

# Abstract

In this project I aim to deliver a unique, custom-built website for Laura Matiukaite, a freelance photographer from Lithuania. A digital portfolio was developed to reflect Laura's unique photography style, while optimizing performance for improved user experience and search engine visibility.

Upon completion, the website incorporates the four essential components of any photography website: an 'About me' section, a 'Pricing' segment, a dynamic photo gallery, and a 'Contact me' section, featuring a photoshoot booking form.

In conclusion, it's recognized that while the website fulfills the primary objectives, there were optional features left unexplored due to time constraints. There's a clear emphasis on SEO as a pivotal aspect for creating a successful photography website, which wasn't deeply covered in this project. Nevertheless, the project offers valuable insights for building a successful photography website and can serve as a guiding model for others in the field.

For future work, two significant aspects need to be addressed to fully complete the project: implementing a Content Delivery Network for improved performance, and incorporating a headless CMS to provide Laura with the tools she needs to manage her website independently. I plan to continue refining the website after the conclusion of this project.

# Sammendrag

I dette prosjektet, hadde jeg som mål å levere en unik, spesialbygd nettside til Laura Matiukaite, en frilansfotograf fra Litauen. En digital portefølje ble utviklet for å gjenspeile Lauras unik stil, samtidig som ytelsen ble optimalisert for bedre brukeropplevelse og søkemotorsynlighet.

Ved ferdigstilling, omfatter nettstedet alle de fire hovedkomponentene til et komplett fotografi-nettsted: en "Om meg"-seksjon, et "Pris"-segment, et dynamisk bildegalleri og en "Kontakt meg"-seksjon, med et skjema for bestilling av photoshoot.

I resultat-delen er det anerkjent at selv om nettstedet oppfyller hovedmålene, ble de valgfrie funksjoner ikke utforsket på grunn av tidsbegrensninger. SEO, som er et sentralt aspekt av det å lage et vellykket fotografi-nettsted, ble ikke dekket omfattende nok i dette prosjektet. Likevel, tilbyr prosjektet verdifulle innsikter i hva det å bygge et vellykket fotografi-nettsted innebærer, og kan tjene som en veiledende modell for andre i feltet.

Når det gjelder videre arbeid, må to viktige aspekter tas opp for å fullføre prosjektet: implementasjon av et innholdsleveringsnettverk (CDN) for å ytterligere forbedre ytelsen, og implementere et "headless CMS" løsning for å gi Laura de verktøyene hun trenger for å administrere nettstedet sitt på eget hånd. Jeg har til hensikt å fortsette å jobbe med denne nettsiden etter at jeg er ferdig med dette prosjektet.

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# Glossary

SEO	Search Engine Optimization
WCAG	Web Content Accessibility Guidelines
HTML	HyperText Markup Language
CSS	Cascading Style Sheets
VPS	Virtual Private Server
CSP	Content Security Policy
XSS	Cross Site Scripting
CMS	Content Management System
UX	User Experience
W3C	The World Wide Web Consortium
CDN	Content delivery Network
CLS	Cumulative Layout Shift
DNS	Domain Name System
HTTP	Hypertext Transfer Protocol
HTTPS	Hypertext Transfer Protocol Secure
SSL	Secure Sockets Layer
DDoS	Distributed Denial of service
ARIA	Accessible Rich Internet Applications

# 1 Introduction and relevance

## 1.1 Background

In this digital age, a professional online presence is essential for any photographer who wishes to attract new clientele. A website serves as a digital portfolio, showcasing the photographer's style, skill, and creativeness. This project aims to explore the key components and considerations when developing a successful website for a photographer. A real-life case is used as a basis for this project - Laura Matiukaite, a budding freelance photographer aiming to establish her career in Norway.

Laura Matiukaite, an upstart freelance photographer from Lithuania needs a website to draw in new customers in Norway. She specializes in wedding/event photography, as well as individual and group portraits for personal clients. Currently, she fluctuates between living in Norway and Lithuania, but she aims to establish her photography career in Norway. A new website displaying her work could significantly help her attract Norwegian clientele. In this project, I intend to create such a website for Laura.

### 1.1.1 Website requirements

The scope of this project has undergone several revisions. Through constant dialogue with Laura, we've settled on the following definitive list of requirements for her website:

1. An image gallery: Implement an image gallery for showcasing Laura's work, it should support viewing the images in full-screen mode.
2. A "Contact" section: Including a photoshoot booking form, allowing the users to request a photoshoot reservation or simply ask a question. All submissions from the form should be forwarded to Laura's email address.
3. "About Me" and "Pricing" sections: These vital sections will allow the photographer to present key information about her business to all potential clients.
4. Unique design: The website should stand out, reflecting Laura's unique style and passion for photography.
5. Website hosting: The photographer will need help finding a suitable hosting solution and publishing her website. She desires a cheap, hands-off solution.
6. Security: All data transactions, especially those involving personal information from the contact form, should be handled privately and securely. Additionally, basic measures need to be taken to protect against common web threats.
7. SEO: The website should be optimized for search engines, ensuring good discoverability.
8. Universal design: Ensure that the website adheres to the Web Content Accessibility Guidelines and is accessible to all users.

As well as the following optional features to consider:

- Lithuanian version: Translate and publish the website in Lithuanian, catering to Lithuanian clientele as well.
- Blogging support: Allow the photographer to post about past photoshoot experiences or other news on her website.
- Google calendar synchronization: Automate the scheduling process by adding new reservations to Laura's Google calendar, upon accepting a photoshoot booking form submission from the website.

## 1.2 Problem statement

The goal of this project is to explore the process of setting up a website that effectively showcases a photographer's work and attracts new clients. Although the requirements and preferences might vary among photographers, there are six essential aspects inherent to any photography website:

1. Content and functionality – Encompassing the core contents of the website and its basic functionality. Including an “About me” section, a separate section for listing different pricing options, an interactive image gallery, as well as a “Contact” section featuring a photoshoot booking form.
2. Design – A unique and captivating design that compliments the photographer's unique style.
3. Hosting - Encompasses the process of identifying and implementing an appropriate website hosting solution, as well as future maintenance considerations.
4. Security – involves implementing the essential measures to secure the website against potential threats.
5. SEO and performance– The website should be optimized for speed, user experience, and discoverability, focusing on both performance metrics and search engine algorithms.
6. Universal design - involves ensuring the website's compliance with WCAG guidelines. Making it accessible to all users and protecting against potential legal action related to accessibility.

Optional features like blogging capabilities, multilingual support and calendar synchronization will also be considered, and implemented based on project constraints.

## 1.3 Objective

Upon completion of this project, I aim to have a functioning, well-designed website that meets all the primary objectives outlined in the problem statement. The website should provide a framework for Laura to effectively showcase her photographic work, provide key information about her services and enable client engagement through a photoshoot booking form. Its design should emphasize and reinforce Laura's unique style, it should be secure, search engine optimized, and universally accessible in accordance with the WCAG guidelines.

Based on the project's constraints and progress, I aim to implement optional features such as blogging capabilities, multilingual support, and Google calendar synchronization, further enhancing the website's functionality and user experience. This website should not only meet Laura's specific needs but also serve as a model for other photographers looking to establish a professional online presence.

## 1.4 Limitations

I will be working on this project alone. Moreover, I am also committed to a part-time job that requires 50% attendance. This situation may affect the project's pace and scope. Additionally, despite my full commitment, time constraints might hinder the implementation of optional features, leading to necessary trade-offs in prioritizing the core aspects of the website.



## 2 Theoretical basis

### 2.1 General concepts

#### 2.1.1 HTML

HTML, the fundamental language of the web, structures and assigns meaning to web content. It works in tandem with CSS and JavaScript to shape a web page's presentation and behavior. By using HTML's system of markup and elements, web creators can annotate and format content for display in browsers. Key to HTML are "tags" that differentiate elements from regular text. While these tags are case-insensitive, it's best practice to write them in lowercase. Also integral to the web, and inherent in HTML, is the concept of "Hypertext," where web pages link to each other, facilitating an interconnected web of information.[9]

#### 2.1.2 CSS

CSS, or Cascading Style Sheets, is a stylesheet language for specifying the visual presentation of documents written in HTML or XML, dictating how elements are displayed across various media types. It's one of the core languages of the open web and follows standardization across web browsers based on W3C specifications.[10]

#### 2.1.3 Responsive design

As mobile devices with various screen sizes and features increasingly dominate web browsing, responsive web design has emerged as a crucial approach. This design principle adapts the layout of a website based on the device's size and capabilities. For instance, a website might display as a single column on a phone and two columns on a tablet. To enable this adaptability, media queries are used in CSS. They are filters that adjust styles based on the device's characteristics, such as width, height, orientation, and interaction mode, optimizing the browsing experience for any device.[11]

#### 2.1.4 JavaScript

JavaScript (JS) is a critical programming language of the World Wide Web, used in tandem with HTML and CSS. As of 2022, it's used in 98% of websites for defining webpage behavior, often utilizing third-party libraries. All major web browsers incorporate a JavaScript engine to execute code on user devices.[12]

#### 2.1.5 KISS

The KISS principle, an acronym for "Keep it simple, stupid!", is a design principle first noted by the U.S. Navy in 1960. It asserts that systems function best when kept simple rather than complex, encouraging simplicity in design and discouraging unnecessary complexity. The phrase was popularized by 1970 and has several variations that retain the central theme of simplicity.[13]

#### 2.1.6 Functional programming

Functional programming is a coding approach crucial for organizing code in higher order languages. It focuses on using functions effectively to create clean, maintainable software. While sometimes contrasted with object-oriented and procedural programming, these paradigms aren't mutually exclusive, and most systems use a combination of all three. Functional programming is widely utilized in many languages and frameworks due to its clear benefits in certain situations and prominence in contemporary software trends. It is recommended as a vital concept and tool for every developer.[14]

### 2.1.7 UNIX

UNIX is a powerful, multi-user and multitasking operating system initially developed in the 1960s at Bell Labs. It's known for its portability, flexibility, and robustness. UNIX has been influential in the development of many other operating systems and has a modular design, with a central kernel providing core functions, surrounded by system and utility tools. Its command-line interface and scripting capabilities are especially recognized for their influence on software development and data management.[15]

### 2.1.8 NPM

npm is a package manager for the JavaScript programming language that is maintained by npm, Inc. It is the default package manager for the Node.js runtime environment. npm consists of a command line client and an online database known as the npm registry. The npm registry contains a wide range of public and private packages that can be accessed and searched through the npm website. Both the package manager and the registry are managed by npm, Inc.[44]

### 2.1.9 Single-page site

GlueUp.com has conducted a thorough study, asking 70 Founders, CEOs, Marketing and Design professionals to provide "one pro and con of a single page website"[8]. The key takeaways from their responses can be summarised as follows.

Pros:

- **Simplicity:** Single-page websites offer a streamlined user experience and provide a clear, concise message.
- **User Retention:** This simplicity can lead to increased user retention as users don't have to click around to find information.
- **Reduced Content Overwhelm:** Single-page sites can help convert more visitors by reducing content overwhelm, providing a focused presentation of a product, brand, or service.
- **Mobile Optimization:** Single-page sites can be optimized for mobile users, enhancing their browsing experience.
- **Increased Customer Inquiries:** With limited information presented, customers may be more likely to reach out with questions.

Cons:

- **Design and Content Challenges:** Developing a single-page site requires careful planning to balance design, user experience, and content.
- **Limited Scalability:** Increasing content means making the page longer, potentially making it harder for users to navigate.
- **Limited Space for Details:** It might be challenging to include in-depth content like blog posts and articles, as too much information can be overwhelming for visitors.
- **Possible SEO Issues:** A single-page site may struggle to rank for multiple keywords and phrases.
- **Web Analytics:** Tracking user behavior across the site can be difficult due to the single-page layout.

