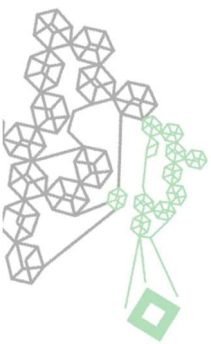


A Fault Tree Dedicated Web Interface Design

Portfolio Website Displaying Fault Tree Explanation and Visualisation Projects



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Programme: Creative Technology

Date: 04/07/2023

Abstract

Technological advancements have resulted in significant changes from basic tools for personal use to interconnected, multi-disciplinary complex systems. In the field of risk engineering, professionals utilize fault trees to assess risks in complex systems. Over the years, there have been multiple projects to explain and visualise fault trees, but these projects are scattered all over the internet. This bachelor's Graduation Project aims to design and develop an interactive website showcasing fault tree explanations and visualisations. The design of this website is based on a literature and state of the art exploration. The main web interface design elements concluded to be user interactions, graphical design, navigation, and content. The website has been evaluated through user testing. The prototype was tested by non-experts and the actual website by experts on aspects like website's appearance, layout, interactions, and navigation. The response was mainly positive. Experts suggested to include more fault tree-related content in the future, such as tools and techniques. I advise to develop the website towards a compendium website providing a centralised source with all relevant resources and materials. Maybe even adding a second audience group: students.

Acknowledgement

This Graduation Project was supervised by Prof. Dr. M.I.A. Stoelinga who brought forward the topic of the research. Professor Stoelinga's insights, constructive feedback, and positive support have been very helpful in shaping my skills and enhancing my professional development. I would also like to express my gratitude for the critical observer of this Graduation Project Dr. M.A. Lopuhaä-Zwakenberg and I thank Ahn Tuan Nguyen for his feedback and insight on the first version of my web interface design.

I express my gratitude to everyone who participated in the user test, generously providing invaluable feedback for the project.

Lastly, I would like to thank my family and housemates for their continuing support.

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1. Introduction

Technology changed the world and will keep doing that in the future. Technological changes vary from 'simple' day-to-day tools for individual use to interconnected, multi-disciplinary complex systems. However, technological progress is impossible without the proper tools to master the risks imposed by those new technologies and technological solutions[1]. Quantitative and qualitative risk assessment is crucial to ensure rational and well-considered solutions. Risk engineers use technical models to assess the risks of complex systems [2]. A popular way to assess these risks is by using fault tree analysis. Fault trees illustrate how several component failures can lead to a system failure. Researchers systematically break down high-level system failures into their causal factors, resulting in a graphical visualisation of the system failure, Stoelinga and Ruijters [3].

A lot of research concerning fault trees has already been done and published. Fault trees are useful for analysing and evaluating risks but are complex and difficult to interpret. That is why it is important to create an environment where people can access the fault trees and where the fault trees are explained. Furthermore, publication on a fault tree-dedicated website has several advantages. For instance, the content is gathered in one place, can be updated easily and in real-time, and is accessible to everybody (with access to the internet) and creating and maintaining a website is very cost-effective.

This Bachelor's Graduation Project aims to design and develop an interactive website showcasing fault tree explanations and visualisations. The main question of this research is:

What are effective web interface elements to inform professionals about the utilisation of fault trees for risk management?

To develop a clear picture of the problem and to break down the main question into smaller, more manageable parts, the following sub-questions have been formulated:

- What web interface key attributes are important to the target audience?
- What are important web interface design elements?
- What visual aids or interactive features can be used to enhance the user's experience and engagement with the information?

Designing a dedicated and fitting web interface is challenging [4]. The key design considerations for creating a web interface that effectively presents professionals with complex information, such as fault trees for risk management, have been identified via a literature review. Later in the process, these

elements will lead the design of a web interface about the applications of fault trees for risk management.

In addition, a thorough internet search to evaluate the state of the art will inspire the website's design. Finally, all the elements will be combined and assessed, serving as input for the web interface design. Chapters 2, 3, and 4 will present the results from literature research and state of the art. Next, the methods and techniques for designing and evaluating a website that will be used in the ideation and evaluation phase, which are presented in Chapters 6 and 8. Chapter 7 presents the website design. Finally, the discussion and conclusion are presented in Chapters 9 and 10.

2. Background

2.1 Fault Tree Analysis

Reliability engineering is a sub-discipline of engineering that applies scientific knowledge to components, products, plants, or processes to ensure that they perform their intended functions without failure [5]. Reliability engineering ensures the system, product, or process is dependable and operates consistently without failure or breakdown. It is particularly important in industries where failures of a system or product can have severe consequences and in industries where reliability is critical to ensure customer satisfaction [5]. Reliability engineering commonly uses fault tree analysis, a graphical technique to identify the potential causes of system failures and determine if a technology is safe and reliable. This method systematically breaks down high-level system failures into their causal factors.

Fault trees indicate how several component failures propagate through the system and lead to system failure. [3], [6] Fault trees have a hierarchical organisation. Starting with a top-level event, this event is then iteratively refined via gates that indicate how the event may occur. If there are no further refinements, possible one arrives at the basic events (the leaves of the tree). The basic events model the basic failure causes (often component failures) [3], [6]. An example of a static fault tree can be seen in Figure 1.

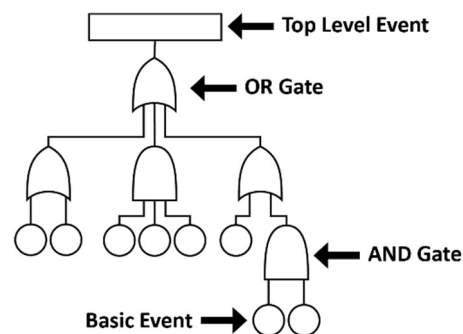


Figure 1: Example of a static Fault Tree [7]

A static fault tree only exists of boolean gates, for example, the OR-gate and AND-gate that can be seen in Figure 1. The OR-gate outputs failure when at least one of its children fails, and the AND-gate outputs failure when all its children fail. [3]

There are two types of analyses, qualitative and quantitative. Qualitative fault trees illustrate a system's components and causal failure paths, and quantitative fault trees focus on dependability metrics.

Fault trees can aid in multiple activities [3]:

- Understanding failure propagation and root causes. Fault trees systematically break down complex system failure scenarios into smaller pieces until the root causes have been identified. This helps with understanding system failures.
- Improving system design. Fault trees help make systems more reliable by preventing the top event from occurring or reducing its probability.
- Diagnosing a fault that has happened. Using an existing fault tree or constructing a new one can help pinpoint where the fault originated.
- Monitoring risks during operations.
- Complying with requirements.

Fault tree analysis is a powerful tool commonly employed in the aerospace and defence industries to assess the safety and reliability of complex systems, such as missiles, spacecraft, and aeroplanes. However, its usefulness extends beyond these fields. For example, it is utilised to evaluate the safety of nuclear power plants, where identifying potential failures is crucial. Similarly, fault tree analysis is used to assess the safety and reliability of transportation systems, including railways, highways, and air traffic control systems. Furthermore, fault tree analysis is used to analyse the reliability of manufacturing systems and identify potential failures that could lead to production downtime or quality issues. Another example is applying fault tree analysis on dike safety by identifying and analysing possible causes of dike failures [3].

Fault trees are important for risk management. However, they are not always accessible to everyone. That is why this research aims at designing a website that will make fault trees accessible to everyone.

2.2 Target audience

Professionals working in the field of fault trees or risk management are the target audience of the website. The target audience already possesses knowledge about risk management and potentially on the use of fault trees. To get an impression of the important elements of a website for this audience, I interviewed a representative¹. Topics discussed are navigation, 'first impressions', 'loading time'², layout, and content. The full list of the questions is included in Appendix A.

¹ On advice of my supervisor, who also provided the contact information.

² The question on loading time is prompted by the inclusion of pictures and video's, which might slowdown complete loading of pages.

The representative prefers to **navigate** by clicking on buttons, scrolling through the website, and using menus (navigation bar), rather than using a search function unless the website contains a large amount of content. However, if looking for specific information, a search function could be useful. If looking for inspiration or to get a general impression of the topic, the target audience is probably more inclined to scroll and explore the website without a search function.

The representative stated that an overload of pop-ups, cookies, or other items scattered over the home page would certainly scare off the target audience if an alternative website is available with similar information. "The website should not be too time-consuming, in the sense that if I need particular information, then it should be clear where I can find the information."

Regarding website **loading time**, the representative logically prefers it to be fast but is okay if it takes longer as long as he sees some progress. If it takes longer, he might check other pages during loading and return to the page when fully loaded (even when annoyed).

As for **layout** and organisation, the representative prefers a home page that shows a preview of the website's content, containing visual and textual elements and an option to (for example, a button) read more about the subject.

The representative's focus would be on the **content** and not the aesthetics. However, the aesthetics of the website do contribute to its credibility. The representative mentioned that in case the website resembles a 90s-style design, they would seek an alternative website since it creates the impression of outdated content.

The representative prefers navigating websites through buttons, scrolling, and menus rather than using search functions, unless there's a large amount of content. Pop-ups, cookies, and cluttered home pages deter the target audience. Fast loading is preferred, but progress is acceptable. A home page preview with visual and textual elements is desired. Content takes precedence over aesthetics, but outdated designs are off-putting.

3. Web Interface Design Elements

The number of websites on the internet is countless, and user experiences vary enormously. User experience (UX) is determined by what the user feels when interacting with the site. [8], [9]

Some websites are better than others based on the design elements that determine the quality of a good website.

The web interface design enables all interactions between the user and the website unlocking the content. Flavian et al. [10] and De Angeli, Sutcliffe, and Hartmann [11] state that the most important web interface design elements are visual appearance (or graphical design), navigation, and content. If not designed correctly, the user will have a bad experience. Therefore, a website should focus on simplicity and freedom of navigation to provide the user with clear, timely, and accurate information. Liu and Ma [12] agree with Flavian et al. and De Angeli, Sutcliffe, and Hartmann that navigation and content are important for web interface design. However, Liu and Ma categorise the design elements into three categories icon/title, navigation bar, and content. According to Liu and Ma, these design elements have different purposes and should be arranged logically. The navigation bar should attract attention; the icon/title refers to the brand, and the icon or title and content must be clear and readable. Garrett et al. [6] also conclude that navigation, graphical representation, organisation or layout, and content utility are important design elements. In their literature review, Garrett et al. even identifies three additional web interface design elements, purpose, simplicity, and readability.

Chun-Cheng Hsu [7] qualifies a website's interface on a higher level by its functional and emotional features. Hsu identifies four functional features: the websites' structure, usability, readability, and title or logo. Hsu also identifies four emotional features: attraction, colours, layout, and images. Emotional features influence the functional perception, according to Weeimer, as mentioned in [8]. For example, if the website's layout is not appealing or unclear, the user might choose a different website. The functional features are directly related to the websites' content, while the emotional features are more related to the appearance of the content and are meant to grab and keep the user's attention. Functional and emotional features are intertwined. For example, when users react positively to emotional features, they are more likely to respond positively to functional features.

The researchers all seem to agree that content, navigation, and graphical design are key elements determining the quality of a web interface design (see a schematic overview in Figure 2).

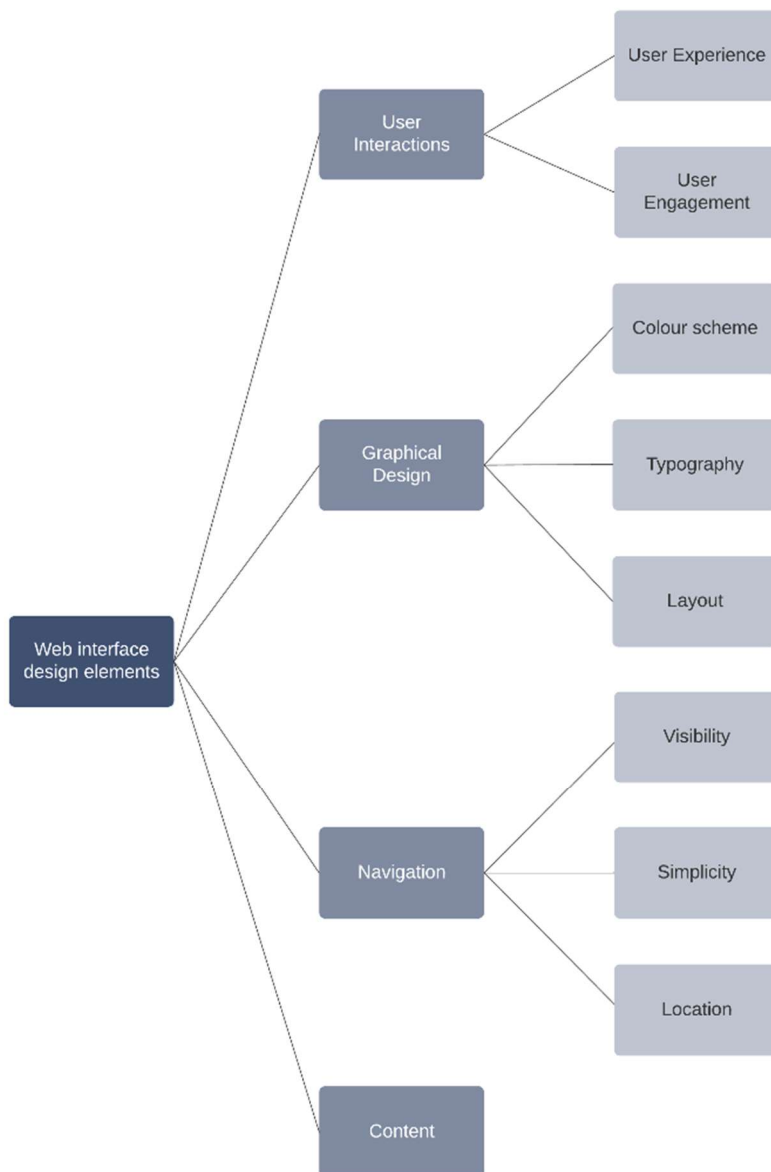


Figure 2: Web interface design elements

All elements will be discussed in the next paragraphs.

3.1 User Interaction

User interaction in web design is how a user engages with the website. This includes actions such as scrolling, typing, hovering, swiping, and clicking. Kuo, Chang, and Lai [13] state that interactive web pages attract more users than static web pages.

