Develop and evaluate
a web-based design guide
for improving
the digital patient experience

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Acknowledgments

Light rain, overcast, and greyish-blue sky, the weather of today reminds me of my first day in the Netherlands, but in a completely different mood. I was anxious, fragile, and upset about the upcoming life and study challenges before coming here. Now, I sit at my desk, calm and relaxed, putting the finishing touches on my graduation thesis. This is the first and will be the last lesson TU Delft has taught me: to always be positive and never underestimate my ability.

Reflecting on my two-year study at TU Delft, I firmly believe it will be an invaluable treasure that will live in my memory for many years. There are countless memorable occasions, especially during this thesis project. This project empowered me to engage in design and research activities, help me to clarify my direction, discern my working style, and yield worthy outcomes, all thanks to my supervisor team, Judith and Tingting.

Thank you, Judith, for your consistent feedback and advice, remind me back on track whenever I deviate from the core subject. I really appreciate your patience in listening to my presentations and browsing my thesis and materials, allowing me to practice my communication and writing skills.

Tingting, thank you for involving me in this meaningful project. Your frequent, timely, and effective feedback and assistance, even at the expense of your leisure time, have been inestimable and have taught me the essence of being a great researcher, an enthusiastic mentor, and a kind-hearted individual. Your encouragement has been a comforting force, guiding me through this journey.

I also want to thank all my friends for inspiring and helping me in both study and life. You've shown me that life lies in interacting with others and building new connections, to understand diverse thoughts and different lives.

A special thanks to my mom, dad, and my dog, for constantly encouraging me to jump out of my comfort zone and allowing me to explore new fields. Thank you for being my steadfast support, and offering unconditional help when I was emotionally overwhelmed or exhausted. Though 12 hours of flight separate us, our hearts remain close.

Lastly, thanks to everyone who supported me in this project, and thanks to myself. Wish us to enjoy the current lives and bravely move forward together.

08 Dec, Delft, at home

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Terminology

Digital health - A wide range of concepts, including internet-oriented application programs, media, scientific terms, and technologies (Mathews et al., 2019).

The digital patient experience (The digital PEx) - "The sum of all interactions, affected by a patient's behavioral determinants, framed by digital technologies, and shaped by organizational culture, that influence patient perceptions across the continuum of care channeling digital health" (Wang et al., 2022a).

Primary research - The research from Wang et al, consists of four studies, aiming to improve the digital patient experience. This is the research that this project intends to transform.

A web-based design guide - The intended outcome of this project.

Healthcare designers/design students - The target group of this project, and the users of the web-based design guide.

Patients - Healthcare receivers. They are not the users of the design guide but can get benefits if healthcare designers make improvements in the digital PEx.

A minimum viable product (MVP) - a product that has a "minimum feature" or uses "minimum effort" to achieve maximum cost-effectiveness (Lenarduzzi & Taibi, 2016, August).

Information architecture (IA) - The content organization and structure of a website.

Five elements of user experience - An UX framework made by Jesse James Garrett (2010), which embraces the entire five aspects of user experience.

Executive summary

Primary research and the context

You, I and almost everyone deal with illness under a certain condition. As digital health is becoming ever more widespread nowadays, this change shapes a new understanding of our medical experience. Consider how these new digital tools might affect patient experience becomes more crucial for everyone's life.

Four studies, aiming at understanding and enhancing the patient experience, thus become the foundation of this project. This primary research is a source of knowledge and actionable insights for digital health designers to make improvements (Wang et al., 2022a; Wang et al., 2022b; Wang et al., 2023a; Wang et al., 2023b;).

Project Goal & Users

However, the transition of academic research knowledge into practical design information often faces obstacles (Zielhuis et al., 2022a). Challenges include effectively teaching freshmen (Hoadley & Cox, 2008), selecting the right formats, and successfully conveying academic knowledge in a practical context (Stappers and Giaccardi, 2017). As a result, despite the fact that the primary research potentially enables healthcare designers to enhance the digital patient experience, whether practitioners can benefit from these academic findings is still unclear.

Therefore, to further transfer the primary research to support design education and best practices for improving patient experience in digital health, as well as increase the accessibility and applicability of the primary research (Daniluk and Koert, 2015; Cook, D. A., 2007), an exploration starts.