### 2.1.10 Website builders

Website builders are tools that simplify the process of creating a website, reducing the need for extensive coding. They provide easy-to-use, often visual, solutions for site building. A variety of website builders exist, each with distinct features and functionalities, ranging from drag-and-drop builders for visually-oriented portfolio sites,

to more flexible, open-source environments for coding. Some even support the creation of e-commerce websites for selling products and services.[16]

While website builders simplify site creation, they have potential drawbacks. They offer limited design customizability, which may stifle specific creative visions. Performance can be hindered as websites made with these tools can load slowly due to backend bloat, and hosting resources might be inadequate for surges in traffic. Flexibility is restricted as users can only utilize supported tools, limiting advanced functionalities. Migration to a new host can be difficult, often requiring a complete site rebuild due to proprietary infrastructure needs. Lastly, security risks are heightened as shared builder code can be susceptible to hacking if the builder's code contains vulnerabilities.[17]

## 2.2 Design

### 2.2.1 UX Design

Visual appeal in design tends to elicit immediate responses, often on an emotional level, yet pinpointing why a design is attractive can be challenging. Principles of visual design help us understand how elements like line, shape, color, grid, and space collaborate to form aesthetically pleasing and thoughtful visuals. These principles serve not only to enhance a design's appearance, but also to:

- Boost usability - Adhering to visual design principles can result in layouts that are intuitive and user-friendly.
- Evoke positive emotions - Attractive designs tend to provoke positive emotions in users, enhancing their experience.
- Reinforce brand perception - A strong visual design system cultivates user trust and interest in a product or a service.[1]

Nielsen Norman Group defines 5 visual-design principles that impact UX:

#### **2.2.1.1 Scale**

The principle of scale is a prevalent tool in visual design, using relative size to signal importance and hierarchy within a design composition. Put simply, more significant elements in a design are typically larger, ensuring they're easily noticeable. When implemented effectively, the principle of scale ensures that the most important elements stand out, guiding users effortlessly through the design.[1]

#### **2.2.1.2 Visual hierarchy**

Visual hierarchy is a design principle that aids users in understanding a layout by guiding their attention to various design elements in order of importance. It can be created through differences in scale, value, color, spacing, placement, and other means. A clear visual hierarchy regulates the flow of user experience. In the absence of such a hierarchy, users may struggle to understand where to focus on a page.[1]

#### **2.2.1.3 Balance**

This principle refers to the satisfying arrangement or proportion of design elements, ensuring an equal, though not necessarily symmetrical, distribution of visual signals on both sides of an imaginary axis. This axis can be vertical or horizontal.

Creating balance involves considering the area occupied by each design element rather than simply their quantity. Establishing an imaginary axis on your visual serves as a reference point for arranging your layout and assessing balance. A well-balanced design prevents one area from drawing undue attention, even if certain elements carry more visual weight and serve as focal points.[1]

#### **2.2.1.4 Contrast**

The principle of contrast involves placing visually distinct elements next to each other to emphasize their differences. These differences can indicate that elements belong to different categories, serve different functions, or behave differently.

In UX design, the concept of "contrast" often refers to the contrast between text and its background, and while reducing text contrast can de-emphasize less important text, it can also compromise legibility and accessibility.[1]

#### **2.2.1.5 Gestalt**

Gestalt principles capture how humans intuitively simplify and organize complex images. These principles explain how we naturally arrange parts of an image into an organized system, forming a cohesive whole rather than perceiving a series of separate elements.

Key Gestalt principles include similarity, continuation, closure, proximity, common region, figure/ground, and symmetry and order. The principle of proximity, for instance, is particularly relevant in UX design, suggesting that visually adjacent items are perceived as belonging to the same group.[1]

### **2.2.2 Directional cues**

Directional cues play a pivotal role in enhancing the user experience by strengthening the visual hierarchy and increasing conversion rates. A notable experiment by the CXL Institute[2] demonstrates the impact of directional cues on user experience and conversion rates. The experiment involved multiple versions of the same landing page, with each version employing different directional cues. The data revealed that the version with a hand-drawn arrow leading to the contact form significantly increased time spent on the page and user interaction.[3]

## **2.3 Hosting**

### **2.3.1 Domain names**

A domain name is a unique string on the internet that identifies a realm of administrative autonomy, authority, or control. Commonly used to identify internet services such as websites and email services, domain names are essential for various networking contexts and specific application naming and addressing. They serve to identify a network domain or an Internet Protocol (IP) resource like a personal computer or server computer accessing the internet. As of 2017, over 330.6 million domain names were registered.[18]

### **2.3.2 DNS**

The Domain Name System (DNS) is a hierarchical and distributed system that names computers, services, and other resources on the Internet or IP networks. It links various information with domain names assigned to respective entities, notably converting easy-to-remember domain names to numerical IP addresses needed for identifying computer services and devices. Introduced in 1985, DNS is crucial to the internet's functionality. It assigns domain names and maps them to internet resources via authoritative name servers for each domain. Network administrators can delegate authority over sub-domains to other name servers, facilitating a distributed, fault-tolerant service designed to avoid a single, large central database.[19]

### **2.3.3 Shared hosting**

Shared web hosting service is a type of web hosting where multiple websites are housed on a single web server connected to the Internet, dividing server maintenance costs

among several users. While advantageous for users who prefer not to manage system administration, shared hosting can limit users needing extensive software development beyond the hosting provider's support. Despite these limitations, shared hosting is more cost-effective than options like dedicated server hosting. Services typically include basic web statistics, email and webmail and script installations.[20]

#### 2.3.4 VPS

A Virtual Private Server (VPS) is a virtual machine that offers virtualized server resources on a shared physical server, providing more control and customization than shared hosting. Despite being on a shared physical server, a VPS emulates a dedicated server environment. This is achieved via a hypervisor, a virtual layer installed on the physical server's operating system, dividing it into independent virtual compartments. Each compartment can run its own OS and software. Notably, even though resources are technically shared, each VPS has a guaranteed, allocated amount of resources that can't be used by other accounts.[21]

## 2.4 Security

#### 2.4.1 HTTP

Hypertext Transfer Protocol (HTTP) is a client-server model protocol used for transmitting hypermedia documents like HTML, primarily between web browsers and servers. Although designed for this specific communication, it can be used for other purposes as well. HTTP is stateless, meaning no data is retained by the server between two requests.[22]

#### 2.4.2 HTTPS

Hypertext Transfer Protocol Secure (HTTPS) is an extension of HTTP that uses encryption to secure communication over a computer network, predominantly the Internet. Communication via HTTPS is encrypted using Transport Layer Security (TLS) or previously Secure Sockets Layer (SSL), offering protection from man-in-the-middle attacks, eavesdropping, and tampering. HTTPS not only authenticates the accessed website but also maintains the privacy and integrity of the transmitted data.[23]

#### 2.4.3 Hypertext Access

".htaccess" files, also known as distributed configuration files, allow per-directory configuration changes on a server. These files contain directives that apply to the directory they're placed in and all its subdirectories. The name of the .htaccess file can be altered using the AccessFileName directive.[23]

#### 2.4.4 Content Security Policy

Content Security Policy (CSP) is a security measure used to detect and mitigate attacks such as Cross-Site Scripting (XSS) and data injection, which can lead to data theft, site defacement, and malware distribution. CSP is designed to be backward compatible, functioning with browsers that do or do not support it. For browsers that don't support CSP, they default to the standard same-origin policy. To implement CSP, the web server must be configured to return the Content-Security-Policy HTTP header or hypertext access file.[24]

#### 2.4.5 Honeypots

A honeypot in cybersecurity is a security tool utilized as a decoy to distract cyber attackers from real targets. It mimics likely cyberattack targets such as vulnerable networks, thereby attracting and detecting potential cybercriminals. The purpose of a

honeypot is not only to deflect hackers from legitimate targets but also to gather information about their identities and attack methods, aiding in preempting and defending against potential threats.[25]

#### 2.4.6 ReCAPTCHA

*"reCAPTCHA is a free service from Google that helps protect websites from spam and abuse. A "CAPTCHA" is a turing test to tell human and bots apart. It is easy for humans to solve, but hard for "bots" and other malicious software to figure out. By adding reCAPTCHA to a site, you can block automated software while helping your welcome users to enter with ease."*[26]

#### 2.4.7 Cross Site Scripting

Cross-Site Scripting (XSS) attacks involve injecting malicious scripts into trusted websites. This can occur when a web application uses unvalidated or unencoded user input within its output. Attackers exploit this flaw by sending a malicious script, usually through a browser-side script, to an unsuspecting user. The user's browser, treating the script as coming from a trusted source, executes it. Consequently, the malicious script can access sensitive information like cookies or session tokens, or even rewrite the HTML content of the page. These attacks are a common security risk for web applications.[27]

#### 2.4.8 Injections

Injection attacks are a common and dangerous type of web attack where an attacker inputs malicious data to manipulate the operation of a web application. This can result in data exposure, damage, denial of service, or compromise of the entire web server. Injection vulnerabilities, which allow for unvalidated user input, are ranked as the top web application security risk by OWASP and are featured in the Common Weakness Enumeration (CWE) Top 25 Most Dangerous Software Weaknesses.[28]

#### 2.4.9 DDOS attacks

A distributed denial-of-service (DDoS) attack is a malicious act aimed at disrupting the regular traffic of a targeted server, service, or network by overwhelming it with an excessive volume of internet traffic. These attacks are carried out by utilizing multiple compromised computer systems, including IoT devices, as sources of attack traffic. Conceptually, a DDoS attack can be likened to a sudden traffic jam on a highway, obstructing the normal flow of traffic and preventing it from reaching its intended destination.[29]

### 2.5 SEO and performance

#### 2.5.1 Cumulative layout shift

CLS stands for Cumulative Layout Shift, a web performance metric that's part of Google's Core Web Vitals. CLS measures the visual stability of a web page, i.e., how much the elements on the page move around while the page is loading. A lower CLS score indicates a better, more stable user experience, as users are less likely to accidentally click on shifting elements. A high CLS score could negatively impact a website's search engine rankings, as Google uses Core Web Vitals as a ranking factor.[30]

#### 2.5.2 Speed index

Speed Index (SI) is a performance metric that measures how quickly the visible contents of a webpage are loaded. It is expressed in milliseconds, with lower values indicating better scores. Speed Index addresses user experience and is used in audits like WebPageTest and Lighthouse. It calculates the percentage of visually complete content

at 100ms intervals until the entire page is loaded, and the score is the sum of incomplete screen percentages at each interval.[31]

### 2.5.3 Responsive images

When serving responsive images, the goal is to optimize the image delivery based on the user's device capabilities. This means selecting the most appropriate image candidate to avoid delivering excessive image data to devices that don't require it. This approach reduces data usage on smaller devices like phones and tablets compared to larger screens. Faster image loading also positively impacts the Largest Contentful Paint (LCP) metric, especially when the LCP element is an image. Lower resource load times for LCP images improve the LCP score and create the perception of faster site loading. Additionally, serving responsive images can reduce bandwidth contention for other page resources, leading to improved overall page load times.[32]

### 2.5.4 Modern Image formats

AVIF and WebP are image formats that offer improved compression and quality compared to older formats like JPEG and PNG. By encoding images in AVIF or WebP, they can be loaded faster and consume less cellular data. AVIF is supported by Chrome, Firefox, and Opera and provides smaller file sizes while maintaining quality. WebP is supported by the latest versions of Chrome, Firefox, Safari, Edge, and Opera and offers superior lossy and lossless compression for web images. Using these formats can enhance web performance.[33]

### 2.5.5 SEO

Search engine optimization (SEO) is the process of improving both the quality and quantity of website traffic from search engines. It focuses on unpaid, organic search results rather than direct or paid traffic. SEO encompasses various types of searches, including image search, video search, academic search, news search, and vertical search engines. The strategy involves understanding search engine algorithms, user search behavior, keywords, and preferred search engines. The goal of SEO is to increase website visibility on search engine results pages (SERPs), which can lead to higher traffic and potential customer conversions.[34]

## 2.6 Universal design

### 2.6.1 WCAG guidelines

*"Web Content Accessibility Guidelines (WCAG) 2 is developed through the W3C process in cooperation with individuals and organizations around the world, with a goal of providing a single shared standard for web content accessibility that meets the needs of individuals, organizations, and governments internationally."*[39]

#### **2.6.1.1 Perceivable**

WCAG (Web Content Accessibility Guidelines) emphasizes the importance of perceivability in web content. It requires that information and user interface components be presented in a way that all users can recognize and understand. Content that is solely visual or audio-based creates barriers for users with visual or hearing disabilities. To address this, web content should be convertible between different formats or provide alternative equivalents. For instance, pre-recorded videos should have transcripts or closed captions to ensure users with hearing disabilities can access the audio content. Assistive technologies like screen readers and braille displays play a crucial role in perceivability, and web content should be compatible with these tools to provide accessibility for users with disabilities.[40]