An effective user interaction design considers the user's experience and optimises it by providing intuitive and easy-to-use interactions. When the user interactions of the website are designed well, it will make a website more engaging and user-friendly [14].

Nasrul et al. [9] state that it is very important to consider the users' emotions when designing website interactions. When users feel comfortable with the interactions between the user and the web interface, the bounce-rate³ will be lower, and people will continue to use the website.

3.1.1 User Experience and Engagement

A good user experience is key. If the user's first impression of the website is not positive, or in other words, the user does not have a good experience and does not get engaged, the user will leave the website.

O'Brien and Toms [9] define engagement as something that 'engages' the user and draws them in, attracts, and holds their attention. They propose a Model of Engagement. In this model, attributes are distributed over three categories: Point of Engagement, Period of Engagement, and Disengagement. The point of engagement is the point at which engagement is initiated. This category comprises aesthetics, novelty, interest, motivation, and goals. The period of engagement is the period in which the user interacts with the interface. This includes the following attributes: aesthetics, attention, awareness, control, interactivity, novelty, challenge, feedback, interest, and positive affect. The last category is disengagement. This is when the user stops interacting with the interface. This category includes usability, challenge, positive affect, negative affect, perceived time, and interruptions.

Based on O'Brien's definition of user engagement (UE), Sutcliffe [10] concludes that user engagement is closely related to user experience (UX). UE describes how and why an interactive product attracts the user and how a good UE makes the interaction exciting and fun for the user. UX extends UE by covering why users adopt and continue to use a particular design.

According to Liu and Ma [5], the user experience on a webpage interface can happen on three levels, visceral (first impression), behavioural, and reflective. Liu and Ma conclude that aesthetic factors mainly influence the visceral level. According to the 7 Seconds Law, users decide to stay on or leave the website within the first seven seconds. Visual design is thus important to enhance the user experience, according to Liu and Ma.

Al-Shamaileh and Sutcliffe [11] conclude that a familiar website brand has the strongest effect on user experience besides comprehensive content and interactive features.

Overall, from the perspective of user experience and engagement, the most important features of a website are the visual design or aesthetics, novelty, control, interactivity, usability, and brand.

3.2 Graphical Design

According to the 7 Seconds Law, users decide if they like the website's interface within the first seven seconds [12]. If not, it takes another three seconds to actually leave the website: a website's highest

³ Bounce-rate: the percentage of visitors who navigate away from the website after viewing only one page.

bounce rates are within the first ten seconds of a visit. Hence, optimising all aspects of the graphical design of a website's interface is crucial. In this chapter, website organisation or layout, colour schemes, and typography, all three major elements in the interfaces' graphical design, will be discussed.

Layout

The objectives of a website are communicated via its content. The arrangement of visual elements, referred to as the layout, determines the most efficient way to deliver that content. The primary objective of a website layout is to organise its content in a visually appealing and user-friendly manner, thereby enhancing the overall user experience and ease of navigation while browsing the website. A good layout, for instance, creates a good balance between text and non-text elements, such as images and other visual elements [15], [16].

Paul Boag [16] and Nick Babich [17] agree that a good layout allows the content to 'shine' where the same content comes across as hard to read and uninspiring with a bad layout. And according to Johnny Levanier [18], a website layout design balances aesthetics with practicality. A good layout in the website design will make the website easier to use. Most importantly, the website should give the user what they came for while looking aesthetically good.

Typography

Typography is the creative design of the text on a web page. Typography is related to the text's appearance, attractiveness, and readability to draw the user's attention [19]. High-quality typography enhances the meaning of words, how the words can be perceived, and the website's value. On the other hand, pre-quality typography can negatively affect the user's comprehension and learnability and thus visually confuse the reader [19]. Typography elements include text size, spacing, and colour. Selecting these elements is important as it enables effective communication and reading. Furthermore, using the appropriate typography on a web interface creates loyalty because of the trust and satisfaction that typography provides.

A typeface is a design style with many different sizes and weights of letters, whereas a font is a graphical representation of text structure. Simply put, a font is a family of related typefaces, whereas fonts refer to the typesetting weights, widths and styles. Typography has four main typefaces: serif, sans serif, slab serif, and script [20]. Each typeface has its distinctive style and purpose. Serif fonts are conventional and convey an air of formality and consistency, making them ideal for official documents. Meanwhile, sans serif fonts are more casual and modern, and their simplicity makes them easy to read, even on low-resolution screens. Slab serif fonts are strong, bold, simple and attention-grabbing. Finally, script fonts are elegant and decorative, and their fluid strokes mimic the look of handwriting, allowing them to add a creative touch to any project.

Colour Scheme

Colour can influence people's emotions and thus influence the bounce rate. By choosing the right colours, the designer can grab the user's attention and trigger the correct emotions [21], [22]. According to Mirza [21], when the eyes take in colour, the hypothalamus sends signals to the pituitary gland, which then triggers a series of signals to the endocrine system and finally to the thyroid glands. As a result, our thyroid glands release hormones that can influence our mood and emotions, ultimately affecting our behaviour.

It is recommended to use three colours for the colour scheme of a website, primary, secondary, and accent colour, to create a harmonious website. The primary colour is the colour that will get the user's attention and will be associated with the brand. The colours should have good contrast. The primary colour is mostly used for buttons and important information. The secondary colour is used on elements that do not need immediate attention. The background and text colour fall under neutral/additional colours. These colours do not need to compete for attention [23], [24].

Colour harmony refers to aesthetically pleasing and harmonious colour combinations based on geometric relationships on the colour wheel. Colours in harmony produce consonant and eye-pleasing contrasts. Every design has a key colour; this is the most important colour. The colour you cannot change or want to draw attention to. The key colour is the starting point in determining the colour harmony and scheme. The emotions the website should evoke determine the colour harmony and scheme.

Multiple successful techniques exist for creating a website's colour harmony and scheme: complementary, split complement, analogous, triadic, tetradic, square, and monochromatic (see Figure 3). A complementary colour scheme is the most basic colour harmony. It uses two opposite colours on the colour wheel. This colour scheme creates vibrant colour palettes with high contrast. And often used for its simplicity and for creating eye-catching elements. Split-Complementary colour schemes are a little more complex than complementary colours. Split-complementary has one key colour and two colours next to the key colour. That gives this scheme a vibrant contrast. An analogous colour scheme creates a visually pleasing and calming display and consists of two or three colours positioned next to each other, including shades and tints. Analogous colour schemes mostly use one colour as their dominant colour while the other(s) are used to enhance the scheme. Triadic colour schemes consist of three colours evenly spread on the colour wheel. These schemes offer a strong contrast and tend to be easier on the eyes than complementary colour schemes. This makes a triadic colour scheme a safe choice. Tetradic colour schemes have four colours, consisting of two complementary colour pairs. This makes the colour schemes bold and vibrant. A square colour

scheme consists of four colours spaced evenly around the colour wheel. Square colour schemes can evoke a sense of fun and playfulness and give an eye-catching result. Monochromatic colour schemes use one main colour and create a scheme of different shades, tones, and tints of that colour. This colour scheme is vibrant and eye-pleasing, but when using a monochromatic colour scheme, make sure to use enough contrast [24]–[27].

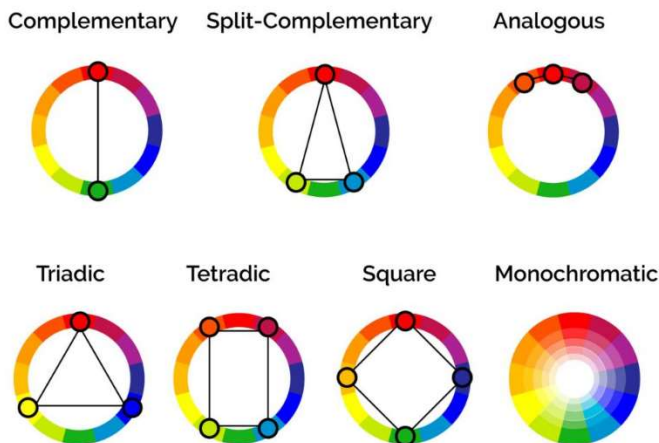


Figure 3: Colour schemes [25]

Colours have different meanings in different cultures. See a complete list of usage and feelings of colours in Appendix B. For this thesis, only Western definitions are considered. In general, warm colours are used to stir up passion, happiness, and energy. Cold colours promote calmness, trust, and professionalism.

The most suitable colours for interactive webpages are royal (R65, G105, B225), slate (R106, G90, B205), and dark blue (R0, G0, B139) [13].

The web interface should have good contrast. The colours need to balance each other and not overpower. The content needs to be readable, etc.

3.3 Website Navigation

Website navigation is another aspect which influences UX [28]. A well-designed navigation system serves as a roadmap, guiding visitors to different pages and information on the website [28]. Research suggests that an easy and intuitive navigation system encourages users to explore the site further [28]. The navigation bar is the most commonly used navigation system, which can either be fixed on the screen or disappear when the user scrolls. The user can obtain immediate knowledge of the

website by having a well-organised navigation bar that is visible, uses clear terms that hit the brief, and is consistent overall with web pages [4], [28].

The website navigation must be appropriate to avoid confusion for the website users and potential abandonment of the website [29]. Next to this, simplifying the website navigation, as suggested by Roshan and Ahmadi [29], can enhance the user experience. Roshan and Ahmadi also conclude that the different website navigation elements must be properly located to avoid confusion.

In their literature review on web design and user engagement, Garrett et al. [4] also found that a salient and consistent navigation bar is essential for effective navigation. Furthermore, the review pointed out that easy access to pages is another must-have for a good web interface design.

In conclusion, a well-designed navigation system is crucial for a positive user experience (UX). It serves as a roadmap, guiding visitors through the website and encouraging exploration. The navigation bar (commonly used), whether fixed or not, provides immediate knowledge and consistency. Simplifying navigation and proper placement of elements prevent confusion and enhance UX. A salient and consistent navigation bar and easy access to pages are vital for effective web interface design.

3.4 Content

Over the years, several visualisation projects related to Fault Trees (FTs) have been conducted. These projects include graduation projects aiming to explain fault trees, explanation videos, and simulations. The website will showcase these projects. In the future other content (projects, video's, photo's) can be added. For that an automated content incorporation (form) will be included on the website.

4. State of the Art

This paragraph evaluates several existing websites on their interface design to identify best practices and techniques already developed. The aim is to get inspiration, compare, combine, or use the methods and elements to create the optimal interface for the fault tree website.

I searched the internet for website evaluations and I combined several to find the portfolio and informational websites. These websites represent the kind of website I am developing.

These websites accurately and effectively represent the current state of websites in the relevant field and they provide valuable insight and inspiration.

In Chapter 3, I explained that the user experience is key, so the websites are scored on three aspects relevant to the user experience: the navigation bar, layout, and user interactions. Each category is assessed with the help of three features. The navigation bar is evaluated based on visibility, simplicity, and location. The layout is assessed based on consistency, easy-to-read, and balance. And finally, user interactions are based on intuitiveness, easy-to-use, and meaningfulness. Each feature gets a score out of 1-5. The evaluation can be found in Table 1: User Experience Ratings [30]–[35], and in the following paragraphs, the score is explained.

Table 1: User Experience Ratings [30]–[35]

Scale 1-5	Navigation bar			Layout			User Interactions			Website score			
	Visibility	Simplicity	Location	Total	Consistent	Easy-to-read	Balance	Total	Intuitive		Easy-to-use	Meaningful	
Claudia ten Hoope	3	4	5	12	4	3	2	9	4	5	3	12	33
Sage Research Methods	5	4	5	14	4	5	5	14	4	4	5	13	41
Edaboard	4	3	5	12	5	4	4	13	4	4	5	13	38
Home Societe	1	5	3	9	5	3	5	13	5	4	5	14	36
Christie Tang	3	5	5	13	4	4	5	13	5	4	4	13	39
Ginko	5	5	4	14	5	4	5	14	5	5	4	14	42

4.1 Claudia ten Hoop

Websites goal

This is a portfolio website. The website aims to highlight Claudia ten Hoop's work, providing a point of contact, and generating business.

Evaluation

The website's background colour is white, and the navigation bar has the same colour. The navigation bar is simple and easy to use, and appropriately located. However, due to the white background and white navigation bar, the distinction between the navigation bar and text fades away as soon as the user starts to scroll. As a result, the text moves up and collides with the navigation bar⁴, see Figure 4.



Figure 4: Navigation bar and content collision [35]

The layout of the website is not appealing. There is a lot of text, and the borders are large, cluttering the text in the middle of the screen, see Figure 5. The layout is consistent over the pages; however, some pages contain more images, resulting in a more appealing layout. As a result, the website is a text-only website rather than a multimedia website⁵. Because of the amount of text, the content is not easy-to-read, or aesthetically pleasing and thus very monotonous and uninteresting.

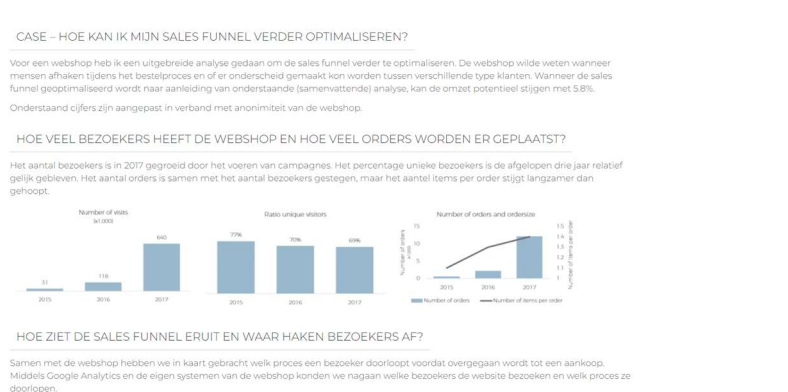


Figure 5: Website layout [35]

The interactions on the website are mostly intuitive. But there is an image on one of the web pages that looks like an interactive system, see Figure 6 and

⁴ Easy fix: adding a line under the navigation bar.

⁵ Multimedia website is a website that presents more than one type of media simultaneously

Figure 7. Unfortunately, it turns out to be an image, and when clicked, the user is sent to a different window/tab with only the (enlarged) image. So, not all interactions are meaningful. Clicking an image (which the user does since when hovered over an image, the cursor changes shape), the user is sent to a different window/tab with an enlarged version of the image (this could be improved by either not being clickable, or an enlarged version of the image on the same window with an option to close).



