Master's thesis

Service Design

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IMPROVING THE MOBILE SITE CUSTOMER EXPERIENCE

– utilizing service design for an improved website design

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Improving the mobile site customer experience

- utilizing service design for an improved website design

In the competitive online environment, users make lasting judgements about a website within seconds of using it for the first time. Web design plays a key role in the success of a website and mobile compatibility is crucial in user retention as the percentage of mobile traffic has surged over the past decade. In this perspective, the study seeks to understand how the online experience of a mobile website can be improved with the help of service design methods and tools.

The present study was conducted as mixed methods research and the empirical contribution involves both qualitative and quantitative methods. The thesis was commissioned by *Deltamarin* with the aim of uncovering the pain points of user experience in its mobile website and designing prototypes to address them. The results of the study have been divided into three key areas which are *navigation*, *filter*s, and *appearance*, each with its own pain points, corrective actions, and received benefits. The corrective actions are presented in a visual form in the final concept.

Based on the findings, it can be concluded that essential for Deltamarin’s website design is the easiness of navigation, and this applies to all aspects of the site. The importance of design elements that complement the site’s structure and filters that make information more accessible to users should also be highlighted.

Keywords:

Service design, user experience design, web design, mobile design, customer experience

Opinnäytetyö (YAMK) | Tiivistelmä

Turun ammattikorkeakoulu

Palvelumuotoilu

2023 | 110 s. + liitteet

Kristiina Varis

Mobiilisivuston käyttökokemuksen parantaminen

- palvelusuunnittelun hyödyntäminen verkkosivun suunnittelussa

Nykyisessä kilpaillussa verkkoympäristössä käyttäjät tekevät pysyviä arvioita verkkosivuista jo muutaman sekunnin käytön jälkeen. Verkkosuunnittelulla on keskeinen rooli sivun menestyksessä ja matkapuhelimien osuuden kasvaessa myös mobiiliyhteensopivuus on hyvin tärkeässä roolissa. Tutkimuksen tarkoituksena on selvittää miten mobiilisivuston käyttökokemusta voidaan parantaa hyödyntämällä palvelusuunnittelun menetelmiä ja työkaluja.

Tämä tutkimus toteutettiin monimenetelmällisenä tutkimuksena ja sen empiirinen osuus perustuu sekä kvalitatiivisiin että kvantitatiivisiin menetelmiin. Opinnäytetyö oli toimeksianto yritykseltä *Deltamarin* ja sen tarkoituksena oli selvittää yrityksen mobiilisivun ongelmakohtia sekä suunnitella prototyyppejä niiden ratkaisemiseksi. Tutkimuksen tulokset on jaettu kolmeen avainalueeseen, jotka ovat *navigointi*, *suodattimet* ja *ulkoasu*. Jokaisella avainalueella on omat ongelma-alueensa, korjaavat toimenpiteet ja saavutetut hyödyt. Korjaavat toimenpiteet on esitetty visuaalisessa muodossa lopullisessa konseptissa.

Tuloksien perusteella voidaan todeta, että olennaista Deltamarinin mobiilisivun käyttökokemuksen parantamisessa on navigoinnin helppous, joka pätee sivun kaikkiin osa-alueisiin. Lisäksi sivun suunnitteluelementtien ja filtterien tulee tukea sivun rakennetta, jotta tieto on mahdollisimman helposti käyttäjien saatavilla.

Asiasanat:

Palvelumuotoilu, käyttäjäkokemussuunnittelu, verkkosivusuunnittelu, mobiilisuunnittelu, asiakaskokemus

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List of abbreviations

UX	User experience
UI	User interface
Low-fi	Low-fidelity
Hi-fi	High-fidelity
SEO	Search engine optimization
CTA	Call to action
DM	Deltamarin
KEH	Knud E. Hansen
LMG	LMG Marin AS
LPC	Largest contentful paint

1 Introduction

In the competitive online environment, firms are exposed to an increasing competition to an extent that durable competitive advantage has become more difficult to maintain, but at the same time, increasingly more valued (Schwager & Meyer, 2007; Flavián, Gurrea, & Orús, 2009). Internet is being developed with a great speed, growth and increase of competence, and users make lasting judgements about a website within seconds of using it for the first time (Flavián et al., 2009, pp. 168, 178). In the electronic environment, integrated and consistent solutions to problems as opposed to scattered and burdensome ones will work towards creating better online experiences and improve the relationship with users (Schwager & Meyer, 2007, pp. 1–2).

The global attention span is narrowing and the ability to create consistent customer experience across multiple channels is one of the best ways a company can achieve long–lasting competitive advantage but consequently, one of the most difficult challenges for businesses in 2020s. Important for good customer experience is the ability to understand the extent and diversity of aspects that together constitute the total experience and how a company can affect and improve each part. (Gentile, Spiller, & Noci, 2007, p. 395; Rawson, Duncan & Jones, 2013.)

One important factor affecting a company's customer experience is a company website. It is a permanent part of the company's image where customer can find information about products, services, news, contact details, job opportunities and so on. It is also a place where customers make purchase decisions, so influencing online users' behavior and perceptions of the brand is important not only for the site's success, but for the company as a whole. (Flavián et al., 2009, pp. 168, 170.) Web design plays a key role for the success and acceptance of a website and helps to form a good impression on prospective customers that can make lasting judgements about a website within the first seconds of using it for the first time (Flavián et al., 2009, pp. 168, 170; Reinecke, Yeh, Miratrix, Mardiko, Zhao, Liu & Gajos, 2013).

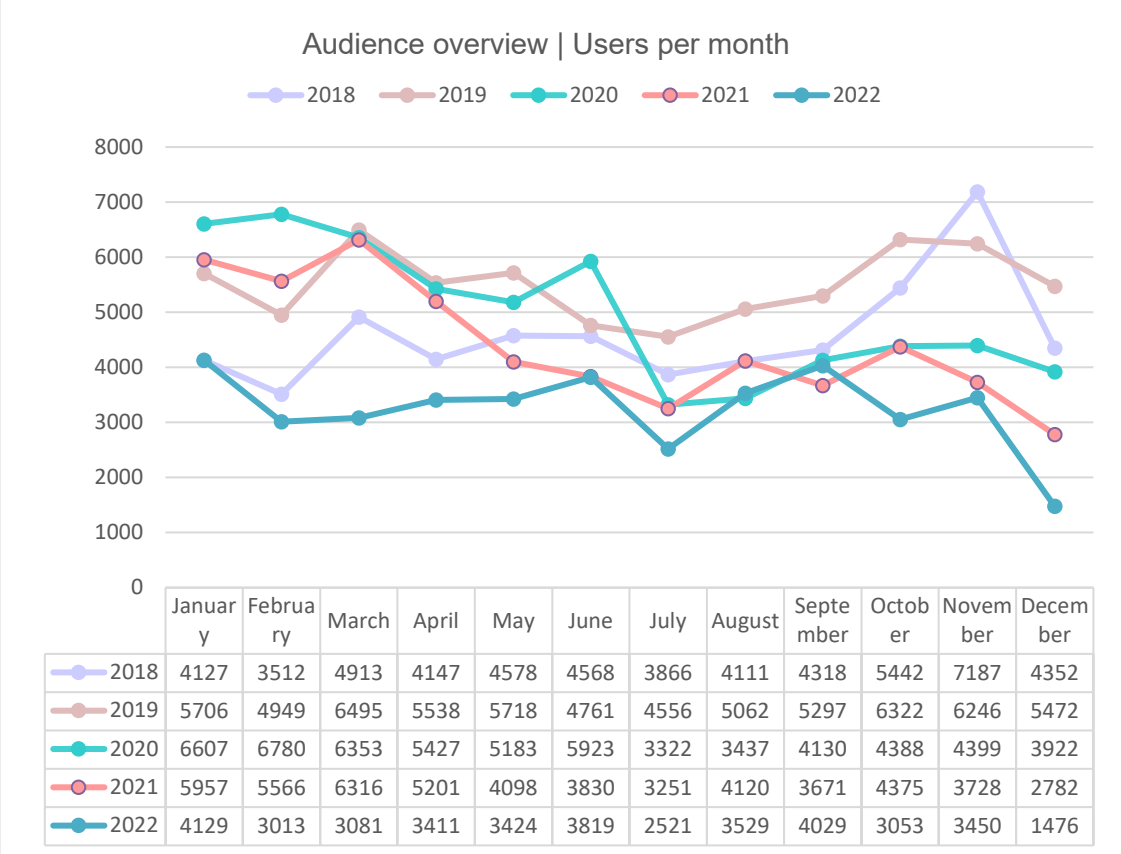
Web design used to be desktop-focused, but since the mid–2010s, designing for mobile browsers has become increasingly important as users access websites more and more through phones and other devices (Interaction Design Foundation, n.d.). As of February 2023, mobile devices were responsible for 60.67% of global website traffic, which means mobile devices are starting to dominate desktop computers in terms of number of users (Oberlo, n.d.). Since 2020, Google's algorithm also shifted from prioritizing desktop versions to prioritizing mobile-friendly websites in search results, so even the most compelling content becomes useless if visitors cannot find the website in search results due to compability issues. The absence of a mobile web design is a clear mistake for customer experience that can endanger users to do business elsewhere. (Schwager & Meyer, 2007; Babich, 2021; Law, 2022.)

In this perspective, the purpose of this research is to investigate how the online experience of a mobile website can be improved with the use of service design methods and tools. The focus of the thesis is on mobile web design and a desktop version is left outside of the scope. The thesis is a commission by a ship design and engineering company *Deltamarin* where the author is employed. The choice of the topic and related themes is based on the researcher's personal interest in web and service design as well as on the author's observations of the declining performance of the company's website and the absence of a mobile friendly version of the site.

1.1 Background

Deltamarin Group is a ship design and engineering company established in Finland in 1990. The group has more than 30 years of experience in providing ship design, offshore engineering, and construction support services for marine and offshore industries worldwide. Deltamarin has its headquarters in Turku and two other offices in Helsinki and Rauma. The company operates also internationally in Poland, China, and Croatia, and employs around 400 experts in total. Deltamarin is part of China Merchants Group, a Fortune Global 500 corporation. (Deltamarin, 2022.)

As Deltamarin is a consulting company offering professional design services, its website is mostly informative without direct commercial use. Users come to the site for information about Deltamarin's services and ship references, to read about the company's latest project updates and news, or to find contact details and job opportunities. The design of Deltamarin's website is over 20 years old with the earliest piece of news dating back to January 2012. No major updates have been done to the layout since. Nothing has been removed either, but content has only been added, making the site unstructured and heavy. The number of website users has been steadily decreasing over the years (Figure 1) and while the reasons for the decline can be manifold, one major issue is the site's performance.



	January	February	March	April	May	June	July	August	September	October	November	December
2018	4127	3512	4913	4147	4578	4568	3866	4111	4318	5442	7187	4352
2019	5706	4949	6495	5538	5718	4761	4556	5062	5297	6322	6246	5472
2020	6607	6780	6353	5427	5183	5923	3322	3437	4130	4388	4399	3922
2021	5957	5566	6316	5201	4098	3830	3251	4120	3671	4375	3728	2782
2022	4129	3013	3081	3411	3424	3819	2521	3529	4029	3053	3450	1476

Figure 1. Overview of Deltamarin's website visitors in 2022 (Google Analytics).

As argued in the introduction, the importance of mobile compatibility is increasing as users access website more and more through their phones (Interaction Design

Foundation, n.d.). Mobile devices covered for most of the global website traffic in 2022 (Howarth, 2022) and the growing trend also applies to Deltamarin's website as the number of mobile users has increased by almost 10% between 2019 and 2022 (Figure 2). In 2019, 20% of the users accessed the website through their phones while in 2022 the number was 29%.

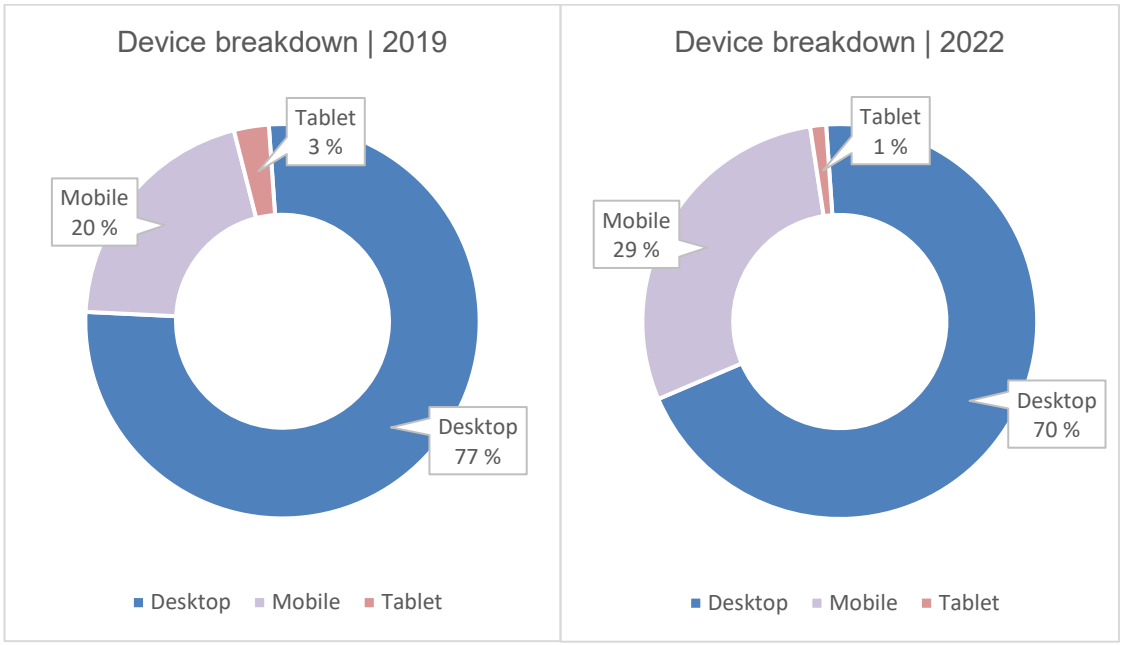


Figure 2. Device breakdown of Deltamarin's website users in 2019 and 2022 (Google Analytics).

Deltamarin's website has not been optimized for mobile use and the absence of a mobile compatibility can be considered as one of the main reasons for the decline in the number of users. The website is both outdated and inflexible when considering the current standards, and if a site is difficult to use or does not work properly, users are fast to exit and unlikely to return to the page (Kirkpatrick, 2016). Considering the number of mobile users is only expected to increase in the future (Law, 2022), converting the site towards mobile friendliness is a clear first step toward a better user experience. Web design should be used to redesign the site to better meet the needs of mobile users and reflect the current trends of user behavior.

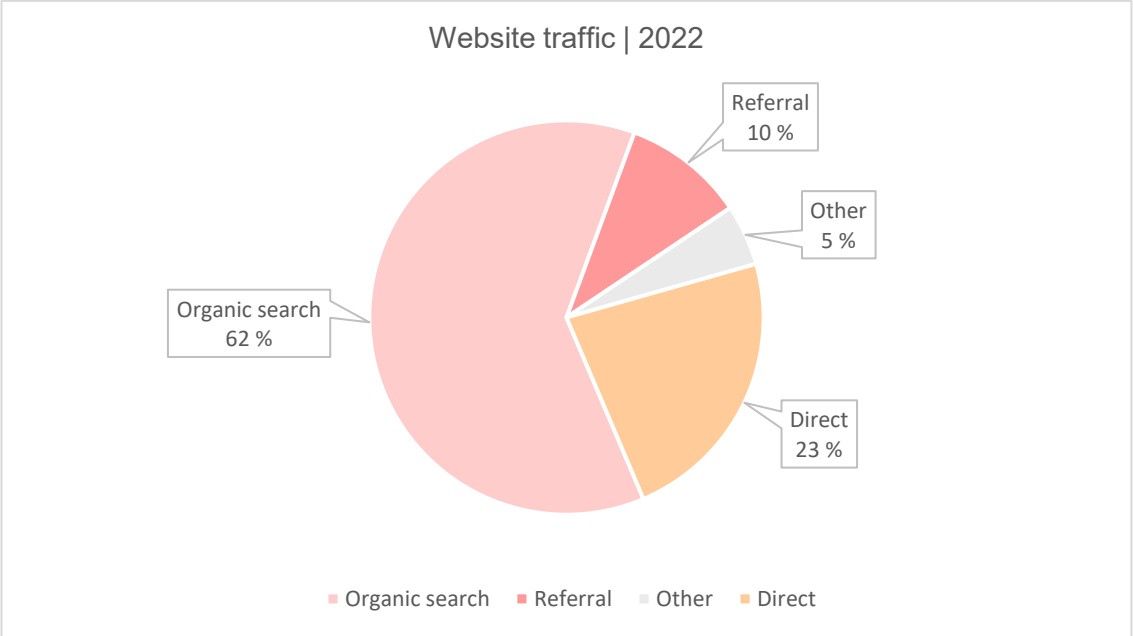


Figure 3. Deltamarin's website traffic in 2022 (Google Analytics).

Having a mobile-friendly site is important not only for guaranteeing a better user experience for mobile users but also for the site's overall search engine rankings. Since September 2020, Google switched to mobile-first index for all websites and prefers content optimized for mobile. Websites that fit mobile screens benefit from a ranking boost over sites that are only optimized for desktops. (Law, 2022.) As seen in Figure 3, organic search engine traffic was a major source of visitors for Deltamarin in 2022, accounting for over 60% of overall visits, and the percentage has stayed more or less the same between 2019 and 2022. Organic search results are the unpaid listings that appear on a search engine results page after a query (Yasar, 2022). Since majority of users find Deltamarin through organic search results, ranking well in search engines like Google is crucial for the company. A clear way to improve the ranking is to focus on improving the mobile version of the website.

1.2 Research objective and limitations

The aim of this study is to utilize service design methods and tools to improve the online experience of Deltamarin's mobile website. The study seeks to understand

how service design methods and tools can be used to increase the usability and performance of the mobile version of the website. To fulfil the objective of the research, the following research question is presented:

How the performance of a mobile website can be improved with service design methods and tools?

The problem is further approached with the following sub–questions:

1. *Which design elements have the greatest impact on website performance?*
2. *How user experience (UX) design should be utilized in website re-design?*

The purpose of the research is to find clear development areas in the mobile version of the website. The purpose is not to create a new design for the entire site, but rather to present improvement ideas, such as new features and additions, to certain areas in the existing design. The commissioner of the thesis is Deltamarin, and the expected outcome of the research from the commissioner's perspective is the creation of a mock-up version of the improved design. Mockups are static designs of a website that show what the future design could look like (Hufford, 2022). The mock-up version will be handed over to the commissioner at the end of the project, and the commissioner can use it as a basis of a website redesign expected to realize late 2023.

Due to the extent of web design as a theme and the scope of this study, limitations are required in this research. The focus of the thesis is mobile web design, and a desktop version is left out of the study. From now on in the thesis, web design will be used to refer to mobile web design and website will be used to refer to the mobile website. Additionally, the thesis will focus on creating a mock-up version of the design and the actual process of developing the site is beyond the purpose of this study. Therefore, the study does not focus on website development but on creating a web design mockup that can be handed over to the commissioner at the end of the project.

1.3 Frame of reference

The frame of reference can be thought as an umbrella term under which the main items of a study are placed. An item like this can be a theme, question, theory, idea, or a problem and can include a review of a scientific debate around a topic, represented by literature or other relevant written material. (Saaranen-Kauppinen & Puusniekka, n.d.) In this thesis, the frame of reference consists of two theory parts of web design and service design, and their interconnected themes of mobile design and user experience design are the main focus of the study. Deltamarin presents the third part of the entity with its mobile website as the focus of empirical research. This relationship is depicted in Figure 4.

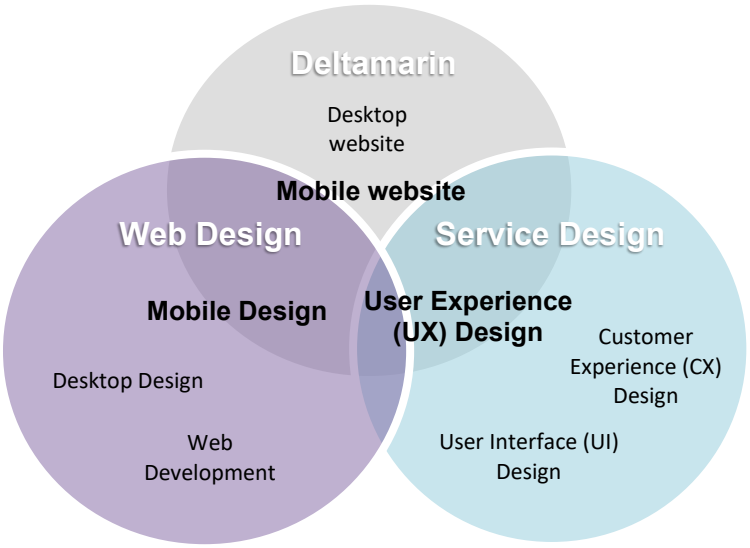


Figure 4. The frame of reference.

When it comes to fulfilling the purpose of this research, mobile web design and user experience design should coexist as complementary elements. Web design should be used to create the elements of a website whereas UX design is a broader service design term and a process that is used to create products and services that provide meaningful and relevant experiences to users. Creating a website design that meets the users' needs requires a research process based on comprehensive data collection methods that focus on uncovering any pain

and gain points of user experience along the journey. (Stickdorn & Schneider, 2012; Pybus, 2019; Glawson, 2020.)

1.4 Research process

Design thinking and service design methods and tools are applied in this study. Design thinking combines creative and analytical thinking and covers three principal values of many eyes, customer viewpoint and tangibility. Many eyes refer to diversified expertise, customer viewpoint means the design is focused on the concerns and values of users and tangibility implies to iterative learning. (Denning, 2013, p. 31.) Design thinking and design methodologies are applied to immaterial products and services through service design, which is a systematic, holistic, and iterative process (Rebelo, 2015; Penin, 2018, p. 174). Service design integrates user-centered, team–based interdisciplinary approaches and user–participatory methods in continuous learning cycles (Holmlid & Evenson, 2008, p. 341; Saco & Goncalves, 2008, p. 12).

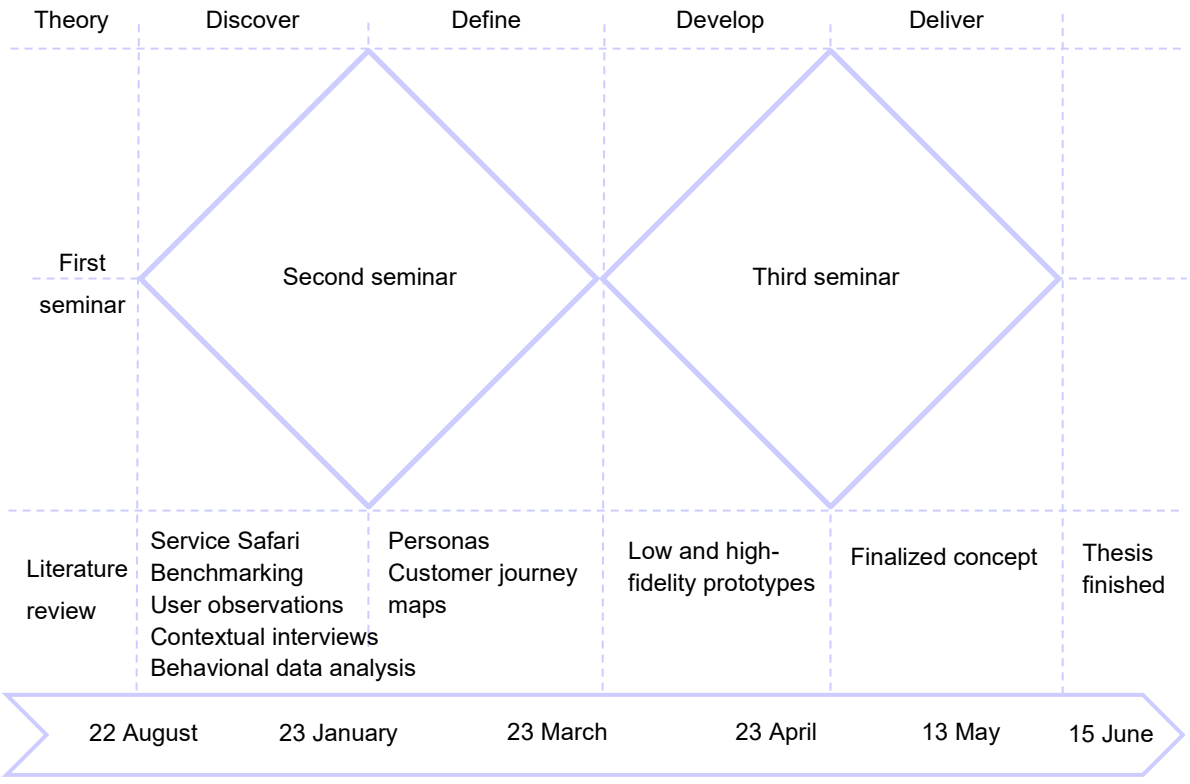


Figure 5. The process chart and schedule (modified from Penin, 2018, p. 185).

The process chart of the study is visualized using a *double diamond* design process model that consists of four stages of discover, define, develop and deliver (Figure 5). Methods and tools used per each stage of the project are presented in the chart together with the overall schedule of the thesis. As service design emphasises qualitative customer insight supplemented with quantitative methods (Solita, n.d.), the study includes both qualitative and quantative data collection methods. Using a combination of qualitative and quantiattive data improves evaluation by ensuring the limitations of one type of data are balanced by the srengths of another. This will also ensure that the understanding is improved by integrating different ways of knowing. (Better Evaluation, n.d.)

1.5 Research methods and tools

The methods and tools used in this study can be divided into four categories according to the stage of the research process. These four categories are discovery, define, develop, and deliver. Discovery and define phases focus on data and analysis whereas develop and deliver use the outcomes of the previous phases to create creative synthesis, such as a new concept or a solution (Cramer, 2021a).

1.5.1 Discovery phase

In the first phase of the research process, the focus is on gaining insights into the problem in question. The discovery phase allows the researcher to empathize with the people the service is designed for and uncover specific areas and demands, such as patterns, user segments and pain points, of a particular service. (Penin, 2018, pp. 184–189.) The focus is on finding areas of improvement that can be further analyzed in the define phase. In this study, the methods used in this stage include service safari, user observation, contextual interviews, behavioral data analysis and benchmarking, as described in Figure 6. Methods, the reason for their selection and the reasoning behind the order of the process are explained in the following chapters.

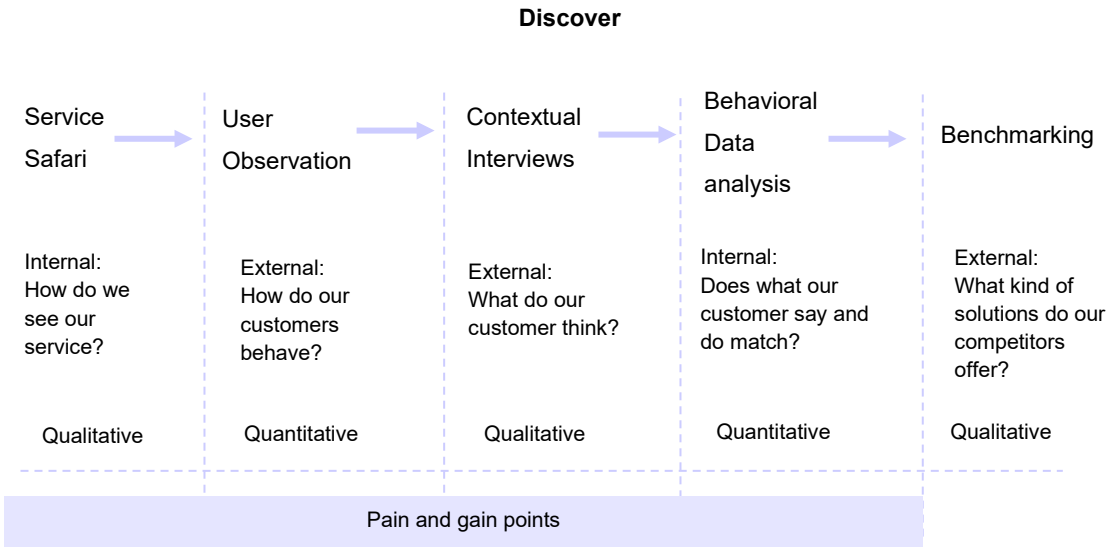


Figure 6. Stages of the discovery phase.

Service Safari

Service Safari is a research tool that helps designers develop interesting insights and inspirations by experiencing a service in first-person, as they were *in the shoes* of a user. While pretending to be a user, designers can understand in detail all the aspects of the interaction with the service, determine its quality, identify pain points and areas for improvement, and eventually intercept the opinions and perceptions of others to emphasize better. It is often beneficial to replicate the service safary by going through the competitors' service as well. (Polaine, Lovlie, & Reason, 2013; UXPin Studio, 2022.)

In this research, service safari is used to gain an initial understanding of the usability of Deltamarin's website. The design of Deltamarin's website and the designs of two competitors are evaluated, and the comparison helps to review the pros and cons of each site and highlight aspects that need further analysis. The findings also help to guide the next stages of the discovery process where real users are included in the research. With an initial knowledge of the prevailing issues, it is easier for the researcher to focus the user testing and interviews on a deeper analysis of the problems that have emerged. It is, however, important

not to let the research findings guide the opinions of the users in any particular direction.

User observation

User observation is a method where researchers observe participants' natural behavior without interrupting them or affecting their behavior. Observing users interacting with a product or service helps to understand the usability of a product and to some extent the overall user experience. With this approach, the people who are being observed know that the researcher is present and that they are currently being observed in situations that are relevant to the research question. Since the researcher is visible, it is important to manage the influence a researcher has on the environment and on the research participants' behavior. Biases such as the *observer effect*, where observing a situation necessarily changes it, are balanced by cross-checking with other (non-participant) research methods. (This is Service Design Doing, n.d.b; Payami, 2019; Interaction Design Foundation, 2021.)

Regular observation sessions provide useful feedback that can be used for service improvement. They also help to create and adjust personas. During participant observations, it is important to observe not only what people are doing by interpreting their body language and gestures, but also what people are not doing. (This is Service Design Doing, n.d.b; Payami, 2019.) In this study, user observation is used in connection with service safari as users complete the same tasks as the service safari participants on the same three websites. The researcher follows the user testing discreetly without interrupting the users unless necessary, so that the test environment is as netural and the results as credible as possible. While following the tests, the researcher pays attention to potential points of frustration by noting them down for reflection in the interviews and for further analysis.

Contextual interviews

There is a fluid transition between user observation and contextual interviews, and often these go hand in hand (This is Service Design Doing, n.d.b). Contextual

interviews are conducted with relevant stakeholders in a situational contect relevant to the research question (This is Service Design Doing, n.d.a). Context means that the research takes place in the users' natural environment as they complete activities the way they normally would. Inquiry refers to researcher watching the users as they perform tasks relevant to the research question and asking for information to understand how and why users do whay they do. (Salazar, 2020.)

Contextual interviews help to undestand users' needs, emotions, expectations, and environment (useful for personas) and articulate pain and gain points of a service in detail and in context (useful for journey maps) (This is Service Design Doing, n.d.a). Contextual interviews are useful for many domains, but they are especially well-suited for understanding users' interactions with complex systems and in-depth processes, as well as the point of view of expert users (Salazar, 2020). In this study, contextual interviews are conducted right after user observation. The tasks are reviewed and the thoughts or ideas they evoked discussed, focusing on what worked, what did not and how the problem areas could be resolved.

Behavioral data analysis

Behavioral analytics is the process of collecting and analyzing data from actions performed by users of a digital product, such as an app or website. Behavioral analytics gives a company the ability to find out exactly how their customers are using their product. With the information, companies can see how users interacted with the digital experience and can make decisions about how to improve, adapt, and mold the product into the experience the customers are seeking. (Busch, 2022.)

Behavioral data includes raw data such as navigation paths, clicks, page views, email sign-ups, purchasing decisions, newsletter signups, form completions or account creations. Behavioral analysis focuses on understanding how consumers act and why, enabling accurate predictions about how they are likely to act in the future. The goal of the behavioral analytics is to make informed

decisions about how to improve digital products in the future. Customers' actions convery much more meaning than words and help to gain a comprehensive understanding of how users engage with the digital experience. (Indicative, n.d.; Busch, 2022.)

Behavioral data analysis is used in this research as a part of the discovery phase, and the analysis is based on behavioral data from Google Analytics. The behavioral data is analysed both on its own and in connection with the results of service safari, user observation and contectual interviews to provide deeper meaning to the data. The comparison helps to bring qualitative insights to the quantative behavioral data, which deepens the understanding of the results of the data collection methods. The results of the behavioral data analysis also help to validate the findings of service safari and other way around.

Benchmarking

Benchmarking is a tool for improvement, achieved through the process of comparing an organization, its operations, or processes against other organizations in the industry or in the broader marketplace that are recognized as best within the area. Benchmarking can be applied against any product, process, function, or approach in business. Central to benchmarking is learning how to improve activities, processes, and management throughout the process. (Kyrö & Kulmala, 2014.)

When it comes to service design, benchmarking is essential for UX design in determining how the usability of a product performs compared to other user interfaces (UIs) on the market. Analyzing the competition brings valuable insights into features, functions, flows, and how users feel when interacting with other products. UX benchmarking helps a company evaluate how its product design is progressing over time and where it falls compared to competitors. The main benefit of benchmarking is to support decision-making around new product development or regarding the development of existing ones. (Babich, 2020; Aela, 2022.)