### **2.6.1.2 Operable**

WCAG not only emphasizes perceivability but also operability, ensuring that users can interact effectively with a website. Guideline 2.1 specifically requires websites to be fully functional and navigable using only the keyboard, benefiting users with motor disabilities. Additionally, users should have enough time to perceive and use the content, with options to adjust or disable time limits if necessary. Navigation plays a crucial role, and websites should have clear and consistent titles, subtitles, and headings to facilitate easy navigation. The focus order of elements should follow a logical structure, such as a top-to-bottom ordering, when using the Tab key for navigation.[41]

### **2.6.1.3 Understandable**

Understandability is an important aspect of WCAG, ensuring that content can be comprehended by users and assistive technologies. WCAG 2.0 divides understandability into three areas: readability, predictability, and input assistance. Readability involves making text easy to recognize and understand by indicating languages, explaining unusual words or abbreviations. Predictability ensures that the content and website behavior follow a logical and consistent order, aiding users with disabilities in successfully navigating the site. Input assistance focuses on providing clear error messages and helping users prevent mistakes when entering information, promoting understanding and problem-solving for individuals with disabilities and assistive technologies.[42]

### **2.6.1.4 Robust**

Robustness, as defined by WCAG, refers to web content that is compatible with a variety of user agents, including browsers and assistive technologies. WCAG aims to ensure that websites can accommodate different browsers and assistive technologies used by people with disabilities. WCAG 2.0 includes two criteria for evaluating robustness:

- Parsing: The content and code of the website should be well-formed, with complete start and end tags and correct nesting of elements. This ensures proper display and compatibility with assistive technologies.
- Name, Role, and Value: User interface components, such as form elements, should have their name and role programmatically determined by assistive technologies. People with disabilities should be able to set values, properties, and states on the website using assistive technologies.[43]

## **2.6.2 Alt Text**

Alt text, also known as alternative text or alt attributes, describes the appearance or function of an image on a webpage. It serves multiple purposes, including enhancing web accessibility by providing information to screen readers for visually impaired users. Alt text is also displayed if an image fails to load and is used by search engine bots to understand the content of the page. By using alt text, you improve accessibility, provide context for images in case of loading issues, and assist search engines in properly indexing and ranking images in search results.[35]

## **2.6.3 Heading order:**

When structuring headings on a webpage, it is important to maintain a logical order and hierarchical structure. This involves using the appropriate heading elements (h1 through h6) and ensuring they are ordered correctly. For instance, an h2 should follow an h1, not an h3. It is crucial to avoid using heading markup on non-heading text.

Headers serve the purpose of conveying the structure of a webpage, benefiting both sighted users and users of screen readers. While different text sizes can indicate structure for sighted users, screen readers rely on properly marked-up header elements.



Well-written and correctly ordered headings make the webpage easier to navigate for screen reader users and save them time and frustration.[36]

#### 2.6.4 ARIA attributes

Accessible Rich Internet Applications (ARIA) is a set of roles and attributes that enhance the accessibility of web content and applications, particularly those developed using JavaScript. ARIA supplements HTML by providing mechanisms to pass interactions and widgets to assistive technologies. It's important to note that while ARIA provides valuable accessibility features, developers should prioritize using native HTML elements and attributes whenever possible, as they often have built-in accessibility features. The guiding principle of ARIA usage is to use native elements when they provide the required semantics and behavior, rather than repurposing elements and relying on ARIA roles, states, or properties.[37]

#### 2.6.5 Focus and tab management

Keyboard navigation is essential for users with motor impairments and those who rely on efficiency through keyboard shortcuts. Implementing a good keyboard navigation strategy improves the overall user experience. Focus refers to the currently active element receiving input from the keyboard. The order in which focus moves through interactive elements is called the tab order. Interactive elements like text fields and buttons are automatically inserted into the tab order based on their position in the DOM. Non-interactive elements like paragraphs and divs are not focusable by default. Creating a logical tab order involves arranging elements in a logical order in the DOM and properly managing the visibility of offscreen content that should not receive focus.[38]

## 3 Materials and Method

### 3.1 Method

#### 3.1.1 Planning

The initial planning phase was instrumental in establishing a clear direction for the project. We began by defining the initial requirement specification through continuous dialogue with the photographer. During these discussions, we delved into her needs, preferences, and goals for the website. This gave me a solid understanding of what features and functionality Laura desired, enabling me to describe issues, epics, tasks, and subtasks that would define the scope of the project.

Following this, I set up an initial roadmap to guide my efforts. This roadmap served as an actionable timeline, outlining what tasks needed to be completed, their priorities, and the sequence in which they would be tackled. The planning phase facilitated a structured and focused approach to the project. The roadmap in question is available in Figure 1.

#### 3.1.2 Workflow

##### **3.1.2.1 Agile methodology**

For this project, the Agile methodology was employed to manage the development process. Balancing work obligations with academic commitments meant that I was working on this project on a bi-weekly basis, rather than a traditional weekly schedule. Consequently, I adopted a two-week sprint schedule instead of the proposed one-week sprint cycle.

Each sprint represented a focused interval of time during which designated tasks were targeted for completion. Tasks for each sprint were identified and catalogued using Jira issues during the planning phase. The Jira platform enabled these issues to be organized into a backlog, detailing tasks awaiting assignment to a sprint, and an active sprint, encompassing tasks currently in progress.

This structure offered a comprehensive snapshot of the project at any given moment, detailing what had been accomplished, what was currently being worked on, and what tasks remained. It enabled a consistent flow of work, with clear start and end points, facilitating steady progress despite the non-traditional work schedule.

##### **3.1.2.2 Continuous deployment**

The continuous deployment approach was enabled through GitHub Pages. As soon as the fundamental components of the website were in place, the site was made accessible to both the photographer and the supervisor. Each update pushed to the repository was automatically mirrored on the live site, giving them both a real-time view of the project's progress. The client in particular was greatly appreciative of the transparent and timely communication fostered by this feature.

In this solo project context, GitHub was employed in a somewhat unconventional manner for version control. Instead of utilizing branches, as is standard in most development workflows, I used the main branch as the primary and only point of modification. The focus was on keeping it simple and pushing only stable versions of the project, rather than managing multiple development branches at once.

Although this strategy deviates from the traditional version control practices, it proved practical and effective given the circumstances. In the context of this project, where time constraints and a solo developer working team were factors. Focusing on a streamlined

version control approach provided a straightforward and reliable record of the project's progression.

### **3.1.2.3 Process documentation**

In the course of the project, I made use of Confluence, a documentation workspace allowing for full integration with the Jira project tracking software. During the initial planing phase, I set up various sections on my Confluence space. These sections served as repositories for meeting notes, sprint retrospectives, as well as a decision log. Employing Confluence, i aimed to keep a comprehensive record of the project's journey.

## **3.1.3 Communication**

### **3.1.3.1 Photographer**

The primary mode of communication with Laura was through Facebook, her proffered mode of communication. In the initial stages, Laura's involvement was crucial as her input directly influenced the aesthetic and functionality of the website. As the project progressed, her involvement was less frequent but remained essential. The continuous deployment feature on GitHub Pages enabled Laura to access and review the evolving website at her convenience.

### **3.1.3.2 Supervisor**

Regular communication with my project supervisor was facilitated via Microsoft Teams. We scheduled formal meetings bi-weekly to review my progress, discuss any challenges, and plan for the upcoming sprint. On occasion, Laura would attend these meetings to provide her input and perspective.

These meetings were vital in maintaining project oversight, ensuring that everything stayed on track, and adjusting the course of action based on our discussions.

## **3.2 Tools**

### **3.2.1 http-server**

http-server is a simple, "zero-configuration" command line tool used to spin up local http servers. *"It is powerful enough for production usage, but it's simple and hackable enough to be used for testing, local development and learning"*[3]. Its easy setup process made it an obvious choice for serving static files during the development phase.

### **3.2.2 Sublime text**

I leaned on Sublime Text as my go-to code editor for this project. Having used it in many of my past projects, it's a tool I'm very comfortable with. Sublime text has both syntax highlighting and code completion features, it's got everything I need for the scope of this project. It's easy to use, straightforward, and simply gets the job done.

### **3.2.3 Figma**

During the design process, I employed Figma, an "all-in-one" design tool. The highly collaborative nature of Figma allows for directly sharing design prototypes through a simple URL link. I made frequent use of this feature in order to share my design prototypes with the photographer throughout the design phase.

### **3.2.4 Gimp**

For image editing, I defaulted to GIMP, a tool with which I'm already quite familiar. GIMP is a free and open-source, fully-featured image editing software. For this project, I

mainly used it to make quick adjustments to the images featured on the website, such as cropping and resizing.

### 3.2.5 Bash

Bash, a Unix shell and command language known for its effectiveness in automating tasks, played an important role in this project. It was used to streamline and automate repetitive tasks, particularly in the handling of multiple image files to be used in the image gallery. This allowed me to focus on other aspects of the project while Bash took care of the bulk processing.

### 3.2.6 ImageMagick

ImageMagick, known for its powerful image processing features, was utilized for image conversion. I took advantage of its ability to handle batch operations to automate the process of preparing each image for use in the responsive image gallery. I set up a simple bash script that would iterate through the list of images to be included in the gallery, and created 4 differently sized version of each, all in a web-friendly WebP format. All it took was to iterate through these 4 lines of code for each image:

```
convert "$originalImageLocation$i$originalImageFormat" -resize 414x -quality 80 "$outputLocation${i}x414.webp"
convert "$originalImageLocation$i$originalImageFormat" -resize 632x -quality 80 "$outputLocation${i}x632.webp"
convert "$originalImageLocation$i$originalImageFormat" -resize 760x -quality 80 "$outputLocation${i}x760.webp"
convert "$originalImageLocation$i$originalImageFormat" -resize 950x -quality 80 "$outputLocation${i}x950.webp"
```

### 3.2.7 Global Stats StatCounter

GS StatCounter provided me with invaluable data for discerning the most popular screen sizes among different web users. Its powerful filter feature allowed me to narrow the results down to the specific user group that mattered most for this project: Norwegian users. This specific data helped me make well-informed design decisions, tailoring my website to devices that my clients are most likely to use. This tool is accessible on the internet for free, and I've included a link to it in the references section [5].

Utilizing this tool, I determined the following:

- The majority of Norwegian PC users' screens are either 1920px, 1536px or 1280px wide.
- Currently, the widest phone screens on the market measure at 414px in width.

These key insights played a vital role during both the testing, and optimization stages.

## 3.3 Design

### 3.3.1 Single-page site

During the design phase, a decision was made to switch to a single-page website layout. We assessed the potential upsides and downsides of such a decision and concluded that it was the logical choice for this project. The potential for increased user retention, more customer inquiries and better UX in general outweighed the negatives.

Single-page sites need to face the challenge of limited scalability and detail-oriented content. In this case, the photographer did not require blogging support from the get-go, thereby making the issue less relevant. Otherwise, the space for comprehensive detail was not a pressing concern as her work mostly speaks for itself.

Additionally, we considered the fact that her target market was quite specific: wedding, event, and individual photography. This narrow focus significantly diminishes the need to pepper the webpage with an extensive amount of SEO keywords, lessening the potential SEO challenges.

### 3.3.2 UX design

#### 3.3.2.1 Scale

The image gallery was designed to take up the entire width of the site, no matter the size or resolution of the screen. This design decision allows Laura's photographs to take center stage and dominate the visual landscape of the site. While the rest of the content has varying degrees of padding. This principle of scale is used to highlight the most integral part of the website, the image gallery showcasing Laura's previous work.

#### 3.3.2.2 Visual hierarchy

In terms of visual hierarchy, I have gone through great lengths to ensure that Laura's photographs are immediately visible upon entering the website, no matter the screen size. In fact, on mobile devices, a special fullscreen-header featuring one of Laura's photographs is inserted before the "about me" section. This positioning ensures that Laura's work is always the focus of the viewer's attention.

Otherwise, I strived to lead users through the information and action items in a logical and intuitive manner.

#### 3.3.2.3 Balance

The website was based on a strict 16-column layout, employed to create a pleasing sense of balance and structure to the website. Figure 5 provides an overview of the "pricing" section, highlighting the 16-column grid. This balance is further enhanced by ample spacing between sections, avoiding a cluttered look and ensuring each component of the site has enough room to "breathe".

#### 3.3.2.4 Contrast

The use of contrast is an essential part of my website design. A plain white background is chosen in contrast to Laura's vibrant and colorful photography style, allowing her images to "pop". Concerning typography, a simple black on white color scheme is employed to ensure maximum readability.