Figure 6: Image of a dashboard (a) [35]



Figure 7: Image of a dashboard (b) [35]

Overall, the user experience score is good (overall score of 33 out of 45), but since the website's layout is not appealing (score 9 out of 15), according to the 7 Seconds Law, the user might leave the website early.

Takeaways

The takeaway from this website is a good location for the navigation bar is at the top of the webpage. Another element to take into consideration is the interactions that this website includes.

<https://www.claudiatenhoope.com/nl/>

4.2 Sage Research Methods

Website goal

This is an informational website. The aim is to provide information to the user.

Evaluation

The navigation bar is visible and properly located horizontally on the top of the pages (see Figure 8). However, to access the drop-down menus, the user has to click on the word representing the web page instead of hovering above it, which is inconvenient. In addition, it means that the user has to perform more actions than necessary.

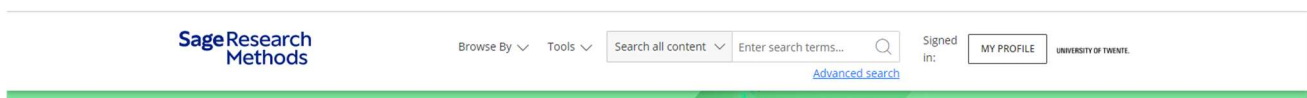


Figure 8: Navigation bar [30]

The layout is easy to read and balanced. The research items have an image, icons, title, and short text (see Figure 9). But not all the web pages are consistent in colour usage on all the web pages. This is not troublesome, though.

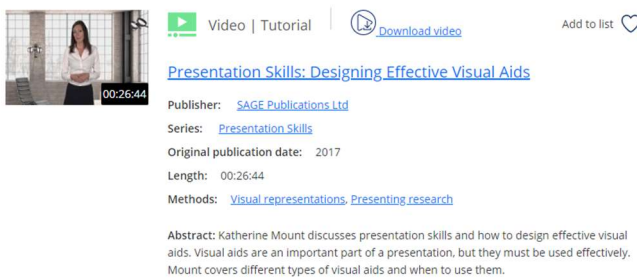


Figure 9: Layout [30]

The user interactions are meaningful. However, as mentioned before, some interactions are expected to happen when hovered above but need clicking to be activated.

Overall, the user experience score is great (overall score of 41 out of 45).

Takeaways

The takeaway from this website is the navigation bar design, more precisely, the way the designer makes the navigation bar visible and distinguishable from the website's content. Next, the Sage Research Methods website's layout is easy to read and balanced, thus a great source of inspiration.

<https://methods.sagepub.com/>

4.3 Edaboard

Website goal

This is an informational and community-building website. The website aims to inform its users about electronics and build a community around a shared interest. In addition, the website provides a space for people to connect and share information.

Evaluation

The navigation bar is visible, but not all items fit on the bar. This results in the user having to press the 'next' button to scroll through the navigation bar (see Figure 10). Next to this, the user needs to click precisely on the arrow to see the drop-down menu. This makes the navigation hard to use. However, the location is appropriate.

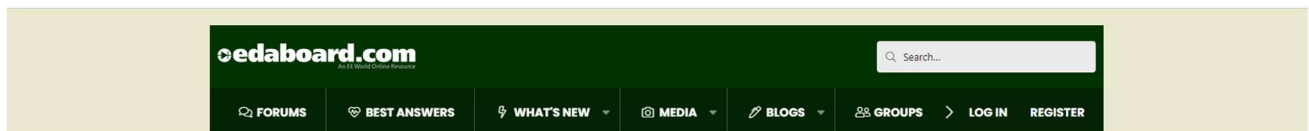


Figure 10: Navigation bar [31]

The layout is consistent but does not utilise the entire screen. In addition, some of the pages have a lot of text and no visible separation between the text boxes, making it hard to read (see Figure 11). The amount of text causes an unbalanced webpage, which can cause confusion and lead to a user leaving the website.

Post 919381 in thread: Simulate Proteus USB Samples on Windows 7 (x64)	Software Problems, Hints and Reviews	87 (100%)	87	Dec 26, 2017
Post 93387 in thread: Setups for doing CPW in HFSS or Momentum ?	Electromagnetic Design and Simulation	33 (100%)	33	May 2, 2020
Post 572228 in thread: what is clock latency and clock uncertainty	ASIC Design Methodologies and Tools (Digital)	32 (100%)	32	Apr 16, 2020
Post 237188 in thread: What is the procedure for PIC timer0 to generate a 1 ms or 1 sec interrupt?	Microcontrollers	30 (100%)	30	Jun 30, 2022

Figure 11: Layout [31]

The interactions are intuitive, except for the drop-down arrow of the navigation bar tiles. This, and the 'next' button, make it a bit hard to use. However, every interaction does have a meaning.

Overall, the user experience score is good (overall score of 38 out of 45).

Takeaways

The takeaway from this website are the interactions, the navigation bar's location, and the layout's consistency throughout the pages.

<https://www.edaboard.com/>

4.4 Home Societe

Website goal

This is a portfolio website for a brand. The website aims to promote their work while creating brand awareness.

Evaluation

Locating the navigation bar takes a few seconds when the website opens. The bar is placed vertically and halfway across the page (not at the edge of the screen) (see Figure 12). When the user starts to scroll, the navigation bar disappears and doesn't return until the user nears the end of the website. Once the navigation bar reappears and the user scrolls back, the bar stays visible. The words representing the different web pages are simple and clear. However, due to the vertical navigation bar, the words are sideways. This makes them hard to read.



Figure 12: Navigation bar [32]

The interactions on the website are intuitive and meaningful. However, the website can become overwhelming due to the number of animations.

Overall, the user experience score is good (overall score of 36 out of 45). However, the website's navigation is not user-friendly (score 9 out of 15), which could result in the user leaving the website early.

Takeaways

The takeaway from this website is the layout's balance and consistency and the website's interactions. Another takeaway is to not place the navigation bar vertically in the middle of the page because that makes the navigation bar hard to pinpoint. Another element to takeaway are the animations; there are too many.

<https://homesociete.ca/en/>

4.5 Christie Tang

Website goal

This is a portfolio website. The website aims to showcase Christie Tang's portfolio and serve as a platform for potential clients to connect with her and engage in business opportunities.

Evaluation

The website has two different navigation bars. The first one is visible when opening the website and while scrolling (see Figure 16). The second appears when the user moves off the home/work web page (see Figure 17). The first navigation bar consists of only text; at first, this is fine. The website is designed so that this navigation bar is visible. However, when the horizontal scroll dissolves into a vertical scroll, the background colour changes to dark grey and the text on the navigation bar to white. But without a navigation bar background, the text on the bar falls over the images and disappears in some images (see Figure 18).



Figure 16: First Navigation bar [33]

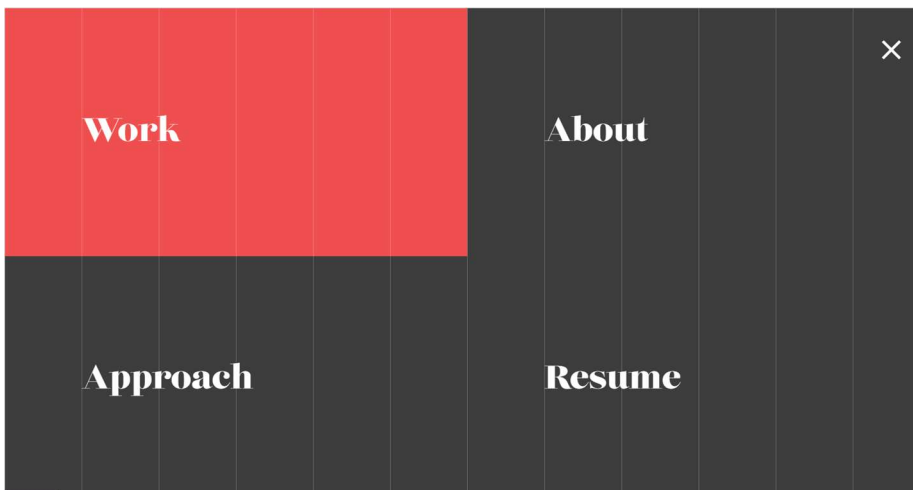


Figure 17: Second Navigation bar [33]



Figure 18: Navigation bar when vertical scrolling [33]

Both navigation bar styles are simple and easy to use and located at an appropriate location.

Besides the two different navigation styles, the website's layout is consistent. This website has animations for the visual elements, making some content hard to read. However, the balance between text and other visual elements is great (see Figure 19).

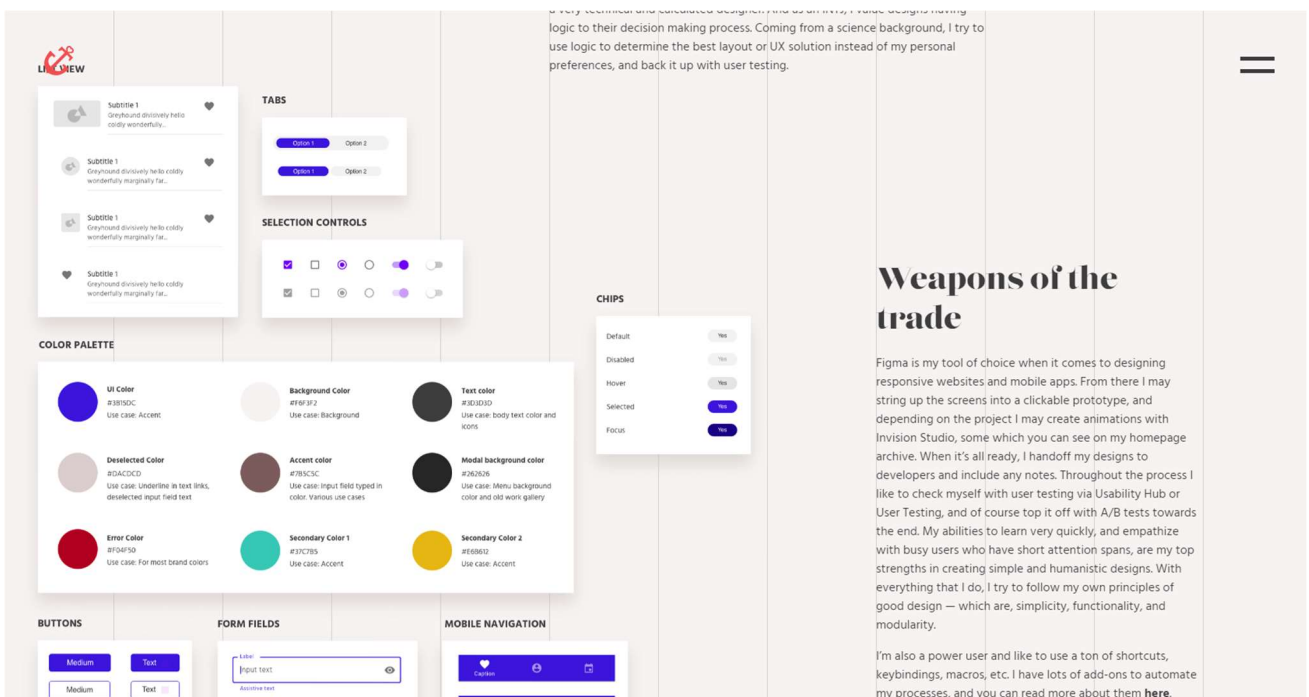


Figure 19: Balance

The user interactions are intuitive. However, a video is shown when the user hovers above the first navigation. This can be overwhelming. It is also not a meaningful addition to the website.

Overall, the user experience score is good (overall score of 39 out of 45). The website could improve the first navigation bar and remove some of the animations to improve the user experience

Takeaways

The takeaway is the navigation bar's simplicity and location, the layout's balance, and the intuitiveness of the interactions. Another element to takeaway is the animations; there are too many.

<https://christietang.com/>

4.6 Ginko

Website goal

This is a portfolio website for a brand. The website aims to promote their work while creating brand awareness.

Evaluation

The navigation bar on the website is visible, and even though both the background colour of the website and the navigation bar are white, the designer made sure to create a clear distinction between the two. Next to this, the navigation bar is simple and easy to use. However, the navigation bar is on the screen's bottom left side. This can cause some confusion. But soon, it becomes clear where the navigation bar is located (see Figure 20).

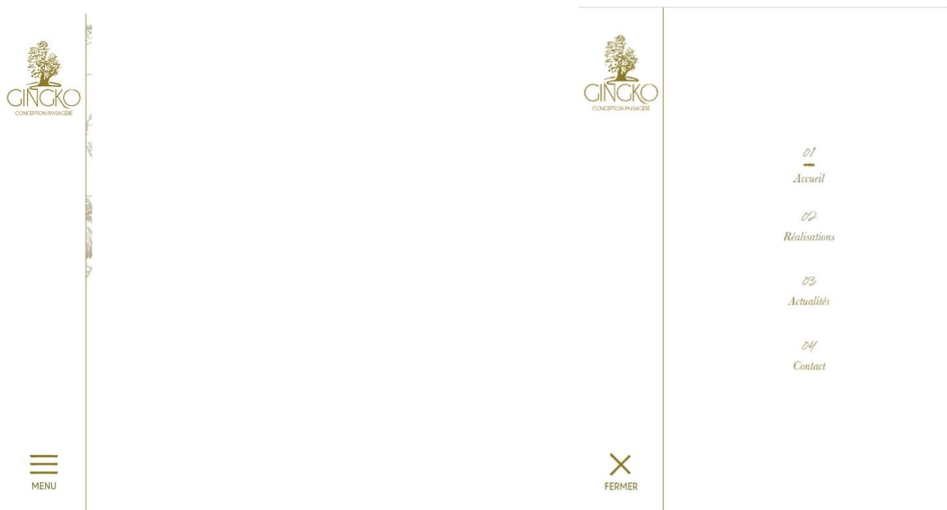


Figure 20: Navigation bar [34]

The layout is consistent and balanced (see Figure 21). However, there some of the visual elements are animated. This makes reading some of the content difficult as it takes some time to appear.



Figure 21: Layout [34]

The user interactions are intuitive and easy to use. However, some interactions lose meaning due to the number of animations. For example, when scrolling faster to get to the next page, it takes a while to load due to the animations.

Overall, the user experience score is great (overall score of 42 out of 45).

Takeaways

The takeaway is the navigation bar's visibility and simplicity, the layout (excluding the font), and the interactions.