In this study, benchmarking is present throughout the research process. It is included as a part of service safari, user observation and contextual interviews as users complete tasks not only on Deltamarin's site, but also on competitors' and compare the results. Benchmarking helps to evaluate the service of Deltamarin to the services of its competitors, gain valuable insights into issues that need improvement and discover new, more functional solutions from the services of competitors.

1.5.2 Define phase

In the define phase, research findings are visualized to make sense of the gathered data. Visual techniques such as personas and customer journey maps help the researcher to comprehend the data, simplify ideas and provide new perspectives on customer experiences. At the end the define process, the researcher should be able to frame the problem to move on to the next phase of the service design process that involves concept generation. (Penin, 2018, p. 150, 198; Cramer, 2021a; Cramer, 2021b.) In this study, the service design tools used in this phase include personas and a customer journey map.

Personas

Persona is a semi-fictional representation of an ideal customer based on market research and data on existing audience. A persona is ideally created to help designers understand users' experiences, goals, and behaviors, and that different people have different needs and expectations for a service. Personas help to guide the ideation process and help the designer to achieve a good user experience for the target user group. (Rocket55, n.d.; Chang, Lim, & Stolterman, 2008; Dam & Siang, 2022.) In this research, three personas are created based on the findings of service safari and behavior data analysis.

Customer journey map

A customer journey map is a visual representation of a customer's experience with a company. It consists of several stages and touchpoints that illustrate the

steps that customers go through in engaging with a company and is often used for ideation and comparison purposes. (Service Design Tools, n.d.; Stickdorn & Schneider, 2012.) In this study, a customer journey map is created for each persona to identify service touchpoints and locate the pain and gain points revealed in research. Knowledge of the pain and gain points helped to make the necessary improvements and create suggestions for further amendments.

1.5.3 Develop phase

In the final phase of the research process, the research findings are transformed into actionable concepts. Methods used during this phase include participatory design methods that promote collaboration between different stakeholders. (Penin, 2018, p. 151; Cramer, 2021b.) Low and high-fidelity prototypes are used in this study to synthesize research findings and generate design directions and preliminary concepts that can be further developed by Deltamarin as the new website is being planned.

Low and high-fidelity prototypes

The process of creating a mobile user interface starts with prototyping, which typically involves creating low-fidelity (lo-fi) and high-fidelity (hi-fi) prototypes. Low-fidelity prototypes are often used in the initial stages of prototyping and focus on showing information on individual pages. Low fidelity prototypes are turned into a high-fidelity ones by adding real content, imagery and technology to the prototype. High-fidelity prototypes have a high resemblance with the final product and are used in the final stages of design to identify issues in the user experience. This is important for user testing as users tend to behave more naturally with the interactive nature of high-fidelity prorotypes and as such, tests are more accurate. (Babich, 2021; Gunaretnam, 2023.)

In this study, the research findings are first turned into low-fidelity sketches that present initial ideas of the design changes. The low-fidelity prototypes are presented to the service safari participants for an initial review and turned into high-fidelity ones using Adobe XD. The high-fidelity prototypes are designed to

be as close to the final product as possible and include animated transitions to demonstrate the design's functionality. The high-fidelity prototypes are reviewed by Deltamarin and validated with the users of service safari to ensure all views are considered and clear flaws in the design fixed. The final prototype is handed over to Deltamarin at the end of the project in May 2023.

2 **Web design**

Web design is focused on designing the layout, look and feel of a website or web application. It is the process of planning and building the elements of a website, from structure and layout to images, colors, fonts, and graphics. Web design has numerous components that work together to create the finished experience of a website, including graphic design, user experience design, interface design, search engine optimization (SEO) and content creation. These elements together determine how a website looks, feels, and works on various devices. (Kramer, 2018; Glawson, 2020; Gandy, 2022.)

Web design is not only about aesthetics and the visual appearance of a website but includes the website's overall functionality. Visual elements refer to fonts, colors, layout, shapes, videos, and images while functional elements consist of issues such as navigation, user interaction, speed, site structure and cross-browser and cross-device compatibility. (Gandy, 2022.) It is important to consider both the appearance and functionality when designing a website as integrating these elements maximizes the overall usability and performance of the site. Performance refers to the site's speed, ranking, searchability, and ability to capture an audience while usability addresses the question of how user friendly the website is. (Flavián et al., 2009, p. 179; Rouse, 2014; Gandy, 2022.)

Web design is different from web development, which is the actual coding that makes a website work. Often web designers will do the visual side, the *front-end* development (what can be seen), while a web developer focuses on functionality, the *back–end* (what cannot be seen). (Glawson, 2020.) When building a website, web designers start the process by turning ideas into mockups that show what the future website could look like. Mockups display a static design of a web page or application that features many of its final design elements but is not functional. Web developers, also called engineers or coders, take the mockup that designers made and translate it into a coding language so it can be displayed on the web. (Kramer, 2018; Hufford, 2022.)

Traditionally, websites have been optimized for desktop users, but as user habits have evolved, mobile-first approach has become more popular in web design. Mobile web design is the process of optimizing web experience for mobile users, and includes creating responsive and search engine-friendly designs. The process starts with optimizing content for the smallest posible screen and then switching to a larger screen size, like a tablet or a desktop. Responsive design ensures that the content works on various devices and browsers and moves dynamically depending on screen size. (Rouse, 2014; Babich, 2021.)

2.1 Website success factors

Determining the difference between good and bad design will help to guide a design process and select factors most important to a study's purpose (Beaird, 2007, pp. 3–4). There are two main standpoints from which most people determine whether a web site design is *good* or *bad*. There is a strict usability standpoint, which focuses on functionality, the effective presentation of information, and efficiency. Then there is the purely aesthetic perspective, which is about presentation, layout, visuals, and images. On a successful website, aesthetics and the usability of a site works as a single cohesive unit, so that users are pleased by the design but drawn to the content. (Beaird, 2007, pp. 2–4.)

A successful site is also one that considers user perception. When designing the appearance and usability of a site, users should be kept as the focal point of design and their perceptions considered for the site analysis. Basing design decisions on the internal needs of the business or on the perspectives of designers, can lead to a site that does not serve its users in the best possible way. It is important to remember that it is the customers' beliefs and perceptions of a value that define the success of a website, not the designers' or businesses'. (Flavián et al., 2009, pp. 169–170, 175; Interaction Design Foundation, 2020.)

Since considering all the visual and functional elements of a website design is too broad of a perspective for the thesis, the focus will be limited to elements that have the greatest impact on a site's success. Starting from earlier studies, a

research conducted by Alba, Lynch, Weitz, Janiszewski, Lutz, Sawyer and Wood (1997) and Geyskens, Steenkamp and Kumar (1999) stated that presenting high quality information, good contents and an efficient navigation are the most important advantages of the online activity. Similarly, Liu and Arnett (2000) researched the key factors of website success that enhance the level of customer satisfaction and found out that the success of website depends mainly on the ease of use of the system, the quality of the information and the service, the quality of the design of the website and the feelings of hedonic pleasure provided.

A few years later, a study carried out by Palmer (2002) examined the success of website designs and established that the characteristics of websites' usability and design, such as the response time (download delay), the organization of the contents (navigation), and the information and contents of the website (content) were the main determinants of the website's success. Ranganathan and Ganapathy (2002) also discovered similar issues in their study as they analyzed the key characteristics of websites and found out that the aspects in relation security, the quality of visual design and the importance of offering a good information and navigation are the most outstanding in getting positive results.

In the latest studies, new elements have appeared among the success factors that were not mentioned in the older publications. Terms such as user experience (UX), search engine optimization (SEO), social media links, call to actions (CTAs) and mobile friendliness are mentioned alongside content, navigation, design and branding as the key elements of successful website design. (Lubinsky, 2018; Campbell, 2022; Marty, 2022.) Technological advancements have created a shift in website design with features such as mobile-first approach, responsive design and optimization growing in popularity during the 2020s, which is reflected in the growing importance of the new elements (Hay, 2022).

Table 1. A literature review on the key factors of website success (Alba et al. (1997); Geyskens et al. (1999); Liu & Arnett (2000); Palmer (2002);

Ranganathan and Ganapathy (2002); Lubinsky (2018); Palmer (2022); Marty (2022).

		Website success key factors							
Study		Content	Navigation	Design	Usability	Privacy	SEO	Responsiveness	CTA
1997	Alba et al.	x	x	x					
1999	Geyskens et al.	x	x	x					
2000	Liu & Arnett	x		x					
2002	Palmer	x	x					x	
2002	Ranganathan and Ganapathy	x	x	x	x		x		
2018	Lubinsky	x		x	x	x		x	x
2022	Palmer	x	x	x		x		x	
2022	Marty	x	x	x		x		x	
Mentions, total		**8**	**6**	**7**	**2**	**3**	**1**	**4**	**1**

Table 1 presents an overview of the factors considered in the literature to have the biggest influence on user behavior and consequently, the success of a website. A great part of the literature remarks the relevance of aspects such as the quality of information and content, the easiness of navigation, an appropriate and appealing appearance, and a high level of usability. (Flavián et al., 2009, p. 175.) Recent studies also highlight the importance of privacy and data protection compliance, responsive web design and a mobile-first approach.

The following chapters provide a short introduction to the key factors. Usability will be assessed first as it affects all the other success factors and is the main criterion by which the factors are evaluated. Fulfilling the usability criteria is important not only for the success of the factor itself but also for the entity of the site since each factor also affect the success of other factors. (Komninos, 2022.)

After usability, we will focus on the factors that have received the most referrals in the literature and these are content, navigation and design.

2.1.1 Usability

According to Flavián, Gurrea and Guinalíu (2006, p. 2) usability can be defined as (a) the ease of understanding the structure of a website, its functions, interface and the contents that can be observed by the user; (b) the efficiency of the design of the site; (c) the degree of error avoidance; (d) the speed with which the user can find what they are looking for; (e) the perceived ease of site navigation in terms of time required and action necessary in order to obtain the desired results and (f) the ability of the user to control what they are doing, and where they are, at any given moment. Usability is hence more than just about whether users can perform tasks easily (ease of use), which is often confused with usability. In a basic sense, it can be said that website usability addresses the question of how *user friendly* a website is. (Powell; Rouse, 2014; Komninos, 2022.)

Usability is directly related to user satisfaction, because the more usable a website is, the more positive experiences it creates (Belanche, Casaló, & Guinalíu, 2011, p. 124; Komninos, 2022). Usability affects not only user satisfaction, but also future purchase intentions and customer loyalty to a website, and therefore strongly correlates with profitability (Belanche et al., 2011, p. 125). If users cannot achieve their goals efficiently, effectively and in a satisfactory manner, they are likely to seek an alternative solution to reach their goals which, for websites and applications, are numerous. The risk therefore is that users will leave for competitors if the product is not usable but the user experience bad. (Komninos, 2022; The Signal, 2022.)

According to Whitney Quesenbery, an UX and Usability Expert and former President of the Usability Professionals' Association (UXPA), there are five criteria a product or service must meet to be usable. These criteria are effectiveness, efficiency, engagingness, error tolerance and ease of learning.

(Komninos, 2022.) The criteria have been summarized in Table 2 for later reference.

Table 2. Usability criteria for products and services (Komninos, 2022).

Usability criteria	Explanation
Effectiveness	How accurately can users achieve their goals?
Efficiency	How fast can users get their tasks done?
Engagingness	Does the product or service create value for its users?
Error tolerance	How well are errors minimized?
Ease of learning	How easily can the use of a product or service be learnt?

Among the criteria, effectiveness and efficiency become easily blurred in mind, but they are quite different from the usability perspective. Effectiveness is about whether users can complete their goals with a high degree of accuracy whereas efficiency deals with speed. Efficiency measures how well a website does what it should do so how quickly a user can get a task done. (Affordable Usability, n.d; Komninos, 2022.)

Engagement occurs when users find value in a product or service, so when a product is both pleasant and gratifying to use. Error tolerance is about minimizing errors and ensuring a user can recover easily when an error occurs. Since errors cannot be eliminated, the focus should be on anticipating when they occur and how to react when they do. Ease of learning refers to creating a product or service that users can learn to use easily. Easy-to-use service or product designs are so familiar to users that they are intuitive. (Belanche et al., 2011, p. 125; Babich, 2021; Komninos, 2022; The Signal, 2022.)

2.1.2 Information and contents

Displaying high-quality content that will be able to satisfy the users' information needs is one of the most important factors for website success and user satisfaction (Flavián et al., 2009, p. 177). A typical website visitor does not stay on a website for long and is very fast to leave or move on to another site if they cannot find what they are looking for. (Beaird, 2007, p. 7.) Organizing and managing the information displayed on a website is therefore one of the key issues in keeping users coming back to the site (Flavián et al., 2009, p. 177; Belanche et al., 2011, p. 124; Komninos, 2022).

Website content should be clearly presented and displayed with timely, relevant, and understandable information. Timely means that the information should be kept up to date so that it is effective and useful at the moment a user sees it. Relevance refers to how well the information on the website corresponds to a search query and is especially important for those users that come to the site through search engines. Non–updated or non–relevant information creates an interaction atmosphere that negatively affects user satisfaction and ranks the page lower on search engines. The language used should be clear and simple without too much complexity, ideally a 6th grade level that can be understood by 11–12-year-olds, to convey a clear message to the users. (Flavián et al., 2009, p. 177; Belanche et al., 2011, pp. 124, 125; Komninos, 2022).

2.1.3 Navigation

A navigation menu is an organized list of links displaying the hierarchy of the current page in relation to the site's structure. Navigation ensures users can identify where they are and where they can go at every moment of navigation and is important since it does not matter how great content or functionality a site has if users cannot find what they are looking for. (Powell; Fitzgerald, 2021.) An efficient navigation structure is well planned, clearly labeled, consistent, predictable, and supported by visual cues (Fitzgerald, 2021).

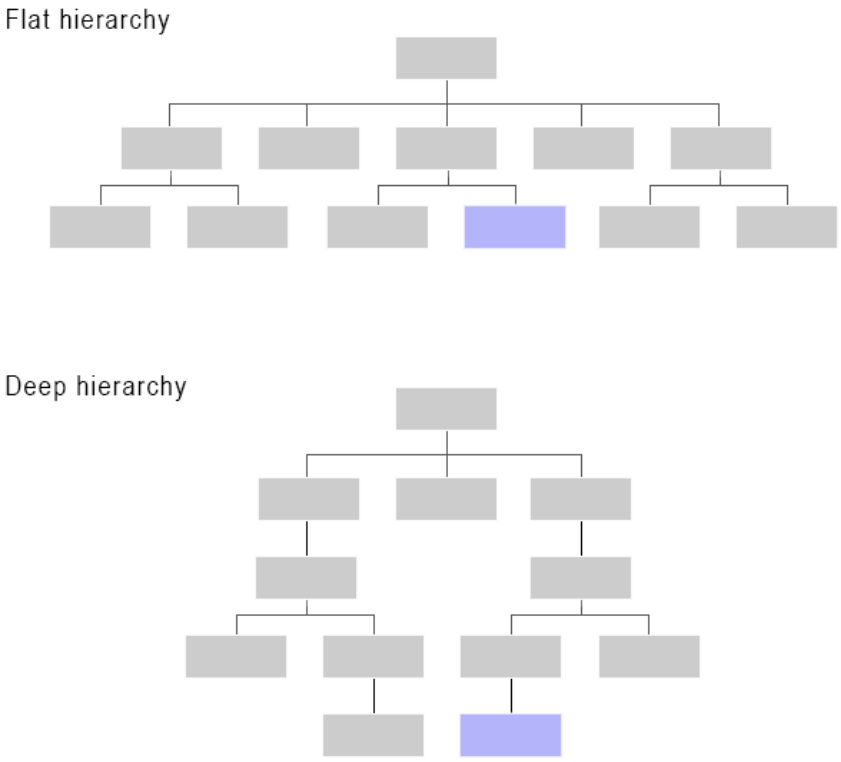


Figure 7. Flat versus deep hierarchy (Wong, 2020).

A well-planned navigation structure usually refers to the site hierarchy that can be divided into a flat and deep hierarchy (Figure 7). Flat hierarchies allow content to be more discoverable as users can access all key information on a site with a few clicks. While this is often preferrable, there is a risk that users are overwhelmed by the number of choices upfront. A deep navigation system can accommodate more content but requires users to navigate through layers of subpages to find information, which is likely to make users overwhelmed and confused. Both flat and deep hierarchy have their pros and cons, and the choice usually depends on personal preferences and the amount of content on the site. (Wong, 2020; Trajectory, 2022.)

A clearly labeled navigation structure means that the navigation labels should contain keywords that make sense to both users and search engines and correspond to their content. Navigation labels refer to web page titles, headings, embedded links, and URLs, which are the addresses of the web pages. Navigation structure should also be consistent and predictable. Consistency

means that the same mechanism is repeated on all pages in the same order, while predictability means that users can predict where they are in the navigation hierarchy and can always locate the navigation menu. Visual cues, such as different colors and highlights, should be used to help users make their way around the website by indicating, for example, an active page or a sector. (Fleming, 1998; Beaird, 2007, pp. 4, 7; Fitzgerald, 2021.)

2.1.4 Design elements

The appearance of a website is important for making a good first impression. Users make lasting judgments about a website's appeal within seconds of seeing it for the first time, and this first impression is also influential enough to affect users' opinions of the site's usability, trustworthiness, and credibility. (Fogg, Soohoo, Danielsen, Marable, Stanford & Tauber, 2002, p. 53; Flavián et al., 2009, p. 176.) To make a positive impact and keep users coming back to the site, a site's design language needs to be cohesive, clear and uniform. Design language consists of multiple elements, such as color, typography, shapes, lines, animations, and white space, that can be considered as the building blocks of a site's aesthetics. (Gordon, 2020; Pepper, 2022; Yu Siang, 2022.)

Color and typograhpy are among the main design elements that determine the visual appearance of a site. Colors refer simply to the collection of colors used in the website design while typography is the design of text on a website and determines how text looks to the reader. (Beaird, 2007, p. 5; Reinecke et al., 2013; Phiboonwittayaruk, 2022.) Shapes and lines are often used to call attention to important pieces of information, add visual appeal and separate different pieces of information. White space refers to the empty area around a shape and is crucial in adding breathing room to a design and separating different sections of a web page. (Galvan, 2021; Yu Siang, 2022.)

Design elements should be used to create unity and hierarchy within the design. A cohesive theme or style should exist across all the pages to help hold the design together, and uniformity should be maintained across different platforms.

(Beaird, 2007, p. 5; Pepper, 2022.) Design principles help to achieve this by demonstrating how design elements can and should go together to achieve the best result. The design principles of scale, visual hierarchy, balance, contrats and gestalt, as shown in Figure 8, are all closely related and complement each other. Taking advantage of them serves to incrase usability, provoke emotion, strengthen brand perception, create unity and drive engagement to the site. Following the principles often results in layouts that are easy to use, intuitive, look good and have high task success rates. (Gordon, 2020; Yu Siang, 2022.)

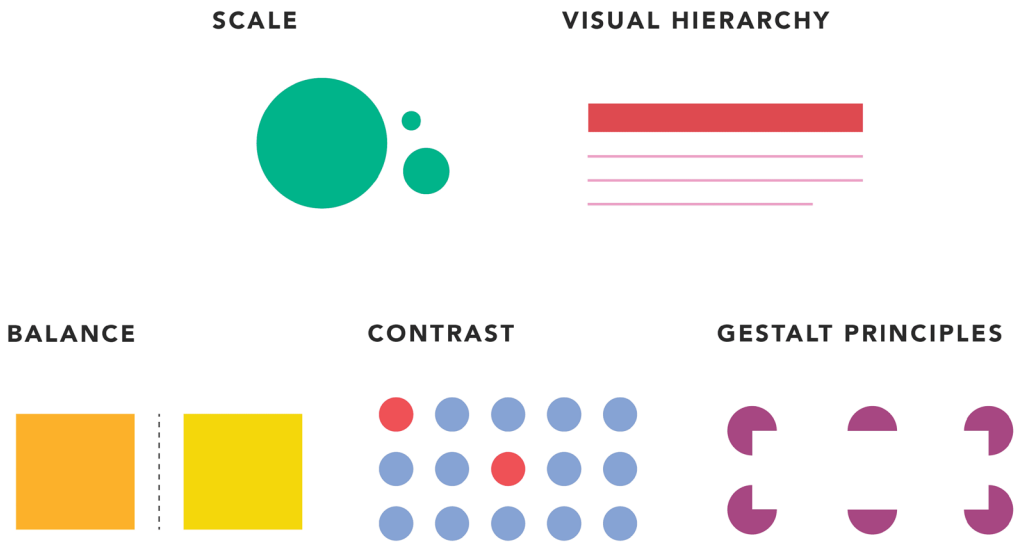


Figure 8. Visual design principles in UX (Gordon, 2020).

Scale and hierarchy are very similar to each other. Scale refers to the use of size to signal importance and rank in composition. When used correctly, the most important elements are larger than the less important ones so that they are more likely to be noticed. Hierarchy deals with how elements are presented on the page, from most important to least important. Size is the most common way to create hierarchy with, for example, large fonts or headings. Items appearing at the top of the page also tend to be viewed as having higher hierarchy than those appearing below. Hierachy improves the scannability of content by assisting users in determining what the most important aspects of the content are. (Gordon, 2020; Lawrence, 2022; Phiboonwittayaruk, 2022; Yu Siang, 2022.)

Balance occurs when there is an equally distributed number of visual elements on both sides of an imaginary axis going through the middle of the screen. (Gordon, 2020). Distributing elements evenly makes design appear calm, stable, and natural. Balance does not necessarily mean that everything needs to be designed with symmetry. Asymmetrical balance is achieved when differently sized elements are arranged in a way that results in unity. (Yu Siang, 2022.) In a valuation by Zheng, Chakraborty, Lin, and Rauschenberger (2009), symmetry and balance significantly correlated with participants' subjective ratings on aesthetics. Balance and symmetry contributed to the perception of orderliness and was an important factor in users' aesthetic perception of a website (Reinecke et al., 2013).

Contrast makes elements stand out to emphasize they are different, such as have different functions or behave differently. This can be done by manipulating differences in color, value, size, and other factors. (Gordon, 2020; Yu Siang, 2022.) Contrast helps users make decision and navigate through the site, so it is important that these elements are not at odds with logicality but in line with the site's structure. For example, red is usually used to signify that something irreversible is about to occur while green is used in a positive context. Red color naturally gives users pause due to its connotations and makes users think twice before proceeding. If the visual elements do not support the site's logical structure but contradict each other, users can become confused and confirm a destructive action. (Fleming, 1998; Komninos, 2022; Yu Siang, 2022.)

Gestalt refers to the tendency to perceive the whole as opposed to individual elements. The human eye and brain perceive a unified shape in a different way than they perceive the individual parts of such a shape. In particular, the overall shape of an object is usually perceived first, before moving on to the details of the object. (Yu Siang, 2022.) There are several Gestalt principles but proximity is especially important for user experience. Proximity refers to the fact that items that are visually closer together are perceived as part of the same group, and it can be used to separate specific areas of a website from each other. (Gordon, 2020.)

3 **Design thinking**

Design thinking is fundamentally user centered, meaning that design is focused on the concerns, interests, and values of users. Design thinking can be considered a team sport with three principal values: many eyes, customer viewpoint and tangibility. Many eyes refer to design teams consisting of diversified expertise where each team member's unique perspectives help other members to see things they would not originally see. Customer viewpoint means that design teams go to customers to interview them and watch what they do to get a real understanding of their operations and ways of thinking. Tangibility is about building prototypes and mockups, testing them, and learning from feedback and reactions. (Denning, 2013, p. 31; Penin, 2018, p. 150.)

Service design is a process that applies design thinking and design methodologies into immaterial products and services. Service design involves a high degree of research and discovery (innovation) as well as ideation, prototyping, and proposal generation (problem solving). (Rebelo, 2015; Penin, 2018, p. 174.) It is a holistic, systematic, strategic, and iterative process that integrates user-centered, team–based interdisciplinary approaches and user–participatory methods in continuous learning cycles. The aim of service design is to improve the experiences of users by creating services that are useful, usable, desirable, efficient, and effective. (Holmlid & Evenson, 2008, p. 341; Saco & Goncalves, 2008, p. 12; Gibbons, Service Design 101, 2017.)

3.1 Core principles of service design

Service design focuses on creating value for customers in two ways: by improving the quality of the service and by improving the interaction between the service provider and its users. Achieving this can be challenging, but there are a few core principles that help to develop an effective service design. Based on a framework proposed by Schneider and Stickdorn (2012), the core principles of service include that; (a) service design is people–centered; (b) service design depends

on participation and codesign; (c) service design is communicated through service narratives; (d) service design includes the material side of services and (e) service design is holistic. These core principles are depicted in Figure 9. (Gibbons, Service Design 101, 2017; Brenton, 2018; Penin, 2018, pp. 150–153.)

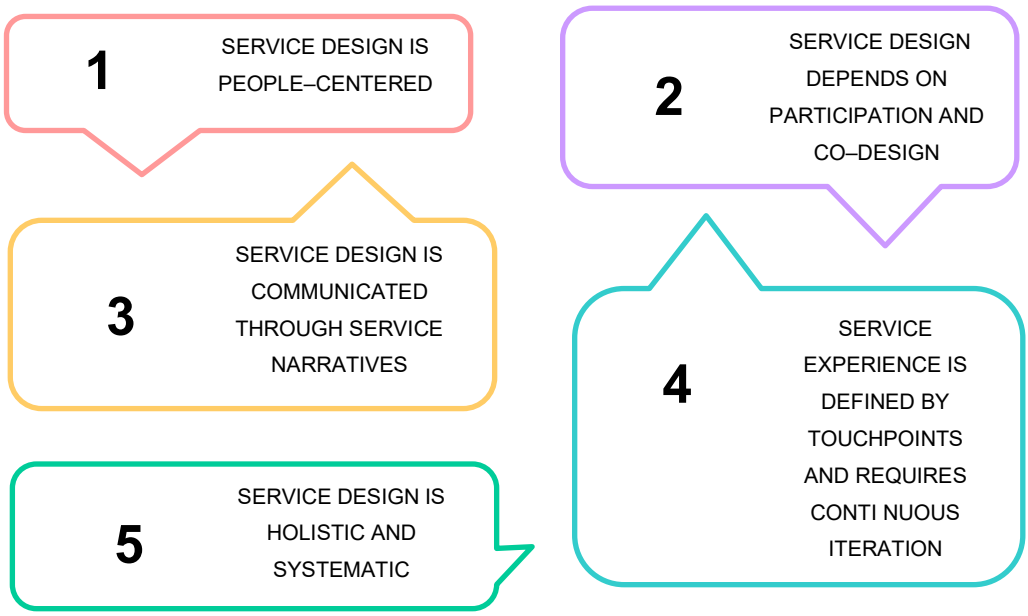


Figure 9. The core principles of service design (Stickdorn & Schneider, 2012).

Service design relies on the close and continuous consideration of users, ensuring that their needs are at the central of the design process. This means not only conducting initial market surveys, but also ensuring that user needs and perspectives are a part of the entire process – from research to ideation, prototyping, launching phases and beyond. The central idea is to avoid designing products based on assumptions or intuitions within the company, but to consider the real needs and full experience of users including physical, cognitive, emotional, and contextual aspects. (Bertolotti, Di Norcia, & Vignoli , 2018, p. 745; Penin, 2018, p. 150; Negbenose, 2021.)

Participatory design practices are central to service design and one of the core capabilities of service designers. Participatory design is an approach that attempts to actively involve all relevant stakeholders in the design process to ensure that the end result meets their needs and is usable. The involvement

happens through collaboration that include exploratory workshops, interviews, consultations, meetings, and conversations. Co–creation strategies and techniques involve design games, devices and probes that prompt productive and constant dialogues with project stakeholders that lead to insights and meaningful ideas. (Penin, 2018, p. 151; Negbenose, 2021.)

Service narratives help to capture all the complexities in people's lives. User–centered methods focus on understanding people in their current relationships and realities, but design is also about imagining preferred futures and designing interventions of how to get there. Visual narratives are the most effective tools to present new possible futures. By using visual narratives, designers can make abstract concepts more concrete, allowing team members to bring ideas to life. When creating narratives, special attention needs to be paid to time. Time is essential in services because the benefit perceived by the user of the service can change as interactions and experiences develop over time. (Penin, 2018, pp. 151–152; Negbenose, 2021.)

All services include material evidence that enable a certain experience during the service journey, such as the bright colors of a fast-food restaurant or the sign above a store that tells which brand it is. Not only do these touchpoints have a specific function, but meaning is also attributed to them. They help to make the service's value tangible. Service designers must be able to imagine the touchpoints that define the service experience, which can often be surprising and atypical. Any unexpected events that cause variation in the process should be treated as common touchpoints along the journey. The design of service touchpoints should be based on research insights and developed through tests, trials and prototypes in cycles leading toward a final version. (Penin, 2018, p. 152; Interaction Design Foundation, 2020.)

Holistic stands for integration, interconnectedness, and harmony. Services are complex and multidimensional. They can be experienced through multiple channels that have origins in different parts of a given organization. Services should be designed to deliver a unified and efficient system rather than component-by-component, which can lead to poor overall service performance.

A key challenge in designing services is therefore how to integrate the system, process, and touchpoints in a consistent and holistic way. Being holistic means ensuring that users experience the service delivery in a consistent way, regardless of the channel they are using. It involves internal consistency with seamless integration of the different back–office operations. (Penin, 2018, p. 153; Interaction Design Foundation, 2020.)

3.2 Service design methods and tools

Service design is more a practical craft than a formal science, with its focus on hypothesis–building and experimentation, which may explain the abundance of methods and tools. Service design methods and tools are drawn from multidisciplinary fields such as social anthropology, linguistics, market research, organizational design, quality management, customer experience and *the voice of the customer* with the aim of bringing people into the process of creating and introducing a service. Table 3 presents some of the most common service design methods and tools per process stage. Their application is situational and depends on the type of service design project, the resources available and objectives. (Saco & Goncalves, 2008, p. 12.; Cramer, 2021b.)

Table 3. Service design methods tools (Saco & Goncalves, 2008, p. 12; Penin, 2018, p. 150; Cramer, 2021b).

Process stage	**Service design activity**	**Methods and tools**	
Research	Seeking (assessing)	Benchmarking Critical incident technique Co-creation workshops Ecology map Ethnographical studies	Interviews Observations Service safari Shadowing Trend scouting
	Framing (visualizing)	Affinity diagram Customer journey map Fishbone diagram Personas	Service blueprint Stakeholder map System map Touchpoints analysis

Ideation	Generating (exploring)	Body–storming Brainstorming How might we? Randomizer	Scenarios Storyboards and storytelling Unfocus group What if
Prototyping	Filtering (reducing)	Heuristic evaluation Pluralistic walkthrough	
	Explaining (rationalizing)	Desktop walkthrough Experience prototyping Metaphors	Social network mapping Wireframe
Implementation	Realizing (building)	Business model canvas Communication prototypes Customer lifecycle map	Pilots Role script Service blueprint

Service design methods and tools aim at creating meaningful conversations, establishing connections between stakeholders, testing assumptions in customer understanding, and stimulating the development of a common language for service development. The difference between service design methods and service design tools is that tools, like personas and customer journey maps, are concrete models that follow a specific structure or are built on a given template. Methods, such as contextual interviews or brainstorming, are procedures to approach or accomplish something. (Saco & Goncalves, 2008, p. 12; Cramer, 2021b.)

3.3 Service design process

Service design follows an iterative design process, meaning that it follows cycles of continuous learning, prototyping, and improvement (Cramer, 2021a). According to Penin (2018), the design process consists of four key phases that are (1) research, (2) ideation, (3) prototyping, and (4) implementation and evaluation. The service design process is not a straightforward cycle but can shift between these four key phases to iteratively create and test a solution for a certain problem or user need. The next four chapters will present each key phase of service design process and development, from exploring the world of

customers, to reflecting on customer data, and finally implementing service design improvements. (Cramer, 2021a.)

3.3.1 Research and analysis

Research is critical for determining the validity and success of a service design project. Research allows the design team to empathize with the people they design for and uncover specific areas, such as patterns, user segments, pain points and uncovered demands of a particular service. The whole research process can be divided into problem seeking and problem framing (Figure 3). Problem seeking includes interviewing and observing people to understand what their problem really is while problem framing is about defining the main aspect of the problem, such as parameters, patterns, and themes. (Penin, 2018, p. 198; Cramer, 2021a.)

When conducting user research and developing an understanding of customers, the first step is to collect empirical data on customer experience and behavior. Ethnographic research methods, such as interviews, observation or shadowing, are among the most common research approaches in service design, because they focus on understanding people in their real-world context. In the second step of research, findings are visualized to make sense of the gathered data. Visual techniques, such as personas and customer journey maps, help the design team to comprehend data, simplify complex ideas and provide unique perspectives on customer experiences. At the end the process, service designers should be able to frame the problem to move on to the next phase of the service design process that involves brainstorming and concept generation. (Penin, 2018, pp. 150, 198; Cramer, 2021a; Cramer, 2021b.)

3.3.2 Concept generation and ideation

The next part of the service design process involves transitioning from understanding a current situation to imagining a desired future, so being able to

transform research findings into actionable concepts. This shift between research and concept generation requires moving away from a learning mindset to one of invention and exploration where ideas are produced en masse, mixed, recombined, culled, distilled, and evolved. (Penin, 2018, pp. 228, 238; Cramer, 2021a.)

Many of the methods used during ideation consist of participatory design practices that focus on fostering collaboration between different stakeholder groups and creating productive dialogues that can lead to insights and meaningul ideas. Involving all of the service's key stakeholders into its development is a crucial step in idea generation to ensure all unique perspectives are considered and nothing is overlooked. Specific co-creation formats such as what-if statements, storyboards, and design scenarios help to synthesize findings from research and generate design directions and preliminary concepts to be further developed. (Penin, 2018, p. 151; Cramer, 2021a; Cramer, 2021b.)