#### 3.3.2.5 Gestalt

The Gestalt principles have been considered in the website's design. The site flows in a natural order: presenting Laura's previous work, first and foremost, then providing essential information about her services, and finally leading the viewer to the contact form. Each element is placed with careful consideration of proximity and logical connection. The arrangement facilitates a smooth user journey, subtly encouraging the them to book a photoshoot, ultimately fulfilling the site's primary goal.

### 3.3.3 Directional cues

When designing the the website interface, i strategically used directional cues to increase potential conversion rates. The key feature of this implementation was my deliberate choice and placement of the image next to the photo-shoot booking form. The image used for this purpose was taken from Laura's vast catalogue of original photographs.

On the mobile version of the site, I placed an image of a crow directing its gaze directly to the "submit" form button. For desktop users, that very same crow is positioned to be staring at the "Contact Me!" call to action. You may view both versions side by side in

Figure 4. This strategic positioning directs the users' interaction towards submitting the form.

## 3.4 Frontend

### 3.4.1 HTML and CSS

HTML and CSS were the primary tools used in the frontend development of the website. HTML served as the backbone of the website, defining the structure and content. CSS, on the other hand, was used to add style and aesthetic appeal to the HTML content. To further enhance the user experience, CSS media queries were leveraged to make the website's layout responsive to different screen sizes, ensuring an optimal user experience regardless of the device used to access the site.

### 3.4.2 JavaScript

Each component on the website that required interaction or dynamic behavior, such as the automatically extending and subtracting navigation bar, or the interactive photo gallery, was powered by JavaScript. In keeping with the KISS development approach, only vanilla JavaScript was used. Avoiding external libraries and frameworks ensured that the website remained lightweight and flexible.

The JavaScript code was developed with a focus on best practices. Such as: functional programming, using clear and descriptive variable names, and adequately commenting the code to ensure maintainability through ease of understanding.

## 3.5 Backend

### 3.5.1 Photoshoot booking form

Due to the project's time constraints, the photoshoot booking form functionality was ultimately outsourced to FormSubmit.co, an external service specializing in handling email forms. Several important factors have been considered when choosing the right service provider for this project:

**Ease of use:** FormSubmit.co offers a simple and streamlined approach to setting up web forms. By simply pointing the HTML form's action attribute to the Formsubmit.co endpoint, I was able to offload the data processing and storage to the service.

**Good documentation:** Formsubmit.co boasts excellent documentation. It provided clear instructions and guidelines, making it easy for me to integrate the service into this project. Particularly, I was able to find straightforward explanations on how to add a honeypot field to my form, as well as enable ReCaptcha to avoid spam submissions.

**Privacy:** Lastly, and most importantly, Formsubmit.co practices a transparent privacy policy, outlined in a concise, straightforward document that avoids complex legal jargon. They clearly outline how the collected data is handled and the steps they take to protect it. Following is an excerpt from their privacy policy, demonstrating full commitment to users' privacy:

*"FormSubmit is committed to processing some of the information with the only purpose of managing the platform and to fulfill the request from the users. We will not use the collected information for any other purpose except when explicitly obtaining permission from the user. We will not disclose any of the collected data*

*to any third party, except in the case when this is required in order to provide desired services to the user, or when it is required by law.”[6]*

### 3.5.2 Domain

The website's domain name was purchased from a local provider, Webhuset. In this case, the main concern was securing the desired domain name before project submission and Webhuset was chosen for that purpose.

It's important to note that while the domain name was purchased through Webhuset, the actual hosting of the website is handled separately. To ensure that the users are correctly guided, DNS forwarding has been utilized. The DNS settings on Webhuset were configured to forward any traffic to the server where the actual website is hosted.

### 3.5.3 Hosting

The website is hosted on Hostinger, a reputable provider known for its reliable and high-performance shared hosting solutions[7]. The downside of no daily backups for lower-tier paid users of Hostinger was of no concern, since this website is completely static. Moreover, shared hosting was an obvious choice, since it's the more economical and efficient solution, especially for smaller businesses or individual projects such as this.

A feature of note provided by Hostinger, is the ability to modify the Hypertext Access file. This capability was utilised for password protecting the website during early development stages, as well as defining a custom CSP for enhanced security.

## 3.6 Universal design

### 3.6.1 HTML Semantics

Semantically correct HTML was implemented as a foundation for creating a universally accessible website. This approach involves using semantically rich HTML tags where possible, such as <nav> designating the navigation links and <section> for defining distinct content sections. This makes the website more intuitive from the get go, especially for those relying on all manner of assistive technologies.

HTML labels were used inside the photoshoot booking form. These labels allow the users relying on different assistive technologies to better grasp what type of information they are supposed to enter in each field. Further enhancing their ability to interact with the website effectively.

Furthermore, alt text was provided for all images on the site. I ensured that even the images dynamically injected into the webpage upon clicking the "load more pictures" button are each enhanced with descriptive alt text. This ensures that Laura's vibrant and colorful photographs are accessible to all users in some form.

### 3.6.2 ARIA Attributes

ARIA roles were utilized to further enhance the semantic descriptions of HTML elements and improve the website's accessibility.

The hamburger menu button on this website is a good example of this. It utilizes the aria-expanded attribute to indicate its current state at all times. When the hamburger menu is collapsed, aria-expanded is set to false. Upon clicking the button, the menu expands, and aria-expanded value toggles to true. This allows the screen reader users to better understand the function and current state of the hamburger menu button, enhancing their overall user experience.

### 3.6.3 Heading order

On the website, I've ensured that the heading order makes logical sense and directly corresponds to the visual hierarchy. Each section of the website begins with an <h1> tag, signifying the start of a new content section. <h2> tags are used for subheadings under the main <h1> heading, particularly in the "pricing" section. All further subsections inside the "pricing" section use <h3> tags.

### 3.6.4 Focus and tab management

The website has been designed from ground up to ensure seamless focus and tab management. Upon clicking an anchor link in the navigation bar for instance, the website not only scrolls up/down to the corresponding section, but it also sets the focus on the corresponding <h1> element.

Similarly, when an image is opened in fullscreen mode, focus management is also applied. The only available interactive element in this mode is the "Exit Fullscreen Mode" button. This intentional restriction ensures that users won't unintentionally stray away from the fullscreen view due to errant tabbing, thereby enhancing the overall viewing experience.

These measures of focus and tab management bolster the site's accessibility and usability, ensuring a smoother and more intuitive navigation experience for all users, regardless of their method of interaction with the site.

## 3.7 SEO and performance

### 3.7.1 HTML Attributes

In order to optimize the website for SEO and general performance, several HTML attributes and techniques have been used, particularly as it relates to image loading and display.

One key HTML attribute used is srcset. This attribute allows the browser to choose the most appropriate image source from a set of provided options, based on the current viewport width. In this case, four different versions of each image are available to choose from: three differently-sized images specifically tailored for the most popular pc screen sizes among Norwegians. As well as an additional, smaller size optimized for mobile users. This technique ensures that the browser only loads the image that best fits the user's device of choice, keeping both their data usage and load times low.

Additionally, the website fully supports the technique of "lazy loading". This means that only the images that are necessary for the initial page view are loaded right away, while the rest of the images are loaded only as they are needed.

### 3.7.2 Modern image formats

To further optimize the website's performance and SEO, modern image formats have been utilized, specifically WebP and SVG. All photographs on the website have been converted to the WebP format, additionally, SVG is used for all icons.

### 3.7.3 Fixed element proportions

The dimensions of all page elements have been explicitly defined with fixed height and width attributes. By ensuring that the browser knows the size of an element before it is fully loaded, the cumulative layout shifts are reduced and the overall user experience improved



### 3.7.4 SEO Keywords

In this project, the primary focus was on covering the fundamentals and ensuring a strong foundation for further SEO work. The full topic of optimising SEO keywords is exceedingly deep and beyond the scope of this project.

HTML meta tags are a part of that SEO strategy, particularly the description and keywords tags. A carefully composed meta description tag accurately represents the website's content, along with a keywords tag that summarises the core topics.

Aside from these tags, other foundational SEO techniques have been implemented throughout the website. These include utilizing alt tags for images, ensuring a logical hierarchy and clear structure of content, and integrating keywords naturally within the website's text.

## 3.8 Security

### 3.8.1 SSL certificate

Secure handling of all user data has been a top priority in the development of this website, which is why the use of HTTPS has been enforced on all connections. Incidentally, Hostinger auto-configures lifetime SSL certificates with LetsEncrypt on all new websites uploaded onto their shared servers.

HTTPS was merely enabled from the get go however. And in order to actively enforce it on all incoming connections, I had to simply enable the option in security settings.

### 3.8.2 Content Security Policy

A rigorous Content Security Policy is implemented to bolster the website's security, defined within the Hypertext Access file. As my website does not depend on any external scripts or libraries, the policy is configured to exclusively permit scripts originating from the local server. This policy adds an additional layer of protection against potential cross-site scripting (XSS) attacks, and all manner of unauthorised code manipulation.

### 3.8.3 Spam prevention

Additional security measures have been set in place in order to prevent spam, and to a lesser extent, DDoS attacks.

Two separate honeypot fields have been integrated into the photoshoot booking form. One of them, an implementation according to official FormSubmit's guidelines, requiring the respective honeypot field's name to be set as "\_honey". By convention, these fields are given inconspicuous names to avoid alerting bot makers who might program their bots to ignore them. If a honeypot field's name clearly indicates its purpose, e.g. "\_honey", it could undermine its effectiveness. And so, the second honeypot field is a custom implementation by yours truly, complete with an inconspicuous field name:

```
document.getElementById('my_form').addEventListener('submit', (event) => {
  if (inconspicuousField.value !== "") {
    event.preventDefault();
  }
});
```

Google's reCAPTCHA system, another anti-spam measure, is also incorporated into the form, and it's worth noting that this feature is enabled by default on all FormSubmit forms.

Lastly, to ensure Laura's email address is concealed from potential spammers, every instance of her email address in the HTML file is obfuscated by adding a

```
<span class="blockspam" aria-hidden="true">lamlam</span>
```

element adjacent to it. This ultimate spam prevention measure represents the final layer of security, ensuring peace of mind for Laura.

## 3.9 Testing

### 3.9.1 Cross-browser usability testing

Ensuring the highest level of usability and compatibility across various platforms was a priority in the development process. Therefore, the website underwent constant cross-browser testing throughout the development process. The site was tested on Google Chrome and Firefox, both on various computer screen sizes, as well as a physical Android phone.

GitHub Pages, which had been used for continuous deployment, proved to be an excellent tool for conducting usability testing on the mobile device as well. By examining the website's appearance on these distinct platforms and devices, I aimed to provide a seamless user experience for all potential clients, regardless of their browsing preferences.

### 3.9.2 Standard compliance

Ensuring the website adheres to established web standards is crucial for its proper functionality, longevity, and accessibility across diverse devices and browsers. To confirm compliance with these standards, the website was evaluated using both the Markup Validation Service and the CSS Validation Service, provided by the W3C. These services play a key role in verifying that the website's HTML and CSS codes align with the universal standards set forth by the W3C, contributing to a more reliable and universally accessible web experience for all prospective clients.

### 3.9.3 Lighthouse testing

Lighthouse, an open-source, automated tool for improving the quality of web pages, was utilized to evaluate and improve all aspects of the website. Lighthouse allows comprehensive analysis covering performance, accessibility, SEO, security, and adherence to best practices[2]. By employing Lighthouse, I was able to obtain detailed insights into areas that required attention, enabling me to enhance every aspect of my website.

### 3.9.4 Accessibility testing

#### 3.9.4.1 ARIA DevTools

ARIA DevTools served as a valuable tool for accessibility testing, enabling a different perspective of the website - akin to that experienced by visually impaired users via screen readers. It transformed the website's layout into a clear hierarchy based on explicit and implicit ARIA roles, encompassing all HTML Elements. This unique view helped identify overlooked ARIA labels or misused roles. In Figure 3, I have showcased ARIA DevTools in action.

Moreover, the unique view of the website provided by ARIA DevTools toolkit made it effortless to spot any inconsistencies or unexpected patterns in the hierarchy of the HTML document. This tool simplified both testing and development, helping build a user-friendly and accessible website.

#### **3.9.4.2 Google Chrome Screen Reader**

During the second phase of accessibility testing, I employed the Google Chrome's integrated Screen Reader. This tool speaks aloud the contents of webpages and provides a lens through which visually impaired users experience all web content. By employing the screen reader, I was given a first-hand understanding of my website's audible navigation experience.