<https://www.gingko.pro/>

4.7 Conclusion

Examining the current trends, it is clear that the placement and design of the navigation bar play a crucial role in establishing a positive user experience. Maintaining a proper balance between text and images is also essential for user engagement. Limiting the use of animations is advisable, as they can be disruptive and lead users to leave the website. Ensuring that interactions are user-friendly and intuitive contributes to a positive user experience as well.

5. Methods and Techniques for Designing and Evaluating a Web interface design

The key elements identified in the literature search to develop the optimal web will be combined and weighed interface to show the use of fault trees for risk management. Adobe XD will be used to design a prototype, and WiX.com® will be used to design and publish the website. Adobe XD is a design tool for web and mobile applications, developed and published by Adobe Inc.

Wix is a platform for web development that helps individuals create and manage their online presence through cloud-based tools. At its core, Wix is an HTML5 drag-and-drop website editor. Wix was founded in 2006 by Avishai Abrahami, Nadav Abrahami, and Giora Kaplan, backed up by investors Venture Partners, Mangrove Capital Partners, Bessemer Venture Partners, DAG Ventures, and Benchmark Capital. The website launched an open beta phase in 2007 using a platform based on Adobe Flash [36], [37].

To get an idea of whether the web interface is moving in the right direction, the Adobe XD prototype will be tested on aesthetics and interactions using the Guerrilla approach (see Chapter 5.1). Collecting personal opinions and emotional impressions about the first ideas and concepts is easy this way. The participants don't need to represent the final website's target audience.

The website's contents will be tested on several elements including clarity, readability, and credibility by members of the IT Risk Management FMT group of the University of Twente. A survey followed by semi-structured interviews will be used to conduct this test. Finally, the results from the prototype tests will be implemented in the web design in WiX.com.

The WiX.com website will be tested by the target audience on the overall user experience and quality of the web interface.

In parallel, a test participant will be asked to perform a destructive test. The aim is to identify potential vulnerabilities or weaknesses of the website so that they can be addressed before the website is published.

5.1 User testing

There will be two rounds of user testing. The first will be with the prototype (Adobe XD), and the second with the Wix website.

5.1.1 Prototype

The first round of user testing aims to evaluate the key design elements: website layout, navigation, and interactions as presented in the prototype of the web interface. This will be done by Guerrilla user testing. Guerrilla user testing is valuable during the early design stages and a quick way to get feedback on a design in an informal setting. The goal is to observe how users interact with the web interface, identify any usability issues, and gather feedback on the user experience. The participants do not have to represent the target audience. Instead, participants will be recruited by asking people I know (housemates, study peers, etc.). The user testing is done one by one.

The participants will first read and sign the information brochure and consent form (see Appendix C). The information brochure contains information about the research and the user test's goal. Then, the participants will be asked to focus on the prototype's layout, navigation, and interactions. Before they start exploring, I will explain more about the specifics of the layout, navigation, and interactions in general. Next, the participants will be asked to explore the website prototype for five to ten minutes. After five to ten minutes, the participants will be asked to complete a survey (see Appendix D). Finally, the participants will be thanked for their contribution with a small token of appreciation.

While the participants explore the prototype, I will observe and take notes of their interactions and reactions.

5.1.2 Wix Website

The second round of user testing aims to evaluate the user experience and quality of the web interface, this includes testing the navigation, content, and graphical design. This round of user testing will be done with the Wix.com website, by 5 participants that represent the target audience. The test will be performed in a lab usability setting with a moderator. In this setting, the users will test the prototype supervised by a moderator. The moderator will facilitate the test participants through tasks, answer their questions, and reply to their real-time feedback. This method allows for investigating the reasoning behind user behaviour. Compared to unmoderated testing, moderated enables the collection of more qualitative information.

The participants will first read and sign the information brochure and consent form (see Appendix E). The information brochure contains information about the research and the user test's goal. Then, I will give the participant a task (see the task list in Appendix F). When a task is completed, I will ask some questions about the participants experience. At the end of the session the participant will be asked to explore the website for five minutes. After five minutes, the participants will be asked some

additional questions (see Appendix F). Finally, the participants will be thanked for their contribution with a small token of appreciation.

While the participants are completing tasks and exploring the website's interface, I will observe and take notes of their interactions, reactions, and possible struggles.

6. Specification

This project aims to design and develop an interactive website showcasing fault tree explanations and visualisations. I have identified multiple requirements based on this project's goal, a literature search, and a thorough exploration of state of the art (see Chapter 6.1).

6.1 Design requirements

The requirements for a good web interface design gathered during the search for the state of the art of website design and the literature search (see Figure 22) will be prioritised using the MoSCoW model. This model identifies four categories to help prioritise: Must, Should, Could, and Won't [38]. In parallel, the requirements are arranged in four subtopics: navigation, graphical design, user interactions, and content.

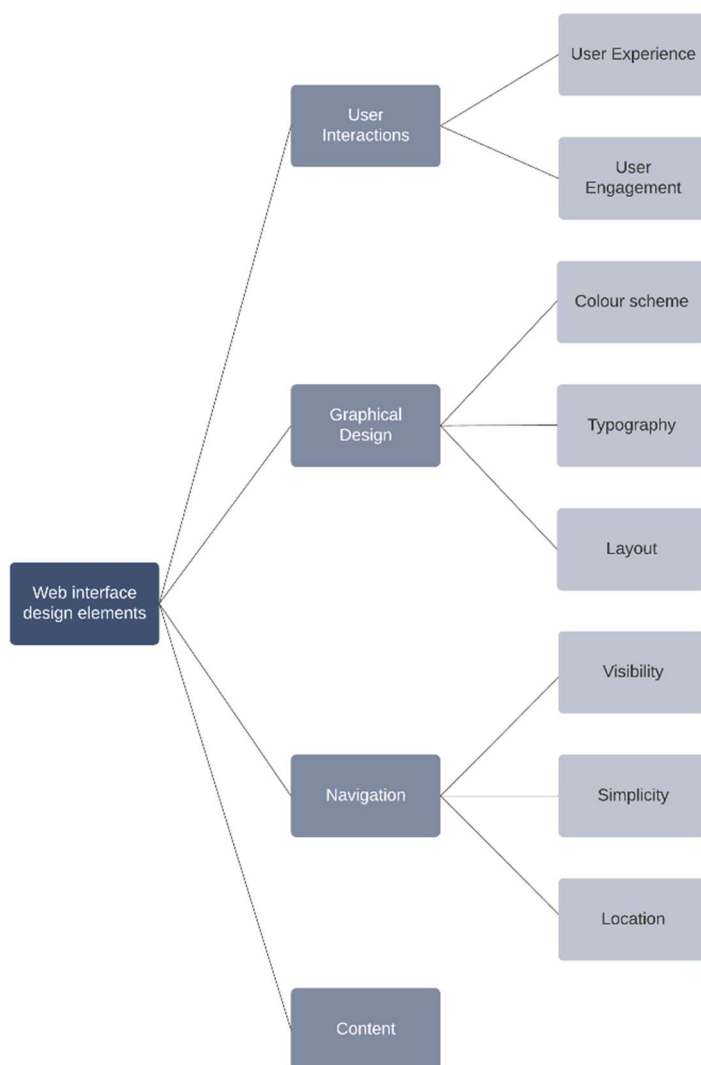


Figure 22: Web interface design elements

6.1.1 Navigation

Visible – Must

Literature states that the navigation elements, specifically the navigation bar, need to be visible [4], [28], [29]. The navigation bar should attract attention as it guides the user and gives them immediate knowledge of what to find on the website. That is why the navigation for my website is a different colour than the background and elements.

Simple – Must

The navigation should be easy and intuitive. The user is more likely to explore the website by simplifying the navigation.

Location – Must

The navigation elements should be properly located to avoid confusion. On most websites, the navigation bar is horizontally located at the top of the page. Some websites place the navigation bar, for instance, vertically on the left side or halfway through the webpage, reducing visibility and confusing the users.

Organised – Should

All navigation elements should be well-organised to avoid confusion: e.g. all buttons will have the same shape and colour and most will be on similar locations (at the bottom).

6.1.2 Graphical design

Consistent – Must

The graphical design must be consistent over all pages to familiarise people with the website and enable the user to navigate the information on the different pages. After visiting one page, they will recognise the colours and layout and easily find the necessary information. Also, the website will look and feel coherent instead of a set of loose chapters. If the design is inconsistent, the users will have to explore each page again, which might lead to the user leaving the website before finding the information they were looking for.

Easy-to-read – Must

The content must be easy-to-read; otherwise, the user will leave the website and likely not return. "Easy-to-read" refers to content that is simple, clear, and accessible to a wide range of readers. Easy-to-read material facilitates understanding and ensures information can be easily comprehended by the target audience.

Balanced – Must

A website with a good balance between text and visual elements creates a visually pleasing and engaging user experience. This will allow users to consume the information enjoyably and efficiently. Too much text can be overwhelming and tedious, while too many visual elements without enough textual context can lead to confusion. That is why the website must balance text and visual elements well.

Aesthetically pleasing – Must

An aesthetically pleasing website can grab the user's attention and keep it. It creates a positive impression and encourages users to explore the content further. When the user finds the website appealing, they are more likely to engage with it, spend more time on it, come back, and recommend it. Not only this, but an aesthetically pleasing website conveys professionalism and credibility, which is very important for a website that aims to provide the user with information.

Colour scheme – Should

The designer can grab the user's attention and trigger the right emotions by choosing the correct colour scheme.

6.1.3 User interactions

Intuitive interactions – Must

Intuitive interactions make it easy and natural for the user to interact with the website. If users can effortlessly navigate, find information, and complete tasks without confusion or frustration, they are more likely to have a positive experience.

Easy-to-use interactions – Must

Easy-to-use interactions encourage user engagement and interaction with the website's content. The user is more likely to explore the website when the interactions are easy-to-use. If not, the user will (be tempted to) leave the website or at least have a negative experience.

Meaningful interaction – Must

When users feel that their interactions on the website are purposeful and valuable, they are more likely to actively participate, explore further, and spend more time on the site.

6.1.4 Content

Home page – Must

The website must have a home page as it serves as a guide point for the user and introduces the website's purpose, content, and navigational options.

Fault Tree Explanation page – Must

One of the basic requirements derived from the website's goal is to have a page where Fault Trees are explained.

Visualisation Portfolio page – Must

This project aims to design an interactive website showcasing and explaining fault tree visualisations. That is why having a dedicated page for the visualisation projects is important.

Contact page – Should

A contact page/option on the website is unnecessary to achieve this project's aim. But it would be a good addition to lower the threshold for people interested or having a project that could be shown on the website to contact the team. Moreover, the website could showcase not only UT projects but, more broadly, from other parties as well.

Add form – Could

The website could have an add form behind password protection so the admin can add projects by filling in the form, which will automatically upload the new project.

Randomiser button – Could

A randomise button that gives the user a random visualisation project to view could be a nice addition.

References – Must

The content must include references to the owner of the projects. The fault tree information page also references the sources and gives credit where credit is due.

6.2 Ideation

During the ideation phase, a wide range of potential solutions was generated towards designing a web interface for applying fault trees for risk management. A semi-structured approach was followed, and several techniques were used to generate creative and innovative ideas to feed the design

process. The first ingredients were the information gathered during the literature research and the state-of-the-art evaluation. During the literature research and evaluation of the state of the art, structured notes were already made of what I thought might be helpful in the design stage. Writing these things down and sometimes making sketches helped me order my thoughts and visualise solutions. The website had to be inviting, appealing, and easy to use, navigate, and understand. The methods and techniques described in Chapter 5 were used during the ideation phase. My choices were motivated, and the process and draft versions were kept track of on paper and in Adobe XD.

Several solutions were tried to determine the best works using the trial-and-error method. This was sometimes time-consuming because it required testing steps and more options to solve the problem or pick the right solution. However, I liked translating any knowledge I gained into concrete solutions as soon as possible.

Heuristics from previous assignments were used, and my insight was trusted when struggling with a problem. And in a way, I also relied on my gut instincts to find a creative and innovative solution even if I didn't see it before.

I tried to avoid cognitive biases because that would have hindered me from seeing situations clearly and objectively and potentially overlooked possible options or relevant information, such as personal preferences. Next to avoiding cognitive biases, I prevented misinformation and functional fixedness. This meant I avoided irrelevant details that could complicate things and made sure I thought creatively and innovatively (out of the box) about potential solutions to the problems.

In parallel, all ethical issues related to website design were considered. One of the starting points was to design for the user, not the designer. The website had to be accessible to everyone, including people with disabilities like visual and hearing impairment. For example, subtitles were added to videos, and an appropriate colour scheme was used for people who were colourblind to make the website inclusive and accessible. Additionally, learning disabilities such as dyslexia were considered when designing and developing the website; a dyslexia-friendly font was used to make it easy to read. I also added a search function that is dyslexia friendly. This dyslexia-friendly search engine can retrieve results even in the presence of typos.

Intellectual property was another aspect that was considered by adding references where needed. The website would publish research results and credit the owners/authors using the correct references and sources methods. Credibility was also very important: all information had been scientifically reviewed and published earlier.

7. Realisation

The collected information on web interface design is utilised to create a prototype using Adobe XD. The prototype is tested, and the test results are incorporated into the actual web design using Wix.

7.1 The building process

7.1.1 Prototype

The building process started by making some mock-ups of potential designs of the different pages. Then after some deliberation and discussion, a first prototype design was developed in Adobe XD see Figure 23.