It is important to notice that the ideation phase it not about avoiding mistakes but rather it is an inclusive process where navigation leverages mistakes and leads to better long term solutions. Good service design approaches focus on understanding people's problems and needs, exploring as many ideas as possible and identifying challenges as early as possible to learn from them. Through fast iterations of different concepts, teams are able to take practical, low-cost actions early on in the process and develop their learning much faster than if they were simply discussing ideas. (Cramer, 2021a.)

3.3.3 Prototyping and testing

Prototyping is used to explore, evaluate, and communicate how people might experience future service situations. Prototypes teach what works, what does not, and where improvements can be made while moving towards the final product. Prototypes help to mitigate costly errors later in the design process by testing assumptions, gathering customer feedback, and developing new ideas into a design earlier rather than later. Prototyping is one of the easiest and cheapest

ways to test how an idea could work in delivering a service. (Penin, 2018, p. 258; Cramer, 2021a.)

Prototyping is an experimental process where design teams implement ideas into tangible forms to refine and validate designs so that the right products are released. The applied methods vary from desktop walkthroughs and wireframes to physical cardboard prototypes or theatrical approaches. The use of stories, narratives, enactments, and performances is key to anticipating the aesthetic and function of things, their meaning and what they can represent in people's lives in the future. Tools for the prototyping process often include ways to visualize experiences, such as future-state journey maps. (Usability.gov, n.d.; Penin, 2018, p. 152; Cramer, 2021b.)

3.3.4 Implementation and evaluation

The implementation of service design projects is complex because it combines physical, technological and human components. These can include change management for organizational procedures and processes, software development for apps and software, and product development or engineering to produce physical objects. Implementing new service concepts also demands change, both from the organisation and from the people in it, which makes change management an important part of the implementation process. (Boks, Sigurjonsson, Steinert, Vis, & Wulvik, 2016, p. 22; Cramer, 2021a.)

Service design methods used during implementation make it easier to transfer and embed new service design concepts to an organization. Uncertainty associated with a new concept can be reduced through live prototypes and pilots that act as a test bed for the new service. Testing ensures that the principles and features of a service idea resonate with the people and organizations involved before committing substantial time and resource investments. Tools that assist in implementation are service blueprints, communication prototypes, customer lifecycle maps, and evaluation frameworks that helps to understand performance

from different points of view over an extended period. (Penin, 2018, p. 280; Cramer, 2021b.)

Regardless of how well things are planned, there is no way to get everything right at the beginning. Feedback strategies are crucial to ensuring that the services remain responsive to emergent needs and changes in the service environment. In this way, we can think of a service evaluation as a continuous form of iteration, enhancement and cocreation. (Penin, 2018, p. 280.)

4 Four concepts of service design

The four concepts of service design (SD), customer experience design (CX), user experience design (UX) and user interface design (UI) are interrelated to the extent that the terms are often used indistinctly. The concepts have many similarities as they all adopt a user-centered approach and see the quality of the product and service as the fundamental piece of success. To understand their connection points, differences and what each concept refers to, each one is briefly introduced. As shown in Figure 10, service design is the umbrella term under which the other concepts fall. Customer experience is the hypernym of user experience and user interface design in the same way as user experience design is the hypernym for user interface design. The focus of this chapter is first on user interface design, followed by UX, CX and service design. (Pybus, 2019; Thinkers.Co, 2020.)

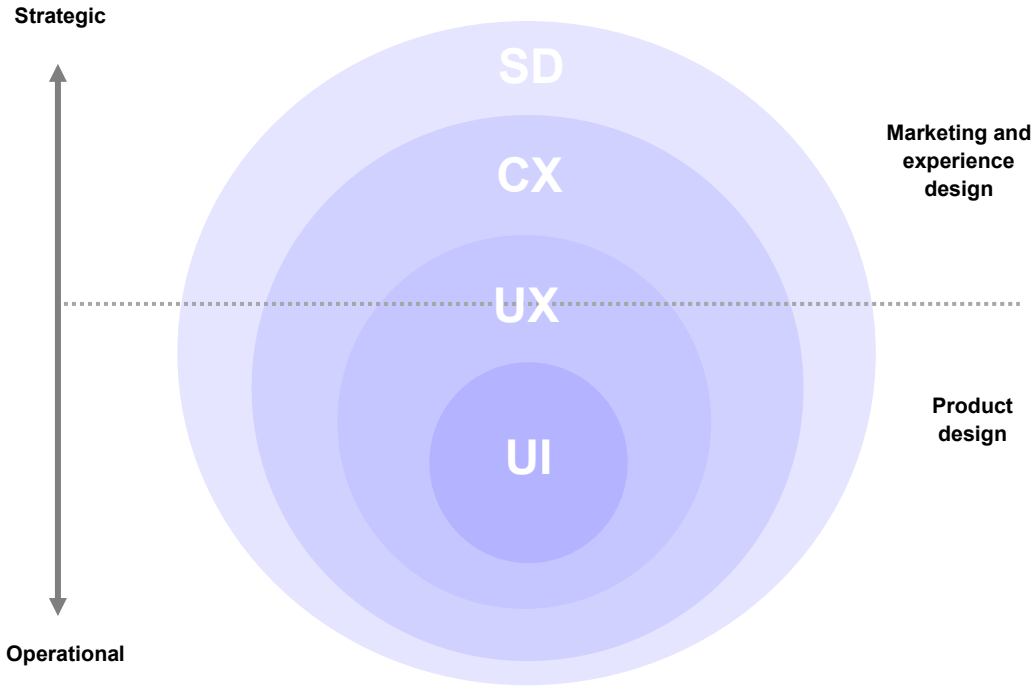


Figure 10. The total design spectrum: UI design, UX design, CX design and Service Design (Burgmans, 2017).

A user interface is the point of interaction between humans and computers, and user interface design is the process of designing how these interfaces look and behave. The goal of an UI designer is to create an interface that users find easy to use and aesthetically pleasing. UI design covers three areas of interactivity, visual design, and information architecture. Interactivity is concerned with how the user interface and its various elements behave and function. Visual design is about how the interface looks and considers things like color, imagery, typography, logos, and such. Information architecture deals with how the content within the user interface is organized and labelled. (Kreimer, 2021; UX Design Institute, 2022.)

While user interface design focuses on appearance and style, user experience design exists to satisfy user intent. UX design considers how the entire experience makes the user feel and how easy it is for the user to achieve the desired result. This requires experience in problem solving through an understanding of interactive methods, user research and behavior, customer engagement and other criteria that focus on uncovering users' needs and goals. The goal of UX design is to enhance user satisfaction through the improved usability, accessibility and pleasure provided by the interaction between the user and the service and focuses on creating services that are easy, efficient, enjoyable, and rewarding for the end user. (Glawson, 2020; Makarskaite, 2021; Coursera, 2022.)

Customer experience (CX) encompasses every single interaction a person has with a brand. The relationship between a user and an organization is based on various types of interactions through many different points of contact. A user's experience does not always start with the first use of a company's product, but there are many touchpoints between the user and the brand both before, after, and even during the use of the product. A good CX gives the user a smooth and professional interaction with the company's representatives and a positive feeling of the overall experience with a company, and everything associated with it, from beginning to end. Customer experience can be broken down into three different

parts of a single interaction, the customer journey, and the lifetime relationship. (Lowden, 2014; Browne, 2022.)

While it is important to think about what the users encounter, it is also important to consider how it gets delivered. Service Design (SD) looks at the big picture and focuses on service creation, curation, and implementation. It enables all the interactions a user goes through with the company and focuses on providing a holistic experience to the user through the design of systems and processes. It is concerned with the end–to–end experience that includes digital touchpoints but also physical infrastructure, teams, and things those teams do, that is processes. The purpose of SD is to look at interactions between a user and a service, break down all the elements of that journey, and use qualitative research methods to improve every touchpoint through customer-centred design. (Pybus, 2019; Gibbons, 2021; Makarskaite, 2021; Sutapalli, 2021; RMIT Online, 2022.)

An example of service design is a person contacting a company's customer support. He visits a website, initiates a live chat, communicates his issue to an agent and the agent works with him to resolve it. All these interactions together with the interface itself make up the user experience. On the other side, the chat agent works behind the scenes as needed. He could be checking a database, filling out a form, recording any changes in the database, speaking with a manager, and so on. These tasks, as well as the people and technology required to complete them, are part of service design. (Gibbons, 2021; Makarskaite, 2021.)

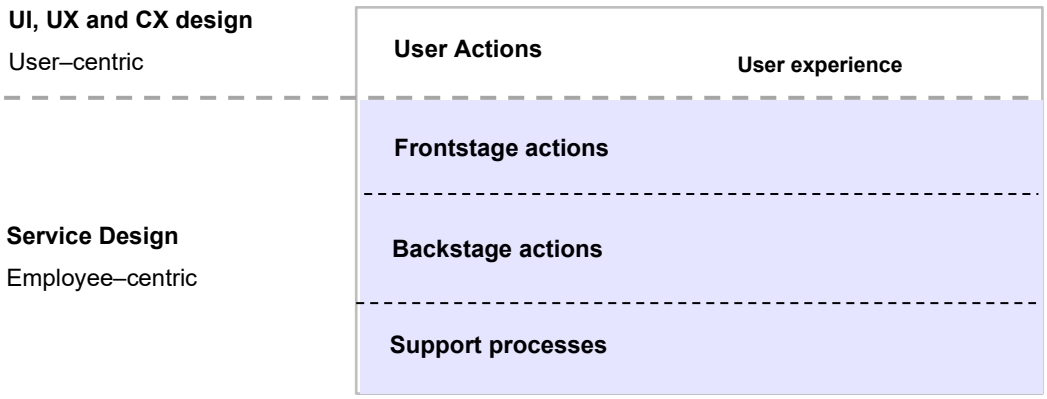


Figure 11. The structure of a service blueprint (modified from Gibbons, 2021).

Everything that a user interacts with comes under the umbrella of UI, UX and CX while everything that a company goes through during those interactions is part of service design. All these concepts work together, and each is dependent on the other. The service blueprint (Figure 11) describes this process; the dotted foundation lane is the user's experience, so the activities and interactions the end user performs to reach a particular goal. Below the top lane, the internal actions are mapped in parallel. A good customer experience cannot be created without considering the people or processes used to create it. Successful businesses have a solid service design along with carefully designed digital touchpoints that enhance the overall user experience. (Gibbons, 2021; Makarskaite, 2021.)

Role of UX design in website design

To design functional and effective websites, user experience design and web design should coexist as complementary elements. The terms are strongly intertwined with each other with user experience design being essentially a part of web design, but there are some marked differences between the two. To understand how user experience design and web design best fit together, the terms will be briefly recapped, and their differences and limitations outlined. (Kramer, 2018; Glawson, 2020.)

The main difference between web design and UX design is that web designers do not take the human-centered approach of UX design. Increasing sales, growing brand awareness, generating leads, and supplying resources are the main goals of web design, while UX design requires a specific methodology to create a great experience for the user. Psychology is strongly embedded in UX design to understand how people think, and what motivates them. Most web designers are essentially business focused and do not go as deep to consider all the psychologic factors that a UX designer keeps in mind. Web design is also less iterative, whereas UX design is about integrating continuous improvements into the design. (Glawson, 2020; Digital Brand Design, 2022; RMIT Online, 2022.)

The lack of attention to user inputs and the popularity of techno-centric practises over user-centric ones often lead to unsuccessful projects where the needs and

problems of users are not understood. Having a successful design goes beyond creating content that the company sees relevant but requires an understanding of customer needs, goals and preferences. User experience is different for everyone, and one of the most important things when designing a user interface is not assuming what users want or need. A single design will result in multiple visitor experiences depending on the variations in the website visitors, and it is therefore important to design for a target audience based on a solid knowledge of that audience. (Rocket55, n.d.; Weinschenk, 2011.)

User experience design provides the missing input to web design with its strong human-centered approach and emphasis on user emotions, behaviors, habits, motivations and needs (Orlova, 2016, pp. 2, 7; Glawson, 2020; Minhas, 2020). Improving user experience requires getting close to the users by listening, observing and questioning. This can be done by talking to the users, watching them use a service or product, getting inside their heads and asking questions about their decisions. Human psychology plays one of the main roles in user experience design and is the key to the successful outcome of the project. Study of the human psychology gives the opportunity to understand how people make decisions, how people think, what make them to act or how to encourage people to realize the ideas and aims of a website. The answers to these questions help to make a design better and more responsive to users' needs. (Rocket55, n.d.; Weinschenk, 2011.)

5 Research process

The core idea that initiated the project was to improve the online experience of Deltamarin's mobile website. The website design is dated, and no major updates have been made in 10 years. The website's functionality is poor, and the number of visitors has been steadily decreasing since 2018 (see Figure 1). The research process of the study has been divided into four parts of discovery, define, develop, and deliver.

5.1 Discovery

The discovery phase of the research process focuses on gaining insights into the issue by assessing the current state of Deltamarin's website and the website of two competitors. The goal is to uncover any pain and gain points of user experience and find areas of improvement. The research methods used in this phase include both qualitative and quantitative methods to have a holistic view to the matter. The research methods include service safari, user observation, contextual interviews, behavioral data analysis and benchmarking. Service Safari can be seen as the umbrella term under which user observation, contextual interviews and benchmarking are placed, so they will not be assessed separately but are included in the service safari portion of the research.

5.1.1 Service safari and user observation

Service Safari was used to evaluate the design of Deltamarin's website and the design of Knud E. Hansen and LMG Marin AS, also referred in the study as KEH and LMG. The companies were chosen from Deltamarin's top 25 competitors since their websites have a filter option for ship references. The term 'ship reference' is used in ship design for a ship in the design of which a company has been involved. A reference list can include hundreds of ships, which makes a functional reference filtering important for the site's functionality. One of Deltamarin's main goals for the site is to improve its reference filter, and the

comparison will help to preview the strengths and weaknesses of each site and highlight aspects that need improvement.

Seven people participated in the service safari. Four of them were Deltamarin's employees and three external individuals. Deltamarin's employees represent the views of the marine industry with their extensive marine backgrounds, while the external actors provide perspectives from users who visit the page with a different agenda. The participants were chosen to represent different backgrounds in relation to age, education, and gender to ensure different views would be covered (see Table 4). The first four interviews were conducted at Deltamarin's office and the last four at the participants' homes during February and March 2023. The interviews were done separately to avoid users' influence on each other.

Table 4. Service safari participants.

	Age	Gender	Education	Speciality	Marine background	Color
Internal (Deltamarin)						
A	30-34	Female	M.Sc. (Economics)	Marketing	4 years	purple
B	40-44	Male	Bachelor's degree in engineering	Project Management	20 years	blue
C	45-50	Male	Bachelor's degree in business economics	Concept design & project services	17 years	orange
D	40-44	Male	M.Sc. (Engineering)	Marketing & Sales	20 years	green
External						
E	60-64	Female	Specialist degree in Medicine	Medical ethics	none	red
F	30-34	Male	Doctor in training	Cardiology	none	black
G	30-34	Male	Bachelor's degree in engineering	Concept design	5 years	yellow

The service safari tasks were created based on Deltamarin's direct and organic search traffic in 2022. Due to the scope of the thesis, the focus is limited to the pages with the most traffic. Contact details, career opportunities, company information and news ranked in the top five for direct traffic, while contact details,

references, design services, career opportunities, and company information gained the most organic traffic. The service safari tasks were created to mimic the paths users take on the website to reach these pages and are depicted in Table 5. Each task was also designed to cover one or more of the usability criteria described in Table 2, so if a task question is answered negatively, there is room for improvement in the usability of the user interface. The goal of the tasks was to understand the pain and gains points of user experience along the journey.

Table 5. Service Safari tasks and objectives.

Task	Navigational viewpoint	Appearance viewpoint	Goal
(1) Where can I find the head office's contact details? (2) Where can I find career opportunities? (3) Where can I find information on when the company was founded? (4a) Where can I find the latest news? (4b) Find *Höegh Autoliners engineering contract* (DM), *Ferry shipping summit award 2021 Eco Valencia* (KEH), *Hjellestad delivered* (LMG) (5a) Where can I find offshore references? (5b) Find *Algoma* (DM), *Botnia Enabler* (KEH), *Jylland Ropax* (LMG)	Is the navigation predictable? Is the navigation clearly labeled? Is the navigation structure well planned and consistent? Do the navigation labels correspond to the content?	Is the text readable and understandable? Is the design language cohesive, clear, and consistent? Does the site structure and visual cues support each other? How is the visual complexity of the site?	To understand the highs, lows, and friction points in the experience

The service safari included two phases. Since the first phase was recorded, it was carried out on the researcher's phone as she did not want to install a screen recording app on the users' phones. In the first phase, each participant completed the tasks of Table 6 on the three websites without interruptions. The researcher followed the user testing but did not interfere with the tasks. The idea was to get real data of the speed, time, success rate (errors, dead ends) and the actions

taken per each step to understand the logicality and user friendliness of the user interface without interference.

In the second phase, the researcher and user discussed the thoughts and ideas the tasks had provoked, focusing on what worked, what did not and how the problem areas could be resolved. Attention was paid to the two viewpoints of navigation and appearance and their viewpoint questions, which are described in Table 6. Screen recording, notes and screenshots were used to document the experience, and the full results are documented in Appendices 1 and 2. Each respondent was given a color code to help data analysis, and information was arranged into specific themes to reveal issues that kept repeating or were otherwise significant.

The results of the service safari are summarized in Table 6. The numbers in the columns are averages of all results, and notes are a selection of reasons for the misclicks and dead ends described in the table. Green color indicates a site on which a task was completed the fastest and with the fewest number of actions, which gives an idea of the site with the most logical and user-friendly interface. The color classification also serves as a basis for a deeper interpretation and comparison of the results when going into the reasons why one site outperformed the other. Misclicks refers to clicks that the user took but which did not contribute to the competition of the task whereas dead ends are instances where the user did not know how to proceed. Notes explain the reasons for misclicks and dead ends.

Table 6. The results of the service safari.

Site	Task	Duration (seconds)	Actions taken	Misclicks	Dead-ends	Notes
DM	1	15,5	1,5			
	2	20	2			
	3	31,5	2		1	Info is not directly visible but needs some digging
	4a	11,75	2			
	4b	50,75	4	2+2+2	1+1	Issues in locating the search bar Tried to search the information manually at first Enter did not seem to work in the search area (delay)
	5a	29,5	4,25	2+2	1	Confused with the multiple reference links in the menu

						Clicked the wrong reference type at first Tried to find a reference filtering on the reference page
	5b	34,25	3,5	1 +1	1	Was on the wrong reference page There was no search bar
KEH	1	22,25	3,25	3	1	Was not able to find contact link in the menu (cookie settings were on the way)
	2	14,25	2			
	3	12,5	2			
	4a	11,75	2			
	4b	39	4	1+2	1	Tried to search it from the active page first Forgot the year of the news Was confused by the news filter
	5a	16,5	4			
	5b	32,25	4,75	2+5		Tried to find a search bar from the reference page Was unsure where to search for the given reference Typo when searching
LMG	1	10	1,5			
	2	15,25	2			
	3	21,75	2,75	3		Was confused about the year
	4a	13,25	2,5	2		
	4b	36,75	4,25	11	1+1	Thought he needed to search for a reference No search bar available
	5a	43,5	6,5	1+2+4	1+1+1	Confused designs with references Page didn't load
	5b	95	6,5	8+2+1	1+1	Confused designs with reference Confused because filter seemed to show same result As no search bar, had to manually go through all

As a general result of the service safari, it can be concluded that Knud E. Hansen performed the best overall. It had both the shortest time durations, fewest actions, and the least amount of misclicks and dead ends in majority of the tasks. Deltamarin was ranked in the middle and LMG Marin the last, but the difference between Deltamarin and LMG Marin was not big. The following paragraphs focus on the factors that created the difference in ranking, with a special focus on the factors that positively affected Knud E. Hansen's results and negatively LMG Marin's. The findings will then be compared to Deltamarin's results to see where improvements can be made and what to avoid when redesigning the website.

The concise and clear navigation panel, the location of the search bar and the functional filtering options were the main reasons for Knud E. Hansen's good performance. Users were able to quickly find what they were looking for, and the search bar and filtering options positively supported the user's journey. The user interface got praises for being intuitive, and the accessibility of the navigation

menu made navigation easy. A few users commented that the texts were too small, the navigation menu lacked a home link and the front page ‘did not look like a front page’ when asking about anything negative. Misclicks and dead ends were often related to human errors, such as typos, rather than clear structural deficiencies.

There were still a few incidents that hindered the overall performance. One of these situations was related to the user not finding the contact link in the navigation menu because he did not realize that the menu continued beyond what was initially visible. As shown in Figure 12, there is no indication in the navigation menu that the menu continues downwards and that some links are hidden. Adding an icon that shows that the menu continues beyond what is currently visible, such as a scroll bar, would be a good addition. Other improvements that were brought up by the users were a search bar on the reference and news pages and an option for multi-filtering so more than one vessel type or subject could be selected at a time.

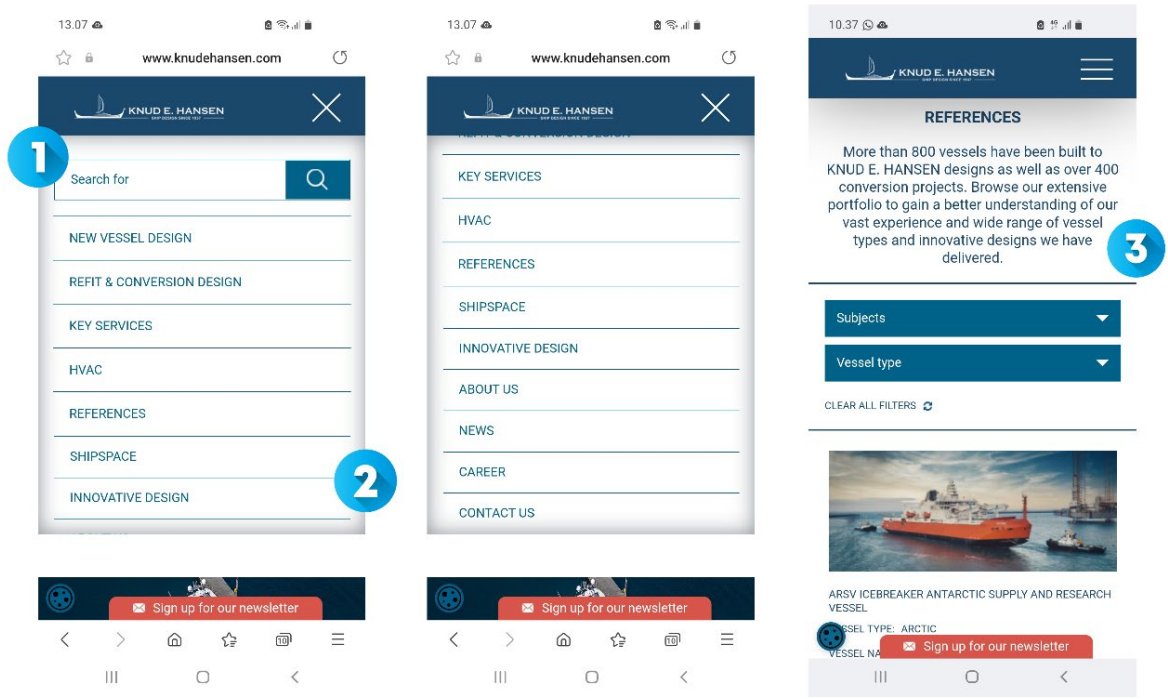


Figure 12. UI of KEH: 1. Clear search bar in the navigation menu 2. No indication that half of the menu is not visible 3. Good filtering option but could benefit from a search bar and multi-filtering.

LMG Marin had clear areas of improvement. Majority of the issues were related to site navigation and the navigation menu. Firstly, the users were confused by the difference between *references* and *designs* on the navigation menu. When completing tasks 5a and 5b (Table 5), users had to search for a specific reference to which there was a clear link on the navigation menu. But instead of clicking *references*, almost all users clicked *designs*. This was because the link came first in the menu and was similar enough to 'references' that they could be confused with each other (Figure 13). As the page also had a similar layout to references, it took a while for users to realize that the information they were looking for was not there, and even then, they were not sure why. Making the distinction between the sites clearer would be beneficial to LMG and should be kept in mind when redesigning the Deltamarin's site. Making two sites too similar in content, name or outlook confuses not only users but also search engines.

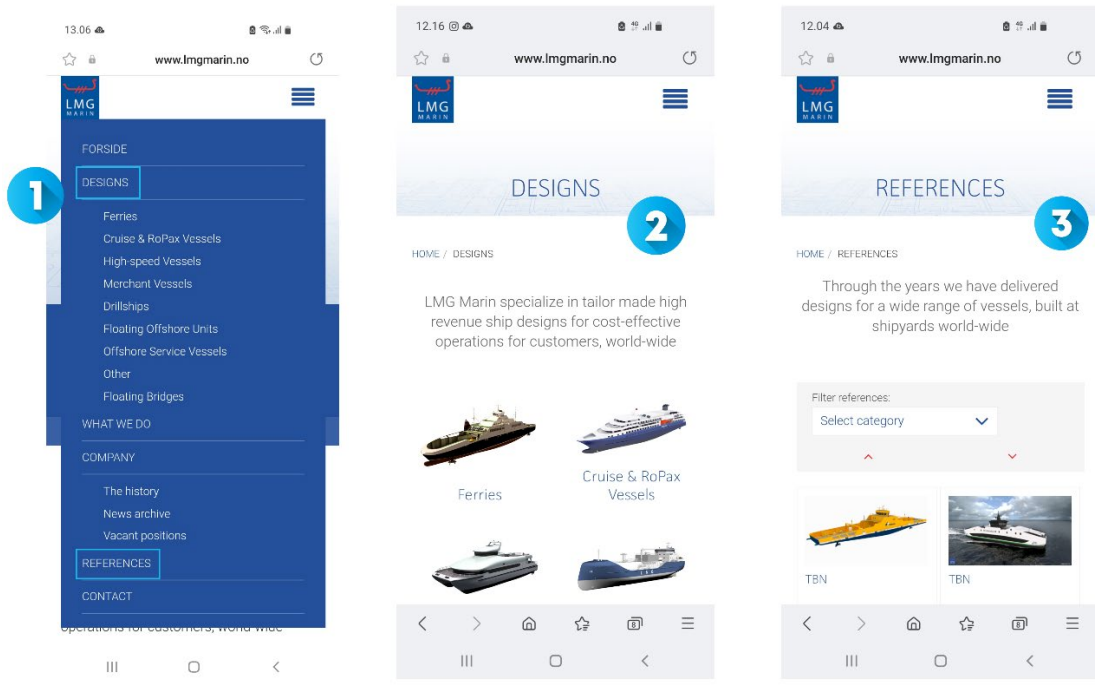


Figure 13. UI of LMG (1): 1. The difference between designs and references caused confusion 2. & 3. The layout of designs was like that of references and the page's difference was unclear.

Another thing that made navigation difficult and caused frustration in the users was the absence of a search function. There was no way to search for anything on the site, which significantly reduced performance as users had to scroll

through pages to find what they were looking for. If it had not been for the test, most of the users would have either given up or googled the information. Additionally, having a filter on the news page would have made searching for news easier, as it would have been good to have the date of the news visible (Figure 14). The menu bar also disappeared when moving down the page, making navigation more difficult. While the site had its issues, LMG was praised for having the clearest menu in terms of typographic hierarchy and a very functional reference filtering (Figure 13). The user interface was also considered clear and visually appealing, but the positives were said not to make up for the flaws in navigation and performance.

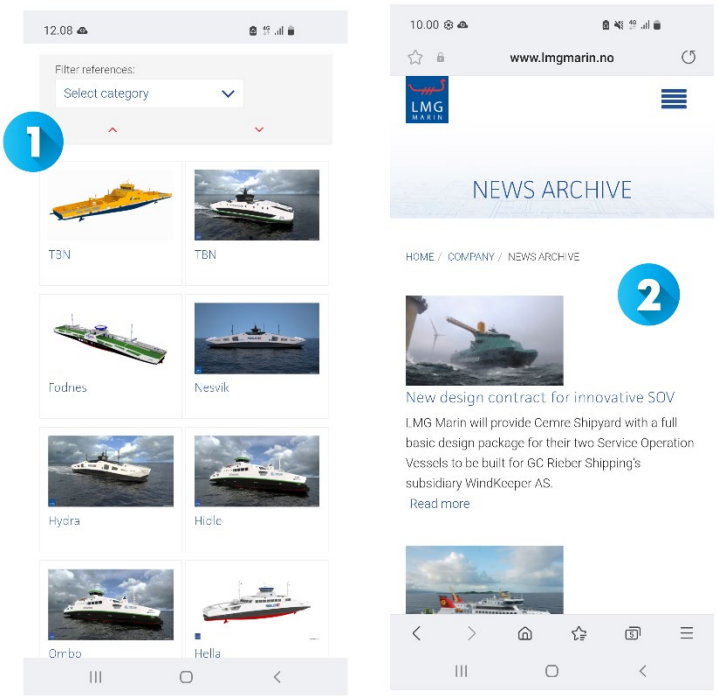


Figure 14. UI of LMG (2): 1. The reference filtering was considered to function well but there was no indication what the sorting arrows do. The menu bar disappeared when moving down the page. 2. There was no filtering on the news page nor a search bar. There were also no dates on the news.

Deltamarin performed better than Knud E. Hansen in many of the tasks when looking at the actions taken (user path) but was lagging in the time that took to complete the tasks (Table 6). When looking at the reasons for this, *the lost time* was often related to unclear menu links and a heavy navigation panel. The

problem was particularly evident in tasks 5a and 5b where users were asked to search for references (Table 5). Deltamarin currently has three reference links separated under three different headings (Figure 15). The indentation between headings and sub-headings is not clear, and users often clicked the first reference link they saw, which was not the right one. It was said to be both confusing and unnecessary to have several links with the same name. Some links were also hard to find because they were located at the end of the menu, such as contact and careers. Unclear links and the heavy navigation panel was the first distinctive reason for the decline in speed and overall performance, and the first major area of improvement for Deltamarin.

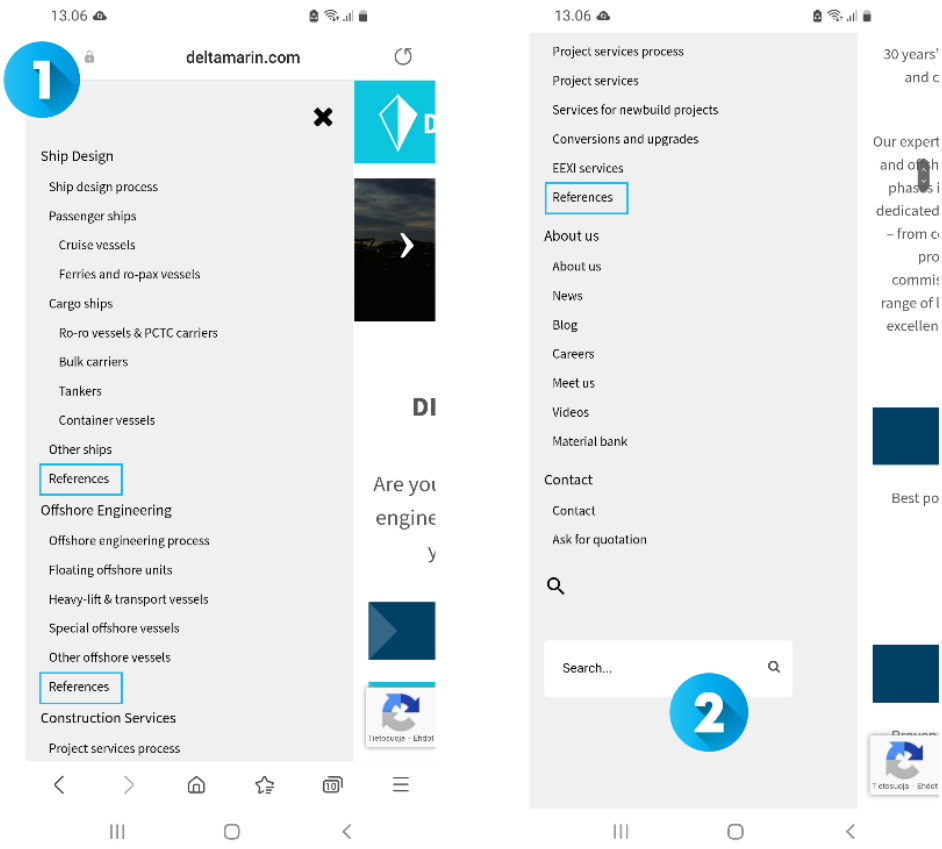


Figure 15. UI of DM (1): 1. An unclear navigation menu with three links for references. 2. Search bar and contact links are difficult to find as they are located at the end of navigation panel.

In connection to the navigation menu, another key fact revealed during research was that Deltamarin's search bar was difficult to find. The search bar is currently located at the end of the navigation panel and at the end of each page (Figure

15). Since the navigational panel is long with a lot of information, the search bar is not immediately visible but requires scrolling to be found. Most of the users were able to find the search bar after a while, but a few users did not find it at all. As the search bar was not located at the beginning of a page where users thought it would be, they simply thought there was no search bar at all. It was also noted that the menu bar disappears when scrolling down a page, so users had to always go back up to access it. In this regard, the user interface was not intuitive.