Research

Desk research and literature research are done to define the project's scope and make a concrete goal. Design guidelines are considered since they play a crucial role in leading designers to success. Through learning and following effective design guidelines, designers can significantly enhance the quality of their design outcomes (Fu, Yang, & Wood, 2016). To transform the primary research into design guidelines, nine qualities should be considered in the creation and evaluation process.

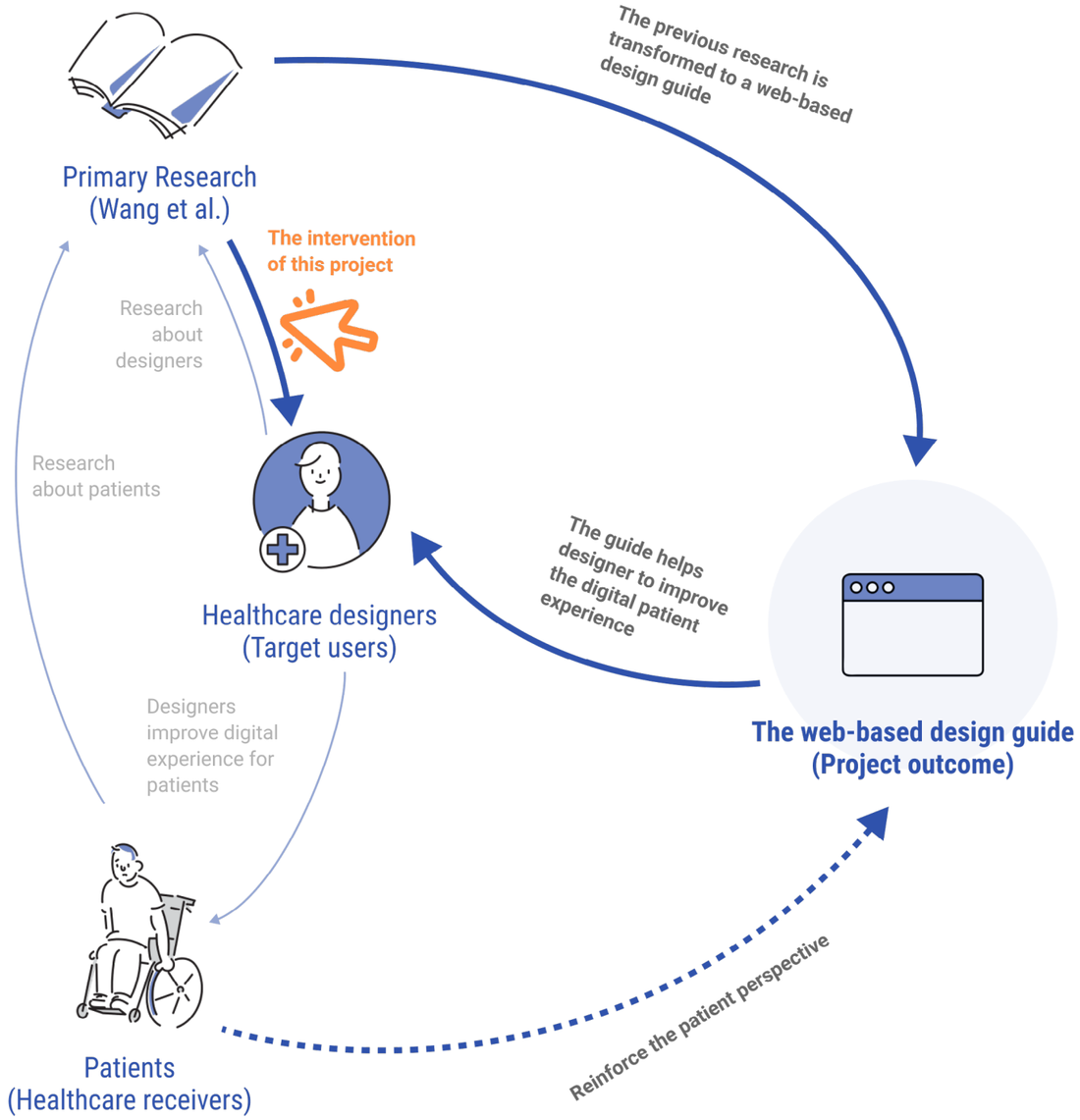


Figure 1 The relationshops between this project with the others

Additionally, the website is an appropriate method of transferring information (Daniluk and Koert, 2015; Cook, D. A., 2007). When creating a website, usability, accessibility, and consistency need to be considered.