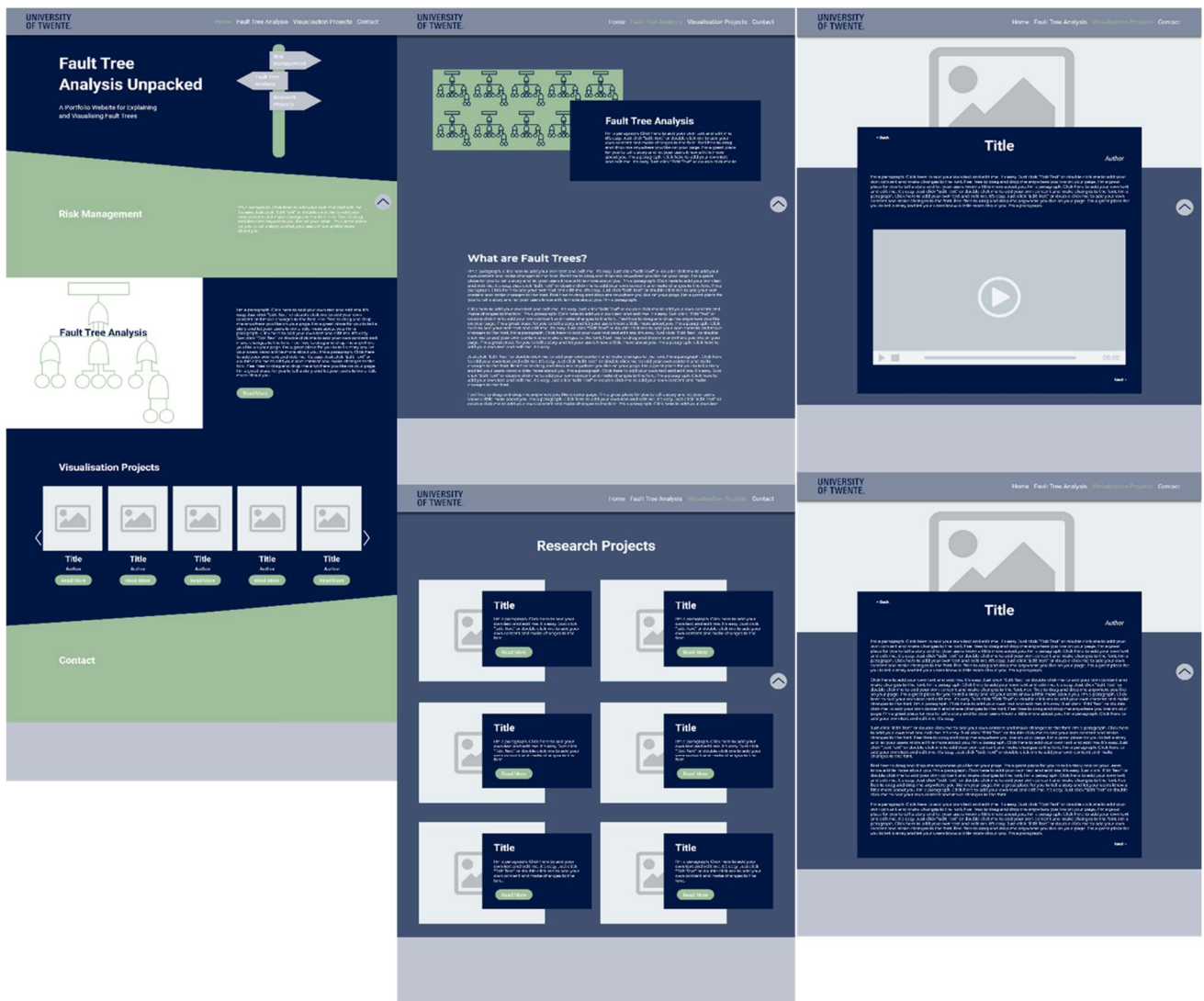


Figure 23: First prototype design

After discussing this version with an experienced designer, Ahn Tuan Nguyen, a final prototype design was developed. This version of the prototype was tested (see the set up in Chapter 7.1.1 and the evaluation in Chapter 8.1).

Considerations

From what I have learned during the literature research and exploration of the state of the art, the navigation bar must be clear and visible at the top of the page. In addition, the layout must have a good balance between text and visual elements, be easy to use, and be readable. And the interaction must be meaningful and intuitive. That is why, as seen in Figure 24, the navigation bar has a different shade of blue and a shadow to ensure it differentiates from the background colour/content. Next to this, the navigation bar is located at the top of the screen so the user can easily find it.

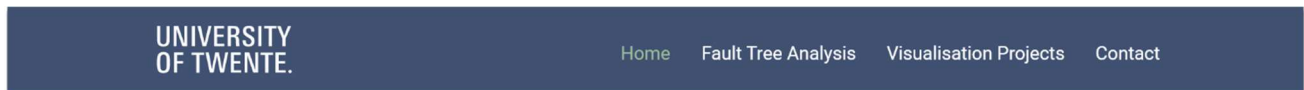


Figure 24: Navigation bar

In Figure 25 a diagram of the navigation bar and the on the page's navigation is presented.

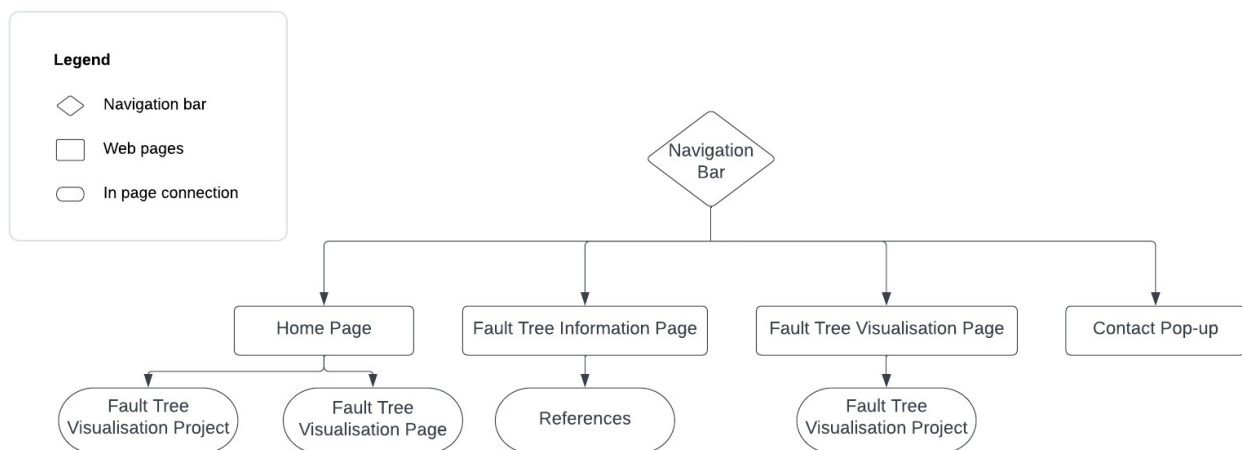
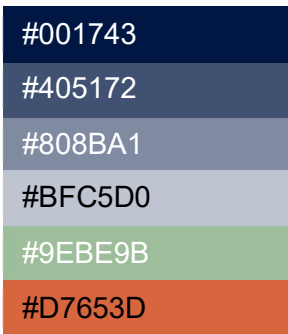


Figure 25: Navigation diagram

Additionally, I chose blue as the main colour and used it in two tints. Blue represents trust and reliability. I chose green as a secondary colour. Green represents stability, relaxation, and green is energising. Green is also used to create a balanced and stable atmosphere. Besides those two main colours, I chose orange as accent colour: together these colours represent a triadic colour scheme (see Chapter Colour Scheme).

The colour scheme for the website is as follows:



The layout balances the text and images to ensure it is not overwhelming (see Figure 26). Next to this, each line of text does not have more than 15 words and has a font type and size that is easy to read.

Interactive Fault Trees

Finding the root of the reason why non-experts have a difficult time understanding fault trees and creating an interactive fault trees that assist non-experts to process the qualitative information of fault trees effortlessly.

Ahn Tuan Nguyen

[Read More](#)

Figure 26: Balance between text and image

All the buttons have the same colour and shape, making sure that the user knows when a button is clickable, see Figure 27.



Figure 27: Button

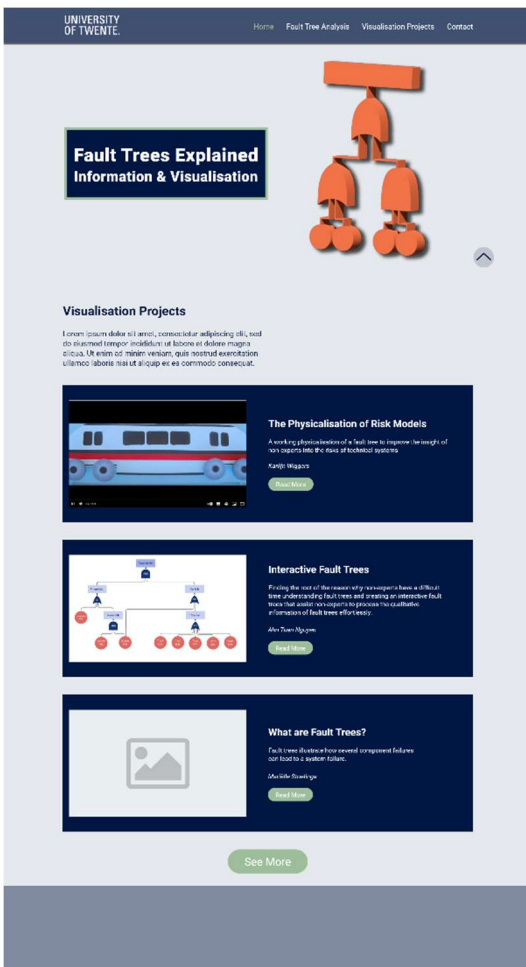


Figure 28: Home page

Figure 28 shows the design of the Home-page. The background of the design is lighter, and the elements on top of the design are darker. This creates a sense of depth and improves visibility. The website opens with its title and a 3D model of a simple fault tree, making it clear what the website is about. When scrolling down, the user will see a short description of the visualisation projects and three of these projects. Each project card has a picture, title, short description, author, and a read more button, which will send the user to that project's dedicated page when clicked. Below the three projects is a 'See More' button enabling the user to go to the 'Visualisation Projects' dedicated page which shows all projects.

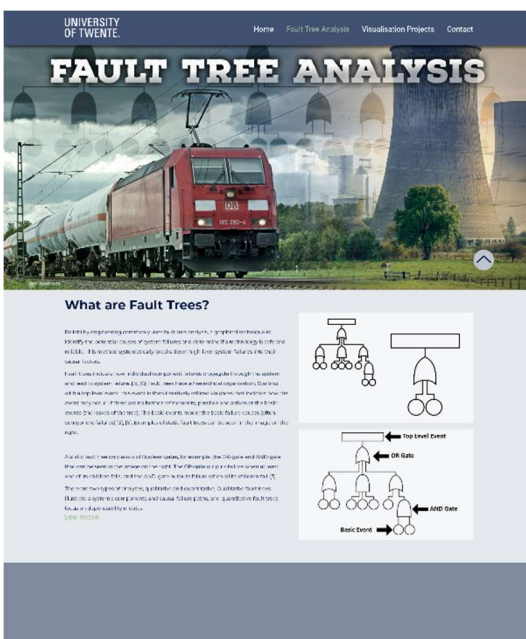


Figure 29: Fault tree analysis page

Figure 29 shows the design of the page at which the use of Fault Trees is explained. The page opens with an image of a train, nuclear power plant, and fault trees in the background⁶. This image is meant to represent the complex situations or field's fault trees can be used for. Below the image, an explanation text and images are shown. The text explains what fault trees are and when and in which fields they are used (including railroads and nuclear power plants). The images support the text.

⁶ The three images I combined are all royalty free.

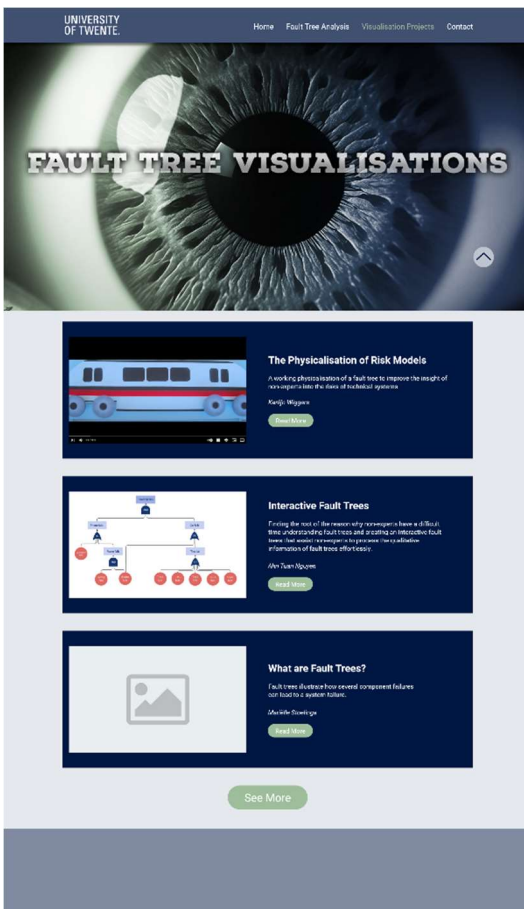


Figure 30: Visualisation Projects page

Figure 30 shows the design of the 'Visualisation Project' page. The page opens with an image of an eye, representing visualisation. Below image, the visualisation projects are showcased. First, only three projects are shown, but three more appear when the 'See More' button is pressed (more projects appear in pairs of three). The projects will be sorted differently, meaning in a different order than the projects on the home page to make sure that users see other projects than before.

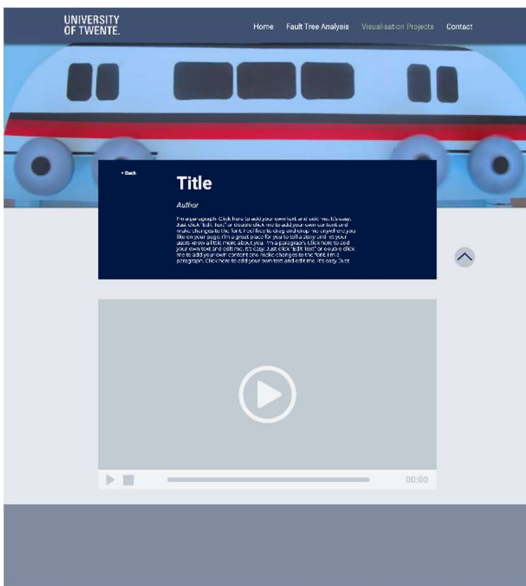


Figure 31: Project dedicated page

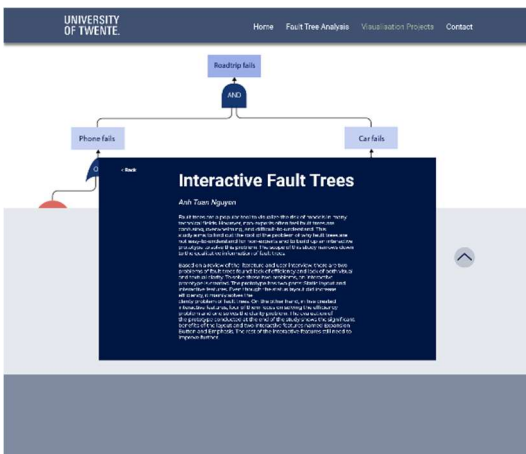


Figure 32: Project dedicated page

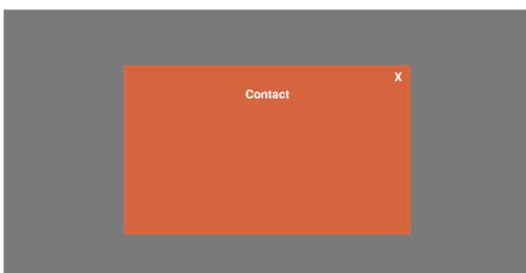


Figure 33: Contact

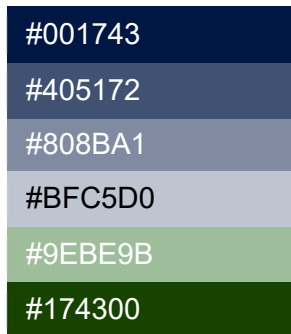
Figure 31 and Figure 32 show the project dedicated pages. Both pages start with a large image at the top with a text box positioned on top of the image. The text is a summary or abstract of the project. If the project includes a video or any other element (such as a simulation), this will be placed below the text box, as can be seen in Figure 31.