Filters were the second major area of improvement for Deltamarin, and there are two reasons for this. Firstly, the site's current reference and news filter is located at the end of each page, and most users were not able to find it at all. Users were often searching for the function and commented on the site benefitting from one. The filter is also just a set of links to different vessel or news types whereas a drop-down list that can filter results by different categories would serve the users better. This type of filter made the search for references very easy on both Knud E. Hansen and LMG Marin's websites and could explain why some of the users thought Deltamarin's reference page looked *strange*. See Figure 16 for reference.

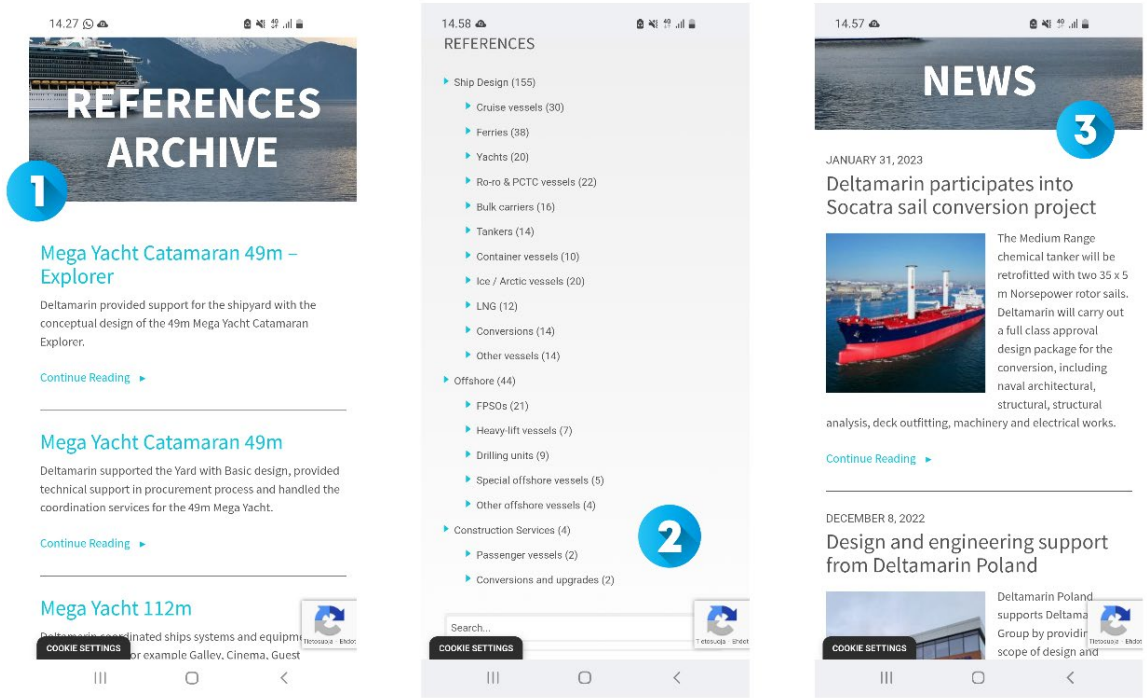


Figure 16 UI of DM (2): 1. The beginning of the reference page 2. Sorting options and a search bar are found at the end of each page 3. The beginning of the news page.

On the visual side, one notable aspect was that size of the headings and pictures, which often accounted for more than half of the above-the-fold section. Above-the-fold is the first view a visitor sees of a website before scrolling, and websites without anything interesting above the fold fail to make an impression on the user (Lorincz, 2023). In comparison, Knud E. Hansen and LMG Marin were able to present a lot of information in a space where only a heading or a part of an image was visible from Deltamarin. It was a continuous theme on the site, repeated on multiple pages (Figure 17). As the mobile screen is small, space should be used thoughtfully. It should also not be overcrowded, meaning having more information than human attention can handle. (Lorincz, 2023.)

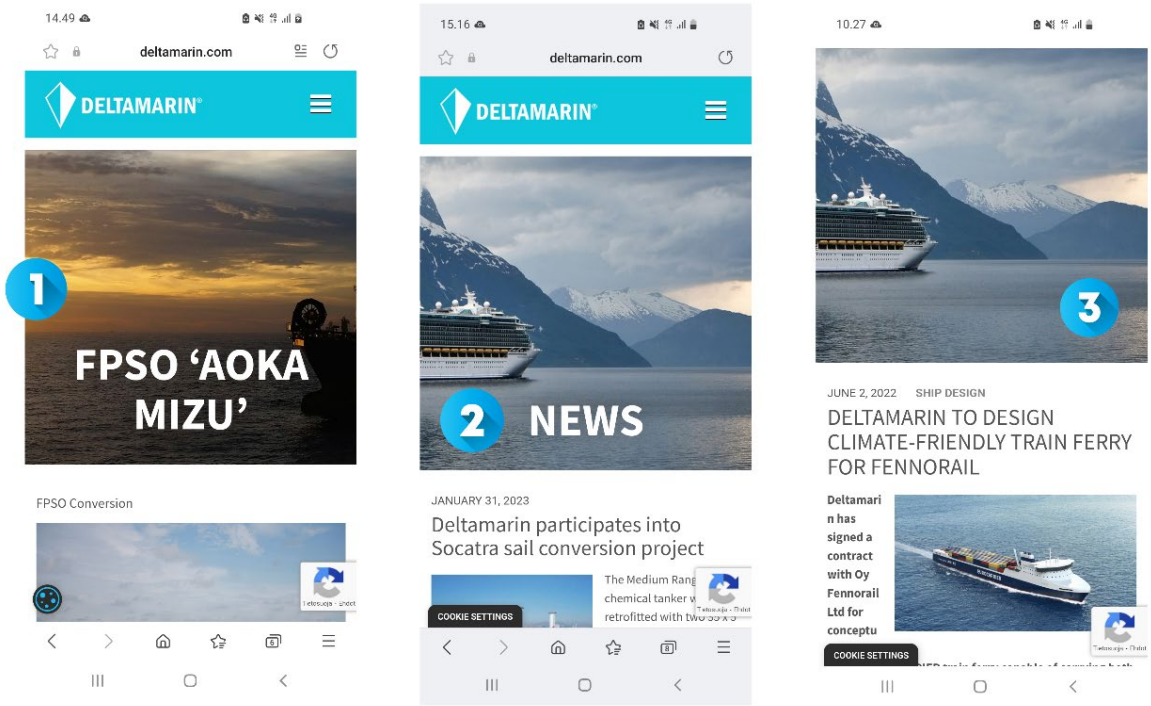


Figure 17. UI of DM (3): 1. The first view of the Aoka Mizu reference page 2. The first view of news page 3. The first view of a specific news page. The menu bar disappears when scrolling down a page.

When it comes to appearance, another issue raised during research was that the clarity of Deltamarin’s navigation menu should be improved with design elements such as colors, fonts, and indentation. The current navigation menu is difficult to follow, not only because it has a lot much information, but also because its visual

design is poor (Figure 15). The headings do not stand out from the sub-headings, and the links are almost the same size. The text is also small, making it difficult to read. When thinking how to improve, Deltamarin could use LMG Marin as a reference. LMG's navigation menu was considered by almost all service safari participants to be a great example of a clear and concise design (see Figure 13). All the figures presented in this chapter can be found in a larger size in Appendix 4.

5.1.2 Behavioral data analysis

Web Analytics offer objective and multi-faceted statistical data to better understand the interaction between a visitor and a website. The data is collected automatically with high accuracy with the purpose of understanding and optimizing web usage. One of the most sophisticated tools for web analysis is Google Analytics, which is also used in this thesis to complement and deepen the qualitative data collection methods. (Dyrli, 2006, p. 72.) Some of Google Analytics' features have already been utilized in this study, including device breakdown, traffic channels, organic landing pages and top content. This information helped determine the focus of the thesis in chapter 1.1. and was used when creating the task questions of service safari in chapter 5.1.1.

In this chapter, the focus is on user behavior flow to see how users behave on the site, which pages they visit and where they are most likely to drop out. The focus is on mobile traffic and on the same user paths and timeframe as in service safari, to have comparable data. Since the data from Google Analytics is fully quantitative, the results are compared with the qualitative findings of service safari. Combining the two sources of data helps to gain a better understanding of the reasons behind user decisions by giving explanation to the user behavior. Combining the data also helps to see how consistent the results of the two methods are.

The Figure 18 shows the behavior flow of mobile users on Deltamarin's site in 2022. A landing page (1) represents the first page users land on when they visit

a site no matter of the source of entry. The source can be a Google ad, social media link or a referral. (Google Support, n.d.) A starting page (3) is a page through which users explore the site or where users initiate an internal search. The main difference between the two is that starting pages represent pages where visitors start their user journey through the site whereas landing pages represent one-time visits. However, the landing page and starting page are the same when people use the landing page to explore the website. (Blyp, 2022.)

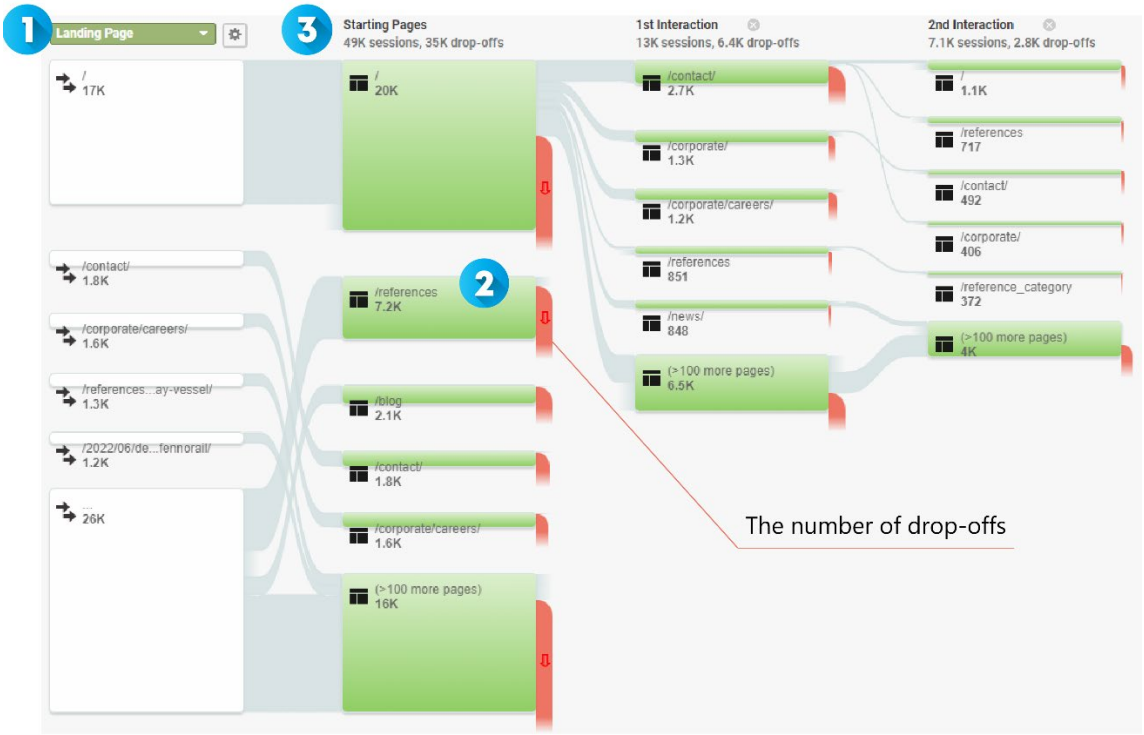


Figure 18. Deltamarin's mobile traffic behavior flow in 2022 (Google Analytics).

When looking at the landing pages, it is clear that the majority of users come to the site to find information about careers, to see specific references or news, or to find contact information (Figure 18). These are also the most popular exit pages with a drop-off rate between 85% and 95%. Drop-offs represent the percentage of users that leave the website after visiting the page (Goebelbecker, 2022). A high drop off rate is not necessarily a bad thing since it can mean that the website is working as intended and users are finding what they are looking for after just one page.

It is still worth considering if something can be done to better engage these visitors. One such example would be increasing the number of call to actions (CTAs) on the site, as currently the pages have almost none. A call to action is an instruction to visitors that encourages them to take a desired action, such as *buy now* or *invite a friend* (Quadros, 2022). Increasing the number of CTAs on Deltamarin's site could extend the user stay and reduce the number of drop offs by encouraing users to continue exploring the site further. One example would be to add *similar news you might like* or *have you also read this?* CTAs to the news page.

Among the landing pages, there are two pages that stand out as alarming in terms of the number of drop offs, and these are references and blogs. Since these pages are merely archives, that is, links to various references and blogs without any significant information per se, it is unlikely that a visit to these pages alone fulfilled a user's goal. It is much more likely that the user was searching for a specific reference or a blog but gave up before finding the page. As the number of drop offs for references and blogs was as high as 85%, this is a major loss of potential visitors that needs further analysis.

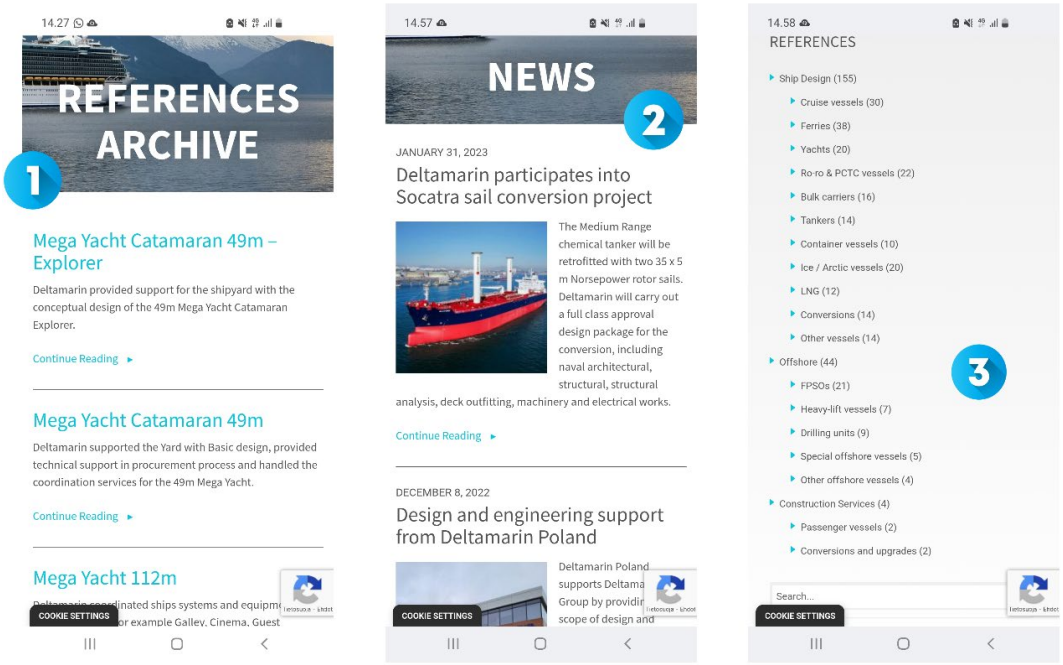


Figure 19. UI of DM (4): 1. The beginning of References page 2. The beginning of news page 3. Reference filtering at the end of the reference page.

One reason for the loss of visitors can be the lack of filters or a search option at the top of the pages. As shown in Figure 19 (1,2), it appears to the visitors that there is no clear way to limit the results or to search for a specific one. The absence of these features can prompt users to leave the site if they believe they have to manually go through each page to find what they are looking for. The filtering option the site currently has is located at the end of the page (3), but the location is not intuitive and is easily overlooked by the users. Most service safari participants who used the filter discovered it by accident, if at all. The filter is also simple without any funtionality and does not include a search option.

The issue with the filter applies to both desktop and mobile users, but the percentage of drop offs is higher on mobile, counting up to 90% (Table 7). When looking at the number of drop offs in general, the table shows a clear trend. The drop offs are around 6,5% higher on each mobile page than on desktop. The website has not been optimized for mobile, and the difference in the number of drop offs can be seen to result from a cross-device compability issue. It seems as the lack of mobile compability aggravates the site's existing problems. The filter is already bad, but its location at the end of each page makes navigation on mobile more difficult. The navigation menu is already confusing, but the lack of design elements makes it even more confusing for mobile users.

Table 7. The number of drop offs on desktop versus mobile in 2022.

Landing page	Drop offs on desktop (%)	Drop offs on mobile (%)
/	51.3%	68.2%
/references	82.3%	90%
/contact	89.4%	85.4%
/corporate/careers	90%	95.2%
/references/…pipelay-vessel/	93.6%	98.6%
/news/…fennorail/	89.3%	96.4%

Besides the lack of design elements, one clear flaw in mobile navigation is the inability to access the navigation menu anywhere on the page. The navigation menu disappears after scrolling down a page and can only be accessed by moving back to the top of the page. This makes navigation to another page difficult and can be frustrating for the user, especially since the quick button to move back to the top of the page is not always visible. When now thinking about the reference and blog pages and their high drop off rates, it is no longer so surprising why users end up leaving the pages. The pages seem to have no filters, no search funtion and no navigation menu accessible, leaving users with little options for what to do.

A final reason for the high percentage of drop-offs, and this applies especially to the home page, can be the slow loading time. Largest contentful paint (LPC) represents how quickly the main content of a web page is loaded. Specifically, largest contentful paint measures the time from when the user initiates loading the page until the largest image or text block is rendered within the viewport. Most users do not care how long it takes to load every element of a page but, they do care how long it takes to start getting value from the website. LPC measures that value moment. (Pollard & Walton, 2022.)

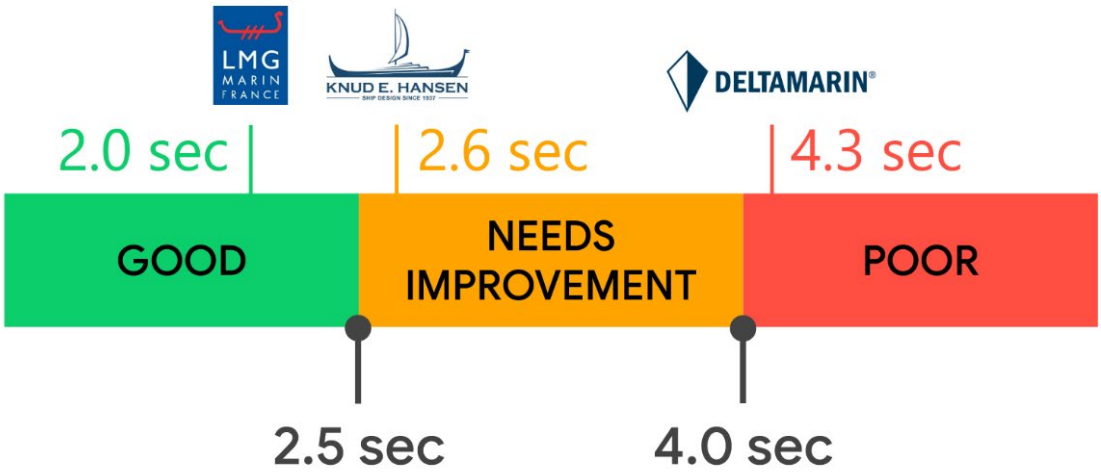


Figure 20. Comparison of LPC metrics (modified from Pollard & Walton, 2022).

Deltamarin's LCP for the home page was almost double when compared to LMG Marin and Knud E. Hansen. It took 4,3 seconds to load the main content of Deltamarin's home page while the loading time was only 2,6 seconds for Knud E. Hansen and 2 seconds for LMG Marin (Figure 20). Users' attention spans are decreasing and people expect to see results quickly, so for a good user experience, sites should strive to have an LCP of 2.5 seconds or less for at least 75% of page visits. Deltamarin falls short of that value and improvements should be made to enhance user retention, engine optimization and overall user experience. (Pollard & Walton, 2022; Fairlie, 2023.) All the figures presented in this chapter can be found in a larger size in Appendix 5.

5.2 Definition

In the second phase of the research process, the research findings are synthesized to map out areas where problems are likely to emerge. Personas and customer journey maps are created in the process, so that customers and their journeys can be understood even more deeply. Based on the results of the service safari, behavior analysis, personas and customer journey maps, the most important problem areas can be defined, which serve as the basis for the final stages of the research; developed and delivered.

5.2.1 Key findings

Reflecting on the results of the service safari, the following Table 8 has been comprised. It contains the key findings of the research followed by recommended actions to improve the usability and performance of the user interface. The table does not only focus on the strengths and weaknesses of Deltamarin's user interface, but also includes important insights from Knud E. Hansen and LMG Marin's results. Competitors' strengths help the process by giving examples of how things could be done while weaknesses help to understand what to avoid so that similar mistakes are not repeated in the new design (Kyrö & Kulmala, 2014).

Table 8. Key takeaways of service safari.

Viewpoint	Key takeaway	Action
Navigation	NAVIGATION MENU - The search bar should be more visible - The menu should be shorter and more logical - There should be only one link for references - The menu bar should be always accessible REFERENCE & NEWS - There should be a search bar at the beginning of the pages - There should be a filtering option at the beginning of the pages	NAVIGATION MENU - Move the search bar to the beginning of the menu - Simplify the menu and remove duplicate reference links - Reconsider site structure and hierarchy - Fix the position of the menu bar REFERENCES & NEWS - Add news filtering - Add reference filtering - Add search bars to both reference and news pages
Appearance	GENERAL - Header images are too large - Headings are too large NAVIGATION MENU - Font size is too small - Color, fonts, or indentation should be used to make the menu clearer REFERENCES & NEWS - The reference page was said to look *strange*	GENERAL - Change header image sizes - Change heading sizes NAVIGATION MENU - Increase font size - Make the menu clearer by using fonts, colors, and other design elements REFERENCES - Add filters to make the reference page look like those of competitors

The results have been categorized into two main sections of navigation and appearance. Key takeaways represent the key findings revealed during research, while actions are suggested improvements that should be made based on the key takeaways. As stated in chapter 5.1.2., the largest development areas uncovered in research were the navigation menu and the reference and news filters, both in terms of navigation and appearance. The findings of the behavioral analysis were very similar to those of Service Safari and no contradictions were found. On the contrary, the data was very consistent, and the findings supported and helped to explain each other.

Table 9. Key takeaways of behavioral analysis.

Key takeaway	Action
User paths are short and drop off rates high	Increase the number of CTAs and add internal links to relevant pages Add a filter and a search bar to references and news pages
Navigational menu must be more functional and accessible	Create a fixed navigation bar Move the search bar to the beginning of the navigation menu Simplify the menu and remove duplicate links Make the menu clearer with the use of fonts, colors, and other design elements
Loading times are too long (LPC)	Optimize the size of the images and other content that will be added to the site from now on Go through the current content and remove unnecessary pages, images and information that will not be added to/will not be a part of the new design Discuss with the service provider of how to decrease LPC now and in the future

Table 9 presents the results of behavioral analysis. The key takeaways include short user paths and high drop off rates, nonfunctional and unaccessible navigation menu and long loading times. The main reason for the problems was considered to be the lack of mobile optimization, which significantly weakened the navigation of the site. Similarly to the service safari, the key actions include improving the current navigation and the reference and news filters. Consideration should also be given to what types of CTAs could be added to pages to extend the user stay and increase the time users spend on the site. It can be concluded that both the service safari and behavioral analysis uncovered similar issues in the site's usability and performance, and the recommended actions focus on fixing the issues for a better user experience.

5.2.2 Personas

Based on the findings of service safari and behavioral analysis, three personas were created. The methods provided the researcher with a good overview of the different ways Deltamarin's website is utilized and gave insights into related persona types. The three personas introduced in the study are Isla, Lennart, and

Roddy. Each person has a different personality, motivators, and values, which reflect their ways of using the website and their requirements for the site.

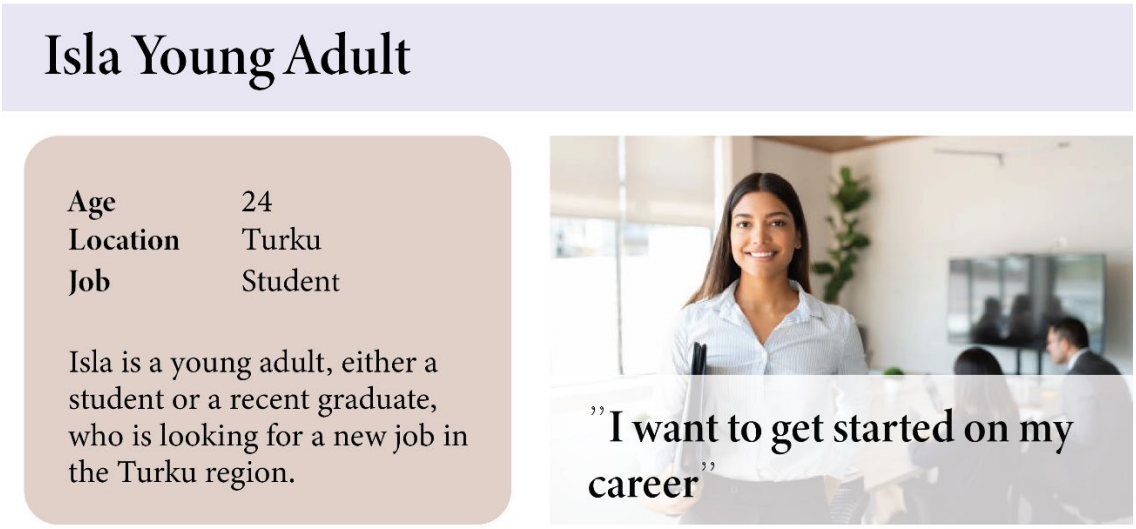


Figure 21. Persona one: Isla.

The first persona (Figure 21), Isla, represents users who visit Deltamarin's site for information about the company and its career opportunities. She is studying either in her final years or is a recent graduate eager to start her professional career. Isla's field of study is most likely marine related, but if not, she has heard about Deltamarin through friends or acquaintances. Isla knows that Deltamarin is a large employer in the Turku region and is interested in knowing more about the company. She initially explores the site through *news* and *about us* pages, before moving on to the career opportunities. While she is interested in Deltamarin as a possible employer, the company is just one of her options and she knows that her skills are valuable. Isla is quite impatient with low tolerance for laziness and inefficiency, so she wants to achieve things quickly. She is eager to get started on her career and cannot wait to land her first full time job.

Figure 22. Persona two: Lennart.

The second persona (Figure 22), Lennart, has worked in the marine industry for 20 years and is enthusiastic about his job. He is a senior engineer and was recently also promoted to a discipline leader with 20 structural engineers in his team. Lennart wants to be up to date on the new developments and trends in the marine industry, especially technological achievements that might affect his work, so he follows the industry news regularly. He is familiar with Deltamarin through his work and every now and then comes across news about the company. Whenever something interesting comes up, he visits the website to learn more about the subject, and while being there, also checks the latest references Deltamarin has worked on. Lennart has a laid-back personality; he enjoys quality time with his family and tries to avoid stressful situations. He likes to plan things in advance and is usually well organized and punctual.

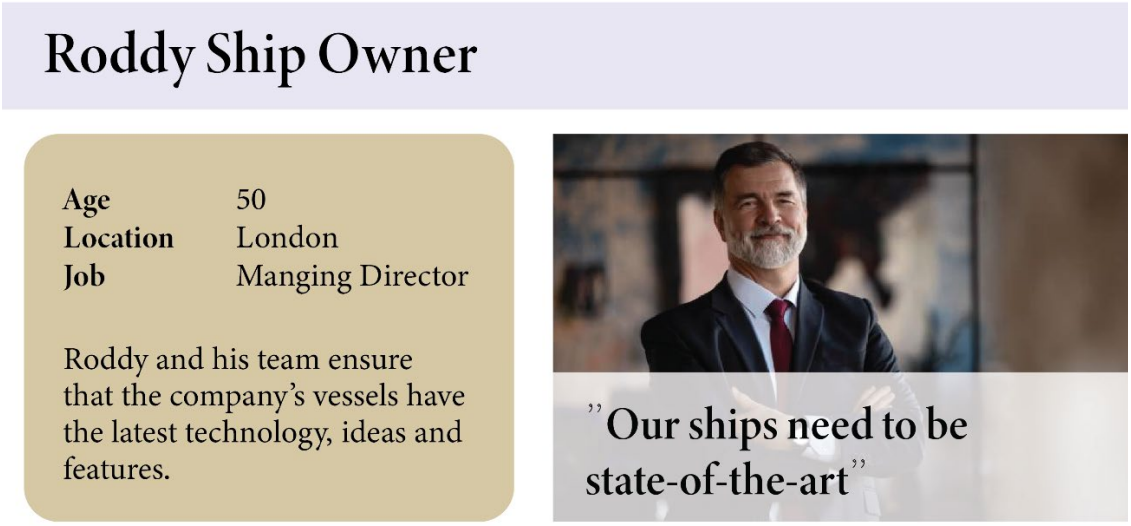


Figure 23. Persona three: Roddy.

The third persona (Figure 23), Roddy, is a managing director at a ship owning company that focuses on cruise vessels. In his daily work, Roddy is in constant contact with shipyards, ship operators and designers around the world. He is always on a lookout for new technologies and ideas to implement to their existing fleet and new designs, but often looks for solutions nearby. Roddy has heard of Deltamarin many times but has yet to collaborate with them. He tends to work with companies he knows well and has had a long relationship with and rarely collaborates with anyone new unless someone close to him recommends it. He puts a lot of emphasis on the opinions of those who he trusts and respects. Roddy leads a team of 15 people who do the operational work for him. He is very proud of his team and, respectively, his team thinks very highly of him. Roddy is a busy man, under pressure from many directions, but always manages to strike the ideal balance between being strict yet nice and experienced yet humble.

5.2.3 Customer journey maps

Customer journey maps were created for each persona based on the findings of the service safari and behavioral analysis. Complete customer journey maps with more detailed information and in a larger size can be found in Appendix 6.

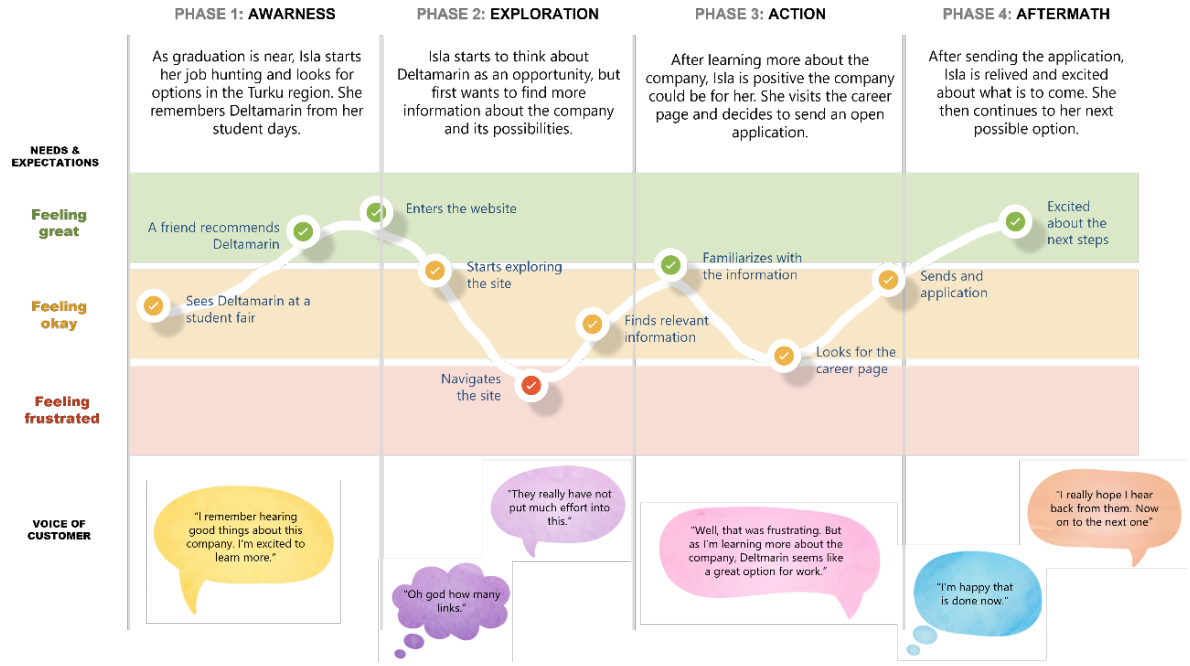


Figure 24. The customer journey map: Isla.

Having spent half of her life on the family's sailing boat, Isla (Figure 24) developed a strong interest in the marine industry. She decided to study naval engineering and is now about to complete her degree. She is looking for her first permanent job and remembers Deltamarin from her study years. She asks for a friend's opinion on the company and her recommendation makes the decision very easy. She wants to find information about the company's sustainability standards and code of conduct before applying, so she visits the company's website and starts exploring. As she navigates through the site, she starts to feel a bit frustrated. It takes her a while to find the pages she is looking for, landing on them just as she was starting to think about opting out. Although the navigation made her a little annoyed, the information she found convinces her to send an open application. After submitting the application, she is excited about the thought of hearing back from the company but cannot deny the fact that the applying process left her frustrated. She is mostly glad it is done and can move on to the next company on her list of possible employers.