Working with the Google Chrome Screen Reader, I thoroughly explored each section of my website, adjusting all elements that were confusing or unclear when presented audibly. Further advancing my goal of creating an environment that is accommodating to all users, regardless of their ability to see the screen.

## 4 Results

### 4.1 Content and functionality

The four key components to any photography website, as defined in the problem statement, have been implemented in this project. Including an "About me" section, a segment detailing the different pricing options, a fully dynamic photo gallery, as well the "Contact me" section.

The "Contact me" section houses a photoshoot booking form, forwarding all submissions to the photographer through email. The form functionality has been outsourced to FormSubmit.co. The integration was completely seamless, only requiring me to append a link to their service inside the HTML form.

The gallery implementation is both dynamic and flexible: it could easily be configured to house any number of images, each image also supports fullscreen viewing.

The site has been built solely using plain HTML, CSS and JS. As discussed in the discussion chapter, this minimalist approach was pursued not only as a learning experience, but also for the potential advantages that it offers.

All the content presented is fully responsive and thoroughly tested employing cross-browser usability testing on real devices. Additionally, StatCounter has been leveraged in order to ensure good browsing experience on devices that are most likely to be used by Norwegians.

Lastly, the website has been developed fully in accordance with the best standards and practices set forth by W3C. The website passes both the Markup Validation Service and the CSS Validation Service provided by the W3C.

### 4.2 Design

During the design process, I aimed to highlight Laura's unique style and boost potential conversion rates using design theory:

- Laura's photographs are immediately visible upon entering the website, asserting their primary importance through visual hierarchy.
- Utilising scale, the image gallery was designed to take up the entire width of the site, highlighting it's integral part of the website.
- A strict 16-column layout was used to provide a sense of balance and structure to the website.
- A simple white background contrasts with Laura's vibrant and colourful photography. A black on white color scheme for typography ensures maximum readability
- Employing Gestalt principles, the site flows in a natural order - showcasing Laura's previous work up-front, providing key information about her services, and then finally, leading the viewer towards the contact form at the end.
- The deliberate placement of images, particularly the crow next to the photoshoot booking form, acts as a strategic directional cue. Always directing its gaze towards the "submit" button or the "Contact Me!" call to action.

### 4.3 Hosting and maintenance

It must be emphasised that as it stands, the website is not ready for hand-off. It currently lacks any form of user-friendly interface for the photographer to be able to

manage the content on her own. A headless CMS implementation is currently in the works and will be further discussed in the chapter on further work.

The website is currently hosted on a shared hosting platform at Hostinger. In terms of maintenance, the static nature of this website, in addition to having only one external dependency means very little maintenance work is required. SEO optimization and content management are the only relevant maintenance concerns.

A shared hosting solution was chosen because it is the more economical and user-friendly solution. A VPS, although providing even more control and better performance, requires a significant amount of technical knowledge to manage and is typically more costly. Given the scale and requirements of this website, the significantly increased complexity and cost associated with VPS hosting did not seem justifiable in this case.

## 4.4 Security

The decision to outsource the photoshoot booking form to FormSubmit significantly reduced the security concerns related to this website. The external service provider would tackle the challenges involved in securing against injections and DDoS attacks.

During this project, I concentrated on adhering to general security best practices, in addition to implementing defences against XSS attacks and spam.

The website is secured with an SSL certificate and HTTPS connections are enforced. Effectively ensuring that all data being transmitted between the user's browser and the website, including the forms submitted through the photoshoot booking form, are encrypted.

The photoshoot booking form features a custom honeypot implementation and employs ReCaptcha to prevent spam and abuse from bots.

And lastly, a strict CSP is defined within the Hypertext Access file, blocking all scripts not originating from the local server.

## 4.5 SEO and Performance

Achieving high performance targets was a top priority during development, as it's the field in which a custom-built website can potentially have the biggest advantage. In addition, I laid a solid foundation for SEO, covering all fundamental aspects and ensuring a strong basis for further SEO efforts, once the site goes live.

Metadata tags were included in the HTML to provide a concise description of the website's content. Aside from these tags, SEO techniques used across the site include: attaching alt tags to all images, ensuring a sensible website hierarchy and embedding keywords seamlessly within the site.

Only modern web-friendly image formats were used throughout the site. All images support dynamic image sizing utilizing the srcset HTML attribute, further enhanced by optimizing these images for the screen widths most prevalent among Norwegians. Paired with the lazy-loading feature, this ensures that users download only the necessary amount of data.

In terms of performance, the site averages a score of 95% on mobile devices using Google's Lighthouse tool[6], while the desktop version usually scores slightly above 80%. The disparity in these scores is attributed to the perceived high CLS detected by the tool on desktop devices. However, it's important to note that this apparent CLS does not seem to actually exist in the "real world".

Lighthouse interprets the dynamic image gallery as having high CLS on desktop devices. Yet my manual testing, with data-throttling enabled, did not reveal any noticeable CLS, despite my efforts to replicate the issue in various conditions. Nonetheless, the tool's interpretation could potentially indicate an impact on the page ranking, a matter that warrants further research. I'll be further discussing this issue in the chapter on further work.

Overall, these test results affirm the effectiveness of the performance optimization techniques employed during development. Even more so considering the fact that the site is currently hosted in the Netherlands, and may be significantly boosted by employing CDN, which incidentally, I will also be covering in the chapter on further work.

## 4.6 Universal design

### 4.6.1 Perceivable

To guarantee the availability of text alternatives for non-text content, alt tags have been provided for all images on the site. This includes images dynamically injected into the webpage upon clicking the "load more pictures" button. These descriptive alt texts make sure that Laura's vibrant and colorful photographs are accessible to all users in some form.

Correct use of semantic HTML tags, like `<nav>`, `<section>`, and the appropriate hierarchy of `<h1>` to `<h3>` headings, helps create a logical structure that can be perceived and interpreted correctly by assistive technologies.

### 4.6.2 Operable

In terms of keyboard accessibility, the site features a seamless focus and tab management system. Whether it's clicking an anchor link in the navigation bar or opening an image in fullscreen mode, the focus is properly managed. For instance, upon clicking an anchor link in the navigation bar, the website not only scrolls up/down to the appropriate section but also sets the focus on the corresponding `<h1>` element.

The website has a straight-forward structure and intuitive navigation. The use of semantic HTML tags, clear headers, and logical content hierarchy contribute to easy navigation. Lastly, the hamburger menu button utilizes the `aria-expanded` attribute to indicate its current state.

### 4.6.3 Understandable

To ensure maximum readability, a simple black-on-white color scheme is employed throughout the website. Also, the language of the page is declared in the HTML document to assist screen readers and translation tools.

The photoshoot booking form provides clear labels and instructions for its input fields. It indicates required fields to help users understand the necessary input.

Lastly, HTML5 validation is used to prevent incorrect data submission. Providing clear error messages when the input does not match the expected format, or if a required field is left empty.

### 4.6.4 Robust

Semantically correct HTML laid the foundation for this website, ensuring that it could be correctly parsed by older, as well as modern browsers. The website was vigorously tested on various configurations through cross-browser usability testing. In addition to these

manual tests, the website also passed the formal validation process using the Markup Validation Service and the CSS Validation Service provided by the W3C.

ARIA roles and properties were also employed to further enhance compatibility with assistive technologies.

## 4.7 Optional features

In light of the constraints outlined early in the report, I was unfortunately unable to incorporate any of the optional features outlined in the problem statement. These omitted features represent potential areas for improvement in the future.

## 5 Discussion

### 5.1 A custom-built solution

Throughout the development process, I strived to code everything from scratch. Partly as a learning experience, and partly because I do believe that a custom-built website offers significant advantages for freelance photographers in particular:

- **Uniqueness:** A custom-built website, designed to emphasize the unique style of the photographer, as detailed in Chapter 3.3, allows them to stand out. In a crowded market such as photography, the value that uniqueness brings should not be underestimated.
- **Performance:** A custom-built website can be built from the ground up with performance in mind, avoiding unnecessary bloat that often comes with website builders. This can lead to better performance, as well as improved SEO. This is demonstrated by my website's performance results, as detailed in Chapter 4.5.
- **Easy Maintenance:** Simply put, a static website, with few external dependencies has very little that could go wrong. Additionally, CMS options are available, providing an easy-to-use interface for keeping the site up to date.

Despite these benefits, I am not blind to the obvious drawback: the cost. Building a website from scratch either requires a significant amount of time and technical skills, or a lot of money.

### 5.2 Design

While I'm happy with the overall design and believe it accomplishes the goals outlined in the problem statement. Certain aspects of the website could certainly be improved.

Currently, the size of the "About me" section is too small. While it looks aesthetically pleasing, it does not provide ample space for Laura to properly introduce herself, or include a sufficient amount of SEO keywords. This is in stark opposition to the principle of prioritizing functionality over aesthetics in UX design. I believe this section should be redesigned with more focus on practicality.

Moving on, the solid black lines defining the top and bottom borders of the "Pricing" section create an unnecessary contrast with the background, resulting in a cluttered look. The "load more images" button is lost in this clutter and can easily be missed.

A more natural separation of the pricing section could be achieved through slight alterations in the background color, or maybe even employing a semi-transparent image as the background. This could help minimize the clutter and improve the overall user experience, while maintaining the aesthetic integrity of the site.

### 5.3 Evaluating the process

Looking back, I can see now that I missed the mark with my initial timeline estimates by about two weeks. Though it would have been much worse, had I decided to stick to the original plan of implementing the photoshoot booking form from scratch.

The two main contributors to my miscalculations were: my poor estimate on how long developing the website structure would take, as well as my severe underestimation of how big topic of a topic universal design truly is.

For the most part, I kept a steady pace throughout the project. That said, I had to clear my schedule and take the entire month of May off from work, in order to to finish writing this report in time.



## 6 Conclusion and further work

As the project drew to a close, I accomplished the goal of developing a working, well-designed website that fulfilled all the primary goals outlined in the problem statement. Unfortunately, time constraints prevented the incorporation of any of the optional features.

The subject of "serving as a model for other photographers wishing to establish a professional online presence", as outlined in the objective statement, presents some key considerations. Most crucially, SEO stands out as an incredibly central aspect of a successful photography website, one which this project did not sufficiently cover.

Due to the limits of the project timeframe, there were countless other topics I wasn't able to explore within this report. Despite these limitations, I believe the final submission still covers a wide range of essential topics for building a successful photography website. The insights and strategies discussed herein can serve as a starting point and guide for those venturing into the field.

### 6.1 Further work

From the get-go, the plan was that me and Laura would continue cooperating beyond the scope of this project. As I transition into the IT field and explore job opportunities, I'm committed to expanding my knowledge in the field by continuously refining all aspects of this project.

There are two of stand-out features currently missing from this solution, needing to be implemented before this project can be considered complete. Firstly, establishing a Content Delivery Network would yield significant performance gains. Secondly, implementing a headless CMS is essential, giving Laura the tools she needs to manage this website on her own.

## 7 Community impact

During the course of this project, the one subject I can say with certainty that I learned the most about, is Universal Design.

I was completely blindsided by the sheer number of aspects to consider when trying to develop a fully accessible website. From having to dynamically control the state of the different aria-values (e.g. the hamburger menu), to manually configuring which parts of the website should be interactable at any given time.

These efforts have not only resulted in a more inclusive website but also provided invaluable learning opportunities. I've been immersed in the intricacies of Universal Design, developing a much deeper understanding of how to create websites that truly are for everyone. This understanding will undoubtedly influence my future work, making this project a significant stepping stone in my development journey.

As mentioned earlier, one of the more significant contributions to ensuring good accessibility on my site, was the inclusion of a custom focus management system:

In certain scenarios, where a semi-transparent overlay, or an overlay encompassing only a part of the screen is displayed. The rest of the website's content is often made to be non-interactive using the mouse, and thus it should not be focusable when employing screen readers. CSS rules are not always sufficient to correctly manage these focusable areas, in such cases `tabindex` and `aria-hidden` properties should be utilised. This helps prevent confusing the user and avoids potential accessibility issues.

