemme kuuluvien brändien, kuten Fiskars, Gerber, Iittala, Royal Copenhagen, Waterford ja Wedgwood kanssa haluamme vaikuttaa positiivisella ja kestävällä tavalla ihmisten elämään. Tuotteitamme on saatavilla yli 100 maassa ja työllistämme noin 7 600 henkilöä yli 30 maassa. Lisätietoja meistä löydät osoitteesta www.fiskarsgroup.com.

Yhteystiedot

Tilaa uutiskirje

Sähköpostiosoite →

Seuraa meitä

Ladattavat tiedostot

- Fiskars Village map 2019
- Fiskars Village Trail Center reittikartta.pdf
- Fiskars Village Puulajipolku ja metsäpolku_2018

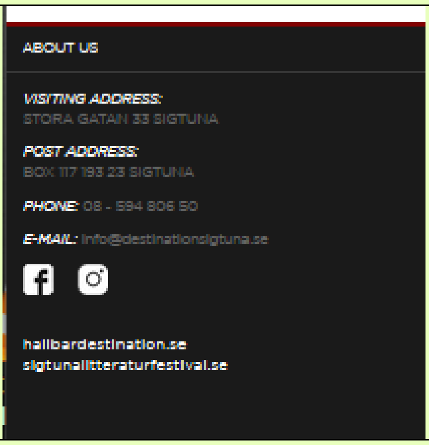
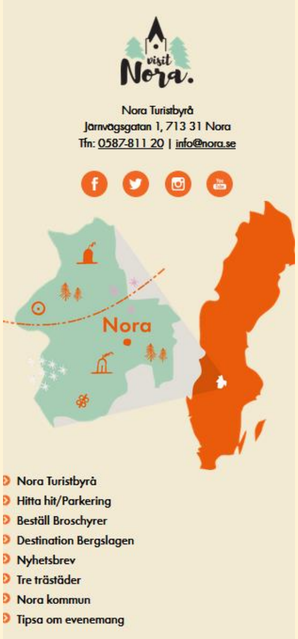
Media

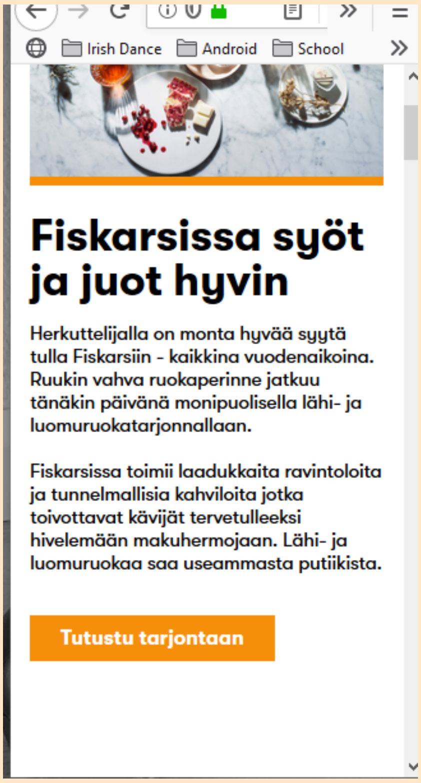
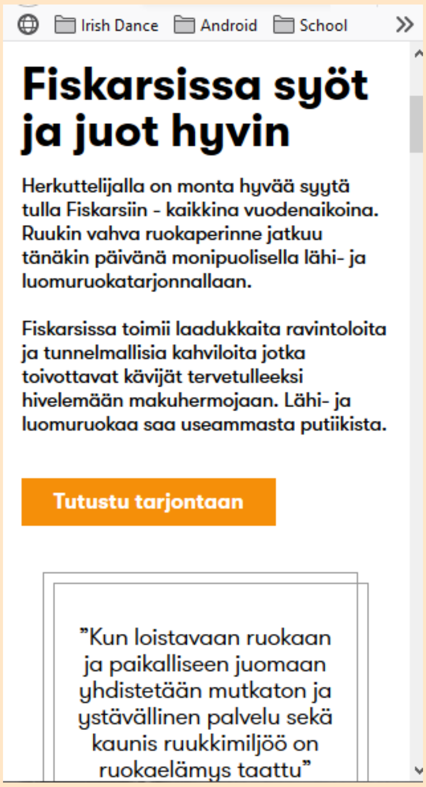
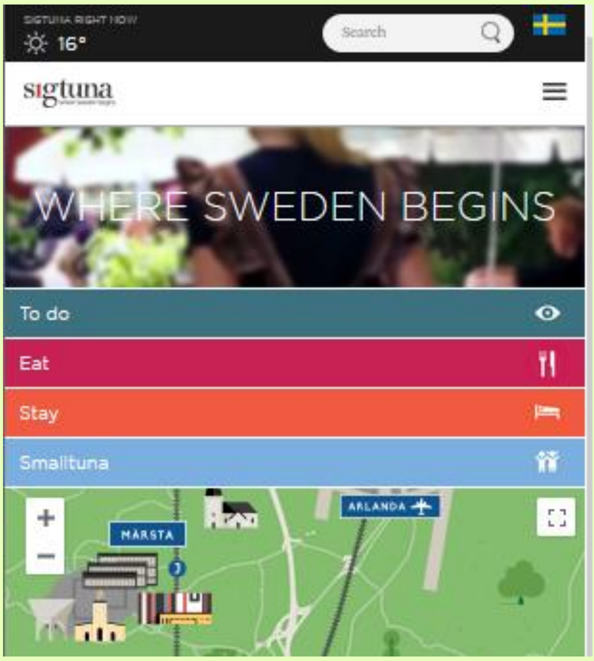
Siirry mediasivulle →