Figure 33 shows the contact page. The contact page is a pop-up box showing contact information/with a contact form the user can fill in to contact a team representative.

7.1.2 Wix Website

After the prototype user tests, a couple of changes to the design were made.

The colour scheme changed from blue, green, and orange to blue and green. The accent colour is now a darker green shade, as seen below. Together these colours represent an analogous colour scheme.



Another change happened in the navigation bar. One of the prototype user test participants noted that adding dividers between the different items in the navigation bar would improve it, so I added them to the navigation bar (see Figure 34). Next, the labels in the navigation bar have been renamed to match the title of the website: Fault Trees Explained, Information & Visualisation— Fault Tree Analysis → Fault Tree Information, and Visualisation Projects → Fault Tree Visualisation. And a different university logo, as per a suggestion from one of the prototype user test participants.



Figure 34: Navigation bar

Next to the changes made to the colour scheme and navigation, the Home page got some additions (see Figure 35). The fault trees in the background were added to liven up the Home page, and the strip at the bottom was added to emphasise the sense of depth.



Figure 35: Home page

Another change was made to the Fault Tree Visualisations explanation field on the Home page. The image on the left is a carousel that goes through all the images of the visualisation projects included on the website.

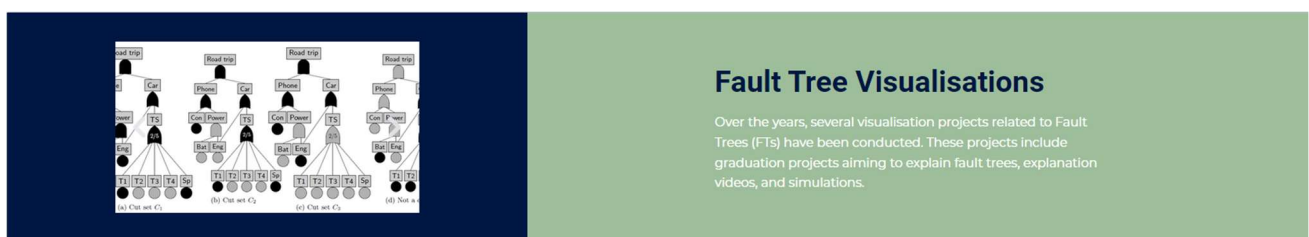


Figure 36: Fault Tree Visualisation Explanation field

The Fault Tree Information page now opens to a page title that matches the label on the navigation bar. This change was made as a result of the feedback received from the prototype user testing. Next to this, the Fault Tree Information page has an additional button. This button, when clicked, opens a pop-up reference list (see Figure 37). By adding this to the page, the sources used are cited, and credit is given where credit is due.

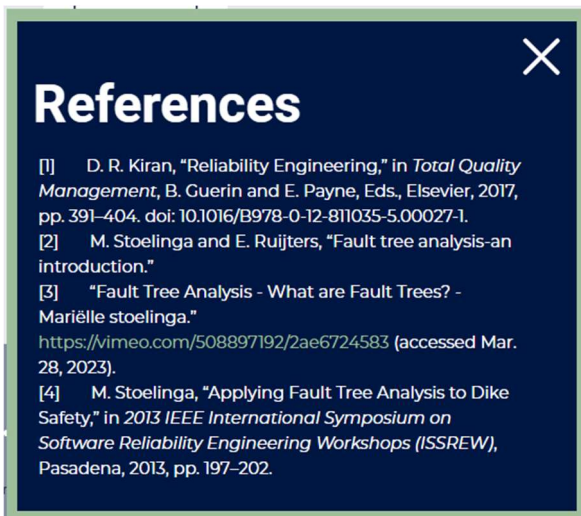


Figure 37: References

Like the Fault Tree Information page, the Fault Tree Visualisation page now has a matching page title and navigation bar label. Another addition to the Fault Tree Visualisation page is the option to filter the content (see Figure 38). The user can filter on subject and visualisation type (PDF, simulation video, website).

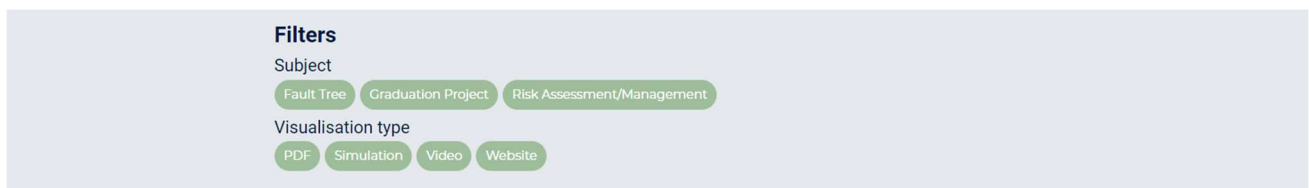


Figure 38: Filters

The contact pop-up has gotten a full makeover to match the rest of the website and include a premade contact form (see Figure 39)

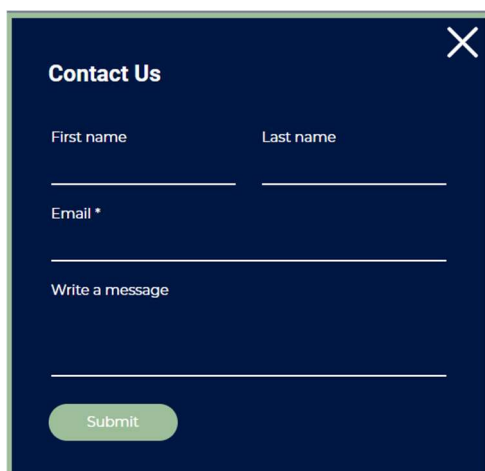


Figure 39: Contact

The footer now includes the University of Twente logo that links to the university website, that the website is part of a Bachelor Graduation Project, and a navigation menu (see Figure 40). The navigation menu also includes admin.



Figure 40: Footer

The admin page is password protected to ensure only password holders can add new projects. When the password has been entered, the site opens the add project page (see Figure 41).

Figure 41: Add form

In the add form, the password holder has to enter the project title, researcher, a short description, and an image. And can add a longer description, filters, video, website address, and a PDF. When submitted, the website adds the new project in the same design style as the other projects.

In addition, all the pages now include simple animations to liven up the website's user experience.

7.2 Compliance with the design requirements

Table 2: Compliance with the design requirements

Element	Requirement	Compliance
Must		
Graphical Design	Consistent	
	Easy-to-read	
	Balanced	
	Aesthetically pleasing	
User interactions	Intuitive	
	Easy-to-use	
	Meaningful	
Content	Home page	
	Fault Tree Explanation page	
	Fault Tree Visualisations page	
	References	
Should		
Graphical Design	Colour scheme	
Content	Contact page	
Could		
Content	Add form	
	Randomiser button	

7.3 Conclusion

A prototype of the website was built in Adobe XD, including the must and should design requirements. The website was design to look appealing and showcase the fault tree visualisation projects. After building the prototype, it was evaluated through user tests. With the feedback from the user tests in mind I designed and developed the website in Wix.com. The Wix.com website also includes some subtle animations, and was user tested. The evaluation of the user tests is discussed in the next chapter.

8. Evaluation

8.1 Prototype user testing

During the first round of user testing, the key design elements: website layout, navigation, and interactions have been tested by 6 participants, using a survey in a so called Guerrilla user test. Due to personal circumstances, the tests were taken online via individual Teams meetings. The participants were given control over my laptop to explore the prototype. After exploring the prototype, the participants completed the survey (Appendix D).

The survey had five sections: opening, navigation, layout, interactions, and closing. In the following paragraphs, the results will be evaluated.

8.1.1 Opening

Figure 42 shows a graph and box plot of the scores for the overall user experience. The average score is 6.7. One of the participants scored the user experience with a 3 due to the lagging caused by a bad internet connection. Because of external uninfluential factors unrelated to the prototype, it is justified to leave this score out, resulting in an average score of 7.4 for the overall user experience.

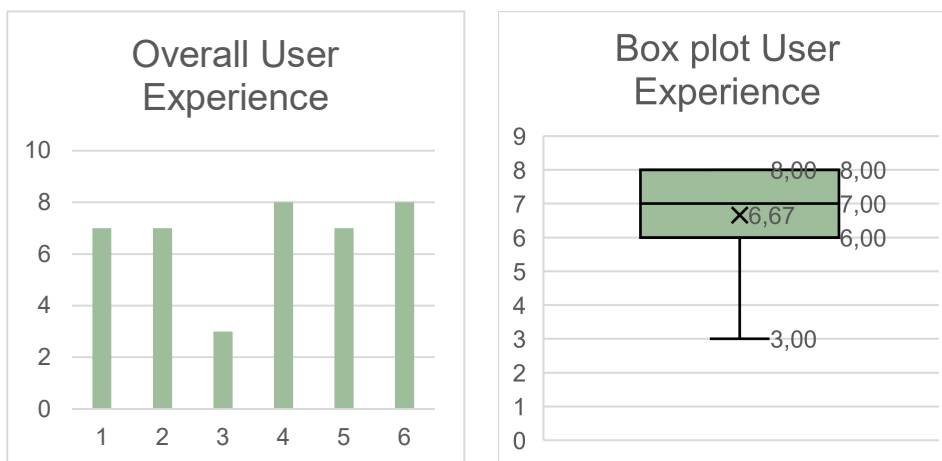


Figure 42: Graph (left) and Box plot (right) Overall User Experience

8.1.2 Navigation

The navigation got a very positive response, with an average score of 8.3. The scores range between 7-9, as can be seen in Figure 43. None of the participants found any issues with the navigation bar.

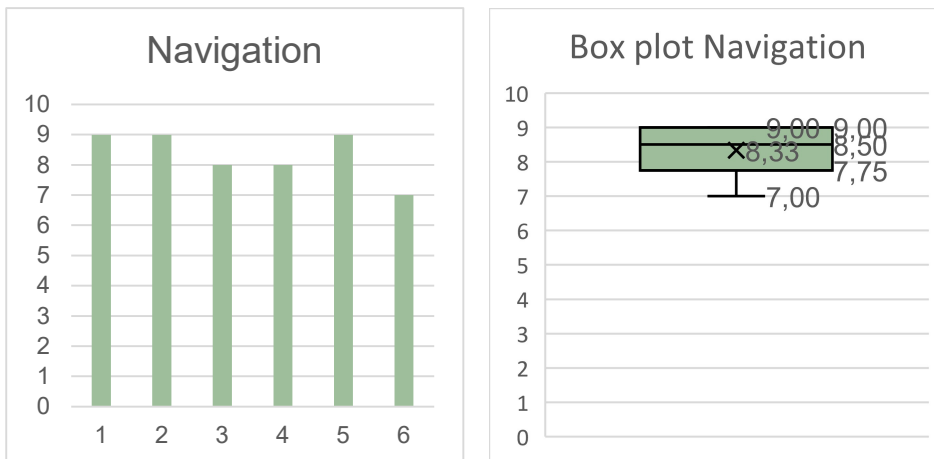


Figure 43: Graph (left) and Box plot (right) Navigation Bar

Some statements from the participants about the navigation bar:

“Easy to find, intuitive.”

“The navigation bar in the more top part of the website is a standard placement, something most internet users are familiar with, it's a classic that's easy to navigate and see.”

“Very clear. By seeing, you knew where to click and what to expect. The only thing was that the home page and one of the other pages felt very similar, but that has more to do with the content than the navigation.”

“It is easy to find. You saw it quickly, and it is clear what your options are.”

“It was intuitive what the tabs represented, and I could see the information was arranged in a cohesive way. However, if possible, I would like a back button available instead of just clicking between the pages.”

“The navigation bar looked good. Maybe put a divider between each searchable segment, e.g., a line or something.”

One of the participants suggested adding a divider between the different menu items in the navigation bar. Another suggested adding a ‘back’-button to navigate between the different pages. I will reflect on those suggestions in Chapter 7.1.2. Overall, the participants agree that the navigation bar is easy to find and use.

8.1.3 Layout

The first impressions of the website were mostly positive (see Figure 44). However, one participant stated that they would not use the website. The participant says: “The colour scheme and seemingly odd emptiness between elements and their placement give me a feeling that, based on previous experiences, this might be a shady website.”

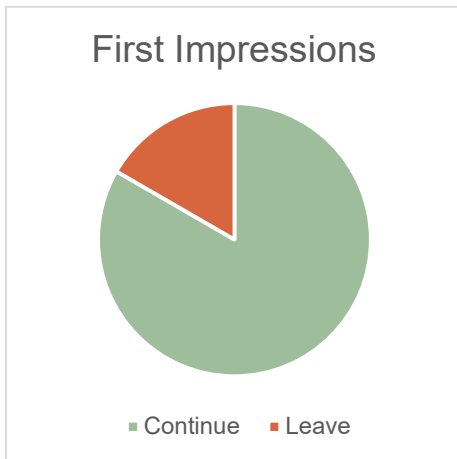


Figure 44: Graph First Impressions

Half the participants mentioned that the lay-out confused them. The comments showed why:

“Selecting navigation “Visualisation Projects” leads to a page with the header “Fault Tree Visualisations”.”