My initial implementation of a JS focus management system, was to clutter the JS file with extensive use of `tabindex` and `aria-hidden` manipulations throughout. But after several iterations, I ended up with a streamlined, easy to use, fully modular and dynamic focus managing system that I'll be sure to employ in my future projects:

```
function enableElements(...elements) {
  elements.forEach(element => {
    element.removeAttribute('aria-hidden');
    element.querySelectorAll('*').forEach(child => {
      child.removeAttribute('tabindex');
    });
  });
}

function disableElements(...elements) {
  elements.forEach(element => {
    element.setAttribute('aria-hidden', 'true');
    element.querySelectorAll('*').forEach(child => {
      child.setAttribute('tabindex', '-1');
    });
  });
}
```

These functions, operate by appropriately adding or removing 'aria-hidden' attribute from the element, and 'tabindex' attributes from all of it's child elements, effectively providing you with the tools needed to manage the interactivity of any website's elements using JS. These functions are built to support any number of elements being passed at any given time, depending on which parts of the website should be altered.

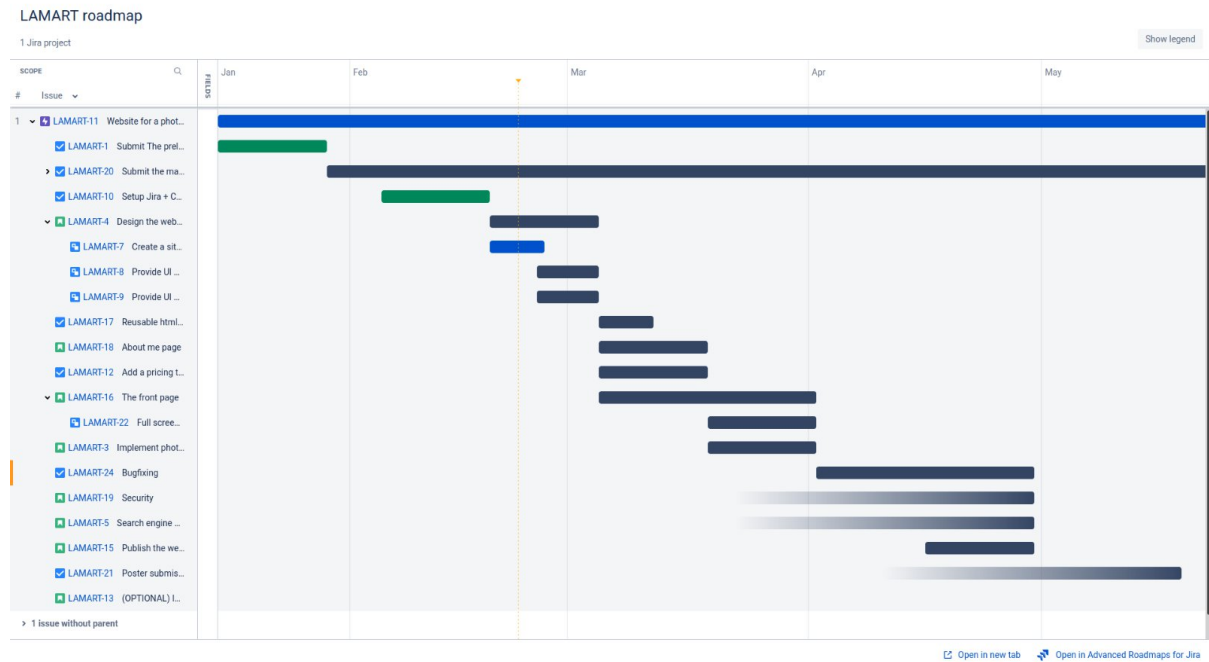
This humble contribution, in addition to spreading general awareness about Universal Design are my contributions the broader community through this project.

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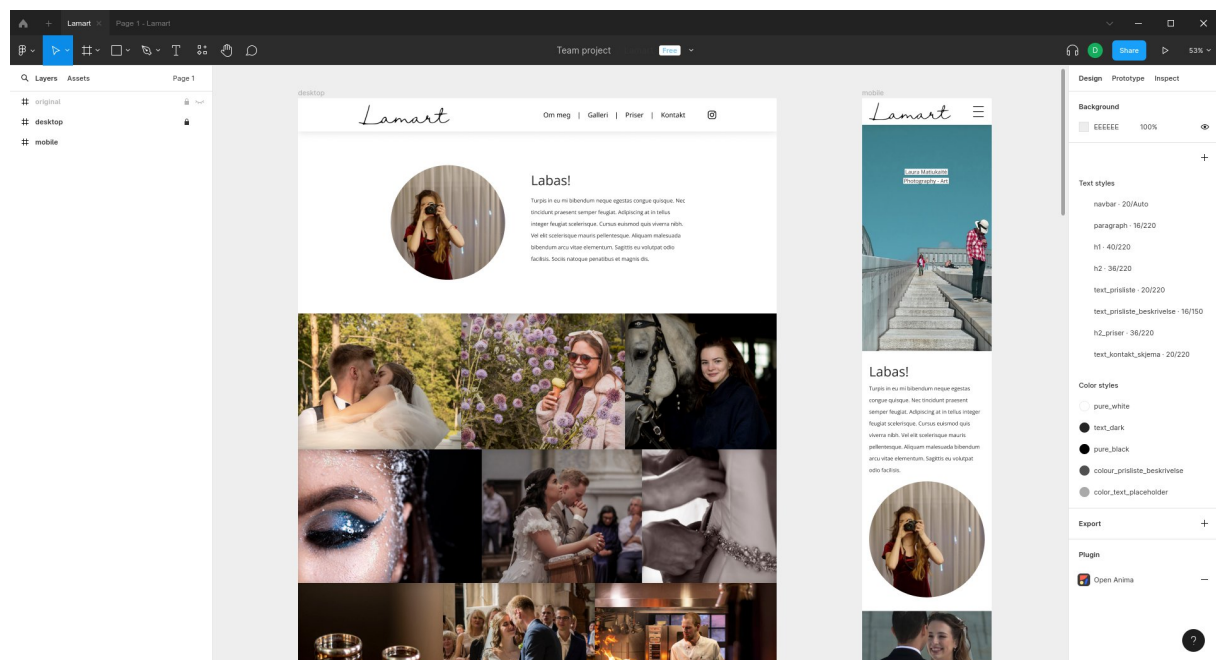
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## 9 Attachments



### 1: Initial project roadmap created using Jira.



**Figure 2: The final design prototype on Figma. The interactive version is available at:**  
<https://www.figma.com/proto/OddCKNbo8O26RxKqzLyXnL/Lamart?type=design&node-id=122-2&viewport=400%2C-612%2C0.12&scaling=min-zoom&page-id=0%3A1%3Ffluid%3D1214197200180263807>

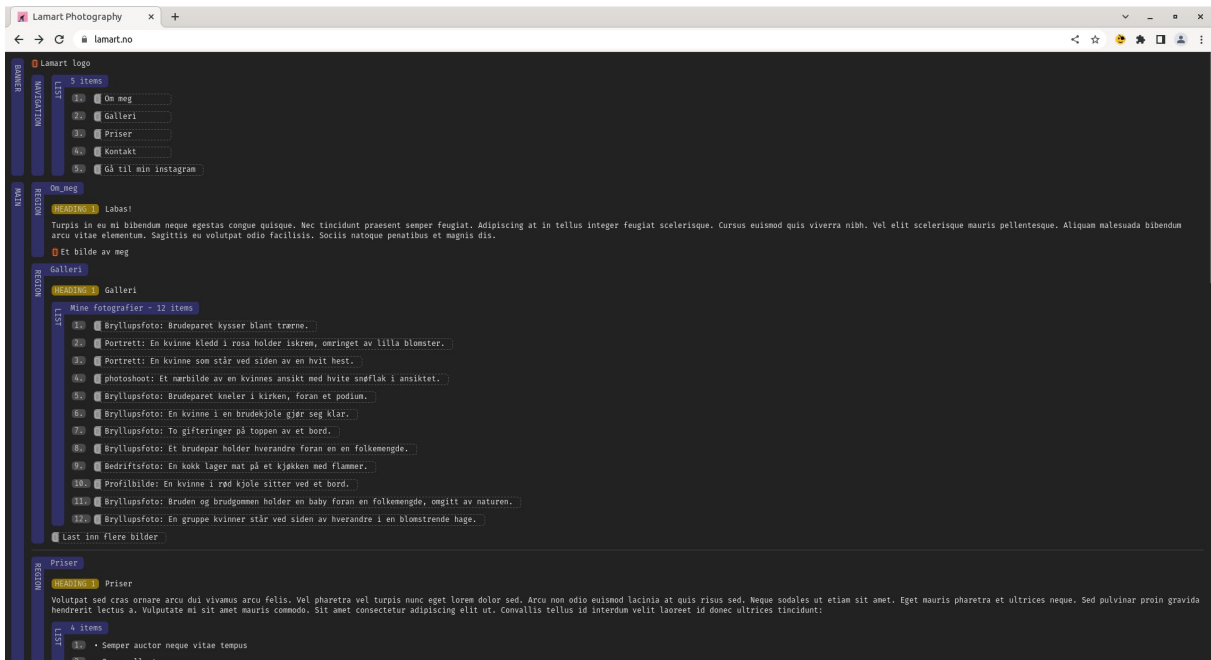


Figure 3: ARIA DevTools screen displaying a clear overview of the website hierarchy.

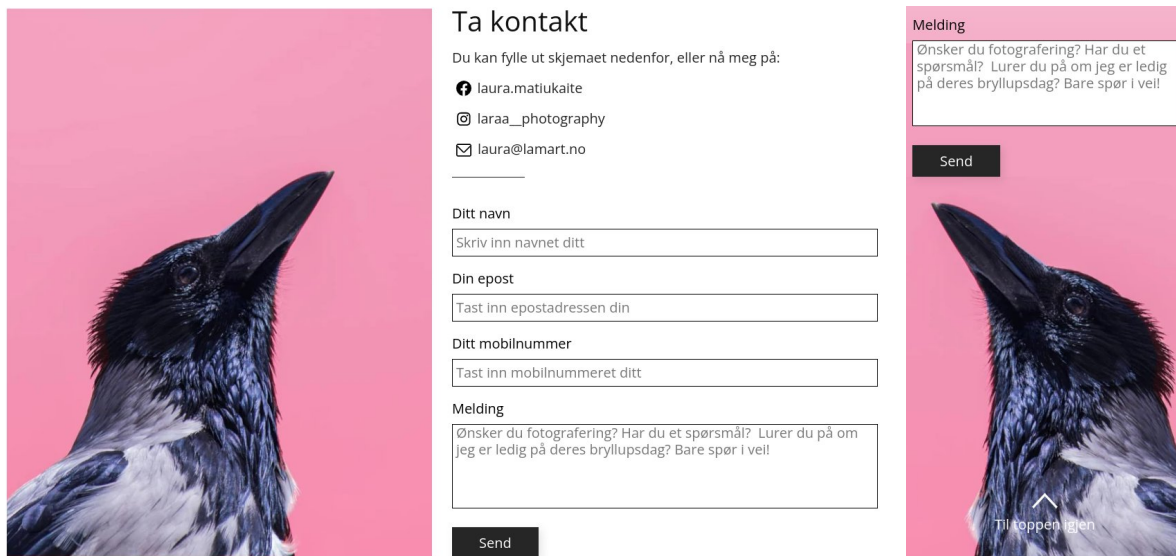


Figure 4: Photoshoot booking form employing directional cues



Figure 5: The website is based on a 16 column grid

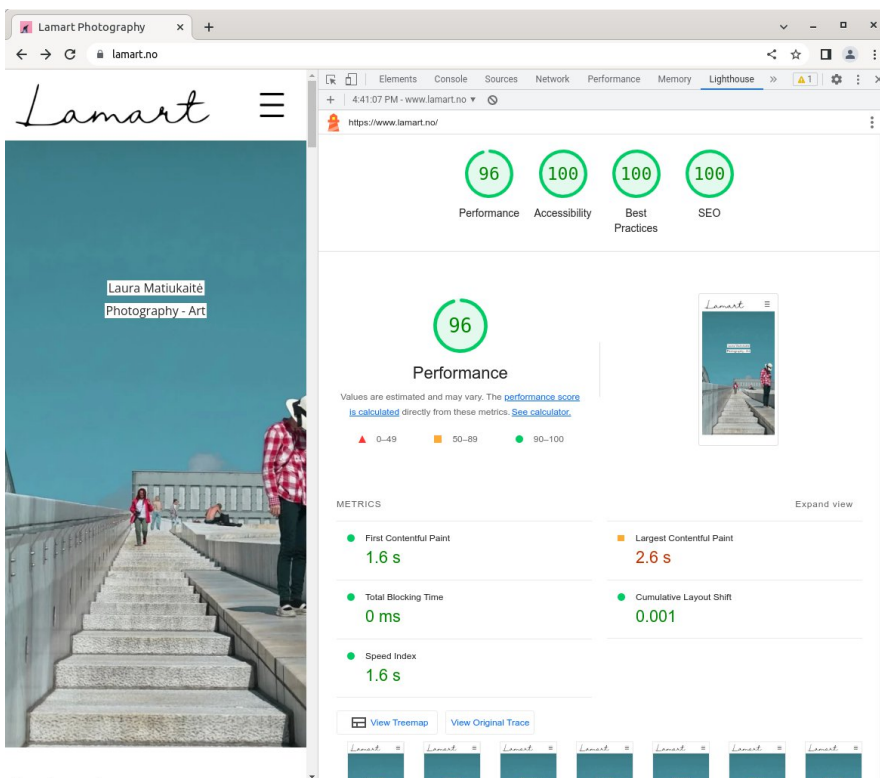


Figure 6: Lighthouse mobile device performance report



# Gruppe 16

## Nettside for en fotograf

### Forprosjektplan

Versjon 1.1

# Revisjonshistorie

<b>Dato</b>	<b>Versjon</b>	<b>Beskrivelse</b>	<b>Forfatter</b>
<28/01/2023>	1.0	Forprosjektplan opprettet	David Geguzinskas
<22/02/2023>	1.1	Revisjon 1	David Geguzinskas

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# 1. Mål og rammer

## 10.1 1.1 Orientering

Jeg har en del erfaring med lagging av nettsider fra studiene, blant annet fra "Webteknologi" faget og dvs. andre prosjekter fra forskjellige fag i løpet av studiegangen. Jeg har også hjulpet en trafikkskole fra Ålesund med å administrere nettsida si tidligere. Når en fotograf jeg kjenner fra barndommen min ba meg hjelpe henne med å lage en nettside for å kickstarte karrieren sin i Norge ble jeg veldig interessert.