Culture EDEN
In Finland 2017

Etusivu
Tapahtumat ja aktiviteetit
Häät ja juhlat
Kokoukset ja yritystapahtumat
Putiikit ja palvelut
Ruoka ja juoma
Majoitus
Elämää Fiskarsissa
Tietoa kävijälle
Koti Fiskarsista

Best Practices	Equitable use	Not applied
	Flexibility in use	Not applied
	Simple and intuitive use	Not applied
	Perceptible information	Not applied
Heuristics	Match between system and real world	Not applied
	Consistency and standards	Not applied
	Aesthetics and minimalist design	Applied
Comment	While the content in the footer section renders to the screen-size, it does so poorly. Some of the elements are unclickable or hard to recognize. While it is good practice to display a static footer menu at the bottom of a website, with mobile view it is not user-friendly, as at first site it is not even clear what the user is looking at.	

Destination Sigtuna		
 ABOUT US VISITING ADDRESS: STORA GATAN 33 SIGTUNA POST ADDRESS: BOX 117 193 23 SIGTUNA PHONE: 08 - 594 806 50 E-MAIL: info@destinationsigtuna.se hallbardestination.se sigtunalitteraturfestival.se		
Best Practices	Equitable use	Not applied
	Flexibility in use	Applied
	Simple and intuitive use	Applied
	Perceptible information	Applied
Heuristics	Match between system and real world	Applied
	Consistency and standards	Not applied
	Aesthetics and minimalist design	Applied
Comment	The footer section is also identical with the desktop view, although in mobile devices the content is vertically arranged (under each other). The text size and colour, as well as the social media account icon sizes might be problematic on mobile.	
Visit Nora		
 Nora Turistbyrå Järnvägsgatan 1, 713 31 Nora Tfn: 0587-811 20 | info@nora.se Nora Turistbyrå Hitta hit/Parkering Beställ Broschyrer Destination Bergslagen Nyhetsbrev Tre trästäder Nora kommun Tipsa om evenemang		
Best Practices	Equitable use	Not applied
	Flexibility in use	Not applied
	Simple and intuitive use	Applied
	Perceptible information	Not applied
Heuristics	Match between system and real world	Not applied
	Consistency and standards	Not applied
	Aesthetics and minimalist design	Applied
Comment	The footer section also just organises content in a vertical fission, and it does not seem to be done well, as the picture does not scale down and takes up too much screen space.	
Conclusion	The footer section should be redesigned in a way, so it is fitting to the screen-size and stays readable. If the content is redundant, it could also be left out from the design.	

Other notable elements	
Fiskars Village	
 **Fiskarsissa syöt ja juot hyvin** Herkuttelijalla on monta hyvää syytä tulla Fiskarsiin - kaikkina vuodenaikoina. Ruukin vahva ruokaperinne jatkuu tänäkin päivänä monipuolisella lähi- ja luomuruokatarjonnallaan. Fiskarsissa toimii laadukkaita ravintoloita ja tunnelmallisia kahviloita jotka toivottavat kävijät tervetulleeksi hivelemään makuhermojaan. Lähi- ja luomuruokaa saa useammasta putiikista. Tutustu tarjontaan  **Fiskarsissa syöt ja juot hyvin** Herkuttelijalla on monta hyvää syytä tulla Fiskarsiin - kaikkina vuodenaikoina. Ruukin vahva ruokaperinne jatkuu tänäkin päivänä monipuolisella lähi- ja luomuruokatarjonnallaan. Fiskarsissa toimii laadukkaita ravintoloita ja tunnelmallisia kahviloita jotka toivottavat kävijät tervetulleeksi hivelemään makuhermojaan. Lähi- ja luomuruokaa saa useammasta putiikista. Tutustu tarjontaan ”Kun loistavaan ruokaan ja paikalliseen juomaan yhdistetään mutkaton ja ystävällinen palvelu sekä kaunis ruukkimiljöö on ruokaelämys taattu”	
Comment	It is plausible, that some of the dynamic design elements are also seen in the mobile view.
Destination Sigtuna	
 SIGTUNA RIGHT NOW 16° Search sigtuna WHERE SWEDEN BEGINS To do Eat Stay Smalltuna MÄRSTA ARLANDA	
Comment	Providing a secondary menu besides the collapsed main navigation is a very good idea. It is also plausible to separate the menu elements via colours, as it draws attention.