“This doesn’t count for the whole website, but the bottom right circle with an arrow pointing up I associate more with opening a service chat than with going back to the top of a page.”

“The only issue was that the big blue bit of text on the front page really looked like a button. It was, however, not clickable.”

Fortunately, these omissions can be easily adjusted (and will be in the actual web interface design).

8.1.4 Interactions

The participants were very positive about the interactions on the website. All the participants said that the interactions were meaningful, intuitive, and easy to use.

8.1.5 Closing

The participants were positive about the prototype website and, when asked what they liked about the prototype, said the following:

“Layout, simplicity”

“It functions, and when you click on an article with an image, the image sort of becomes the banner for the article page with all the text from the article placed slightly over it.”

“The simplicity”

“It was very uncluttered. I liked the colours; it was nice and simple, not too much fuss.”

“I like that I had an impression of what the fault gates were because there was a visualisation. Furthermore, there was space dedicated for paragraphs and a video explaining different parts, which I think would be helpful for more information.”

“The colour scheme was very pleasing. “

The participants noted a couple of elements that could be improved:

“Not so much. Maybe it is possible to show more info (smaller font?) at the time.”

“The colour scheme (the colours were quite flat and not all colours worked well together) and slightly outdated placement and style of text/video/image elements on the website.”

“Maybe change the University logo to the logo with the text on one line.”

“The “read more” buttons had the same colour scheme as a still loading button. So, it looks like it needs to load or isn’t clickable.”

When asked for any further feedback, the participants stated:

“It is quite hard to pull off, but making elements fade or slide into the screen the more you scroll down gives a fresh and professional feel instead of the static element placement.”

“It could be nice to have a sub-menu option to see the different visualisations.”

“I think there could be better cohesion between the pages, so it flows smoother. Other than that, the website is easy to navigate and straightforward.”

Overall, some small improvements can be made to make the website better. For example, making the colour scheme less flat, some animations, and cohesion between the pages.

8.1.6 Conclusion

During the prototype evaluation, the participants explored the prototype and answered survey questions. The participants were positive about the prototype. However, some improvements could make the website better.

Some of the changes that I will be implementing are the title of the pages needs to be the same as the menu item in the navigation bar and adding dividers to the navigation bar.

8.2 Website user testing

The purpose of the user tests was to assess both the user experience and the quality of the web interface. The interviews were conducted online through a Teams meeting. The participants assessed the website's navigation, content, and graphical design. Five participants assessed the website. The user testing session went as follows; first, I sent the website's URL to the participants and let them explore it. Next, I asked the participants to complete a few tasks (see Appendix F), and the session ended with a semi-structured interview (see the setup in Appendix F). Throughout the sessions, I observed the participants and made notes.

Table 3: Legend for Table 4

Good/ succeeded	Remarks/ Succeeded but with some difficulty	Not good/ did not succeed
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Table 4: Results of website user testing

	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Task 1: Testing filters					
Task 2: Testing filters					
Task 3: Finding references					
Task 4: Contact					

	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Question 1: Description of the overall design					
Question 2: First impression					
Question 3: Navigation bar					
Question 4: Content					
Question 5: Interactions					
Question 6: Filters					
Question 7: Experience score 1-10	6	7	7	8	7
Question 8: Areas of improvement	Add more elements to the website, such as tools and techniques.	Link to the faculty and team.	Link to the team.	Add a project carousel that gives a quick overview of all the projects on the website.	Read more on the dedicated project pages is not necessary.

Figure 45 shows a graph and box plot of the scores for the overall user experience. The average score is 7.0.

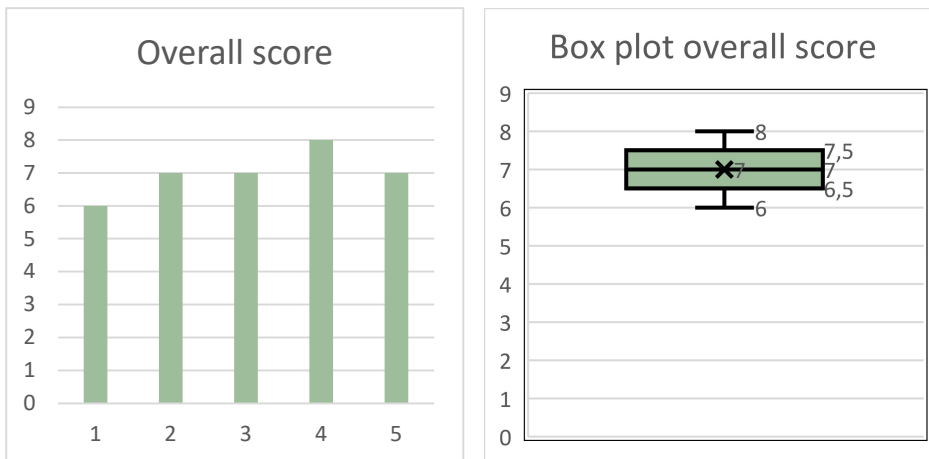


Figure 45: Graph (left) and Box plot (right) Overall Score

The participants were positive about the website's overall design, stating that the website is visually appealing and has a good colour scheme. However, the title of the website and the title of the web pages do not represent the content and give the user mixed signals. The participants stated they were expecting different content than the website provides. The website's title, Fault Trees Explained: Information & Visualisation, gave the participants the impression they would find Fault Tree visualisation tools and techniques on the website, but this is not the case.

The participants did not understand the website's aim in their first impression. Some participants stated that they did not know what to expect, and others indicated that they expected to find certain information (for example, tools and techniques to visualise fault trees), but that was not the information the website provided. However, the participants did find the website visually appealing and organised in their first impression.

The participants found that the navigation bar was visible and easy to locate. However, they stated that the labels did not describe the web pages. When reading the labels on the navigation bar, the participants expected to find different information than what they saw.

The participants agreed that the content was organised and easy to understand. However, one of the participants stated that the images belonging to the visualisation projects could explain the projects more instead of being an image from the project. Another participant noted that there was some confusion on the home page. There should be a heading above the projects shown on the page, and they expected to have an information block above the visualisation block. The participants also agreed that the interactions were meaningful and easy to use. However, one participant expected to be able to click on the image in the carousel on the home page to get more information on that project.

The filters on the Fault Tree Visualisation page have value according to the participants. The participants also stated that the value of the filters would only increase when more projects are included on the website. One participant did note that they would rather have the filters be a part of a sub-menu in the navigation bar.

When I asked if the participants had any other remarks or areas where the website could improve, one participant noted that they would like for the website to include everything needed to know about fault trees, including explanation, tools, techniques, a comparison of the tools and techniques, and more. Another participant stated there is no need for a read more button on the project's dedicated pages as the participant has already chosen to read more. Other participants stated they would like to see a clear link to the faculty and research group, Formal Methods and Tools (FMT), and include a carousel on the Fault Tree Visualisation page to see all the projects quickly.

In conclusion, the website is aesthetically pleasing, has clear navigation, and meaningful and easy-to-use interactions. However, the website and page titles do not convey the aim and purpose of the website. Next, the participants indicated they would like to see a connection between the website and the faculty and research group. The filters are a good addition, especially when there is more content.

8.3 Compliance with the design requirements according to the user tests

Table 5: Compliance with the design requirements according to the user tests

Requirement	Priority	Feedback
Graphical design		
Consistent	Must	The participants were positive about the consistency of the layout.
Easy-to-read	Must	The participants found the text easy-to-read.
Balanced	Must	According to the participants, there was a good balance between text and visual elements.
Aesthetically pleasing	Must	The participants found the website aesthetically pleasing.
Colour scheme	Should	The participants were positive about the colour scheme, stating that they liked the colours and that everything was visible and readable.
User interactions		
Intuitive	Must	The user interactions were intuitive, according to the participants.

Easy-to-use	Must	The participants found the interactions easy-to-use.
Meaningful	Must	The participants found the interactions meaningful. In the case of the filters, they stated that the interaction would increase in value when more content is added to the website.
Content		
Home page	Must	The participants were expecting different content when they read the website's title. However, they were positive about the content they found, stating that it was easy to read and organised.
Fault Tree Information page	Must	The participants were not expecting to find an explanation about fault trees on this page. But they did state that what they saw looked good.
Fault Tree Visualisations page	Must	The participants were not expecting to find projects on this page but were positive about the layout and organisation of the page.
References	Must	The references were easy to find.
Contact page	Should	The contact page was easy to find and works.

8.4 Conclusion

The evaluation consisted of two parts: prototype and website user testing. Six participants who explored the prototype and completed a survey evaluating the prototype. After implementing the prototype user test feedback, five participants explored the website, completed tasks, and participated in a semi-structured interview. In both evaluation parts, the participants were positive about the website's appearance, layout, interactions, and navigation. However, the website does have some points that can be improved. The most important improvement is ensuring the website's goal and purpose are clear when a user visits the website. To do this, I will be looking into renaming the website and the different web pages.

9. Discussion of the results

This project aimed to design and develop an interactive website showcasing fault tree explanations and visualisations. In the realm of user experience, when websites fail to attract attention, visitors tend to depart swiftly, seeking more captivating websites. The literature research and exploration of the state of the art revealed that navigation and layout are important elements determining the user experience. The navigation bar must be clear and visible at the top of the page. In addition, the layout must have a good balance between text and visual elements, be easy to use, and be readable. And the interaction must be meaningful and intuitive.

Following the literature research and exploration of the state of the art, I interviewed a representative of the target audience to get an impression of the important elements of a website from a user's perspective. The interview confirmed the results from the literature research and state of the art regarding navigation, 'first impressions', layout, and content. However, even though loading time seemed crucial to user experience, the interview indicated this is more nuanced. According to the representative, a long loading time is annoying but not insuperable because a typical website user like this is no random visitor but an intentional visitor interested in the content and willing to invest some time. If marked as a serious issue (leading to a considerable negative user experience), I would have considered limiting the multimedia elements, such as images and videos, because these take more time to load than text. The representative also mentioned that a good balance between text and images is important, but content takes precedence over aesthetics, and outdated designs are off-putting. I advise the admin to keep that in mind while maintaining the website's content.

The user testing participants in both evaluation phases were positive about the website's appearance, layout, interactions, and navigation. However, there were still some elements that could be improved. During the prototype evaluation, one participant suggested adding dividers between the page labels in the navigation bar. I included those to improve the ease of navigation by enhancing the distinction between different labels. Next, as suggested, animations were incorporated into the website to add visual appeal. To further enliven the home page, fault trees were added in the background, while a strip at the bottom emphasised depth. These changes were made to create a positive first impression for users.

Despite a participant's misinterpretation of the 'to the top' button as a service chat opener, I maintained its original design, considering it an isolated perception supported by the logical placement of those buttons observed in the state-of-the-art exploration.

The colour scheme was modified from a triadic to a three-colour analogous one. An analogous scheme is visually more pleasing and calming.

The Wix website test revealed that the design is aesthetically pleasing, has clear navigation, and has meaningful and easy-to-use interactions. However, it was noted that the website and page titles did not effectively convey the purpose and aim: showcase Fault tree visualisation projects. Consequently, I changed the website title from "Fault Trees Explained: Information & Visualisation" to "Fault Trees Explained: A Portfolio of Visualisation Projects." Additionally, a dedicated section highlighting the website's services was included on the home page, featuring a gradient background to enhance its visual appeal.

The colour scheme undertook further refinement, transitioning from a three-colour to a two-colour analogous scheme. This change resulted in a better sense of balance, simplicity, and a minimalistic, elegant aesthetic.

Furthermore, a connection to the Formal Methods and Tools Group was added to indicate the link to the research group.

It is important to acknowledge and address the limitations of this study. Firstly, due to personal circumstances, the prototype user testing was conducted online, leading to occasional lagging issues non-related to the web interface design. As a result, the evaluation of the prototype was negatively affected. I decided to exclude this tester's user experience score.

Secondly, all feedback implemented after the two test rounds (the prototype and the Wix website), the resulting design, was not thoroughly tested. An additional round of user testing would have been beneficial, especially to check the changes made to improve the clarity of the website's goal. Unfortunately, due to time constraints, conducting an additional round of user testing was not feasible.

10. Conclusion & Future Work

This Bachelor's Graduation Project aims to design and develop an interactive website showcasing fault tree explanations and visualisations. This project answered the question: What are effective web interface elements to inform professionals about the utilisation of fault trees for risk management? To answer this question, I investigated three sub-topics, the target audience, web interface design elements, and user experience and engagement.

Results literature study and the study of the state-of-the-art

My literature research revealed that the design elements of a web interface, including content, navigation, and graphical design, are recognized as key factors determining the quality of the interface design. User interaction is crucial in engaging users, with interactive web pages attracting more users than static ones. Effective user interaction design prioritizes user experience by offering intuitive and user-friendly interactions, considering users' emotions during the interaction.

The layout of the interface is essential for organising content in a visually appealing and user-friendly manner. The layout I designed balances text and non-text elements, creating a positive reading experience for users. The sans serif fonts Roboto and Montserrat are dyslexia-friendly, contributing to user loyalty, readability, and accessibility. The chosen colour scheme is a dominant dark blue with green as a secondary colour. This way, I established a sense of reliability and trustworthiness while providing a calming effect.

Navigation is another critical aspect of web interface design that guides users through the website and encourages exploration. A simple and appropriately placed navigation bar minimises confusion, resulting in an effective web interface design.

Overall, considering these design elements and incorporating user-friendly features and aesthetics contribute to an improved user experience, engagement, and satisfaction when interacting with a website.

The prototype of the actual web interface was developed, considering these features and the input from the target audience. The first test was positive overall, with minor suggestions on clarifying the navigation bar and adding some spice to the design. I implemented some changes in the actual web interface design in Wix. The interface design was finalised after a second user test, incorporating the important recommendation to clarify the website's goal; I changed the website and web page titles. The result is published on: <https://ftvisualisations.wixsite.com/ftvisualisations>.

Future work

My advice for future work is to expand the website with more information on fault tree analyses and tools. The website could develop into a compendium website providing users with a centralized source of relevant resources and material on the use of fault trees. Anyhow it is important to regularly refresh the information and keep it updated. Enhancing the website's responsiveness is advisable to foster greater engagement, allowing for improved user interaction.