Jeg valgte denne oppgaven først og fremst fordi jeg mener dette er noe jeg absolutt skal klare å fullføre alene i løpet av dette semesteret, og fordi jeg vil gjerne hjelpe Laura med å skaffe seg flere kunder gjennom denne nettsiden. Jeg vil også lære mer om oppretting og drift av nettsider, og synes denne oppgaven vil komme meg til nytte når jeg skal søke jobb i databransjen etter studiene.

## 10.2 1.2 Problemstilling / prosjektbeskrivelse og resultatmål

Laura Matiukaite, en fotograf fra Litauen trenger en nettside for å bedre kunne markedsføre virksomheten sin.

Etter de første møtene med fotografen ble vi enige om følgende preliminnære resultatmål:

#	Title	User Story	Importance	Notes
1	User interface	As a developer, I want to decide on the design and structure of the website early, so that I won't have to make any big revisions later, when it is much more costly.	Mandatory	<ul style="list-style-type: none"> <li>Provide a sitemap and UI <a href="#">mockups</a>.</li> </ul>
2	The front page	As a freelance photographer, I want the front page of my website to be attractive and show off my previous work, so that all visitors are inspired with confidence in my abilities.	Mandatory	<ul style="list-style-type: none"> <li>The images presented on the front page should be viewable in full-screen mode.</li> </ul>
3	About me page	As a potential client, I want to be able to learn more about the photographer through her website, so that I can make a well informed decision.	Mandatory	<ul style="list-style-type: none"> <li>The "about me" page should contain a picture of Laura, as well as information about her.</li> </ul>
4	The booking form	As a potential client, I want to be able to book a <a href="#">photoshoot</a> appointment by filling out a simple, intuitive form, so that I can easily get in touch with the photographer. When I submit the form, the photographer is notified through email and is able to respond to me in a timely manner.	Mandatory	<ul style="list-style-type: none"> <li>The appointment booking form has to be easily accessible from the main website page.</li> <li>It has to include the following fields: name, email, phone number, type of <a href="#">photoshoot</a>, desired date, optional message to the photographer.</li> <li>All submitted forms need to be forwarded to the photographer through e-mail.</li> </ul>
5	Search engine optimization	As a website owner, I want my website to be easily discoverable, so that all potential clients are able to easily find it among search engine results.	Mandatory	<ul style="list-style-type: none"> <li>The website should be optimized for search engines.</li> <li>Focus on responsive design, performance and accessibility.</li> </ul>
6	Security	As a website owner, I want my website to be safe and secure, so that I can protect the privacy and sensitive information of my customers, as well as prevent the website from being compromised or taken offline.	Mandatory	<ul style="list-style-type: none"> <li>Keep the website up to date.</li> <li>Protect against common cyber attacks.</li> <li>Secure the <a href="#">photoshoot</a> booking form.</li> </ul>
7	Publish the website	As a website owner, I want to publish the website on a web hosting service, so that the website is accessible to visitors on the internet.	Mandatory	<ul style="list-style-type: none"> <li>Focus on affordability.</li> </ul>
8	Blogs/news articles	As a website owner, I want to be able to publish blogs/news articles on my website, so that I can keep my clients updated and better market my business.	Optional	<ul style="list-style-type: none"> <li>Blog posts should contain both text and images.</li> <li>Visitors should be able to share these posts on social media.</li> </ul>
9	Google Calendar	As a freelance photographer, I want to be able to easily update my Google Calendar with the new <a href="#">photoshoot</a> booking reservations, so that I can better keep track of them.	Optional	

## 10.3 1.3 Effektmål

Mitt mål er først og fremst å bestå faget og endelig fullføre dataingeniør studiet. Jeg vil fullføre dette prosjektet på en god måte, slik at jeg kan referere til den når jeg skal søke jobb innen IT-sektoren i ettertid. Videre gleder jeg meg også til å få mer praktisk erfaring og bli mye bedre på å dokumentere arbeidet mitt. Og sist, men ikke minst er jeg også begeistret for å kunne hjelpe Laura med å tiltrekke mange nye kunder med hjelp av denne nettsiden.

Oppdragsgiveren har som mål å tiltrekke flere kunder med hjelp av den nye nettsiden.

## 10.4 1.4 Rammer

Den eneste relevante begrensning for dette prosjektet er tid. Siden jeg skal arbeide alene og har en deltidsjobb ved siden av studiene.

## 11 2. Organisering

Det er tre aktører involvert i prosjektet:

- David Geguzinskas (Student)
- Saleh Abdel-Afou Alaliyat (Veileder)
- Laura Matiukaite (oppdragsgiver)

## 12 3. Gjennomføring

### 12.1 3.1. Hovedaktiviteter

- Sprint 1 og 2 (uker 2-5)

Jeg og oppdragsgiveren må bli enige om et førsteutkast til problemstilling og resultatmål. Videre må vi finne ut av hvordan nettsida skal se ut, ved å se på forskjellige nettsteder til andre fotografer og finne dem som Laura liker best.

Jeg må også levere inn et forprosjektplan før 28. Januar.

- Sprint 2 (uker 6-7) Dokumentasjon og versjonskontroll

I sprint 2 skal jeg sette opp et rammeverk for versjonskontroll og dokumentasjon av arbeidet (Jira + Confluence og evt. GitLab).

- Sprint 3 (uker 8-9) Nettsidedesign og struktur

Når rammeverket for versjonskontroll og dokumentasjon er satt opp, skal jeg begynne med å skissere utseendet og strukturen til nettsida basert på kravspesifikasjonen og lignende designer fotografen er glad i.

Jeg skal produsere et UX-diagram og skisser som jeg skal senere bruke når jeg lager nettsiden. I denne fasen er tett kommunikasjon med oppdragsgiver helt avgjørende, for å slippe masse ekstra jobb i ettertid. Jeg skal sørge for at Laura er helt fornøyd med både min foreslåtte nettsideutseende og struktur, ettersom det kommer til å bli mye vanskeligere å endre på det etterpå.

- Sprint 4 (uker 10-11) HTML og CSS

Mesteparten av HTML og CSS kode skal jeg skrive i sprint 4. Jeg skal basere meg på skissene jeg har utarbeidet tidligere, og gjøre mitt beste for å følge "best practices" når det gjelder nettsidebygging, for å sørge for at nettsida mi blir prioritert av søkemotorene.

- Sprint 5 (uker 12-13) Ekstra funksjonalitet

I sprint 5 skal jeg lage et bestillingskjema med evnen til å videresende alle bestillinger til fotografens e-post kontor. Målet er å finne en ryddig PHP løsning som blir enkelt å vedlikeholde i ettertid.

Jeg skal også implementere dvs. andre funksjoner som for eksempel et "fullskjerm modus" for visning av bilder på hjemmesida.

- Sprint 6 (uker 14-15)

I sprint 6 skal jeg begynne å finpusse nettsida mi. Jeg skal gjøre de siste endringene, teste funksjonaliteten og evt. feilsøke problemer som dukker opp. Videre skal jeg jobbe med å forbedre søkemotoroptimalisering og sikkerheten av nettsiden, jeg skal gjøre nettsiden klar for publisering.

- Sprint 7 (uker 16-17)

Jeg skal fortsette med finpussing i sprint 7 og publisere et 1.0 versjon av nettsida før neste sprint.

Jeg skal også holde en presentasjon av prosjektet mitt på engelsk.

- Sprint 8 (uker 18-20)

De siste 3 uker skal jeg fokusere på rapportskrivning.

Jeg skal levere inn mitt første utkast av hovedrapporten til veileder før 5. Mai. Jeg skal utarbeide en poster (plakat) og presentere oppgaven min i plenum, og den 22. Mai skal jeg levere inn hele prosjektet mitt i Inspira.

## 12.2 3.2. Milepæler

- 28. Januar: Innlevering av forprosjektplan.
- 19. Februar: Jira + Confluence er satt opp.
- 19. Mars: Ferdig med HTML/CSS.
- 2. April: Ekstra funksjonalitet er implementert.
- 21. April: Muntlig presentasjon på engelsk.
- 30. April: Nettsida er publisert.
- 5. Mai: Første utkast av hovedrapporten innleveres til veileder.
- 18. Mai: Utarbeidelse av poster.
- ~19. Mai: Presentasjon av oppgaven i plenum.
- 22. Mai: Innlevering av rapport og vedlegg i Inspira.

## 12.3 3.3 Verktøy

Dokumentasjon: Jira + Confluence

Versjonskontroll: GitLab

Kodeeditor: Sublime Text

Webserver: Apache

Bilde editor: Gimp

Testing: Chromium og Firefox

# 13 4. Oppfølging og kvalitetssikring

## 13.1 4.1 Kvalitetssikring

I tillegg til å følge retningslinjene for god nettsidebygging av Google, kommer jeg til å verifisere all kode som jeg skriver med Markup Validation Service av w3schools, for å sikre god kvalitet på all kode som blir skrevet.

Jeg kommer også til å ha jevne møter med veilederen min og stille all kode og dokumentasjon til inspeksjon underveis i prosjektet.

### 13.1.1 4.1.1 Sikkerhet

- Input validering: Jeg skal sørge for at all brukerinput er validert og rensert for å forhindre injeksjon av skadelig kode. Dette gjelder spesielt photoshoot bestillingskjemaet.
- Sikker kommunikasjon: All kommunikasjon mellom nettsiden og brukere skal krypteres ved hjelp av HTTPS for å forhindre avlytting og manipulering av data.
- Sikker e-posthåndtering: PHP scripten skal håndtere e-postdata på en sikker måte, for å beskytte mot uautorisert tilgang.
- Nettstedsikkerhet: Jeg skal publisere nettsida mi på en sikker server med oppdaterte sikkerhetspatcher og programvare, for å beskytte mot hackingforsøk og andre angrep.
- Denial of Service (DoS): Jeg skal implementere tiltak for å beskytte mot DoS-angrep, slik som hastighetsbegrensning og IP-blokkering.

### 13.2 4.2 Rapportering

Annen hver uke skal det holdes et videomøte mellom meg, veileder, og hvis nødvendig oppdragsgiver. Jeg skal også være i tett kontakt med oppdragsgiveren under hele prosessen.

I forkant av hvert møte skal jeg i tillegg sende inn følgende dokumentasjon til veilederen:

- Sprintrapport
- Statusrapport
- Timeliste
- Referat fra forrige møte

## 14 5. Risikovurdering

Det største risiko for dette prosjektet er at jeg ikke klarer å fullføre det i tide, ettersom jeg skal arbeide alene og har en deltidsjobb ved siden av studiene.