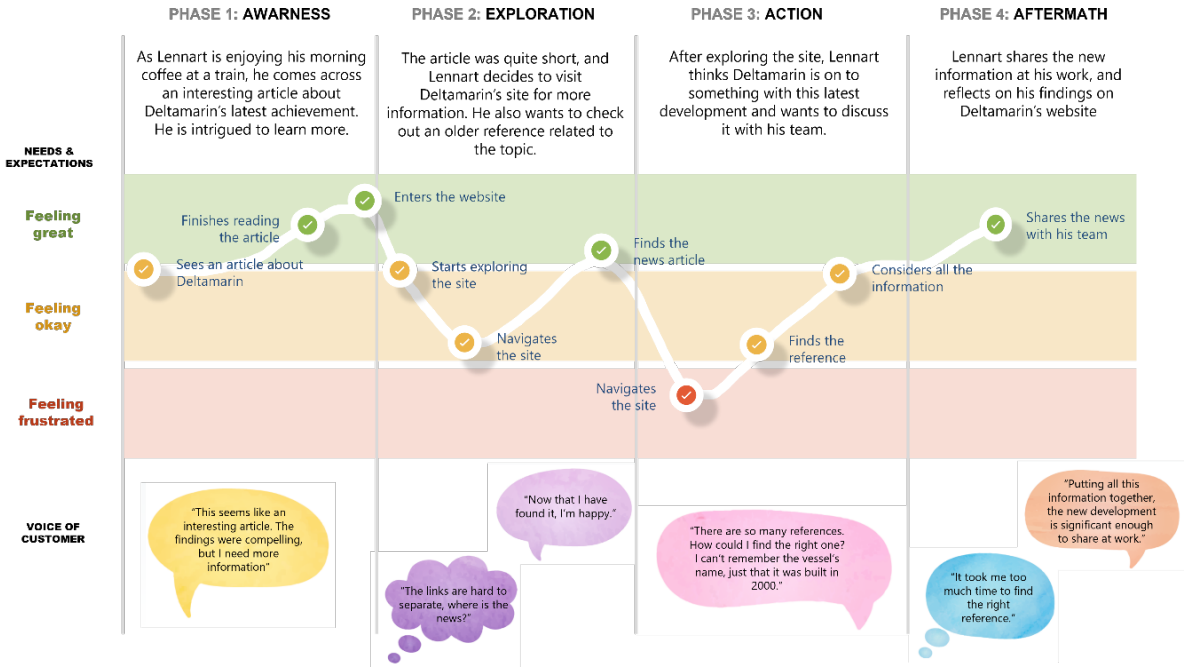


Figure 25. The customer journey map: Lennart.

Lennart (Figure 25) is on his way to work when he comes across an interesting article about Deltamarin's latest development. He is intrigued to learn more and visits Deltamarin's website for the full story. After arriving to the page, he struggles to find the news link in the menu. All the links are blurred together, and it is difficult for Lennart to tell them apart. He manages to find the right link and is happy to find the news he was looking for as the first one on the page. He finishes the article but wants to find more information about a ship mentioned alongside the news. He finds the correct reference page but struggles to find the right vessel on the page. He remembers the year of the ship but does not remember its name, which makes searching difficult. He goes through four pages of references and starts to feel a bit frustrated. On the 5th page, he finds what he is looking for and checks a few details on it. After considering all the information he has found, Lennart decides to bring it up to his team at the morning meeting. The technology is something they could benefit from, and they need to consider contacting Deltamarin for further details.

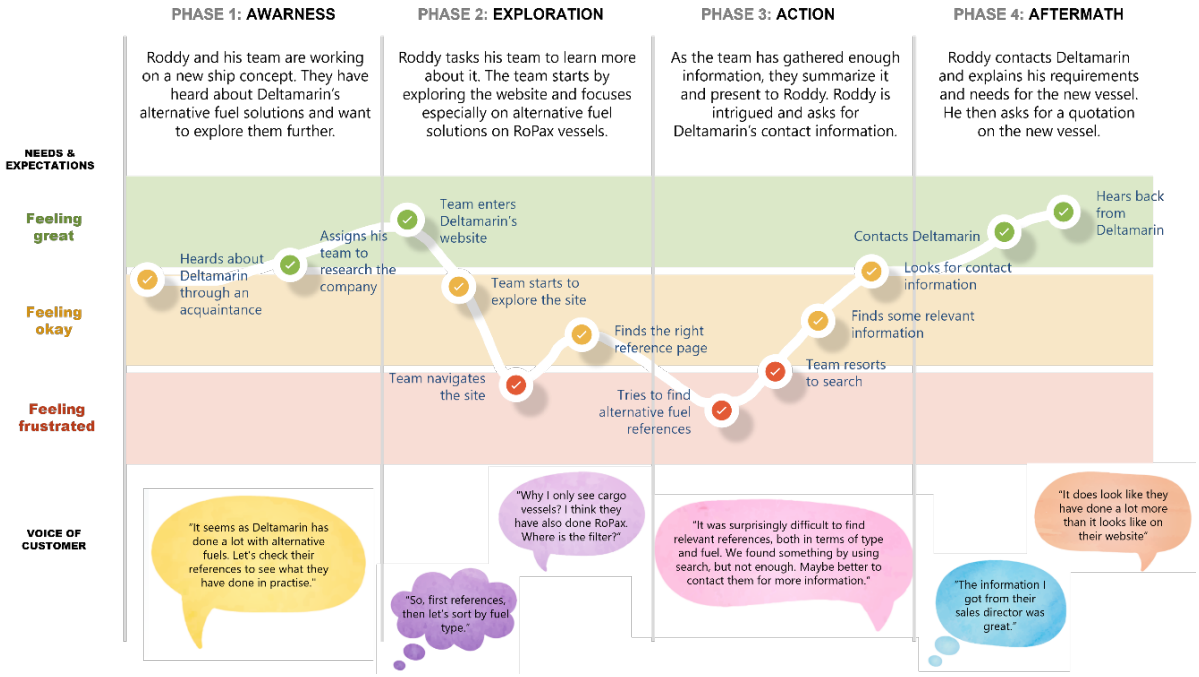


Figure 26. The customer journey map: Roddy.

While chatting with an old acquaintance, Roddy (Figure 26) brings up a new cruise ship concept they have been developing. The ship will run mainly on alternative fuels and Roddy is searching for design companies experienced in the field. Roddy already has a few companies in mind but wants to ask for his colleague's opinion also. His friend recommends Deltamarin and encourages him to explore their solutions further. Roddy is hesitant but assigns his team on the matter.

The team visits Deltamarin's website for more information. They start their search on the reference page but are confused when it displays only bulk carriers. It takes them a while to understand that there is another link for references. After finding the right page, the focus shifts to vessels that operate on alternative fuels, which turns out to be more difficult than expected. The results cannot be filtered, and, by this point, the team starts to get frustrated. They decide to use the site's search bar but are not convinced they have found all the necessary information. They suggest that Roddy contacts Deltamarin directly. Roddy calls Deltamarin's sales director who explains in detail what they have been working on, which

appears to be a lot more than it seemed on the website. Roddy decides to give the company a chance and asks for a quote on the new vessel design.

In all three cases, majority of the pain points relate to site navigation. Searching for information is difficult and the navigation menu is confusing. Finding the right information takes time and leaves users frustrated. This applies to all personas, regardless of their agenda and reasons for the visit. While the pain points occurred in different contexts and at different stages of the journey, all of them can be solved by improving the navigation menu and the location of the search bar. The example shows that a poor design can result in multiple bad experiences depending on the variations in the users. It is, therefore, important to design for a target audience based on solid knowledge of that audience. (Flavián et al., 2009, pp. 169–170.)

5.3 Development and delivery

The develop and deliver phases typically pick up the outcomes from the research and discovery and use them to inform creative synthesis, such as a new concept or a solution (Cramer, 2021a). The research insights were synthesized in multiple sessions, which led to the definition of key actions that serve as the basis for ideation and prototyping. The actions have been divided into three main viewpoints of navigation, appearance, and performance, each responding to one or more user personas and main problem areas (Table 10). The actions are a summary of the findings of the service safari, behavioral analysis, and customer journey maps.

Table 10. Key actions for the final design concept.

Viewpoint	Action
Navigation	NAVIGATION MENU - Move the search bar to the beginning of the menu - Simplify the menu and remove duplicate reference links - Reconsider site structure and hierarchy - Fix the position of the menu bar REFERENCES & NEWS - Add news filtering - Add reference filtering - Add search bars to both references and news pages
Appearance	GENERAL - Change header image sizes - Change heading sizes NAVIGATION MENU - Increase font size - Make the menu clearer by using fonts, colors, and other design elements REFERENCES - Add filters to make the reference page look like those of competitors
Performance	Increase the number of CTAs and add internal links to relevant pages Optimize the size of the images and other content that will be added to the site from now on Go through the current content and remove unnecessary pages, images and information that will not be added to/will not be a part of the new design Discuss with the service provider of how to decrease LPC now and in the future

The key actions will be implemented into the final design concept, which is an improved version of the website's user interface. The process of creating a mobile user interface starts with prototyping, which typically involves creating low-fidelity and high-fidelity prototypes. First, the researcher creates low-fidelity prototypes to show how information is organized on individual pages. After that, the low-fidelity prototypes are turned into high-fidelity ones by adding real content and imagery to validate the design with real users. As soon as a team has a validated high-fidelity prototype, the changes can be implemented into the website. (Babich, 2021.)

5.3.1 Low-fidelity prototypes

In the first development phase, the researcher created paper-based sketches of the service. Paper-based prototyping is the quickest way to get feedback on the preliminary site information architecture, design and content. They are helpful in enabling early visualization of the alternative design solutions, which helps to provoke innovation and improvement. (Usability.gov, n.d.) The first low-fidelity sketch was made with one of the participants of service safari in January 2023. The participant was a Deltamarin employee who wanted to consider possible changes to the user interface based on his experience. The sketch is depicted in Appendix 7 and includes ideas of the new navigation menu and reference filter. These initial ideas were utilised also in the sketches the author created.

Figure 27 displays a sketch of the improved navigation menu with a shorter, clearer and more concise layout. The content of the website has been divided under six main headings and the number of links has been reduced. Most of the headings will not include sub-headings, as the menu wanted to be kept as simple and clear as possible. The font size is also larger, and the different headings have been separated with a divider and indentation. The order of the headings is not fixed but is to be decided in the next development phase. The navigation bar will have a fix position at the top, and the search can be found just beneath it.

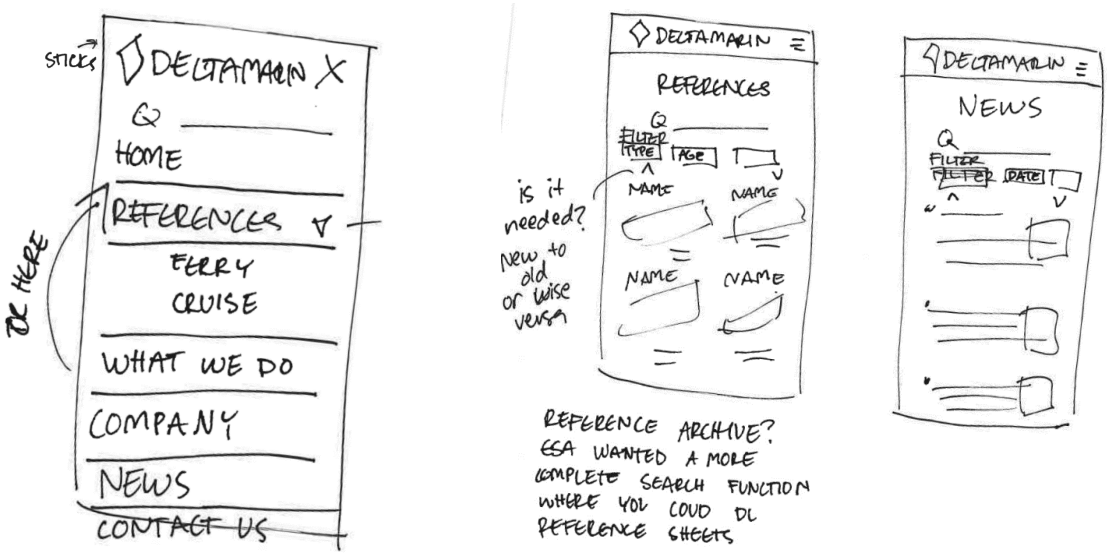


Figure 27. Sketches of the navigation menu and references and news pages.

The sketches of the new reference and news pages are also displayed in Figure 27. Filters and a search bar have been added to the beginning of the pages to make navigation more efficient. Header images have been removed and the headings are in a smaller font, allowing more space for relevant information. When it comes to the references, the page will display two vessels per row to fit more information in a smaller space. This allows a user to see up to four references in the above the fold section, increasing the amount of information a user sees when arriving to a page. The text that is displayed with each vessel is also minimized. The layout of the news page will not change as much, but removing the header image and decreasing the header size means that more news can fit into the above the fold section.

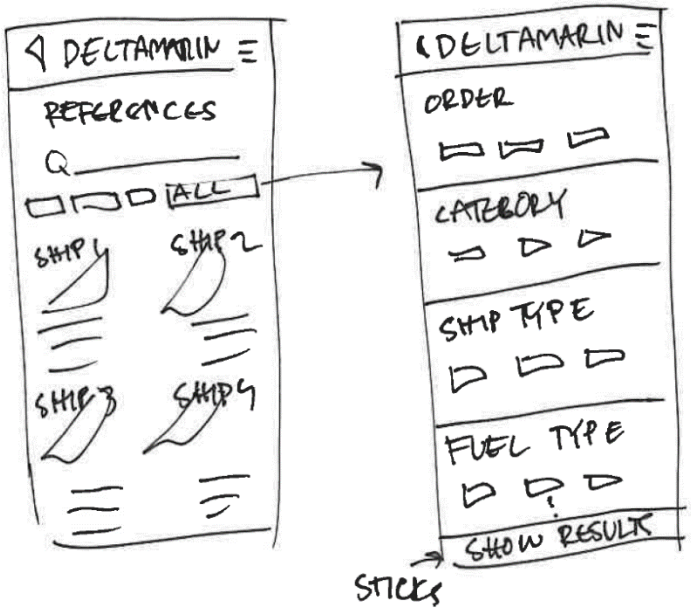


Figure 28. An initial sketch of the reference filter.

Due to the limited scope of the thesis, only the reference filter will be assessed in more detail, both in low-fi and hi-fi prototypes. As shown in Figure 28, the reference page will display only the most used filters while the full list will open to a separate window from which a user can choose any combination of filters. This was because not all the desired categories could fit on the reference page, but it made more sense to open them in a new window. The filter makes it possible to create versatile searches, which is important not only for Deltamarin's customers

and website visitors but also for the sales personnel in their day-to-day work. The *show results* bar will have a fix position at the bottom of the page so that the results can be accessed at any time without a need to scroll up or down the page. The filter categories will be defined in the next phase of the prototype, but they will include at least vessel age, type, technology, and scope.

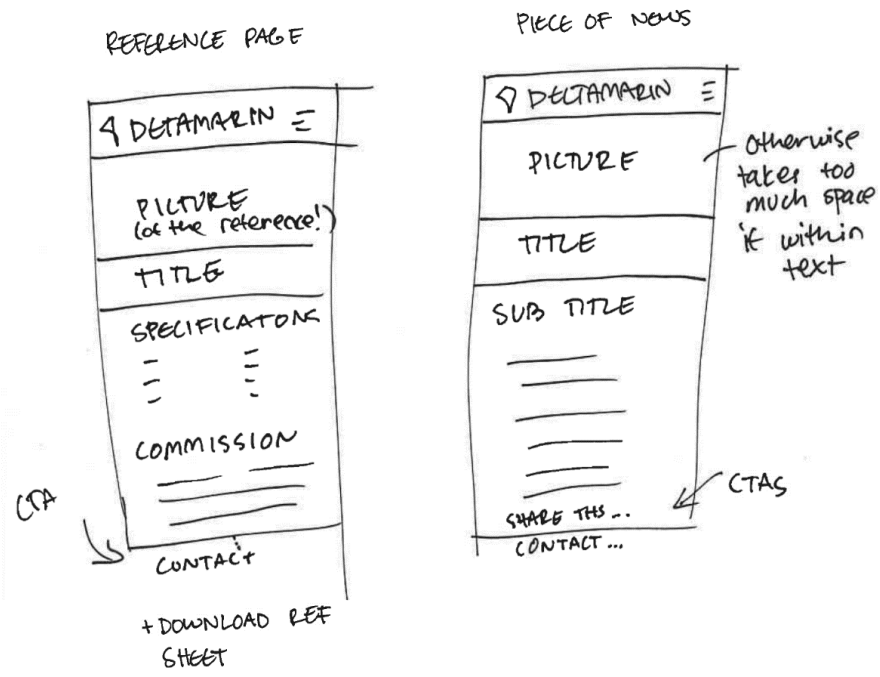


Figure 29. An initial sketch of the new visual layout (references & news).

Individual reference and news pages have been changed only in terms of appearance (Figure 29). Similarly to the current layout, both pages have a header image at the beginning of the page followed by a title. Existing header images have been removed and replaced with content-related images as they are general brand images not directly related to the page in question. The brand images are not bad per se, but they do not bring enough value to the mobile version to make up for the lost space. By removing the images, more important information is visible in the above the fold section. The pages will also include new call to actions in addition to *share* and *contact* links, such as an option to download a reference page to PDF, as requested by Deltamarin's sales and marketing director (E. Jokioinen, personal communication, January 30, 2023). All the figures presented in this chapter can be found in a larger size in Appendix 8.

5.3.2 High-fidelity prototypes

The low fidelity prototypes were turned into a high-fidelity ones by adding real content, imagery and animated transitions to the prototypes (Babich, 2022). The focus was on making interactive prototypes that could be tested with real users and Deltamarin's staff to review their funtionality and provide feedback. The main improvement areas were the navigation menu and the reference filter, but improvements were also done to individual reference and news pages. The prototypes were created to closely match the final design of Deltamarin's website with detailed look, work and feel (Babich, 2022). The hi-fi prototypes will be assessed in the same order as the low-fi prototypes, starting with the navigation menu, followed by the reference filter and ending with the new visual layout of the individual reference and news pages.

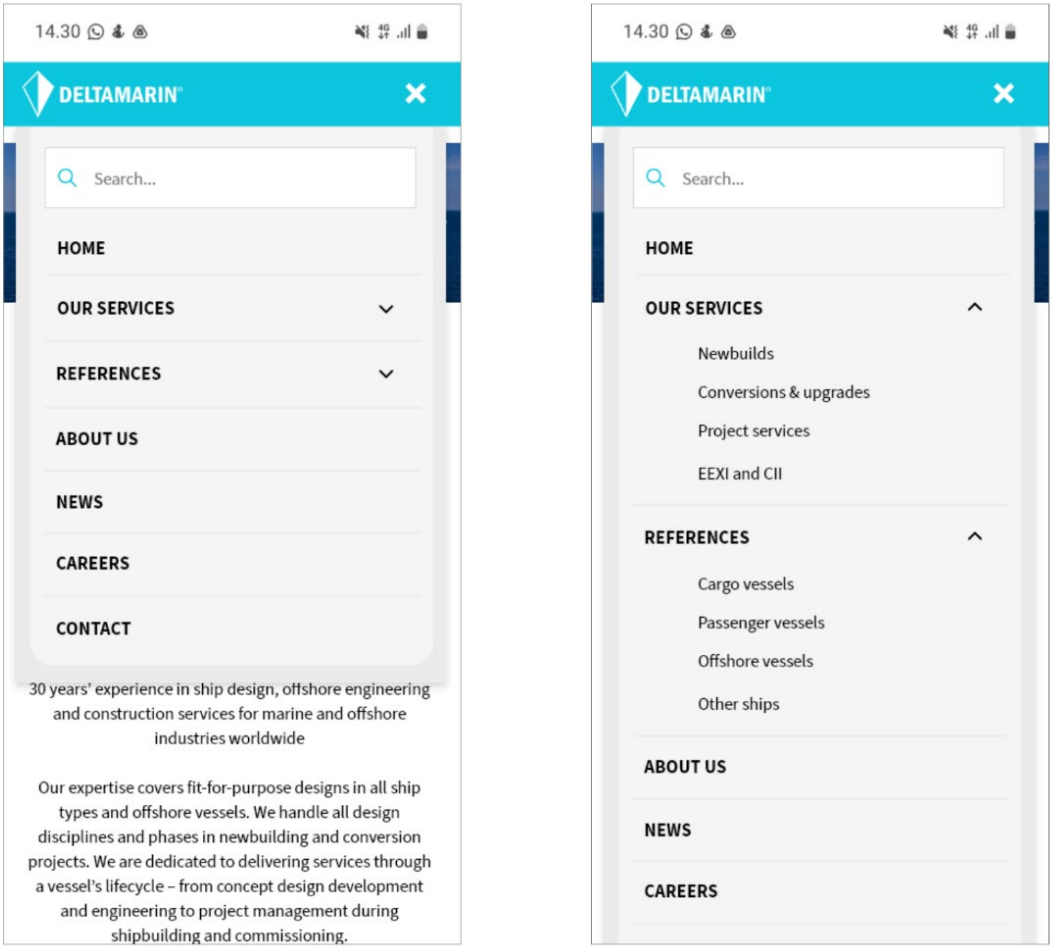


Figure 30. Hi-fi prototype of the navigation menu.

The improved navigation menu is displayed in Figure 30. The menu is simplified and easier to read. Content has been divided under new headings that better resemble the content and reduce confusion. Services and references include sub-headings that are hidden by default. The search bar has been moved to the top of the menu. All these features have been added to make the site easier to navigate and in turn, help users find what they are looking for faster and more conveniently. The changes have been created based on research findings to ensure they cover real user needs. The navigation bar has also a fix position at the top and can be accessed everywhere on a page.

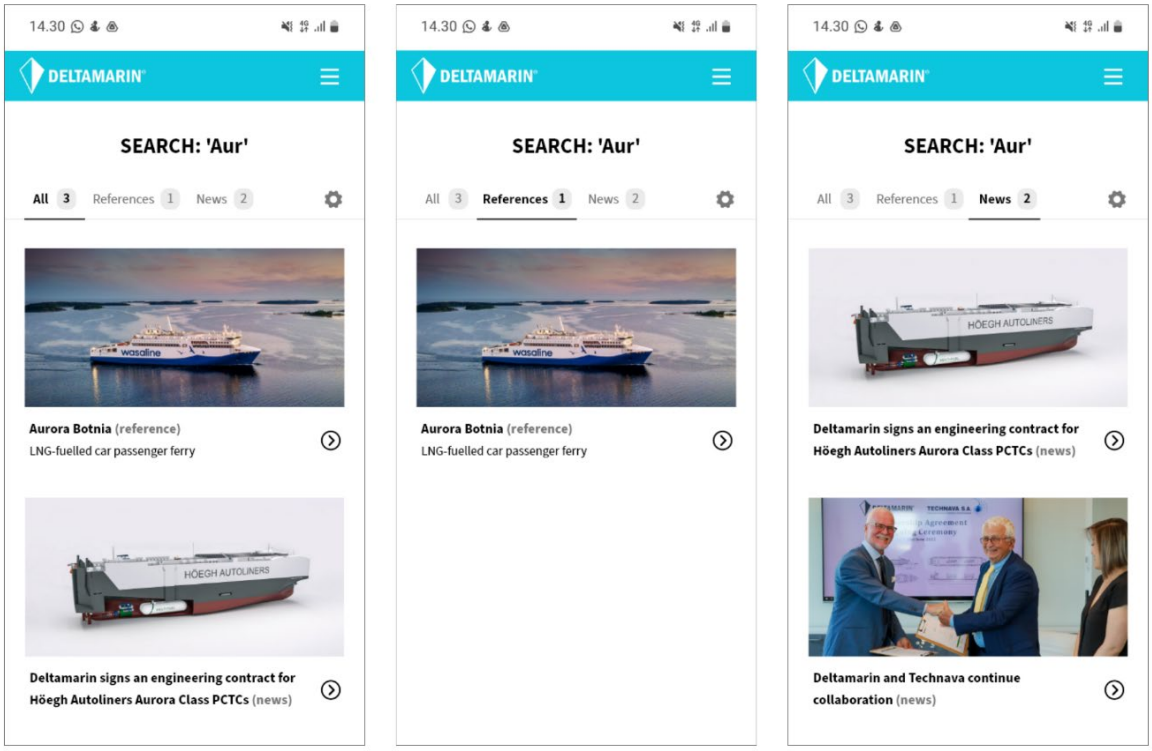


Figure 31 Hi-fi prototype of the improved search

When the location of the search bar was changed, the researcher thought about possible improvements to its funtions. Since the purpose of the search bar is to help users find what they are looking for, the ability to sort the results by type could be useful, especially when there are multiple results from different areas of the site. Figure 31 shows an example of a search result that is sorted by type. In this case, the results are sorted into *references* and *news*, but there could be

more types under the settings icon, such as *contacts* or *blogs*. The ability to categorize search results by type makes it faster for users to find what they are looking for, improving the usability of the site.

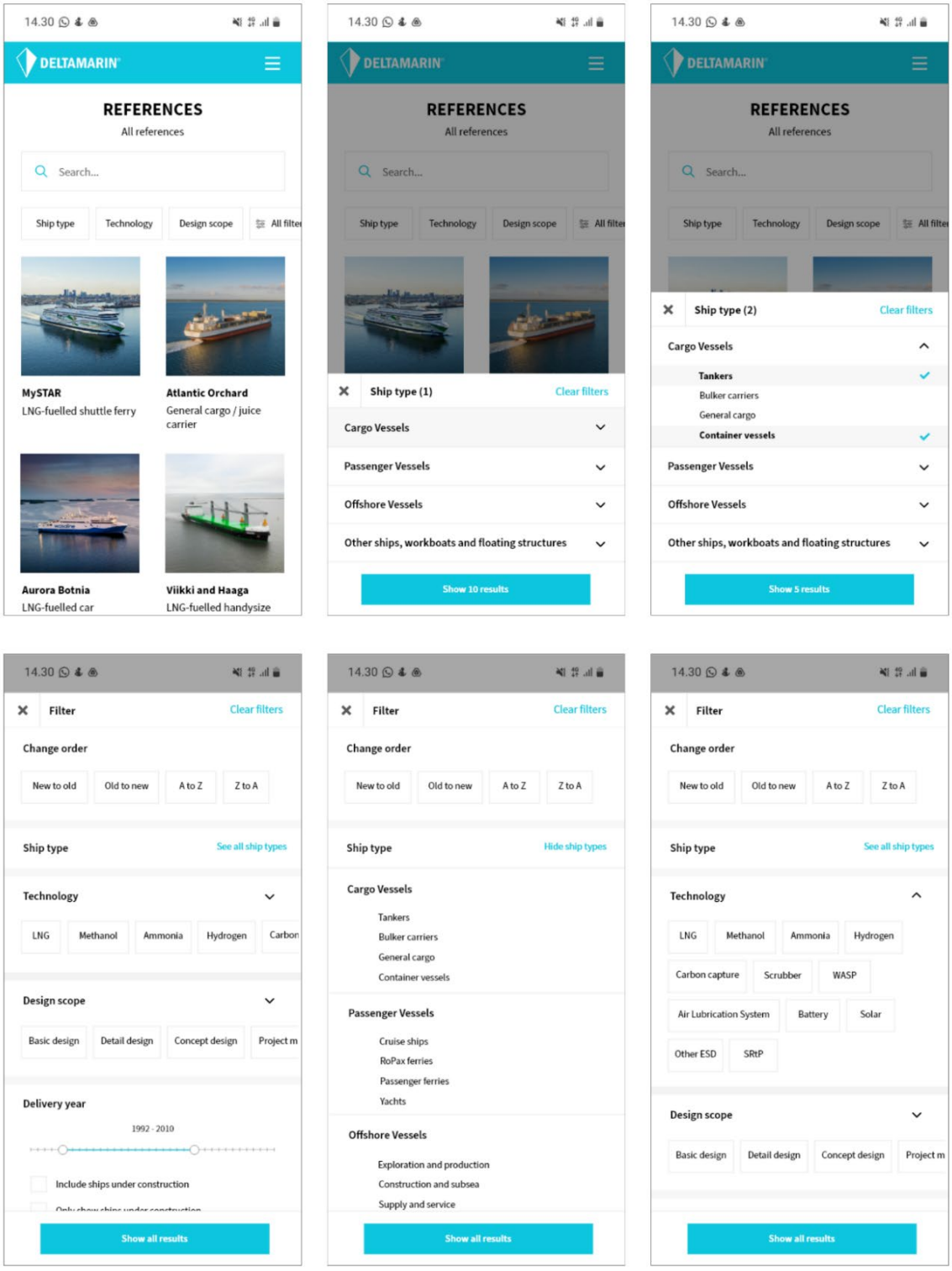


Figure 32. Hi-fi prototypes of the reference page and filter.

Figure 32 present the new reference layout and filter. The search bar and the filter can be found at the beginning of the page. Two references are displayed side by side to allow more references to fit into the screen. Selecting a ship type opens a menu from which a user can choose either an upper-level or a lower-level ship type. The background of the page is darkened to highlight the active area. The number of the chosen ship types is shown at the top of the menu so that users are always aware of the number of types selected. The blue button at the bottom of the page displays the number of results per the combination of ship types selected. Filters can be cleared from top right, and the menu can be closed either by pressing the cross icon or by clicking anywhere on the dark area. The filter makes it easy for users to select any combination of ships, and the same design can be applied to other filters displayed on the references page.

The list for all filters is displayed on the second row of Figure 28. In addition to the ship type, it includes categories for technology, design scope, delivery year and design discipline. The options for each category are partially hidden, but can be accessed either by scrolling horizontally or by pressing the arrow next to the category, which shows them one below another. The order of the results can also be changed so that the references are displayed either by the delivery year or in an alphabetical order. The need for the reference filter was evident in service safari and its absence made task completition difficult. Deltamarin believes the importance will only increase as the number of references grow and that its sales personnel will also benefit from the feature (E. Jokioinen, personal communication, March 5, 2023). Overall, the new design provides a much-needed addition to the website and improves the page’s usability by making it more versatile and reponsive to future needs.

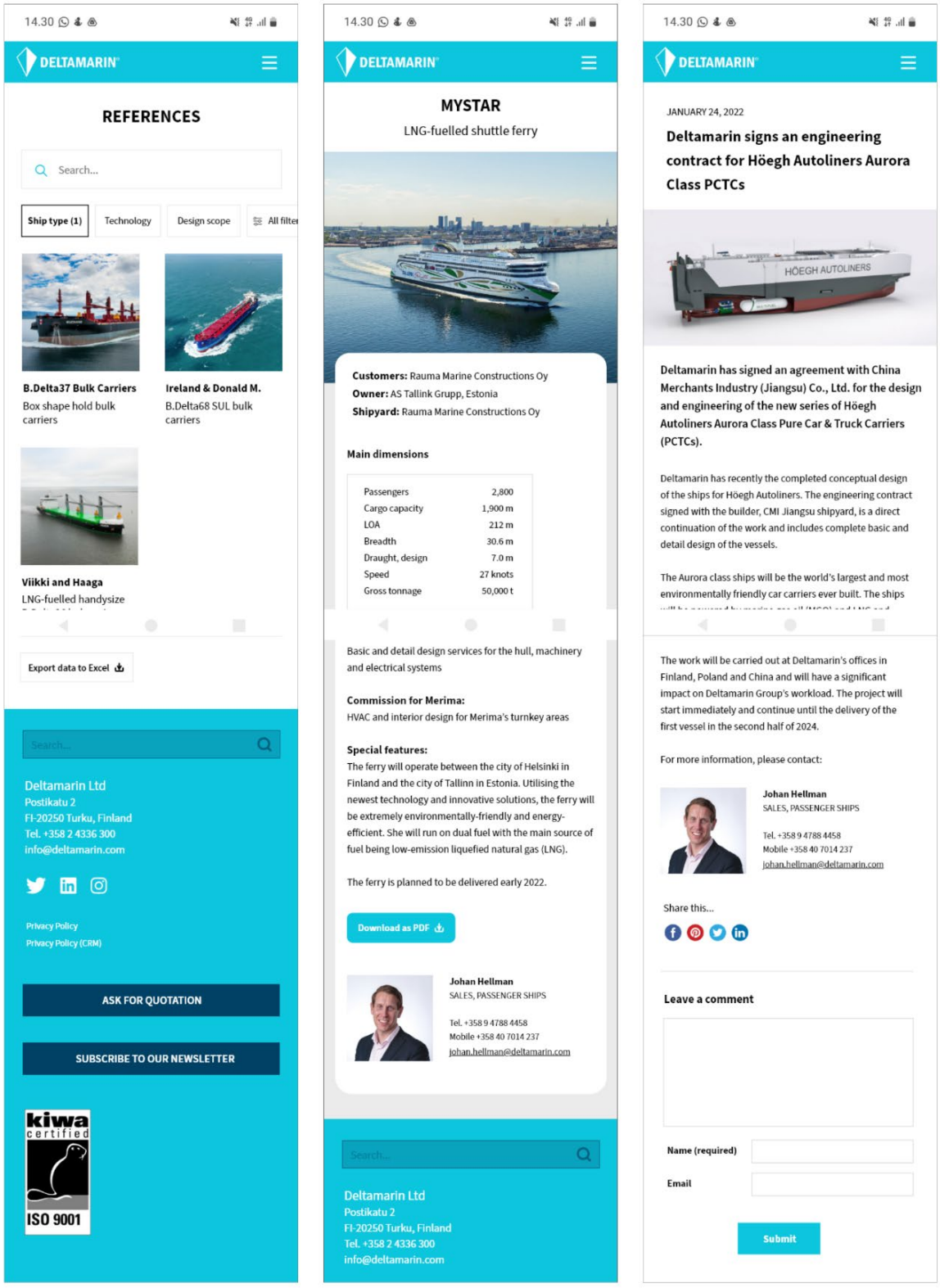


Figure 33. Hi-fi prototypes of the new layout designs.

The new layouts for individual reference and news pages are displayed in Figure 33. The focus was to increase the clarity and readability of the pages. The number of call-to-actions was increased and new ones were added to better engage users. One of these new additions was the ability to download a single reference page to PDF. A similar call-to-action was added also to the reference page, and users are now able to export the filtered results to excel, as shown in the Figure 33 (1st picture). The ability to export filtered results and individual reference pages is convenient not only for the users who want to save the information for later, but also for Deltamarin's sales personnel who regularly needs these types of materials in their work. Another clear improvement in the layouts is the smaller size of headings, headers and images. Important information and relevant pictures now fit to the above-the-fold section, making the page more relevant and useful for a user from early on. All the figures presented in this chapter can be found in a larger size in Appendix 9.