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Appendix

Appendix A Target audience interview

1. Are you a frequent website user? Yes, what kind of websites do you use?
2. How would you describe your browsing habits? Do you prefer to navigate through menus or use search functions?
3. What are the most important factors that influence your decision to stay or leave a website?
4. How do you feel about scrolling on websites? Are you comfortable with long-scrolling pages or do you prefer shorter pages with more clicks?
5. What are your expectations regarding website loading times? How long are you willing to wait for a website to load before abandoning it?
6. How would you like information to be organised on a website?
7. Are there any specific accessibility features that are important to you when visiting a website?
8. How important is the overall aesthetic appeal of a website to you? Do you prefer clean and modern designs or are you open to more unique and creative styles?
9. Are there any specific features or functionalities that you expect to find on a website? (e.g., search bar, contact form, social media integration)
10. Is there anything you find particularly frustrating or annoying when browsing websites?
11. Are there any specific websites that you find particularly user-friendly or visually appealing? What aspects of those websites do you appreciate?
12. Do you have any suggestions or ideas for improving website design and user experience in general?

Appendix B Usage and feelings associated with colours

Table 6: Colour and their feelings [21], [26], [39]

Colour	Feeling	Usage
Red	Power, importance, youth, passion. Red energises and gets the blood pumping. But unfortunately, this can also incite anger and overstimulation.	Red is often used for warnings, emergency attention, and to create excitement.
Orange	Friendliness, energy, uniqueness, freedom, engaging, and playfulness.	Orange is often used to create a sensation of movement and energy. The colour is also used to show creativity while still retaining familiarity.
Yellow	Happiness, enthusiasm, optimism, and antiquity (the darker shades). Brighter shades of yellow are energising. Middle shades give a sense of comfort while still feeling invigorating, and darker shades show antiquity, wisdom, curiosity, and authority.	Yellow builds excitement due to its energising nature, often used in small quantities.
Green	Growth, stability, prosperity, financial themes, calming, and environmental themes. Green gives a relaxing effect and is energising.	Green is often used to stimulate a balanced and stable atmosphere.
Blue	Calm, safety, openness (lighter shades), reliability (darker shades), logic, and trust. The lighter shades of blue are friendly, and the darker shades are reliable.	Blue is used to create a friendly or strong and reliable atmosphere, often used to gain the user's trust.
Purple	Luxury, royalty, romance (lighter shades), and mystery (darker shades).	Purple used to be the colour of royalty and is now used to create a luxurious and wealthy atmosphere.
Black	Power, edginess, sophistication, and minimalistic.	Black is often used to create a timeless atmosphere.

Colour	Feeling	Usage
White	Cleanliness, virtue, simplicity.	White is used to promote purity and innocence.
Grey	Neutrality, formality, melancholy.	Grey is often paired with brighter colours to create a modern atmosphere.
Beige	Traits of surrounding colours.	Beige is always used as a secondary or background colour. Using darker shades of beige creates an earthy, almost paper-like texture.
Ivory	Comfort, elegance, simplicity.	Ivory is used to create a warmer atmosphere than white.

Appendix C Guerrilla User Testing Flyer, Information Brochure, and Consent Form



Figure 46: Guerrilla User Testing Flyer

Informed consent form for interviews about web design

Information Brochure

This research is meant to design an informational website that showcases and explains Fault Tree Visualisations. Participants in this research are asked to give feedback on the website's layout, navigation, and interactions, which can help make the design of the website and its interactions more effective.

This research has been reviewed and approved by the EEMCS ethics committee.

The participant will explore/interact with the website prototype and complete a survey about layout, navigation, and interactions. The session will take between 5 and 10 minutes.

The participant can withdraw from the study at any time before the first of July 2023 by informing the researcher you do not want to participate in the research, or your answers cannot be taken into account. The data gathered will not be shared or reused without the participant's consent. Data will be deleted in 2028.

Consent Form for Fault Tree Analysis Unravelling

YOU WILL BE GIVEN A COPY OF THIS INFORMED CONSENT FORM

Please tick the appropriate boxes

Yes No

Taking part in the study

I have read and understood the study information dated [17/05/2023], or it has been read to me. I have been able to ask questions about the study, and my questions have been answered to my satisfaction.

I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.

I understand that participating in the study involves answering feedback questions in a semi-structured interview, in which the researcher will take notes.

Use of the information in the study

I understand that the information I provide will be used to design an informational website about risk management and the accompanying bachelor thesis.

I understand that personal information collected about me that can identify me, such as [e.g. my name or where I live], will not be shared beyond the study team.

I agree that my information can be quoted in research outputs

I agree to joint copyright of the [*specify data*] to [*name of researcher*]

Future use and reuse of the information by others

I give permission for my survey answers to be archived in an anonymised survey database so it can be used for future research and learning.

Guerrilla user test

* Required

General

1. How satisfied were you with the overall experience of using the website?*

0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10

Not at all

Extremely

Navigation

The questions in this section focus on the website navigation, focusing on the navigation bar.

A navigation bar needs to be visible, simple, and located at a proper location. The navigation bar needs to be simple to use, the terms must be clear, and the interaction must be intuitive. Finally, the location of the navigation bar should be proper, meaning that the navigation bar needs to be visible to everyone within the first few seconds of entering the website.

2. How would you score the navigation bar on the visibility, simplicity, and location? *



3. Please elaborate *

4. Did you encounter any issues while using the navigation bar? *

Yes

No

5. If yes, could you elaborate?

Layout

The questions in this section focus on the websites layout.

The layout is the arrangement of the visual elements on the website (including content). A good layout creates a balance between text and images (or other visual elements).

6. Does the first impression trigger you to continue or leave the website?

*

Continue

Leave

7. If leave, please elaborate

8. Did you have any trouble understanding the organisation or flow of the website? *

Yes

0 No

9. If yes, could you elaborate?

Interactions

The questions in this section are about the user interactions.

Interactions have to be meaningful, they have to have a purpose. They have to be logical/intuitive, when a user expects there to be an interaction there should be one. And the interactions need to be easy-to-use. Examples of user interactions are scrolling, typing, hovering, swiping, and clicking.

10. Where the interactions meaningful? *

Yes

No

11. Where the interactions logical/intuitive? *

Yes

No

12. Where the interactions easy-to-use? *

Yes

No

Closing

Thank you for participating in this test! Please answer these final questions.

13. What did you like most about the website?*

14. What did you like the least about the website? *

15. Do you have any additional feedback or comments about the
website design or interaction? Tips are also welcome! *

Appendix E Lab Usability Testing Information Brochure and Consent
Form

Informed consent form for interviews about web design

Information Brochure

This research is meant to design an informational website that showcases and explains Fault Tree Visualisations. Participants in this research are asked to give feedback on the website's layout, navigation, and interactions, which can help make the design of the website and its interactions more effective. The participants are also asked to complete several tasks.

This research has been reviewed and approved by the EEMCS ethics committee.

The participant will explore/interact with the website prototype and complete a survey about layout, navigation, and interactions. The session will take between 5 and 10 minutes.

The participant can withdraw from the study at any time before the first of July 2023 by informing the researcher you do not want to participate in the research or your answers cannot be taken into account. The study will not include any other personal information; only the answers to the interview and the completed tasks will be used and published. The data gathered will not be shared or reused without the participant's consent. Data will be deleted in 2028.

Consent Form for Fault Tree Analysis Unravalled

YOU WILL BE GIVEN A COPY OF THIS INFORMED CONSENT FORM

Please tick the appropriate boxes

Yes **No**

Taking part in the study

I have read and understood the study information dated [07/06/2023], or it has been read to me. I have been able to ask questions about the study, and my questions have been answered to my satisfaction.

I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.

I understand that participating in the study involves answering feedback questions in a semi-structured interview, in which the researcher will take notes.

Use of the information in the study

I understand that the information I provide will be used to design an informational website about risk management and the accompanying bachelor thesis.

I understand that personal information collected about me that can identify me, such as [e.g. my name or where I live], will not be shared beyond the study team.

I agree that my information can be quoted in research outputs

I agree to joint copyright of the interview, and observations to Kim de Weger

Future use and reuse of the information by others

I give permission for my survey answers to be archived in an anonymised survey database so it can be used for future research and learning.

Signatures

Participant name Signature Date

I have accurately read out the information sheet to the potential participant and, to the best of my ability, ensured that the participant understands to what they are freely consenting.

Researcher name Signature Date

Study contact details for further information:

Name: Kim de Weger

Email: k.j.deweger@student.utwente.nl

Contact Information for Questions about Your Rights as a Research Participant

If you have questions about your rights as a research participant, or wish to obtain information, ask questions, or discuss any concerns about this study with someone other than the researcher(s), please contact the Secretary of the Ethics Committee Information & Computer Science: ethicscommittee-CIS@utwente.nl

Appendix F Lab Usability Testing Tasks and Interview questions

Tasks:

Look around, is everything readable.

- Task 1: Navigate to the visualisation projects and select all the graduation projects.
- Task 2: In the fault tree visualisation page select all the projects that include a video.
- Task 3: Find the reference list on the fault tree information page.
- Task 4: Get into contact.

Interview questions:

1. How would you describe the website's overall design and user interface? Is it visually appealing and easy to navigate?
2. What was your first impression of the website?
3. Was the navigation bar visible? Simple to use? Located properly? Are the labels logical? Is there something missing?
4. Is the content well-organised and easy to understand?
5. Where the interactions meaningful and easy to use?
6. Do the filters have a value? Do they add something?
7. On a scale from one to ten how satisfied were you with the overall experience of using the website?
8. Are there any areas where the website could be improved or enhanced? What specific changes or additions would you recommend?

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Appendix G Guerrilla survey responses

How satisfied were you with the overall experience of using the website?	How would you score the navigation bar on the visibility, simplicity, and location?	Please elaborate	Did you encounter any issues while using the navigation bar?	If yes, could you elaborate?	Does the first impression trigger you to continue or leave the website?	If leave, please elaborate	Did you have any trouble understanding the organisation or flow of the website?	If yes, could you elaborate? 2
1	7	9	Easy to find, intuitive	No	Continue		Yes	Selecting navigation "Visualisation Projects" leads to page with header "Fault Tree Visualisations"
2	7	9	The navigation bar in the more top part of the website is a standard placement, something most internet users are familiar with, it's a	No	Leave	The colour scheme and seemingly odd emptiness between elements and their placement give me a feeling that this might	Yes	This doesn't count for the whole website, but the bottom right circle with arrow pointing up I associate more with opening a service chat

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How satisfied were you with the overall experience of using the website?	How would you score the navigation bar on the visibility, simplicity, and location?	Please elaborate	Did you encounter any issues while using the navigation bar?	If yes, could you elaborate?	Does the first impression trigger you to continue or leave the website?	If leave, please elaborate	Did you have any trouble understanding the organisation or flow of the website?	If yes, could you elaborate? 2
		classic that's easy to navigate and see.				be a shady website based on past experiences.		than with going back to the top of a page.
3	3	8	No		Continue		No	
		Very clear. by seeing in you knew where to click and what to expect. The only thing was that the home page and one of the other pages felt very similar but that has more to do with the content than the navigation						

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How satisfied were you with the overall experience of using the website?	How would you score the navigation bar on the visibility, simplicity, and location?	Please elaborate	Did you encounter any issues while using the navigation bar?	If yes, could you elaborate?	Does the first impression trigger you to continue or leave the website? If leave, please elaborate	Did you have any trouble understanding the organisation or flow of the website? If yes, could you elaborate? 2
4	8	8	4	8	8	4
		Hij was makkelijk te vinden. Je zag hem snel en het was overzichtelijk wat je opties waren	No	Continue	No	No
5	7	9	4	8	8	4
		It was intuitive what the tabs represented and I could see the information was arranged in a cohesive way. I would like a back button available though if possible instead of just clicking between the pages.	No	Continue	No	No

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How satisfied were you with the overall experience of using the website?	How would you score the navigation bar on the visibility, simplicity, and location?	Please elaborate	Did you encounter any issues while using the navigation bar?	If yes, could you elaborate?	Does the first impression trigger you to continue or leave the website?	If leave, please elaborate	Did you have any trouble understanding the organisation or flow of the website?	If yes, could you elaborate? 2
6	8	7	No		Continue		Yes	The only issue was that the big blue bit of text on the front page really looked like a button. It was however not clickable.

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	Where the interactions meaningful?	Where the interactions logical/intuitive?	Where the interactions easy-to-use?	What did you like most about the website?	What did you like the least about the website?	Do you have any additional feedback or comments about the website design or interaction? Tips are also welcome!
1	Yes	Yes	Yes	Layout, simplicity	Not so much. Maybe it is possible to show more info (smaller font?) at the time	No, keep up the good work!
2	Yes	Yes	Yes	It functions and when you click on an article with an image, the image sort of becomes the banner for the article page with all the text from the article placed slightly over it	The colour scheme (the colours were quite flat and not all colours worked well together) and slightly outdated placement and style of text/video/image elements on the website	It is quite hard to pull off, but making elements fade or slide into the screen the more you scroll down gives a fresh and professional feel instead of the static element placement.
3	Yes	Yes	Yes	the simplicity	its not really the website but the lagging during the test took all my hate focus	like said before, the homepage and the example page (forgot the name) felt very similair but this had more to do with the content than the layout

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	Where the interactions mean- ingful?	Where the interactions logical/intuitive?	Where the interactions easy-to-use?	What did you like most about the website?	What did you like the least about the website?	Do you have any additional feedback or comments about the website design or interaction? Tips are also welcome!
4	Yes	Yes	Yes	Het was zeer overzichtelijk. Ik vond de kleuren mooi en het was lekker simpel niet te veel poespas	Misschien het universiteits logo degene die niet boven elkaar is.	Het kan leuk zijn om bij de navigatie bar een uitklap functie te hebben waar de see more dingen al tussen staan
5	Yes	Yes	Yes	I like that I had an impression of what the fault gates were because there was a visualisation. Furthermore, there was space dedicated for paragraphs and a video explaining different parts which I think would be helpful for more information.	I did the test online and there was some lagging which made the website hard to navigate	I think there could be better cohesion between the pages so it flows smoother. Other than that, the website is easy to navigate and straight forward
6	Yes	Yes	Yes	The colour scheme was very pleasing	The "read more" buttons had the same colour scheme as a still loading button. So it looks like it needs to load or isn't clickable.	all feedback I had has already been given :)