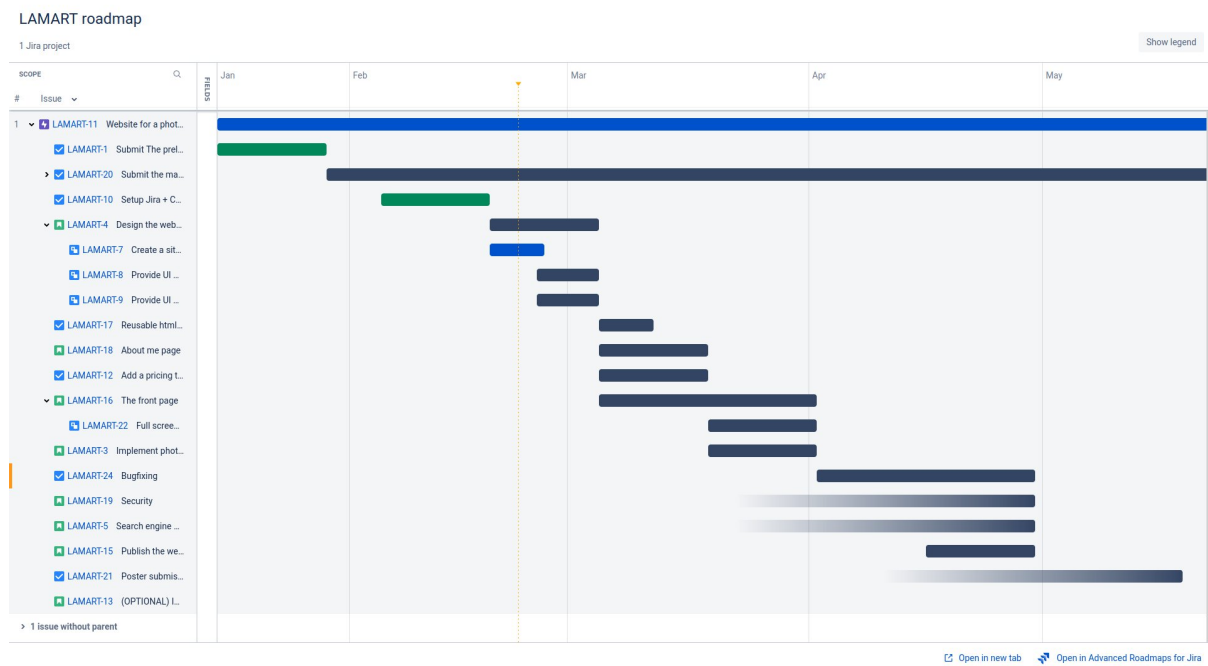
Det er trolig at jeg ikke klarer å fullføre absolutt alle resultatmål innen tidsfristen. Men om jeg ikke rekker å implementere Google Calendar integrasjon eller en litauisk versjon av nettsiden har det lav konsekvens.

Omfanget av dette prosjektet kan i stor grad justeres i henhold til tidsfristen og jeg er helt sikker på at jeg skal rekke å lage en nettside som fungerer og oppfyller alle oppdragsgiverens viktigste krav innen tidsfristen. Med dette i bakhodet vurderer jeg dette prosjektet til å innebære LAV risiko.

## 15 6. Vedlegg

Følgende dokumenter leveres som separate filer ved innlevering i Blackboard i januar (obligatorisk arbeidskrav), men ikke i endelige leveransen av hovedrapporten den 20. mai!

## 15.1 6.1 Tidsplan



## 15.2 6.2 Adressliste

Rolle	Navn	Tlf. nummer	E-post	Adresse
Student	David Geguzinskas	464 321 90	dovydasg@ntnu.no	Barnesveien 18, 3175
Veileder	Saleh Abdel-Afou Alaliyat	701 61 530	alaliyat.a.saleh@ntnu.no	Ålesund
Oppdragsgi ver	Laura Matiukaite	+370 683 64004	laura.matiukaite2@gmail. com	Vilnius, Litauen

## 6.3 Avtaledokumentene

### 6.3.1 3-partsavtale



*Approved by the Pro-Rector for Education 10 December 2020*

## **STANDARD AGREEMENT**

### **on student works carried out in cooperation with an external organization**

The agreement is mandatory for student works such as master's thesis, bachelor's thesis or project assignment (hereinafter referred to as works) at NTNU that are carried out in cooperation with an external organization.

#### **Explanation of terms**

##### **Copyright**

Is the right of the creator of a literary, scientific or artistic work to produce copies of the work and make it available to the public. A student thesis or paper is such a work.

##### **Ownership of results**

Means that whoever owns the results decides on these. The basic principle is that the student owns the results from their own student work. Students can also transfer their ownership to the external organization.

##### **Right to use results**

The owner of the results can give others a right to use the results – for example, the student gives NTNU and the external organization the right to use the results from the student work in their activities.

##### **Project background**

What the parties to the agreement bring with them into the project, that is what each party already owns or has rights to and which is used in the further development of the student's work. This may also be material to which third parties (who are not parties to the agreement) have rights.

##### **Delayed publication (embargo)**

Means that a work will not be available to the public until a certain period has passed; for example, publication will be delayed for three years. In this case, only the supervisor at NTNU, the examiners and the external organization will have access to the student work for the first three years after the student work has been submitted.

## 1. Contracting parties

The Norwegian University of Science and Technology (NTNU) Department: Ålesund
Supervisor at NTNU: Saleh Abdel-Afou Alaliyat email and telephone: <a href="mailto:alaliyat.a.saleh@ntnu.no">alaliyat.a.saleh@ntnu.no</a> 70161530
External organization: Photographer Contact person, email address and telephone number of the external organization: Laura Matiukaite <a href="mailto:laura.matiukaite2@gmail.com">laura.matiukaite2@gmail.com</a> +370 683 64004
Student: David Geguzinskas Date of birth: 05/06/1997
Other students, if applicable <sup>1</sup>

The parties are responsible for clearing any intellectual property rights that the student, NTNU, the external organization or third party (which is not a party to the agreement) has to project background before use in connection with completion of the work. Ownership of project background must be set out in a separate annex to the agreement where this may be significant for the completion of the student work.

## 2. Execution of the work

The student is to complete: (Place an X)

A master's thesis	
A bachelor's thesis	<b>X</b>
A project assignment	
Another student work	

Start date: <b>01/01/2023</b>
Completion date: <b>22/5/2023</b>

The working title of the work is:

<sup>1</sup> If several students co-author a work, they can all be listed here. The students then have joint rights to the work. If an external organization instead wants a separate agreement to be concluded with each student, this is done.

## Nettside for en fotograf

The responsible supervisor at NTNU has the overarching academic responsibility for the design and approval of the project description and the student's learning.

### 3. Duties of the external organization

The external organization must provide a contact person who has the necessary expertise to provide the student with adequate guidance in collaboration with the supervisor at NTNU. The external contact person is specified in Section 1.

The purpose of the work is to carry out a student assignment. The work is performed as part of the programme of study. The student must not receive a salary or similar remuneration from the external organization for the student work. Expenses related to carrying out the work must be covered by the external organization. Examples of relevant expenses include travel, materials for building prototypes, purchasing of samples, tests in a laboratory, chemicals. The student must obtain clearance for coverage of expenses with the external organization in advance.

The external organization must cover the following expenses for carrying out the work:

**Irrelevant**

Coverage of expenses for purposes other than those listed here is to be decided by the external organization during the work process.

### 4. The student's rights

Students hold the copyright to their works<sup>2</sup>. All results of the work, created by the student alone through their own efforts, is owned by the student with the limitations that follow from sections 5, 6 and 7 below. The right of ownership to the results is to be transferred to the external organization if Section 5 b is checked or in cases as specified in Section 6 (transfer in connection with patentable inventions).

In accordance with the Copyright Act, students always retain the moral rights to their own literary, scientific or artistic work, that is, the right to claim authorship (the right of attribution) and the right to object to any distortion or modification of a work (the right of integrity).

A student has the right to enter into a separate agreement with NTNU on publication of their work in NTNU's institutional repository on the Internet (NTNU Open). The student also

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<sup>2</sup> See Section 1 of the Norwegian Copyright Act of 15 June 2018 [Lov om opphavsrett til åndsverk]

has the right to publish the work or parts of it in other connections if no restrictions on the right to publish have been agreed on in this agreement; see Section 8.

### 5. Rights of the external organization

Where the work is based on or further develops materials and/or methods (project background) owned by the external organization, the project background is still owned by the external organization. If the student is to use results that include the external organization's project background, a prerequisite for this is that a separate agreement on this has been entered into between the student and the external organization.

#### Alternative a) (Place an X) General rule

<b>X</b>	The external organization is to have the right to use the results of the work
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This means that the external organization must have the right to use the results of the work in its own activities. The right is non-exclusive.

#### Alternative B) (Place an X) Exception

	The external organization is to have the right of ownership to the results of the task and the student's contribution to the external organization's project
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Justification of the external organization's need to have ownership of the results transferred to it:

### 6. Remuneration for patentable inventions

If the student, in connection with carrying out the work, has achieved a patentable invention, either alone or together with others, the external organization can claim transfer of the right to the invention to itself. A prerequisite for this is that exploitation of the invention falls within the external organization's sphere of activity. If so, the student is entitled to reasonable remuneration. The remuneration is to be determined in accordance with Section 7 of the Employees' Inventions Act. The provisions on deadlines in Section 7 apply correspondingly.

### 7. NTNU's rights

The submitted files of the work, together with appendices, which are necessary for assessment and archival at NTNU belong to NTNU. NTNU receives a right, free of charge, to use the results of the work, including appendices to this, and can use them for teaching and research purposes with any restrictions as set out in Section 8.

### 8. Delayed publication (embargo)

The general rule is that student works must be available to the public.

Place an X

<input checked="" type="checkbox"/>	The work is to be available to the public.
-------------------------------------	--

In special cases, the parties may agree that all or part of the work will be subject to delayed publication for a maximum of three years. If the work is exempted from publication, it will only be available to the student, external organization and supervisor during this period. The assessment committee will have access to the work in connection with assessment. The student, supervisor and examiners have a duty of confidentiality regarding content that is exempt from publication.

The work is to be subject to delayed publication for (place an X if this applies):

Place an X		Specify date
<input type="checkbox"/>	one year	
<input type="checkbox"/>	two years	
<input type="checkbox"/>	three years	

The need for delayed publication is justified on the following basis:

If, after the work is complete, the parties agree that delayed publication is not necessary, this can be changed. If so, this must be agreed in writing.

Appendices to the student work can be exempted for more than three years at the request of the external organization. NTNU (through the department) and the student must accept this if the external organization has objective grounds for requesting that one or more appendices be exempted. The external organization must send the request before the work is delivered.

The parts of the work that are not subject to delayed publication can be published in NTNU's institutional repository – see the last paragraph of Section 4. Even if the work is subject to delayed publication, the external organization must establish a basis for the student to use all or part of the work in connection with job applications as well as continuation in a master's or doctoral thesis.

### 9. General provisions

This agreement takes precedence over any other agreement(s) that have been or will be entered into by two of the parties mentioned above. If the student and the external organization are to enter into a confidentiality agreement regarding information of which the student becomes aware through the external organization, NTNU's standard template for confidentiality agreements can be used.

The external organization's own confidentiality agreement, or any confidentiality agreement that the external party has entered into in collaborative projects, can also be used provided that it does not include points in conflict with this agreement (on rights, publication, etc). However, if it emerges that there is a conflict, NTNU's standard contract on carrying out a student work must take precedence. Any agreement on confidentiality must be attached to this agreement.

Should there be any dispute relating to this agreement, efforts must be made to resolve this by negotiations. If this does not lead to a solution, the parties agree to resolution of the dispute by arbitration in accordance with Norwegian law. Any such dispute is to be decided by the chief judge (sorenskriver) at the Sør-Trøndelag District Court or whoever he/she appoints.

This agreement is signed in four copies, where each party to this agreement is to keep one copy. The agreement comes into effect when it has been signed by NTNU, represented by the Head of Department.

**Signatures:**

Head of Department:	<i>G. M. / G. STRAZPINS /</i>	<i>På vegne av</i>
Date:	<i>02/02/2023</i>	<i>IR</i>
Supervisor at NTNU:	<i>Solen Alaligsk</i>	
Date:	<i>1/2/2023</i>	
External organization:	<i>31/1 M.</i>	
Date:		
Student:	<i>31/1 Dye</i>	
Date:		
Other students, if applicable		