6 **Results**

The purpose of the study was to examine how the performance of Deltamarin's mobile website can be improved with the help of service design methods and tools. The research was started by focusing aspects important to web design and how these can be optimized with user experience design methods and tools. By combining the concepts of web design and user experience design, the researcher was able to narrow the study's focus on features important for the website's redesign. This study was conducted as mixed methods research and the empirical contribution involves both qualitative and quantitative research methods.

Table 11 illustrates the main findings of the study. It consists of issues revealed in research as significant for the functionality and performance of Deltamarin's website. The findings have been divided into three key areas of *navigation*, *filters*, and *appearance*, each with its own pain points, corrective actions, and received benefits. Pain points refer to issues that negatively affect the site's performance, either in terms of site speed, error rate or mislicks. Corrective actions refer to concrete measures aimed at fixing the pain points, and received benefits highlight the advantages of each action.

Table 11. The main findings of the study.

Key area	Pain point	Corrective action	Received benefit
Navigation	• Navigation bar disappears when scrolling down a page • No clear way to search for information as the search bar is located at the end of the navigation menu • The navigation menu has too many links, some of them duplicates • Links are on a small font that is difficult to read	• Create a fixed navigation menu • Move the search bar to the beginning of the navigation menu • Rearrange links and remove unnecessary • Increase the font size • Make menu clearer by utilizing fonts, colors, and other design elements	• Features are more accessible to users • Time spent searching for information (wasted time) is reduced as the navigation is clearer and easier to use • Users find relevant content faster • User frustration is reduced as the site's functionality increases • People are less likely to opt out since the site is more user friendly

	• No CTAs to guide users further to the site	• Optimize the current content in terms of CTAs and come up with new ones	
Filters	• No clear way to filter down results on the references and news pages • No clear way to search for information on the references and news pages	• Add search bars to the pages • Create reference and news filters for these pages	• Users can find what they are looking for faster and more conveniently • Time wasted on scrolling and searching for information is reduced • People are less likely to opt out because the pages are more user-friendly • Users are more likely to continue their visits beyond the original purpose when they are satisfied with the information they have found and possibly interested in reading more • Less user frustration as the site's functionality is increased
Appearance	• Header images take too much space on pages • Header images are not relevant to the content in question • Headings are on a large font that takes too much space • Navigation menu is confusing since its content has not been clearly divided with indentation and other visual design elements • Reference page looks *weird* (not what the users thought it would look like)	• Make header image smaller in size • Remove brand images that are not relevant to the content and replace them with ones that are • Make headings smaller in size • Make navigation menu clearer by utilizing dividers, colors, and other design elements • Make the references page look more like those of competitors (with the use of filters and design elements)	• Users sees relevant content faster • Time is not wasted on scrolling as important information is already visible in the above-the-fold section • The page is more visually pleasing and easier to comprehend • People are less likely to opt out because the pages are more user-friendly and they see content faster • Less user frustration as the site's functionality is increased

The main outcome of the recommended actions is the reduced time users must spend on finding information and comprehending the site. One of the main issues revealed in research was that users had difficulties finding the content they were looking for. As this is one of the most important tasks of a website, most of the actions are focused on tackling the issue. When implemented well, the new modifications will make the site more responsive to user needs and increase the

overall functionality and performance of the site. When users can achieve their goals quickly and easily, user frustration is reduced, and users are less likely to opt out prematurely. The researcher therefore put forward a proposal that involves the redesign of the site's navigation and a new approach to customer experience.

The result of the research informed the ideation phase and the initial prototypes evolved into the development of a new concept that proposes a switch from the current design into a concept that better support the user needs. The concept is presented in chapter 5.3.2 and consists of high-fidelity prototypes that present the suggested modifications in a visual format. While the final concept was created through research and user testing to ensure its functionality, continuous iteration, monitoring, and implementation of improvements will continue even after the prototype has been created, regardless of how well things are planned (Penin, 2018, p. 280). The final concept will be handed over to Deltamarin at the end of the project in May 2023, and it will used as a part of a complete website remake later in 2023.

Research analysis and validity

Data analysis is the practice of working with data to gain useful information, which can then be used to make informed decisions. Data analysis generally involves five main stages *of data preparation, initial exploration, data analysis, data representation,* and *data validation*. The first stage of *data preparation* focuses on transforming the collected data into a form that is usable for analysis. (Cresswell & Plano Clarle, 2007, p. 129; Denscombe, 2007, p. 289.)

In this study, user tests were recorded, and the main content of the interviews written down on a paper. The results of each user were compiled into a table, given a color code to help data analysis and divided into sections according to the company and task in question. The data included the elapsed time, actions taken, mislicks, and dead ends per each task. Interview results were used to explain the data and were noted alongside each the task. All results were later compiled into one table, and the researcher studied the material carefully to gain

an initial understanding of the results as a whole. This *initial exploration* phase can be seen to begin already during the interview phase as the researcher starts to identify specific themes that emerge from the discussions (Hirsjärvi & Hurme, 2008, p. 136).

Knowledge was deepened in the next phase of *data analysis* as the researcher focused more profoundly on the gathered material. She focused especially on themes that kept repeating or were linked to each other. Convergence adds strength to the findings as data from various sources is put together for a better understanding of the entity (Baxter & Jack, 2008, p. 554). It is important to note that data analysis is always guided by the researcher's persona and is dependent on the issues to which she pays attention. Research analysis is a researcher's interpretation of the subject under study and differences in persona, value system or communication style affect the way material is interpreted. (Hirsjärvi & Hurme, 2008, p. 189.) While acknowledging these limitations, researcher focused on analyzing the material as neutrally as possible while understanding that her position in the company may affect the interpretation.

Data representations are graphics that display and summarize data and help us understand the data's meaning. Data representation is realized through the writing process as the empirical material is combined with the theoretical frameworks of the study. (Denscombe, 2007, p. 288.) Tables were used to present the main research findings and visualize results to make sense of the gathered data. Screenshots were used as visual representations to describe the issues users faced during research and to help understand what the data in the tables meant. Throughout the thesis, the empirical material was in a continuous dialogue with the theoretical frameworks, which builds for a profound analysis and a structured conclusion of the research material (Pihlaja, 2006, pp. 53–54).

Data validation verifies that the data is true and correct and the results credible. Research validity is assessed through *credibility, transferability, dependability,* and *conformability*. *Credibility* refers to the internal validity of the research and describes how probable the data is to be accurate and appropriate. (Flick, 2002, p. 228; Denscombe, 2007, pp. 297–298.) The selection criteria for the service

safari case companies were a marine industry and a functional filter to make comparison between websites useful. The interviewees were chosen based on their familiarity with the industry. The first user group represented users familiar with the industry and/or employed by Deltamarin and the second users unfamiliar with the industry to see how the website meets the needs of both user groups.

The research material was assembled after the theoretical frameworks of the study were written, which ensured that the research questions covered the theoretical frameworks comprehensively and that the researcher had a solid understanding of the frameworks. The data validation was also increased by using multiple sources for information (Taylor, 2005, p. 102), and the number of interviewees provided a comprehensive view on the topic as specific themes kept repeating and new information was only minor during the last interview.

Transferability, described as the extent to which the results of the study are applicable in other contexts (Merriam, 2014, pp. 223–227). The results of the study may apply to organizations of the same size and industry, but they should not be used per se, but always tested with users before implementing. User groups and their needs are different and what works for Deltamarin may not work for some other organization. For the results to be generalized, the number of case companies and users should have been increased. The case companies should have also covered a variety of industries to achieve this level of transferability.

Dependability measures the similarity of the results if performed by another researcher. As the conditions of a qualitative research vary each time, a study cannot be replicated in a way that exactly same results are gained. In this study, the dependability refers mostly to the assessment of the research material and whether the research process is logical so that a reader can easily notice how a decision was reached. (Merriam, 2014, pp. 220–223.) The user tests were recorded, and interviews documented so they could be analyzed as precisely as possible, and the research process was documented in detail. All intermediate steps were reported in detail and in the order in which they took place, and nothing was left out.

Conformability relates closely to dependability as it depicts to what extent the researcher has influenced the outcome of the study (Denscombe, 2007, pp. 300–302). In this study, the researcher focused on analyzing the subject open-mindedly and focused only on the interviewees and their perceptions without giving room to prejudices or preconceptions. The researcher knew most of the interviewees beforehand but focused on being as objective and neutral with the data as possible. Data reporting included only what had been observed or said as opposed to what was thought to have been told or making one's own conclusions (Taylor, 2005, p. 102). It is still worth noting that subjectivity is always present in qualitative research to some extent and cannot be completely ruled out (Eskola & Suoranta, 2015, p. 210).

7 Conclusions

The conclusions of the study will be assessed through the research questions, starting from the sub-questions, and ending with the main research question. The purpose of the first sub-question was to find out ***which design elements have the greatest impact on website performance?*** The idea behind the first sub-question was to narrow the study's focus on the most important design elements for a website's performance and usability. The limitation was necessary due to the scope of the study. The first sub-question was answered in chapter 2.1.

Based on a literature review of eight studies over different decades, content, navigation, and design emerged as the most influential for a website's success. Recent studies also highlighted the importance of privacy, data protection compliance, responsive web design and a mobile-first approach. Due to the scope of the thesis, the study's design elements were limited to content, navigation, and design. The empiric part of the research focused on assessing the current state of Deltamarin's website from these perspectives. The research quickly revealed that the biggest factors affecting Deltamarin's website performance and the biggest flaws in terms of usability were related to navigation and design aspects, not so much the content itself. Content was therefore left out from further analysis, and the research focused mainly on navigation and design.

The navigation problems users faced were mostly convergent among participants and can be grouped under two categories of *navigation menu* and *reference and news filter*. The issues with the navigation menu were related to its illogical structure and illegibility whereas the reference and news filters were difficult to find and not versatile, which meant they were neither useful nor convenient. From design perspective, results were more diffused and often based on personal preferences, but *the navigation menu* and *the size of the design elements* emerged as clear themes that affected user experience. The font size of the navigation menu was considered too small and design elements should be used to make the menu clearer. On reference and news pages, headers and heading

images were said to be too large and dominant, taking space from important information.

The issues revealed in research were consistent with theory as both navigation and design elements emerged as important themes for the page's overall performance. The website's poorly designed navigation structure and illogical filters decreased the overall usability of the site through decreased speed and accuracy, while the ineffective design elements made it more difficult for users to find important content. While the navigation menu was emphasize in discussions related to navigation, design elements are also important for site navigation as it does not matter how good content a site has if users are not able to find it. Navigation should be considered in all aspects of the website, just as design elements apply to the whole design layout. Navigation and design were chosen as the main elements of the high-fidelity prototypes (the final concept) and their functionality as one of the main priorities.

After the main elements of the final concept were chosen, the next step was to understand the role of service design in website redesign. As the thesis focuses on improving the user experience of one service without considering its connections to other services or background processes, user experience design (UX) was chosen as the focus of the study. The second sub-question therefore focuses on understanding ***how user experience (UX) design should be utilized in website re-design?*** The chapters 2 and 4 focused on presenting the themes of web design and UX design on a general level, after which the themes were connected. The second sub-question was answered in chapter 4.1.

The way user experience design complements traditional web design is by elevating user testing and user research methods as a core part of the design. Web design does not have a human-centered approach and incorporating UX design elements into the design process ensures that the finished design is responsive to user needs. Improving user experience requires getting close to the users to understand how they make decisions, what motivates them, how they think and what makes them to act. This calls for a comprehensive research process that is based on user experience research methods and analysis.

The research methods used in the study included safari, contextual interviews, behavioral data analysis and benchmarking. The methods were chosen based on their human centered approach that highlights the experience of the user. As an employee of Deltamarin, the researcher had her own ideas and opinions for the new design, but kept them to herself, and the focus was on ensuring the design ideas are based on solid information and data. The research methods were designed to cover what users say but also how they behave to see if users' actions match their words. This was achieved by having both qualitative and quantitative data collection methods.

The research concluded that both qualitative and quantitative data were congruent. Users' thoughts and opinions matched user behavior and the methods gave a comprehensive overview to users' needs. The comprehensiveness of the data collection methods and the in-depth analysis ensure that the changes implemented to the new layout will provide a better experience for the end-users as they are based on solid understanding of that audience. The results of the research were used in creating high-fidelity design prototypes that were handed over to Deltamarin at the end of the project in May 2023.

The sub-questions needed to be resolved before moving to the main research question of the study which purpose was to discover ***how the performance of a mobile website can be improved with service design methods and tools?*** The main research question has been answered in chapter 5. The chapter presents low and high-fidelity prototypes of the improved website design, also known as the final concept. The final design is the result of comprehensive research and analysis and includes improved versions of the navigation and design features perceived as problematic in user testing.

One of the main requirements for website performance was the easiness of navigation. The importance of navigation was emphasized throughout the case research discussions as user testing revealed major issues in the current design. An improved navigation menu and reference filter were created based on the feedback, and the focus was on increasing the overall usability of the site through increased speed (efficiency) and accuracy (effectiveness). The new layout has a

clear design with a focus on simplicity, which makes searching for information faster and is also more intuitive and responsive to user needs.

The appearance of a website is important for first impression and affects users' opinions of the website's usability, credibility and performance. The impact of design elements on visual appearance was evident also in research discussion as their size, contrast and hierarchy sparked discussion and their user-friendliness was questioned. Design elements covered important information and affected site navigation, or more precisely, the lack of design elements hindered the functionality of the navigation menu. The improved prototypes focused on making the visual layout clear so that important information is more easily accessible. The usability and performance of the site is increased through the increased speed by which users are able to see content relevant to them.

Based on the findings, it can be concluded that essential for the website design is the easiness of navigation, functional site filters and appropriate use of design elements. Navigation does not only relate to the navigation menu and the search bar but applies to all aspects of the site. All elements should be designed with the easiness of navigation in mind, as finding important information is one of the main purposes of a site. The importance of design elements that complement the site's structure and functional filters that make information more accessible to users should also be highlighted.

Further research

The concept of web design and user experience design are so extensive that there are a variety of possible subjects for future research. The findings of the study could be researched more comprehensively by introducing a larger sample size from different industries. The research currently focuses on marine industries and extending the study's scope to other industries would help to understand whether the issues revealed in research are only visible within a specific context or if broader conclusions can be drawn based on them. Additionally, the results of the research could be compared in-depth within a specific industry so that they could be understood more profoundly in relation to the context in which they exist.

The results of the study are also limited to navigational and visual aspects and introducing other elements important to a site's success (see Table 1) could make the research more comprehensive and be a topic of further research.

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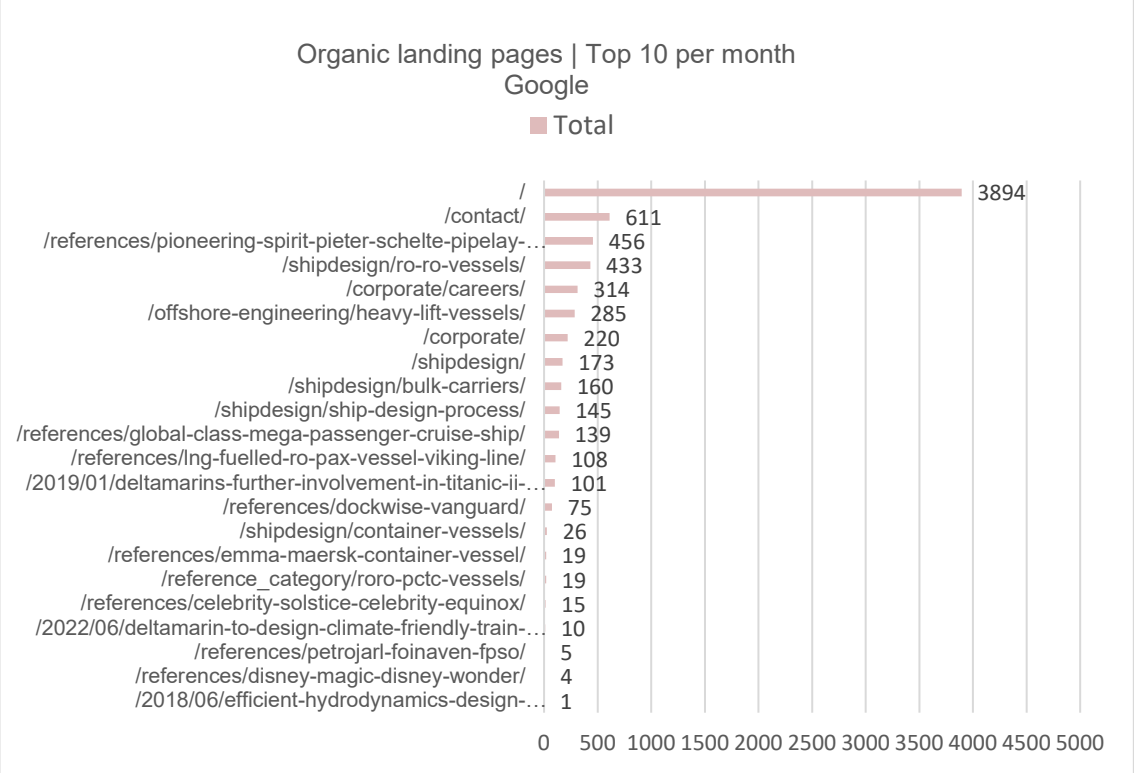
Appendices

Appendix 1. Google Analytics results from 2022.

No.	Page	Page views	%Page views
1.	/	38,207	18.43%
2.	/contact/	11,839	5.71%
3.	/corporate/careers/	7,164	3.46%
4.	/corporate/	6,608	3.19%
5.	/news/	5,437	2.62%
6.	/shipdesign/ship-design-process/	3,089	1.49%
7.	/2022/06/Deltamarin-to-design-climate-friendly-train-ferry-for-fennorail	2,968	1.43%
8.	/references/pioneering-spirit-pieter-schelte-pipelay-vessel/	2,946	1.42%
9.	/2022/01/deltamarin-signs-an-engineering-contract-for-hoegh-autoliners-aurora-class-pctcs/	2,589	1.25%
10.	/shipdesign/	2,542	1.23%



Appendix 2. The results of the service safari (round one).

User A						
Site	Task	Time* (duration)	Actions taken	Misclicks**	Dead-ends***	Notes
DM	1	20s	2	0	0	
	2	13s	2	0	0	
	3	27s	2	0	0	
	4a	10s	2	0	0	
	4b	32s	3	0	1	No search bar
	5a	31s	2	0	0	Navigation issue
	5b	52s	4	1	1	Wrong reference tab No search bar
KEH	1	13s	2	0	0	
	2	13s	2	0	0	
	3	5s	2	0	0	
	4a	10s	2	0	0	
	4b	18s	3	0	0	Quick search bar
	5a	12s	4	0	0	Filtering option
	5b	7s	2	0	0	Quick search bar
LMG	1	11s	2	0	0	
	2	10s	2	0	0	
	3	9s	2	0	0	
	4a	10s	2	0	0	
	4b	10s	2	0	0	
	5a	22s	6	1	1	Confused design with reference
	5b	1min 24s	13	8	1	Confused design with reference Confused because filter showed same results

User A		
Site	Task	Path
DM	1	/ + menu + contact
	2	/ + menu + careers
	3	/ + menu + about us
	4a	/ + menu + news
	4b	/ + menu + news (note Estonian ferry was changed later to a different piece of news because it was too easy)
	5a	/ + references button + offshore (at the end of the page)
	5b	/ +menu + references (ship design) + menu + references (offshore engineering) (note pioneering spirit was changed later to a different reference because it was too easy)
KEH	1	/ + menu + contact us
	2	/ + menu + career
	3	/ + menu + about us
	4a	/ + menu + news
	4b	/ + menu + search + enter
	5a	/ + menu + references + page filter open + vessel type (offshore)
	5b	/ + menu + search

LMG	1	/ + menu +contact
	2	/ + menu + vacant positions
	3	/ + menu + company
	4a	/ + menu + news archive
	4b	/ + menu + news archive
	5a	/ + menu + offshore service vessels (designs) + menu + references + page filter + category (offshore service)
	5b	/ + menu + ferries (design) + LMG 70-DE + menu + cruise & ropax (design) + menu + references + page filter + category (ferries) + page filter + category (conversions) + page filter + category (ferries)

User B						
Site	Task	Time* (duration)	Actions taken	Misclicks**	Dead-ends***	Notes
DM	1	15s	0	0	0	Found the info from front page
	2	30s	2	0	0	
	3	35s	2	0	0	
	4a	15s	2	0	0	
	4b	1min 7s	5	2	0	Tried to search it manually first Took a while to find search bar
	5a	20s	2	0	0	
	5b	36s	2	0	0	Used the search bar at the bottom of the page
KEH	1	16s	1	0	0	Found the link from the front page
	2	23s	2	0	0	
	3	21s	2	0	0	
	4a	15s	2	0	0	
	4b	53s	3	1	0	Tried to search it from the page first Forgot the year of the news
	5a	22s	4	0	0	
	5b	42s	4	2	0	Tried to find search bar from reference page
LMG	1	9s	0	0	0	Found info from front page
	2	24s	2	0	0	
	3	17s	2	0	0	
	4a	13s	2	0	0	
	4b	25s	0	0	0	Found it from the news page
	5a	1min 23s	8	2	1	Confused designs with references
	5b	56s	6	2	0	Confused designs with references note. I told B it was a ropax!

User B		
Site	Task	Path
DM	1	/
	2	/ + menu + careers
	3	/ + menu + about us
	4a	/ + menu + news
	4b	/ + menu + news + menu + search + enter
	5a	/ + menu + references (offshore engineering)
	5b	/ + search + enter
KEH	1	/ + contact
	2	/ + menu + career
	3	/ + menu + about us

	4a	/ + menu + news
	4b	/ + menu + search + award 2020 + backwards + award 2021
	5a	/ + menu + references + page filter open + vessel type (offshore)
	5b	/ + menu + references + page filter + menu + search
LMG	1	/
	2	/ + menu + vacant positions
	3	/ + menu + the history
	4a	/ + menu + news archive
	4b	/ + menu + news archive
	5a	/ + menu + designs + floating offshore units + offshore service vessels + menu + references + page filter + category (offshore service vessels)
	5b	/ + menu + designs (cruise & ropax vessels) + menu + references + page filter: category (passenger, cruise & ropax)

User C						
Site	Task	Time* (duration)	Actions taken	Misclicks**	Dead-ends***	Notes
DM	1	12s	2	0	0	
	2	22s	2	0	0	
	3	28s	2	0	0	Year difficult to find
	4a	12s	2	0	0	
	4b	1min 26s	4	2	1	Tried to find search bar Tried to press enter to search?
	5a	19s	4	2	0	Confused with many references
	5b	16s	4	1	0	Knew where the search bar was
KEH	1	12s	2	0	0	
	2	10s	2	0	0	
	3	13s	2	0	0	
	4a	12s	2	0	0	
	4b	1min 2s	7	2	1	Confused with news filtering Forgot the year of the news
	5a	16s	4	0	0	
	5b	21s	3	0	0	
LMG	1	10s	2	0	0	
	2	16s	2	0	0	
	3	53s	5	3	0	Confused about the year
	4a	9s	2	0	0	
	4b	1min 29s	13	11	1	Thought he needed to search for a reference Search bar missing
	5a	21s	4	0	0	
	5b	3min 6s	3	1	0	Knew that there was no search bar Had to manually go through all

User C		
Site	Task	Path
DM	1	/ + menu + contact
	2	/ + menu + careers
	3	/ + menu + about us
	4a	/ + menu + news

	4b	/ + menu + close menu + search (at the bottom of the page) + enter
	5a	/ + menu + references (construction services) + menu + references (offshore engineering)
	5b	/ + menu + close menu + search (at the bottom of the page) + enter
KEH	1	/ + menu + contact us
	2	/ + menu + career
	3	/ + menu + about us
	4a	/ + menu + news
	4b	/ + page filtering open + subject (exhibitions & speeches) + menu + search + 2020 news + enter + back
	5a	/ + menu + references + page filtering open + category (Offshore)
	5b	/ + menu + search + enter
LMG	1	/ + menu + contact
	2	/ + menu + vacant positions
	3	/ + menu + close menu + company + read more about our history + menu + the history
	4a	/ + menu + news archive
	4b	/ + menu + forside + menu + designs + design (ferries) + menu + close menu + designs + home + menu + references + menu + news archive
	5a	/ + menu +references + page filtering + category (offshore)
	5b	/ + refresh + tried to go to google + references

User D						
Site	Task	Time* (duration)	Actions taken	Misclicks**	Dead-ends***	Notes
DM	1	15s	2	0	0	
	2	15s	2	0	0	
	3	36s	2	0	1	Info is not directly visible
	4a	10s	2	0	0	
	4b	18s	4	2	0	Enter did not seem to work
	5a	48s	5	2	1	Clicked wrong reference type Was not able to find reference filtering on reference page
	5b	33s	4	0	0	
KEH	1	48s	8	3	1	Was not able to find contact link in the menu > probably since cookie settings was on the way
	2	11s	2	0	0	
	3	11s	2	0	0	
	4a	10s	2	0	0	
	4b	23s	3	0	0	
	5a	16s	4	0	0	
	5b	59s	10	5	0	First unsure where to search for the references Typo when searching
LMG	1	10s	2	0	0	
	2	11s	2	0	0	
	3	8s	2	0	0	
	4a	21s	4	2	0	Misclick
	4b	23s	2	0	1	Tried to find a search button
	5a	48s	8	4	1	Page didn't load / offshore button didn't work
	5b	54s	4	0	1	Tried to search manually first but then went to google as there was no search (! this was not allowed)

User D		
Site	Task	Path
DM	1	/ + menu + contact
	2	/ + menu + careers
	3	/ + menu + about us
	4a	/ + menu + news
	4b	/ + menu + search + enter + enter + click
	5a	/ + menu + references (ship design) + menu + references (ship design) + offshore
	5b	/ + menu + references (ship design) + search (at the bottom of the page) + enter
KEH	1	/ + menu + about us + menu + about us + menu + search + enter + contact us
	2	/ + menu + career
	3	/ + menu + about us
	4a	/ + menu + news
	4b	/ + menu + search + enter
	5a	/ + menu + references + page filter + vessel type (offshore)
	5b	/ + menu + references + clear all filters + page filter + menu + search + enter + menu + search + enter
LMG	1	/ + menu + contact
	2	/ + menu + vacant positions
	3	/ + menu + the history
	4a	/ + menu + vacant positions + menu + news archive
	4b	/ + menu + news archive
	5a	/ + menu + references + references + designs + menu + references + page filter + category (offshore)
	5b	/ + page filter + references (all) + search in google + google result

User E						
Site	Task	Time* (duration)	Actions taken	Misclicks**	Dead-ends***	Notes
DM	1	28s	2	0	1	Did not find contact from the menu at first
	2	16s	2	0	0	
	3	31s	2	0	0	
	4a	15s	2	0	0	
	4b	38s	3	0	0	Searched it manually
	5a	1min 37s	7	4	1	Went first to the wrong reference category
	5b	28s	3	0	0	
KEH	1	12s	2	0	0	
	2	8s	2	0	0	
	3	10s	2	0	0	
	4a	14s	2	0	0	
	4b	20s	4	0	0	
	5a	19s	4	0	0	
	5b	15s	3	0	0	Thought about searching it manually first but decided not to since the vessel type was unknown
LMG	1	14s	2	0	0	
	2	14s	2	0	0	
	3	13s	2	0	0	
	4a	20s	2	0	0	
	4b	32s	3	1	0	Tried to find search in the menu
	5a	1min 2s	6	2	0	Went to designs first
	5b	30s	3	0	0	Tested sort arrows without knowing what it does

User E		
Site	Task	Path
DM	1	/ + menu + contact
	2	/ + menu + careers
	3	/ + menu + about us
	4a	/ + menu + news
	4b	/ + menu + news + news page 2
	5a	/ + menu + references (ship design) + page 2 + page 3 + page 4 + menu + references (offshore)
	5b	/ + menu + search (Algoma) + enter
KEH	1	/ + menu + contact us
	2	/ + menu + career
	3	/ + menu + about us
	4a	/ + menu + news
	4b	/ + menu + news + page filter + subject type (awards)
	5a	/ + menu + references + page filter + vessel type (offshore)
	5b	/+ menu + search (Botnia) + enter
LMG	1	/ + menu + contact
	2	/ + menu + vacant positions
	3	/ + menu + the history
	4a	/ + menu + news archive
	4b	/ + menu + news archive + menu
	5a	/ + menu + designs (offshore service vessels) + menu + references + page filter + category (offshore)
	5b	/ + page filter + category (all) + sort arrow down

User F						
Site	Task	Time* (duration)	Actions taken	Misclicks**	Dead-ends***	Notes
DM	1	13s	2	0	0	
	2	12s	2	0	0	
	3	18s	2	0	0	
	4a	12s	2	0	0	
	4b	16s	3	0	0	
	5a	21s	3	1	0	Clicked the wrong reference category first
	5b	16s	3	0	0	
KEH	1	14s	2	0	0	
	2	13s	2	0	0	
	3	18s	2	0	0	
	4a	16s	2	0	0	
	4b	29s	2	0	1	Was looking for a search option on the page
	5a	25s	4	0	0	
	5b	36s	6	4	1	Was looking for a search option on the page
LMG	1	19s	2	0	0	Slow loading time
	2	20s	2	0	1	Confused since the page was not like traditional career pages
	3	41s	2	0	0	
	4a	18s	2	0	0	
	4b	47s	7	5	1	No date in the news so did not know which was the latest
	5a	25s	4	0	0	
	5b	1min 31s	6	4	1	Tried to find search > frustrated since had to go through all

User F		
Site	Task	Path
DM	1	/ + menu + contact
	2	/ + menu + careers
	3	/ + menu + about us
	4a	/ + menu + news
	4b	/ + menu + search (Höegh) + enter
	5a	/ + menu + references (ship design) + reference filter at the end of the page (offshore)
	5b	/ + menu + search (Algoma) + enter
KEH	1	/ + menu + contact us
	2	/ + menu + career
	3	/ + menu + about us
	4a	/ + menu + news
	4b	/ + page filter + subject (award)
	5a	/ + menu + references + page filter + vessel type (offshore)
	5b	/ + menu + references + vessel type open + vessel type close + vessel type open + vessel type close
LMG	1	/ + menu + contact
	2	/ + menu + vacant positions
	3	/ + menu + the history
	4a	/ + menu + news archive
	4b	/ + menu + front page + menu + news archive + new major ferry contract + back + refresh page
	5a	/ + menu + references + page filter + category (offshore)
	5b	/ + page filter + references (all) + menu + close menu + menu + close menu

* Download time for the site entry not included (LCP: DM 4.3s, KEH 2.6s, LMG 2s)

** Clicks that did not lead to the desired result

*** Times when a user was confused how to proceed

Appendix 3. The results of the service safari (round two).

Deltamarin		
User	Navigational viewpoint	Appearance viewpoint
A	Search bar difficult to find Navigation too heavy Double check front page quick links No quick search bar Reference search does not work No filtering on news or references	/ Front page picture too small Heading picture taking too much space on each page Some headings too large, taking up space
B	Performance better since search bar found by accident Navigation bar a bit long	
C	Search bar difficult to find Search menu confusing and sorting bad/not clear Reference links on two places > confusing Menu bar disappears when you move down and does not come back	Heading image and text taking too much space Color/typography not used to differentiate menu
D	There is no filter on the reference page > reference filter is at the bottom (didn't find first) Menu should be more condensed What we do should be more compact & reference page should be as wide as possible	Good that there is a lot of information in the menu, but text is too small
E	Navigation menu too long > important links hidden and difficult to find, takes too much time Did not find the search bar until after a while as it was hidden Having many reference links on the menu is confusing Could not find the reference filtering Why careers and news are under about us? should be separately	Texts too small on the navigation menu Too many links on the menu Headings and sub headings have almost the same font size so difficult to differentiate Colors and visual look generally good, but normal text too small and pictures could be smaller
F	Too many options in the menu Search bar should be at the beginning not at the end There should also be search bar at reference and news pages Filtering should be at the beginning on reference and news page Search worked well	Visual look OK but could be better Reference page was strange, did not look like the ones of LMG and KEH Some texts too small, especially on the navigation bar

Knud E. Hansen		
User	Navigational viewpoint	Appearance viewpoint
A	Navigation more condensed but LMG clearer Filtering on references and news Search bar immediately visible Search works Navigation done better> but no multi-filtering	Text smaller but still visible? News and reference info more minimal > could be even more minimal No large heading image taking space
B	Would have needed a search bar on reference page	
C	I thought the menu looked and worked well	I thought the menu looked and worked well Site works well overall
D	Main menu is good Was not able to find contact us immediately because it was hidden in the menu	Navigational menu should be clearer
E	Menu works well and looks good Bonus that search bar at the beginning No home button on the menu, you don't necessary understand how to get to the front page Reference filtering worked well	Good that there is a cross indicating you can close the menu Front page does not look like front page, confused what page you are on > thought you are on a sub page In some cases text too small
F	No search bar on the reference page, this would make navigation easier Same goes for news page	Visually pretty and works well Good and intuitive Best of the three sites

LMG Marin AS		
User	Navigational viewpoint	Appearance viewpoint
A	No search bar Navigation structure the best Design & reference filtering good, but can be improved Your location on top of each page a good thing? Designs vs references Vacant positions page unstructured / unclear Contact email link hyperlinked	In general, clear layout Text good size References layout with 2x next to each other good Overall clear layout but some issues // clearest navigation
B	No search bar Confused by design vs references >> two of so-called reference pages Overall ok, most issues with search bar and navigation	

C	No search bar at all Did not see this until forced to use search > I rather use menu not search Was not confused by design & reference > depends on the user (maybe just read more carefully?)	
D	No search filter > shouldn't be so difficult to find	
E	Arrows on references and news page should indicate what it does No search bar Confused by design vs references	There should be an arrow indicating you can close the menu Clear and visually appealing
F	There should be search bar on the reference and news page No search bar No date on the pieces of news on the news site	Too many options on the menu, there should be only headings and option to open to a sub headings Visually not very fresh, looks like an amateur had done them Worst of the three, both in terms of navigation and visuality

Appendix 4. Figures appearing in the service safari chapter.

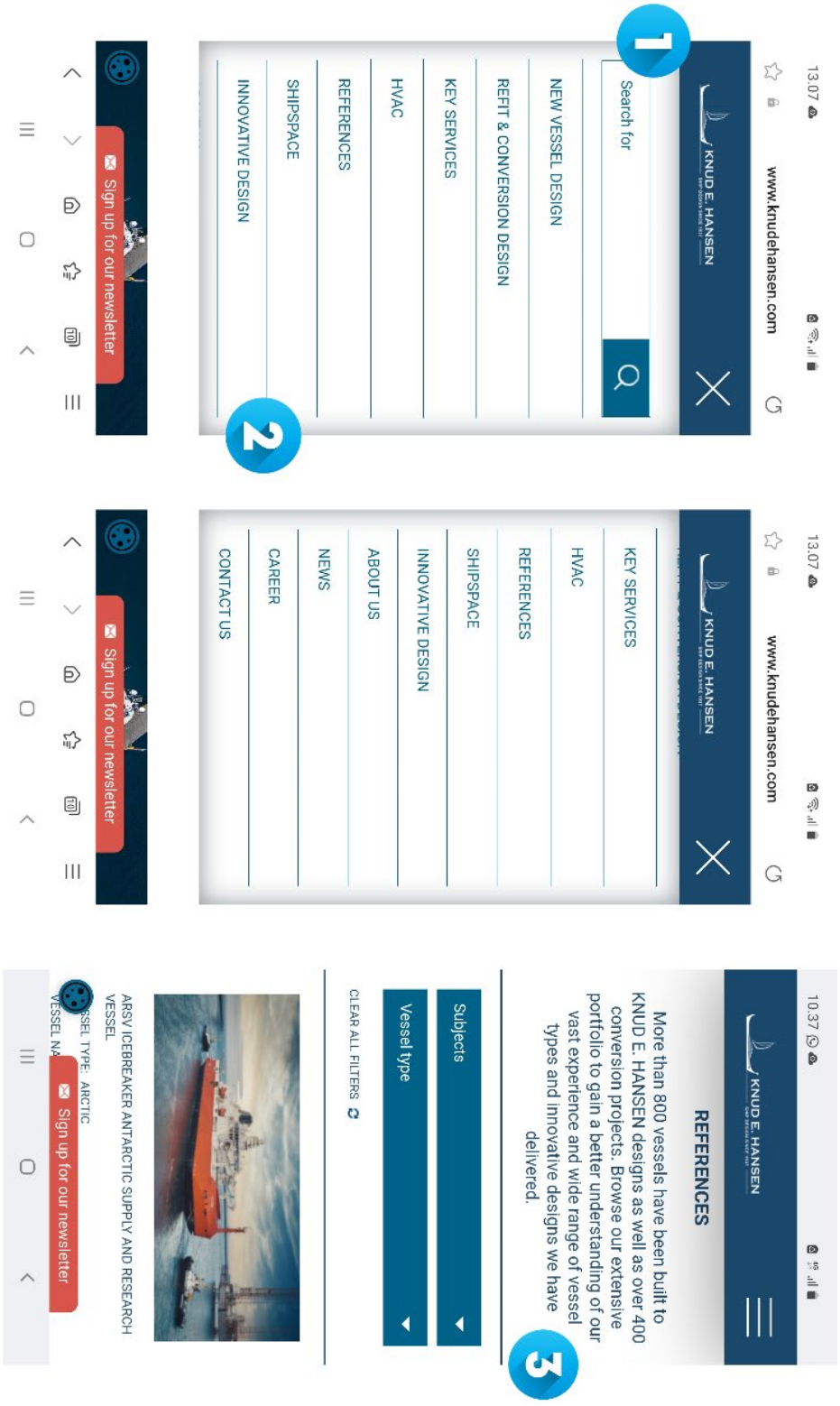


Figure 34. UI of KEH: 1. Clear search bar in the navigation menu 2. No indication that half of the menu is not visible 3. Good filtering option but could benefit from a search bar and multi-filtering.

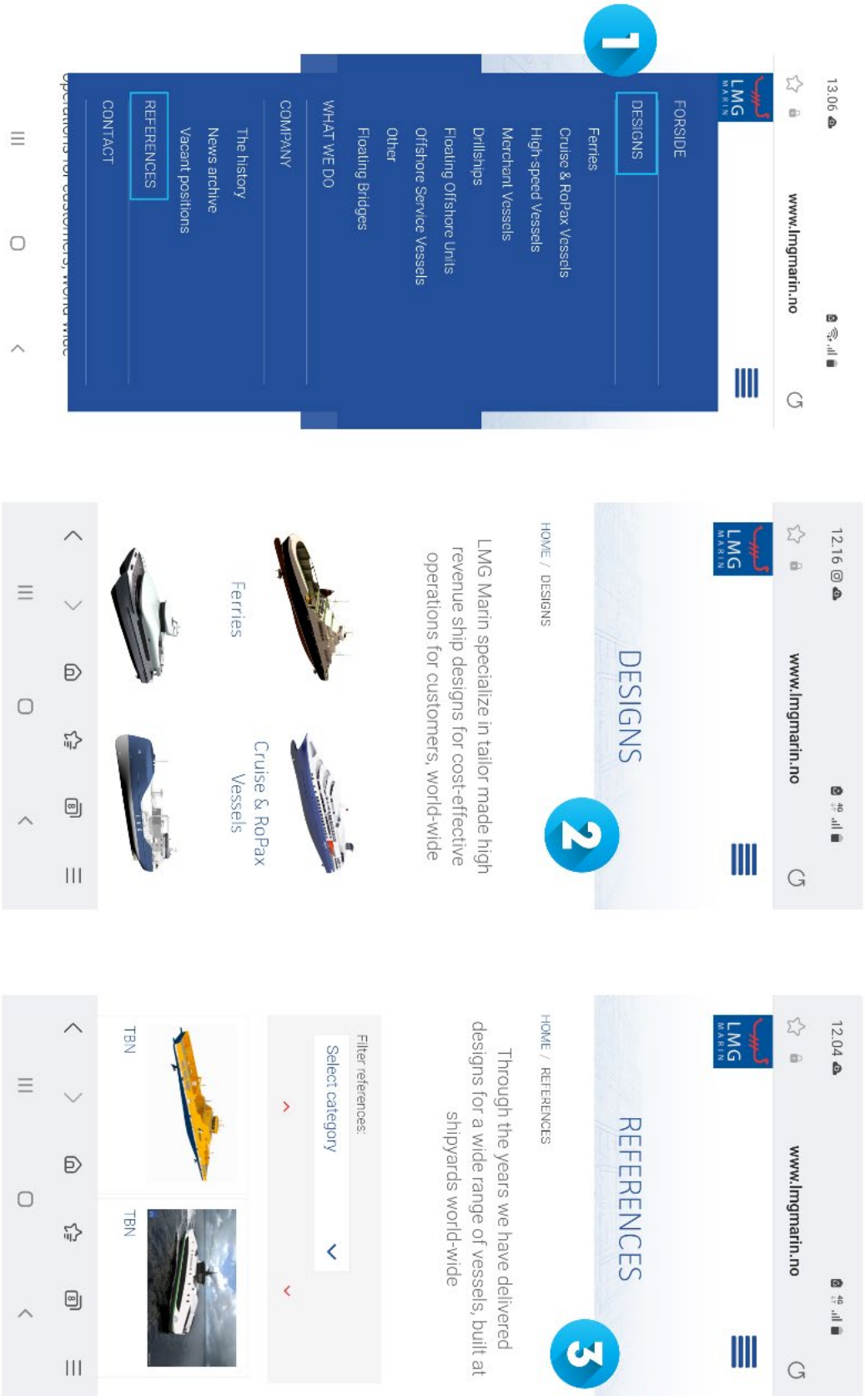


Figure 35. UI of LMG: 1. The difference between designs and references caused confusion 2. & 3. The layout of designs was like that of references and the page's difference was unclear.

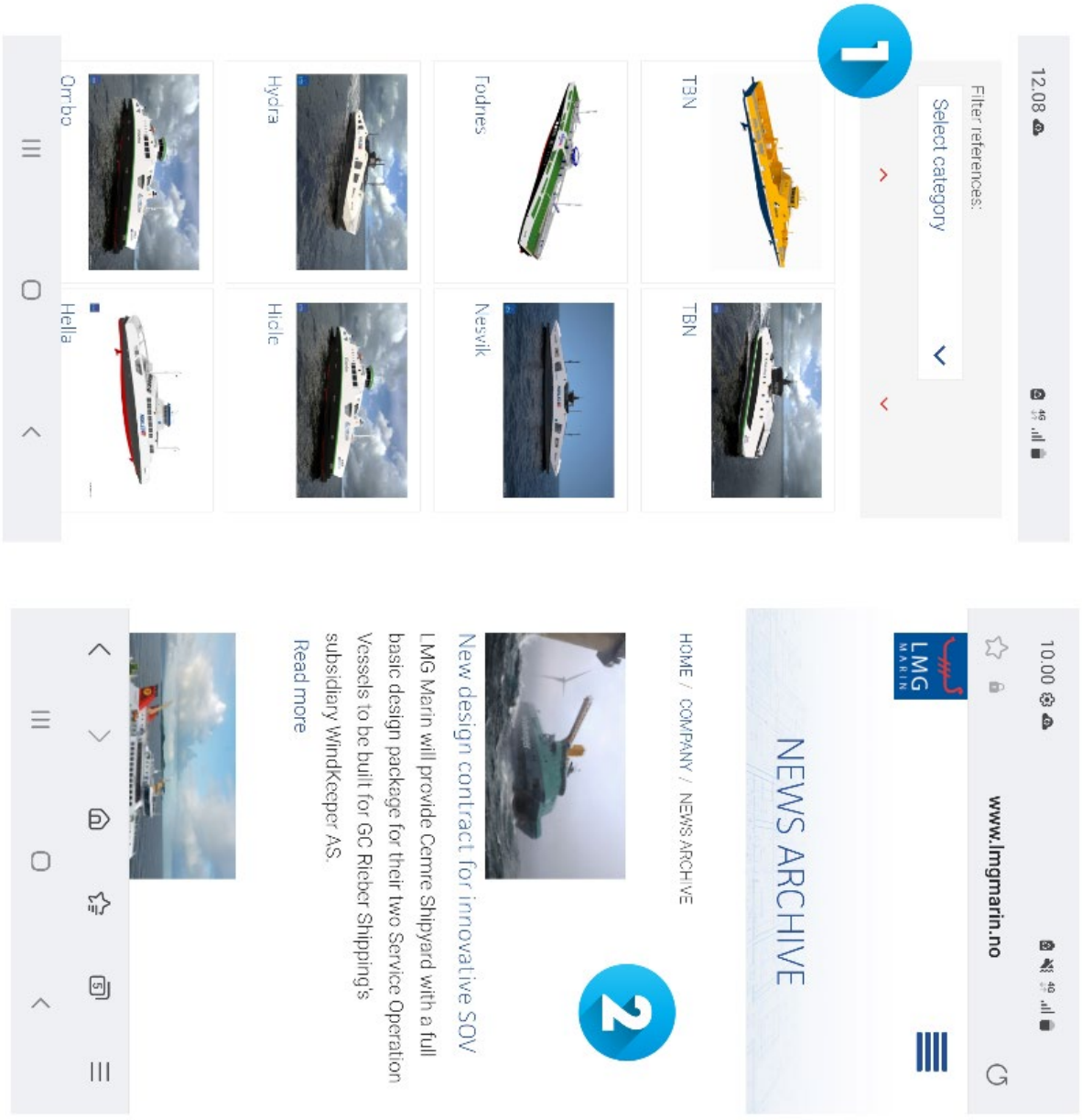


Figure 36. UI of LMG: 1. The reference filtering was considered to function well but there was no indication what the sorting arrows do. The menu bar disappeared when moving down the page. 2. There was no filtering on the news page nor a search bar. There were also no dates on the news.

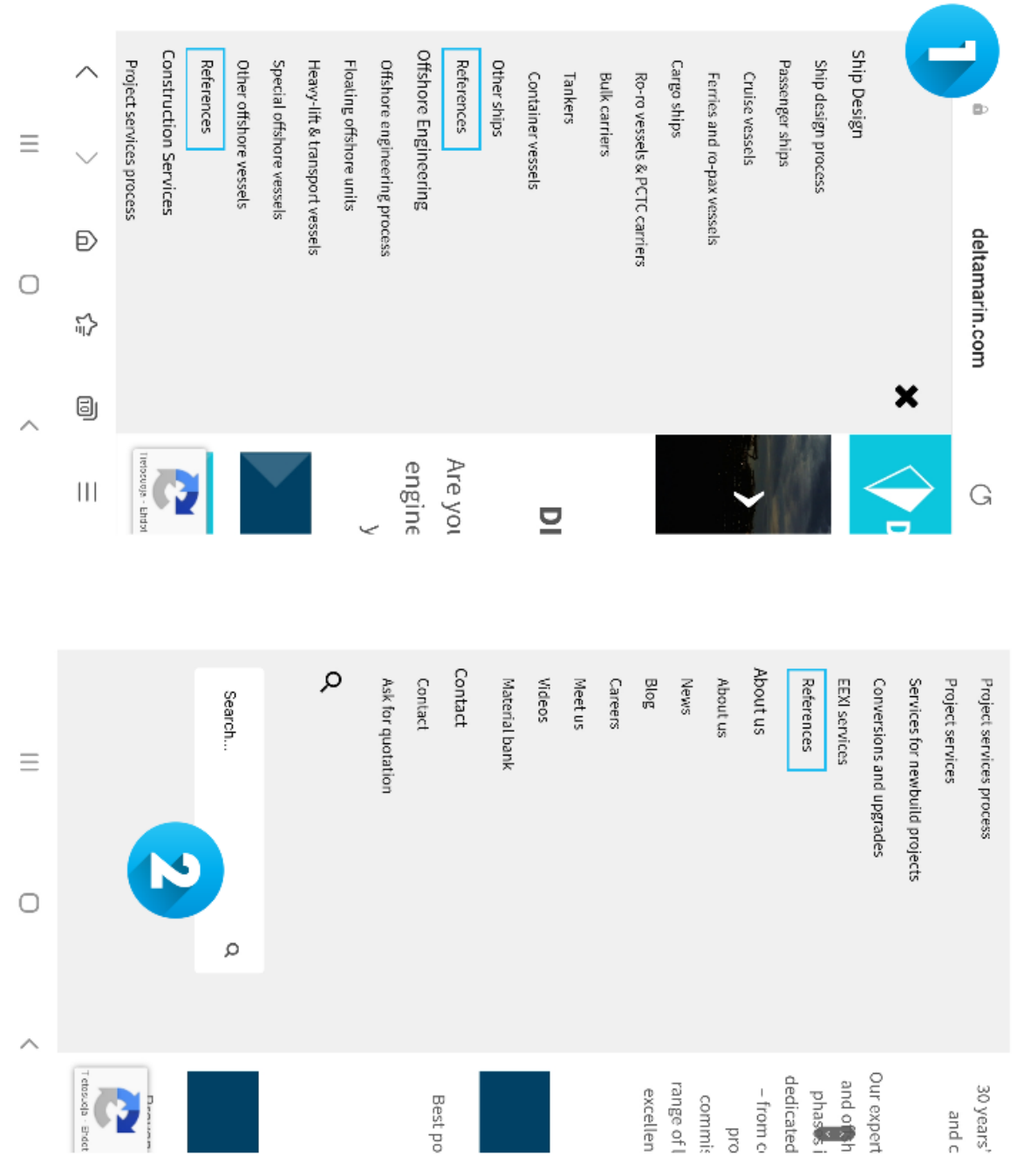


Figure 37. UI of DM: 1. A heavy and unclear navigation menu with three links for references. 2. Search bar and contact links are difficult to find as they are located at the end of navigation panel.

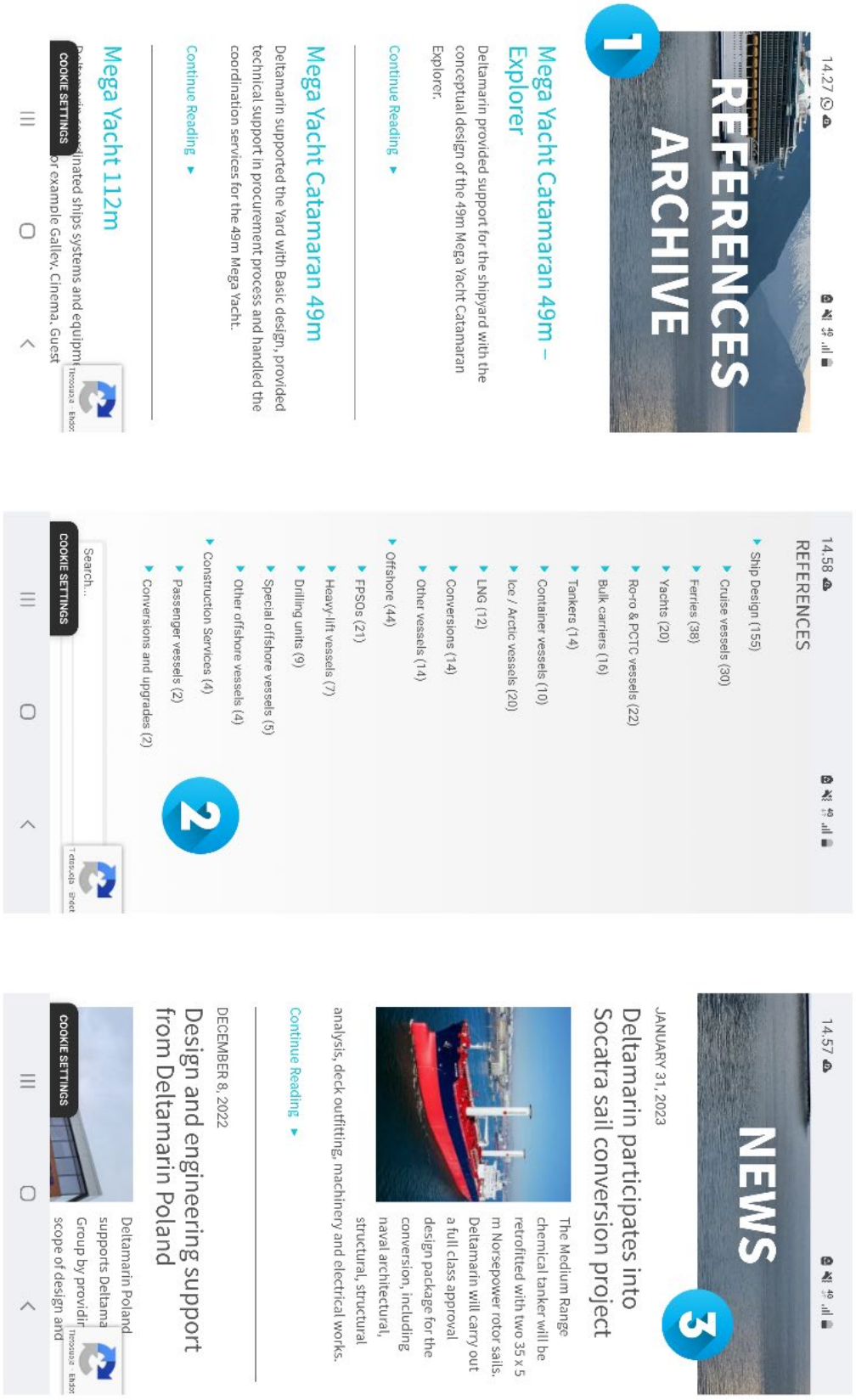


Figure 38 UI of DM: 1. The beginning of the reference page 2. Sorting options and a search bar are found at the end of each page 3. The beginning of the news page.

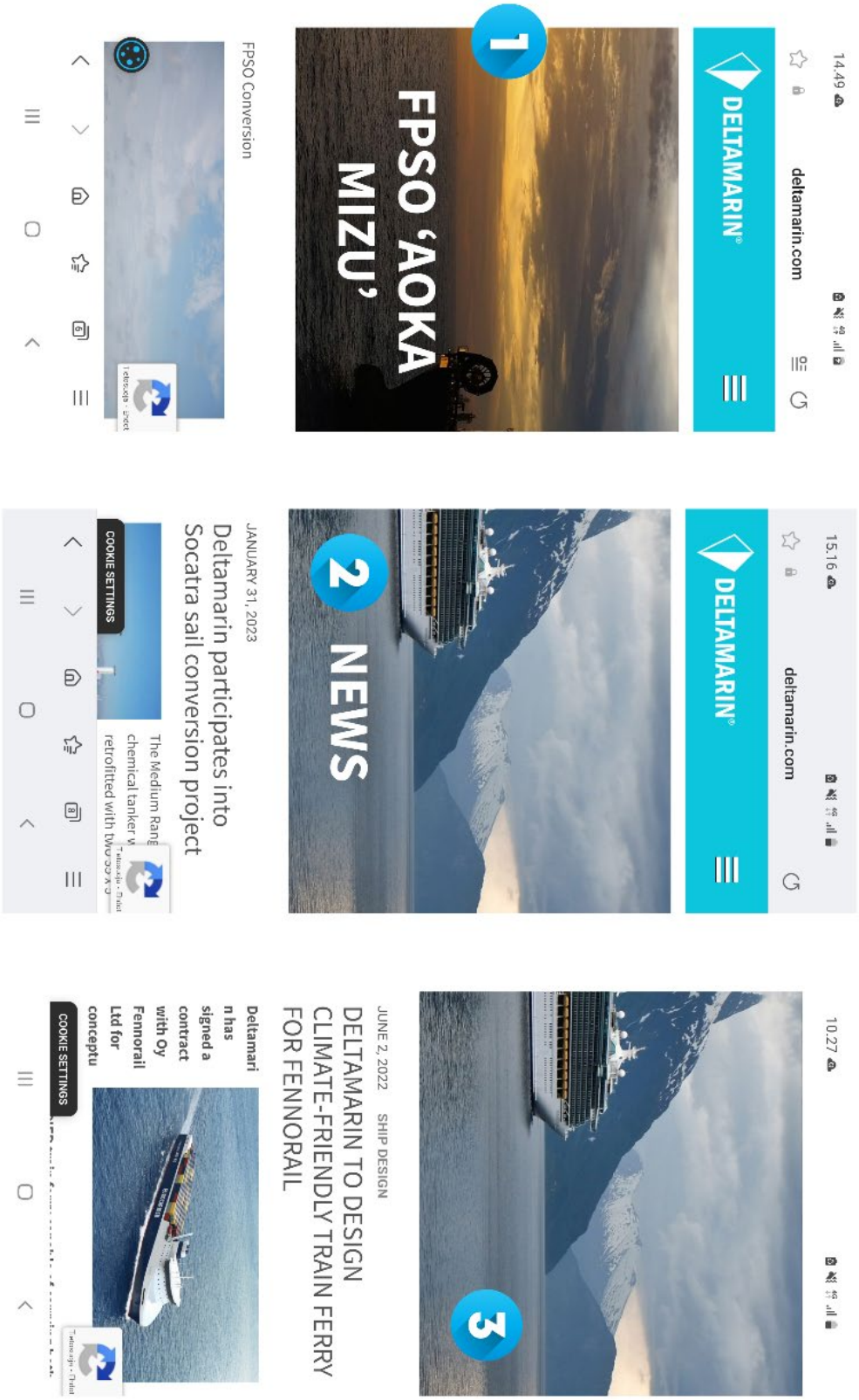


Figure 17. UI of DM: 1. The first view of the Aoka Mizu reference page 2. The first view of news page 3. The first view of a specific news page. The menu bar disappears when scrolling down a page.

Appendix 5. Figures appearing in the behavioral data analysis chapter.

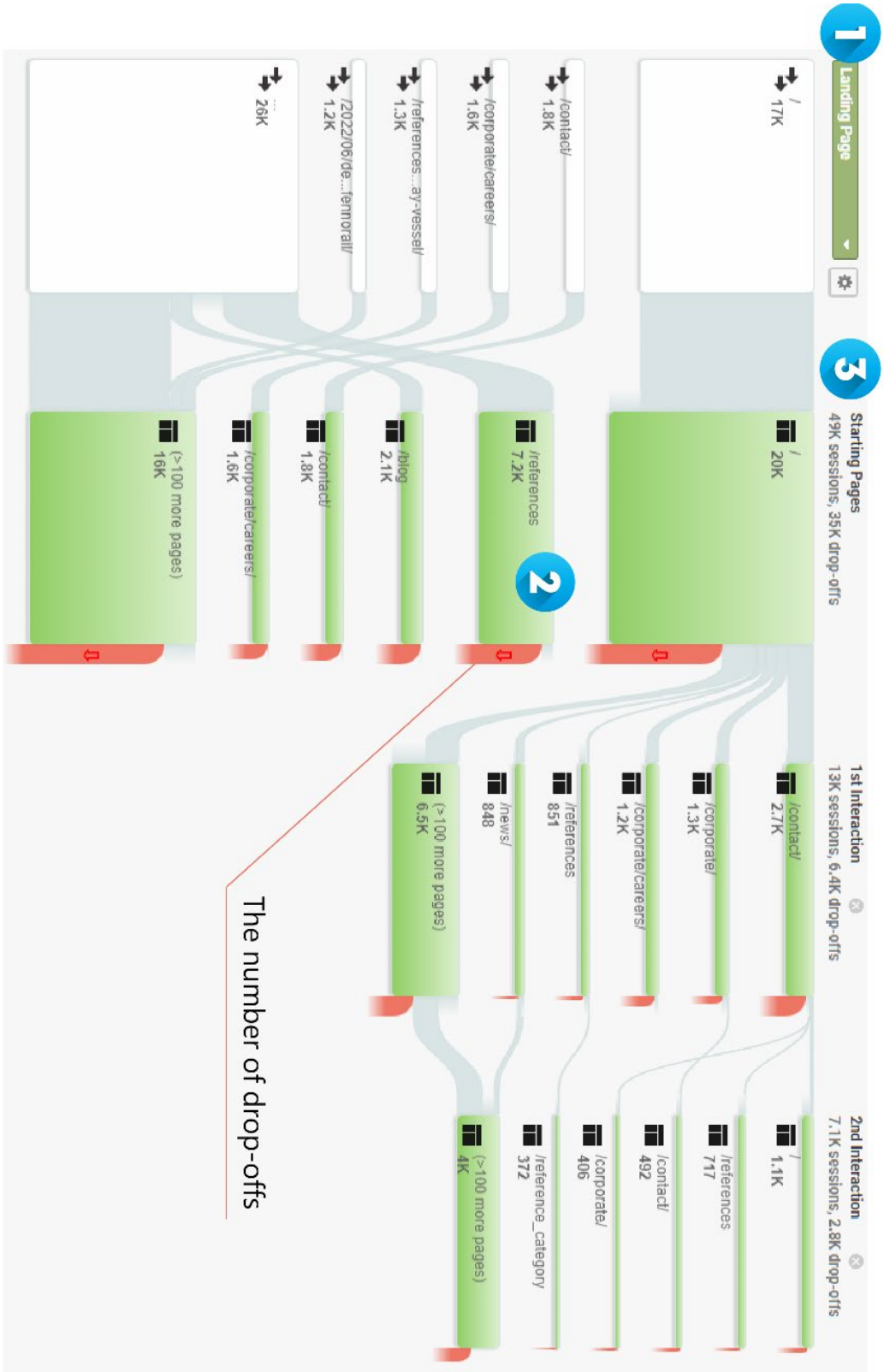


Figure 39. Deltamarin's mobile traffic behavior flow in 2022 (Google Analytics).

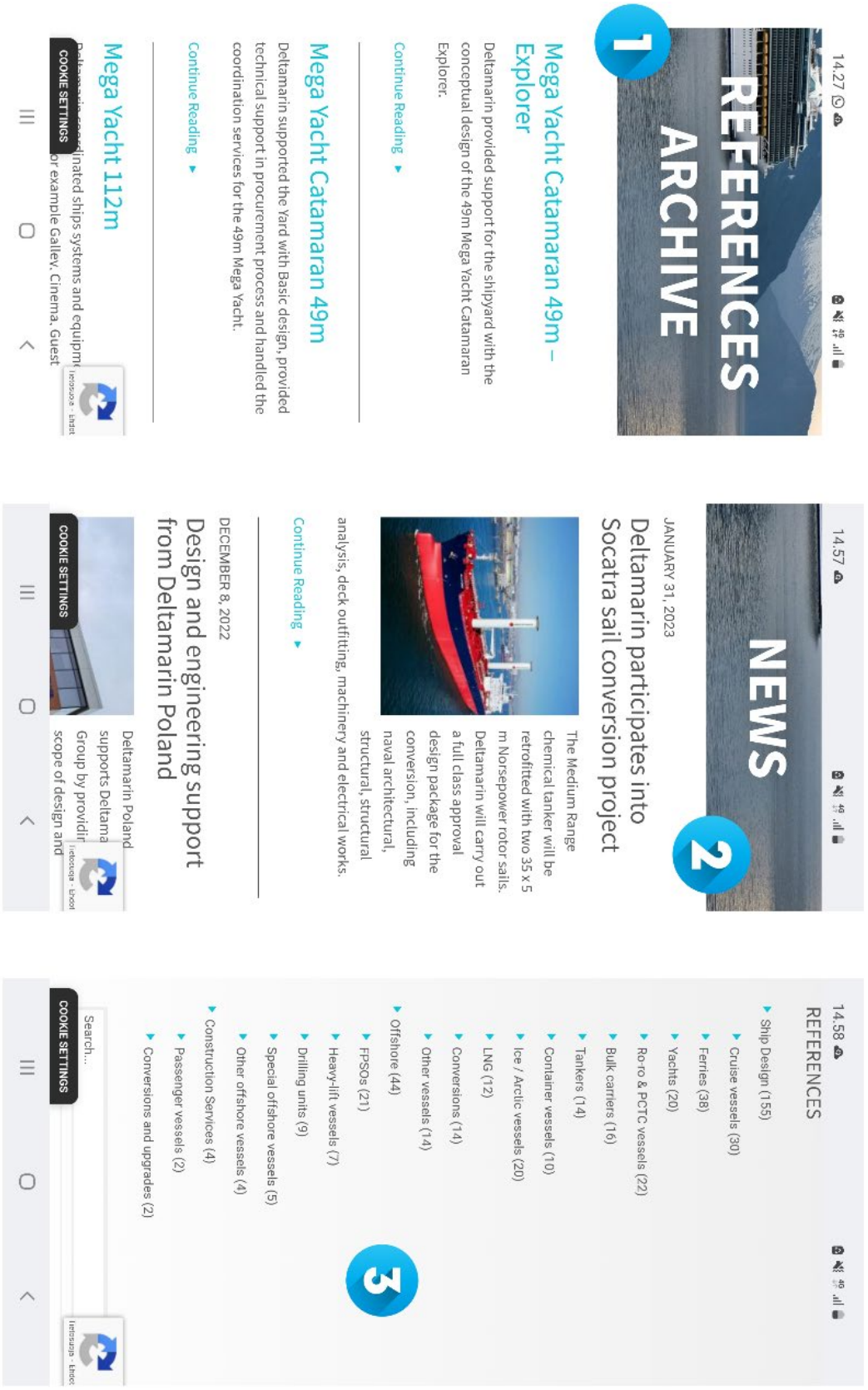
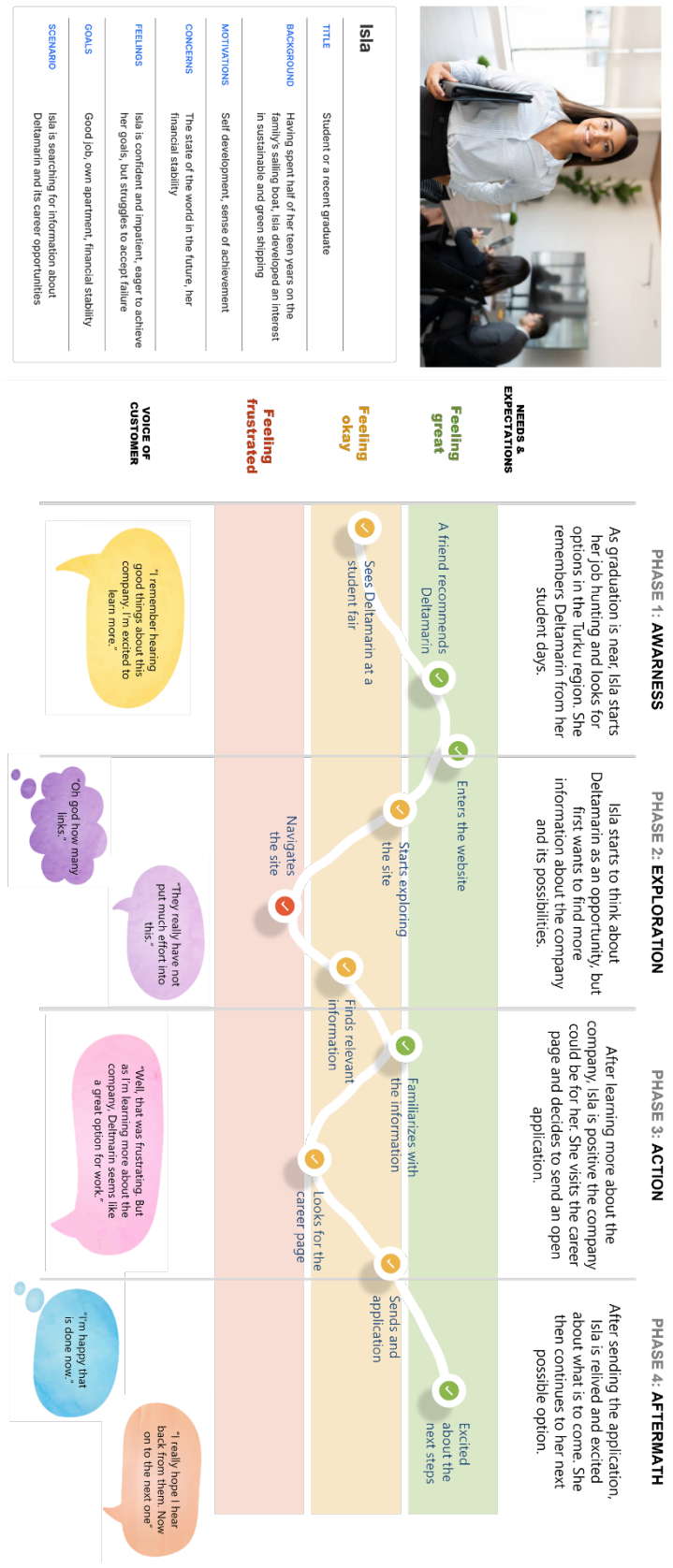


Figure 40. UI of DM: 1. The beginning of References page 2. The beginning of news page 3. Reference filtering at the end of the reference page.

Appendix 6. The customer journey maps of Isla, Lennart, and Roddy.



Lennart

TITLE	Senior engineer
BACKGROUND	Lennart graduated as a naval architect in 2003 and has since worked in various positions and in different companies in the field
MOTIVATIONS	Spending time with his family, self improvement, being honest and doing what is right
CONCERNS	The wellbeing of his family, his health
FEELINGS	Lennart has a casual outlook to life and keeps stress away by being organized and exercising
GOALS	Having a good work life balance
SCENARIO	Lennart comes across an article about Deltamarin and visits the site to learn more

Roddy

TITLE
Managing Director

BACKGROUND
Roddy has a marine background which he has later supplemented with a business degree

MOTIVATIONS
Achieving his personal goals; both at work and in leisure time. Being able to provide for his family and spending time with grandkids

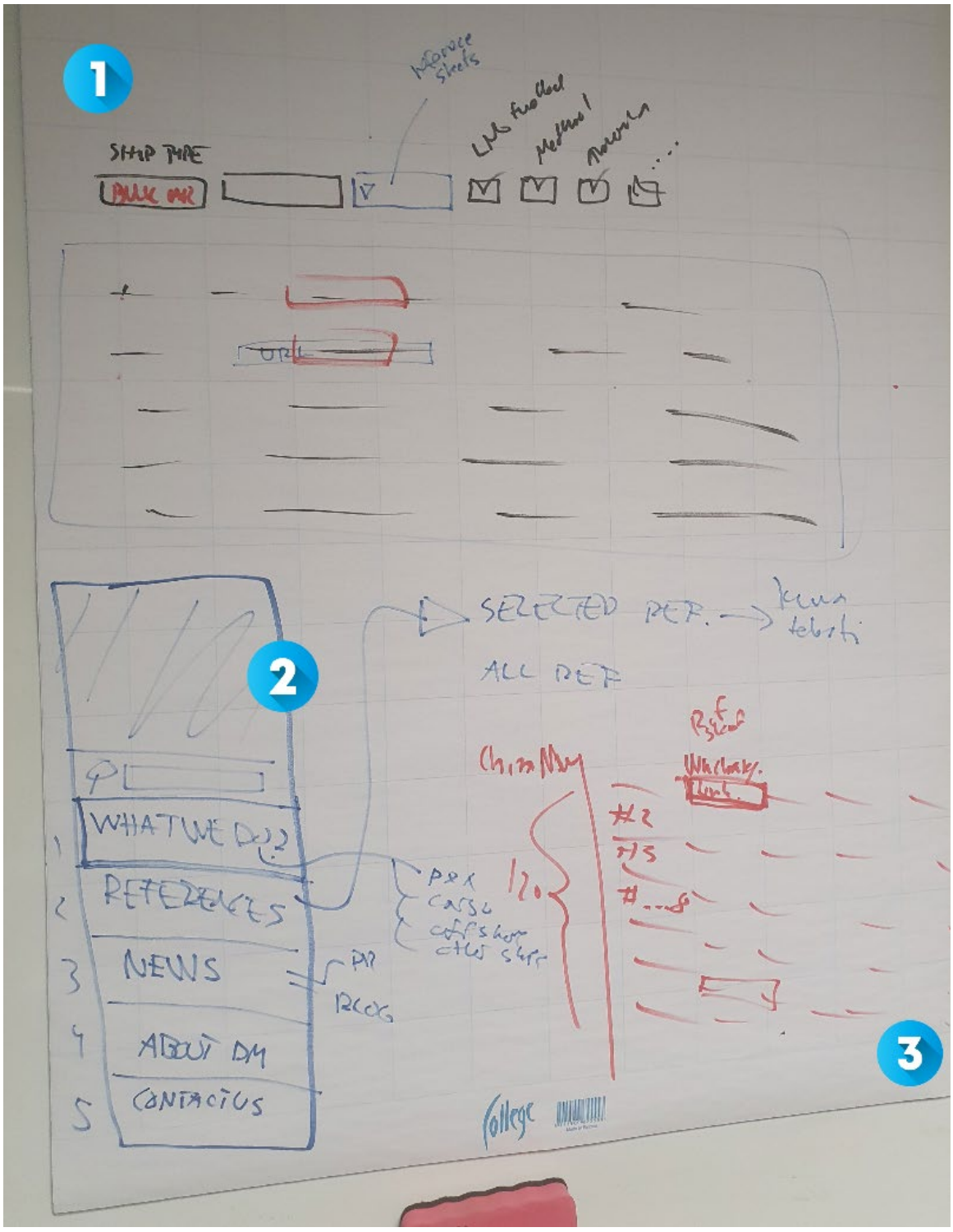
CONCERNS
Having a fulfilling life also after retirement, his health and the future of his kids and grandkids

FEELINGS
Roddy has been raised to be an ambitious but, at the same time, humble and considerate person. He wants to achieve his goals but not at any cost

GOALS
Being proud of his achievements and to know they have been achieved fairly and in respect to others. Having a good work-life-balance

SCENARIO
Roddy hears from his acquaintance that Deltamarin has developed a solution that would fit well with his company's new ship concept. He assigns his team to find out more about the matter.

Appendix 7. Initial sketches of the changes to the user interface (1. & 3. Ship filters 2. An improved navigation menu structure).



Appendix 8. Figures appearing in the low-fidelity prototype chapter.

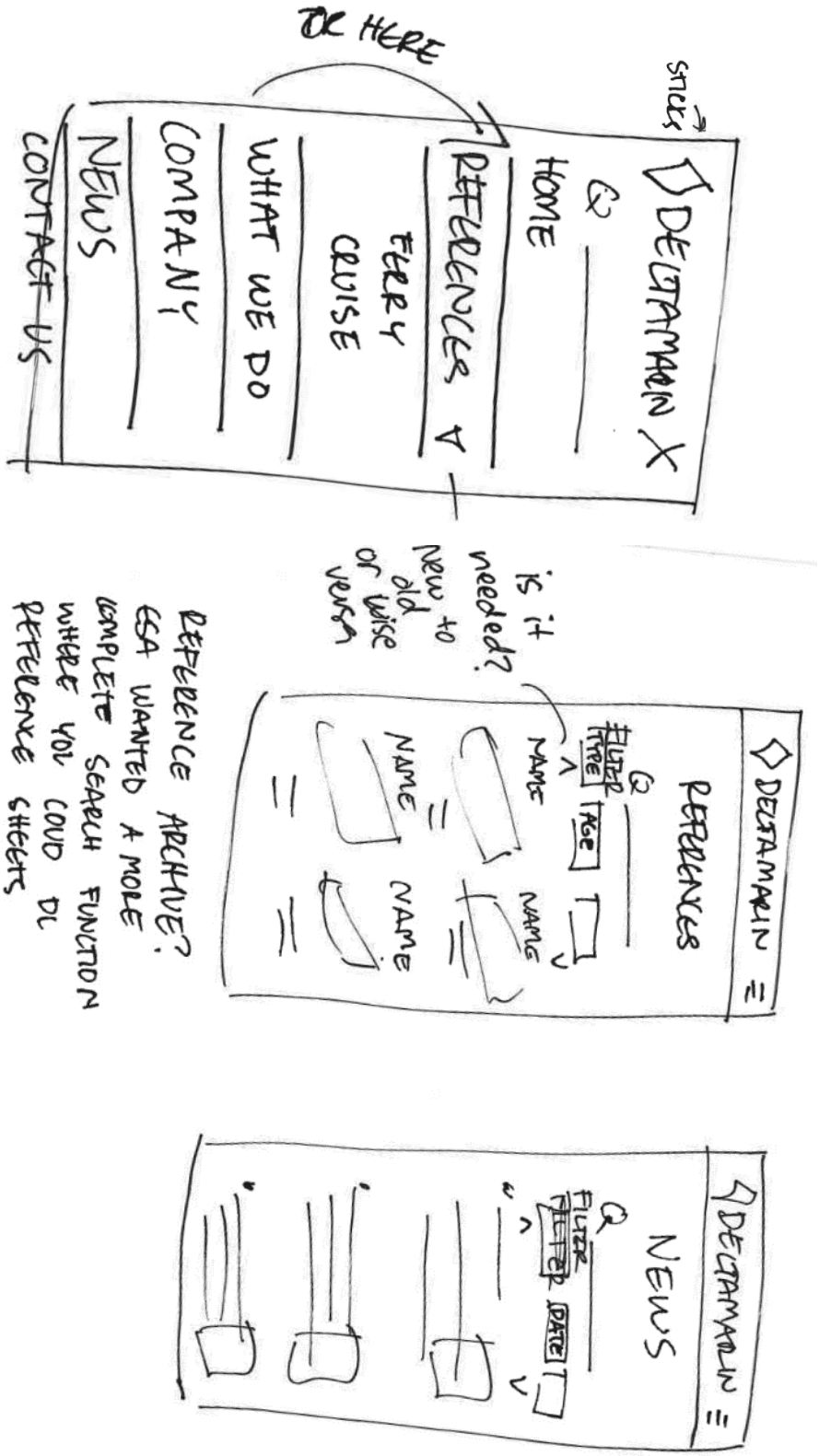


Figure 41. An initial sketch of the navigation menu and the reference and news pages.

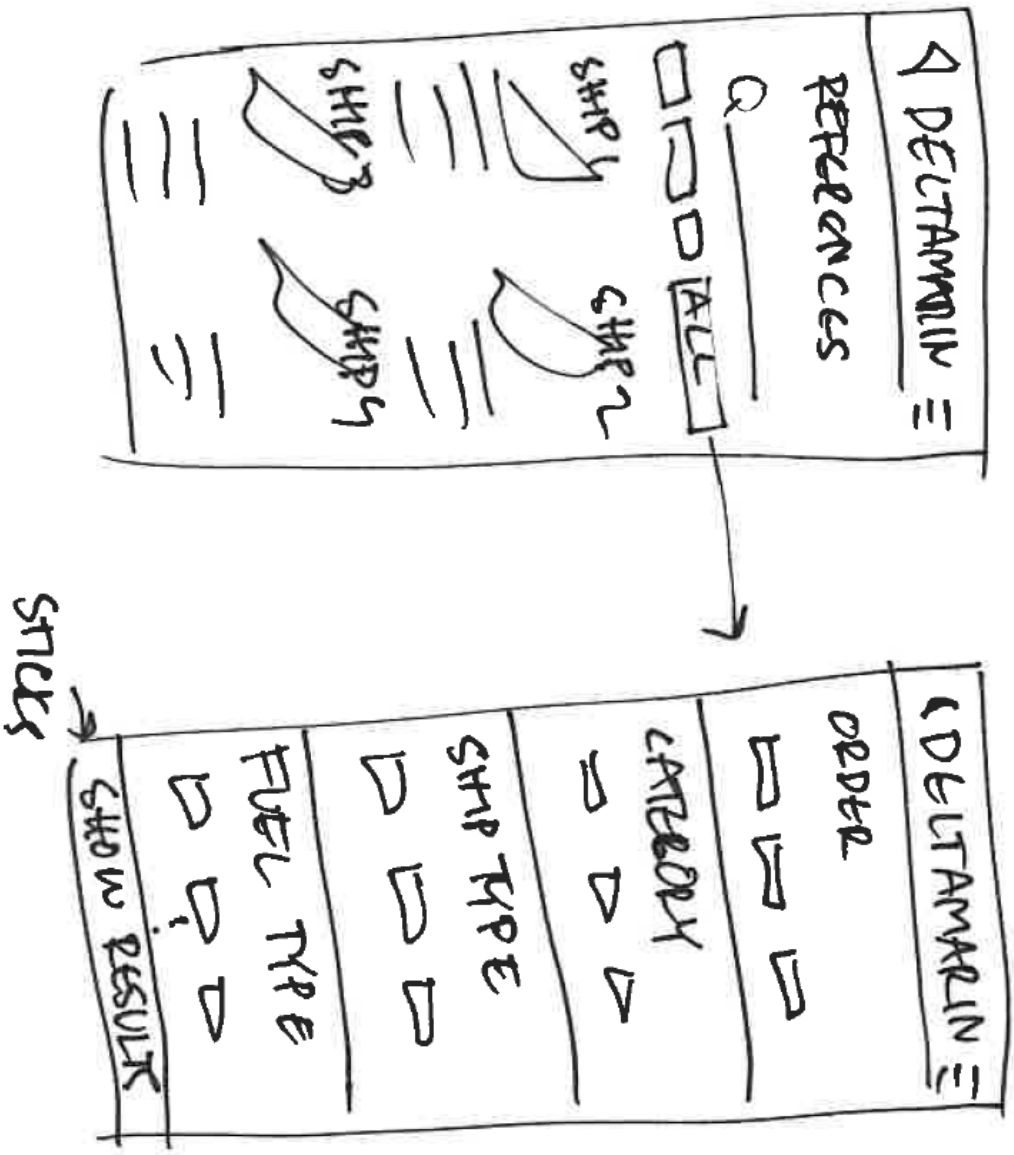


Figure 42. An initial sketch of the reference filter.

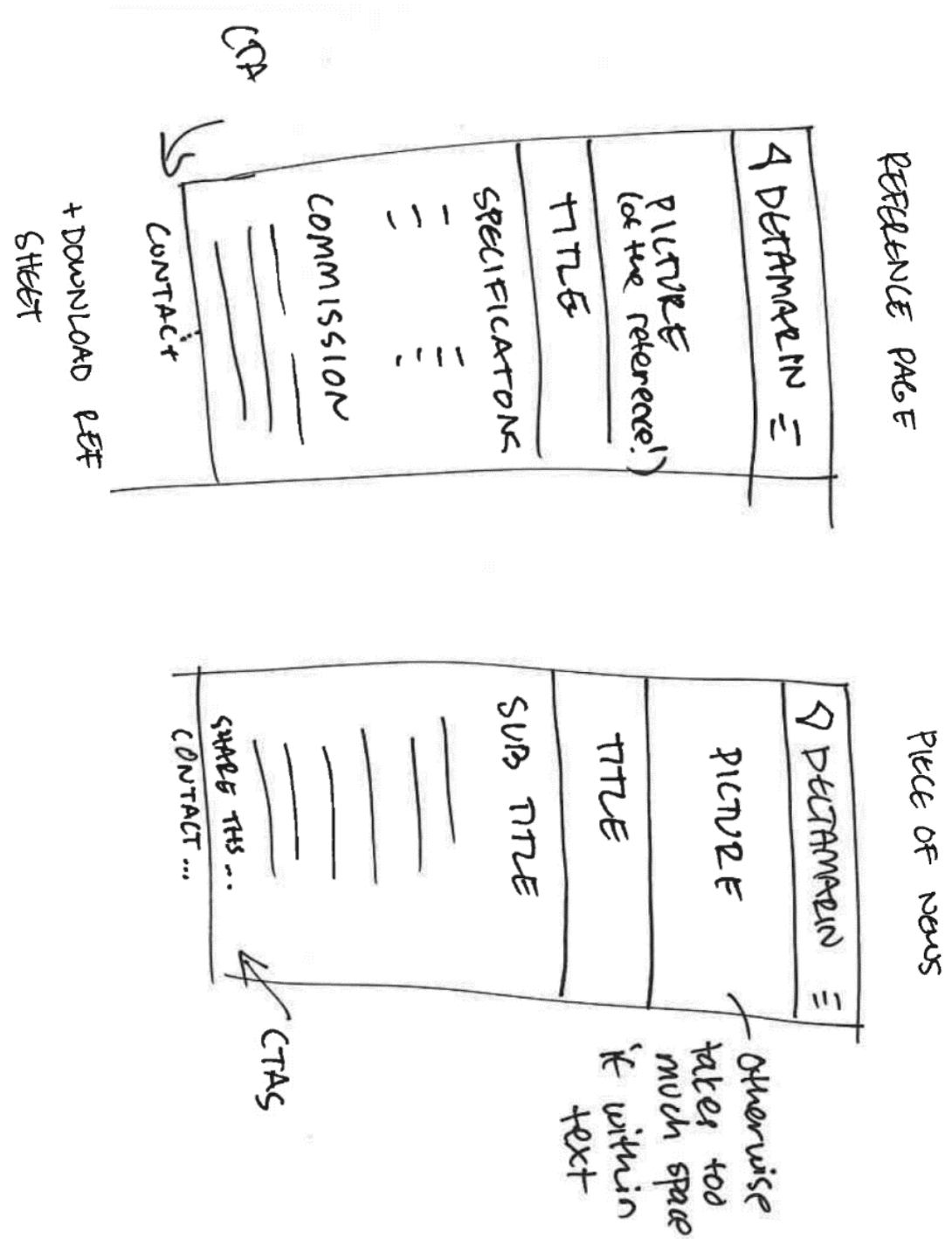


Figure 43. An initial sketch of the new visual layout (references & news).

Appendix 9. Figures appearing in the high-fidelity prototype chapter.

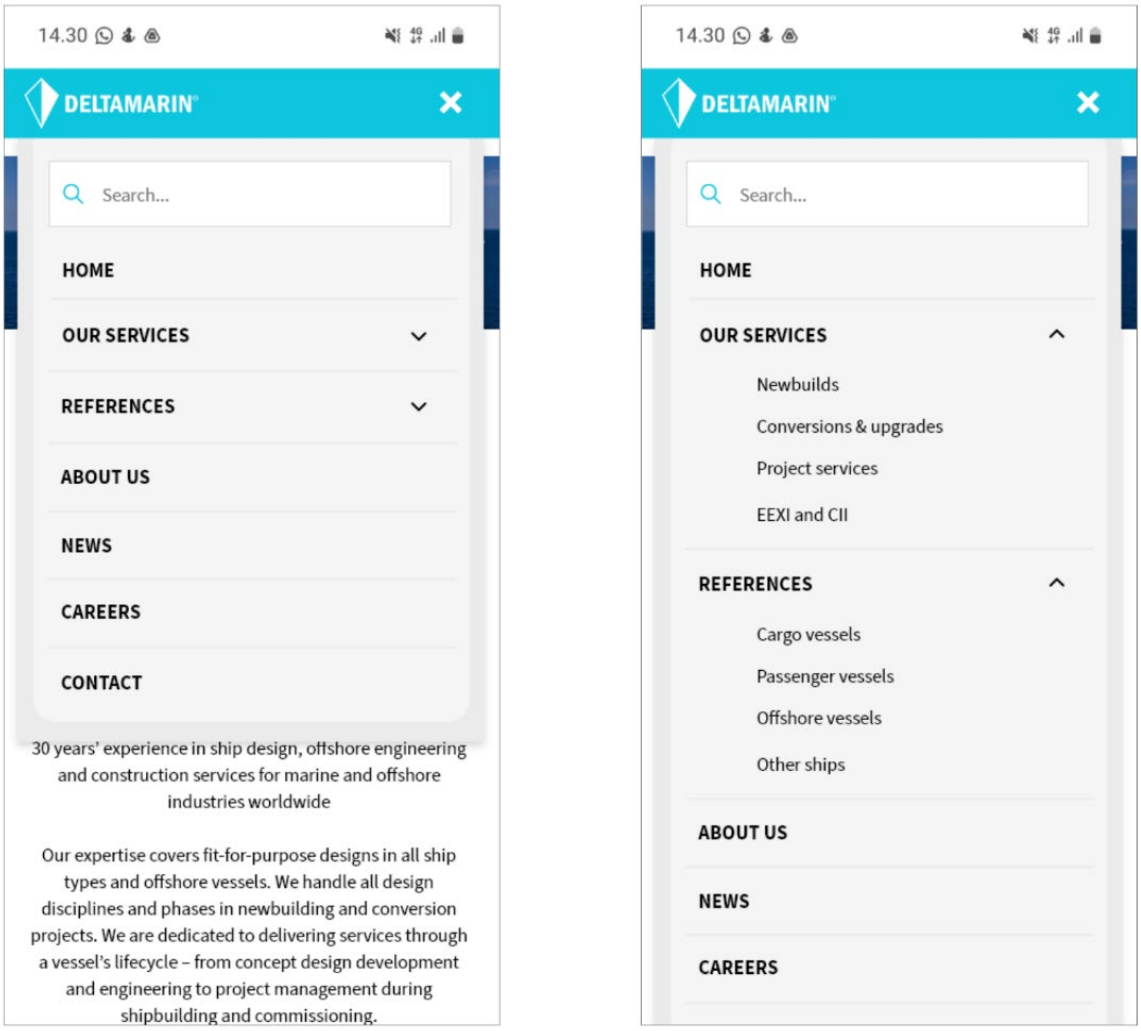


Figure 44. A hi-fi prototype of the navigation menu.

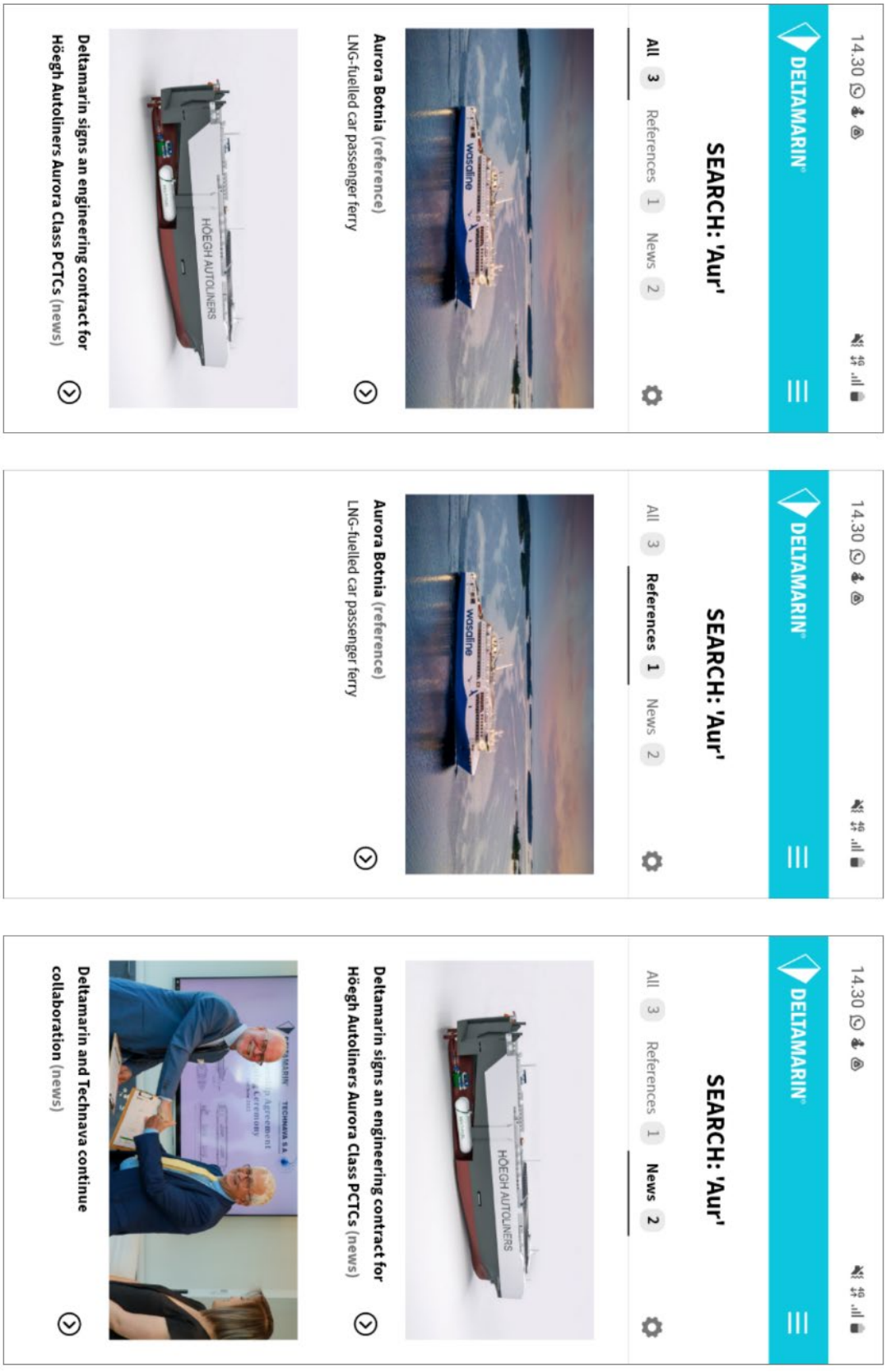


Figure 45 Hi-fi prototype of an improved search

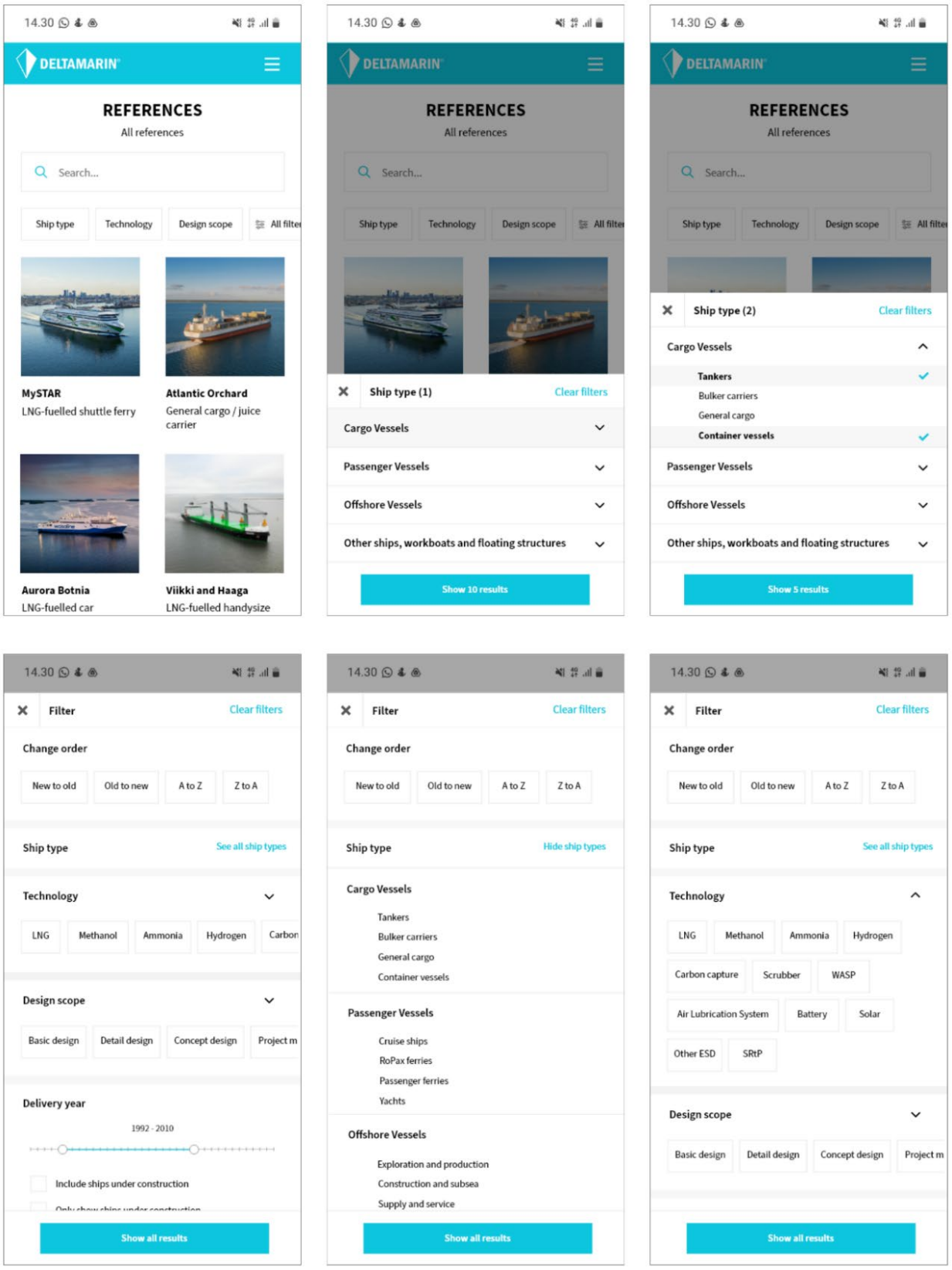


Figure 46. Hi-fi prototypes of the reference page and filter.

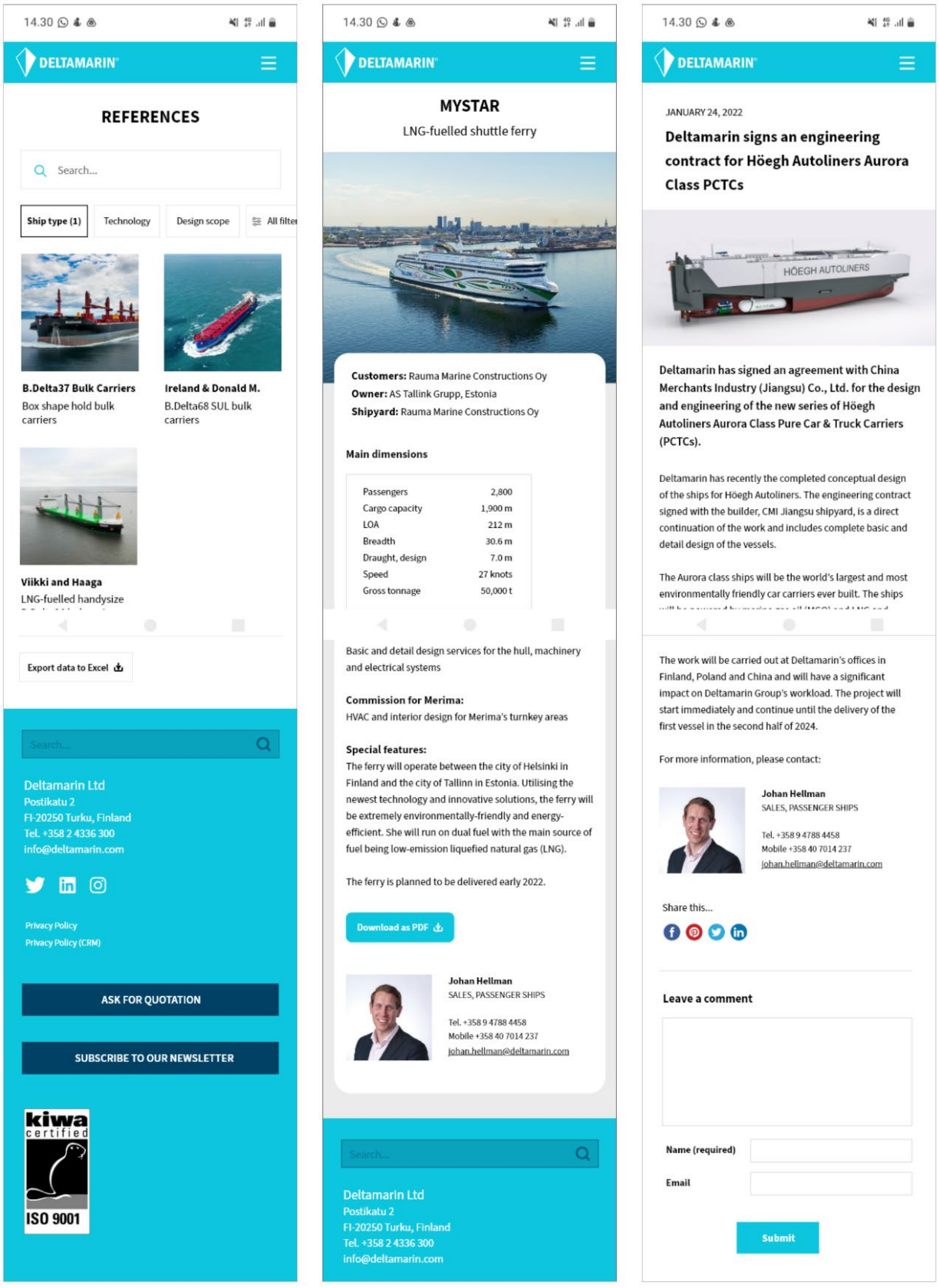


Figure 47. Hi-fi prototype of new layout designs.