Design Goal

It is defined that the primary research should be transformed into design guidelines based on a website platform, the design goal therefore is defined as: **To transform the primary research into a good and usable web-based design guide, enabling healthcare designers to utilize the primary research to improve the digital patient experience.** To achieve this goal, design activities should be conducted to ensure the website's usability, consistency, and accessibility, with the guide content's clarity, efficacy, and credibility.

The Design

Through design activities such as walkthroughs and case studies, an initial minimum viable (MVP) website is developed. An evaluation workshop makes clear that the website partially meets its design objectives and suggests a need for improvement in content clarity and efficacy and website usability. Following this feedback, an iteration is developed, resulting in a complete website design. A small-scale usability test validates the increase in content clarity, credibility, and efficacy, with overall usability slightly declining. Hence, the website is iterated again.

Conclusion

In summary, the final design achieves the desired levels of content clarity, efficacy, and credibility. The case study, color contrast ratio, and walkthroughs ensure website accessibility and consistency. However, a mean SUS (System Usability Scale) score of 59.5 indicates acceptable usability but with great room for improvement (Bangor, Kortum, & Miller, 2009).

Future developments should aim to enrich content storytelling and presentation, along with advanced website functionalities and accessibility, investigate users with various levels of healthcare design knowledge, and involve more designers and patients in evaluations.

Introduction

This chapter elaborates on the primary research findings and the problem, the focus, and the approach of this thesis project.

1.1 Primary research

Research Background

Digital health contains a wide range of concepts, including internet-oriented application programs, media, scientific terms, and technologies (Mathews et al., 2019).

Triggered by the digital technological revolution, digital health is flourishing nowadays (Lupton, D., 2014). **Digital health solutions have been recognized as a significant approach** to overcoming the widespread COVID-19 pandemic. Especially for medical institutions, the digital health approach enables rapid information transmission, instant monitoring, online working platform establishment, and virtual medical consultations for patients (Fagherazzi et al., 2020). For patients, digital health solutions empower benefits to strengthen the control of their health and improve their health status by providing information and treatments, such as healthy behavioral changes, healthy status outcomes, and distant therapies (Murray et al., 2016; Alkire et al., 2020). Moreover, digital health matters for patients, as evidenced by the rising healthcare costs, the need to employ physical distance therapy during the pandemic, and the shortage of medical personnel worldwide (Alkire et al., 2020).

While digital health technology supplies many benefits, it also exposes new challenges, especially for patients. In addition to the risks of losing clinical efficacy trials, market regulation, safety testing, and verified validation, it affects how patients feel and how they use it. Moreover, patients themselves, with different ages and experiences, will influence their healthcare involvement. Without these considerations, digital health technology might frustrate patients, who may even have to accept the risk of ineffectiveness or harmful outcomes from digital health (Alkire et al., 2020; Mathews et al., 2019). Therefore, considering these complexities, understanding how digital health affects patient experience is crucial for better utilizing digital health.

However, there is a lack of clear research on how digital health technologies influence patients' experiences, not to mention improving the patient experience (Wang et al., 2022a).

In the primary research, Wang et al. (2022a, 2022b, 2023a, 2023b) researched and identified effective knowledge for understanding and improving patient experience in digital health within four studies. They defined the digital patient experience (digital PEx) as how people experience in different digital health contexts. In detail, the digital PEx is

"the sum of all interactions, affected by a patient's behavioral determinants, framed by digital technologies, and shaped by organizational culture, that influence patient perceptions across the continuum of care channeling digital health " (Wang et al., 2022a).

These primary research outcomes aim to and have the potential to bridge the gap and facilitate designers to make changes in improving the digital PEx.

Primary research outcome

The section will briefly present the structure and content of the primary research outcomes.

Framework 1

In a nutshell, this knowledge consists of four research activities, followed by a research-centric and high-level process (Wang et al., 2022a).

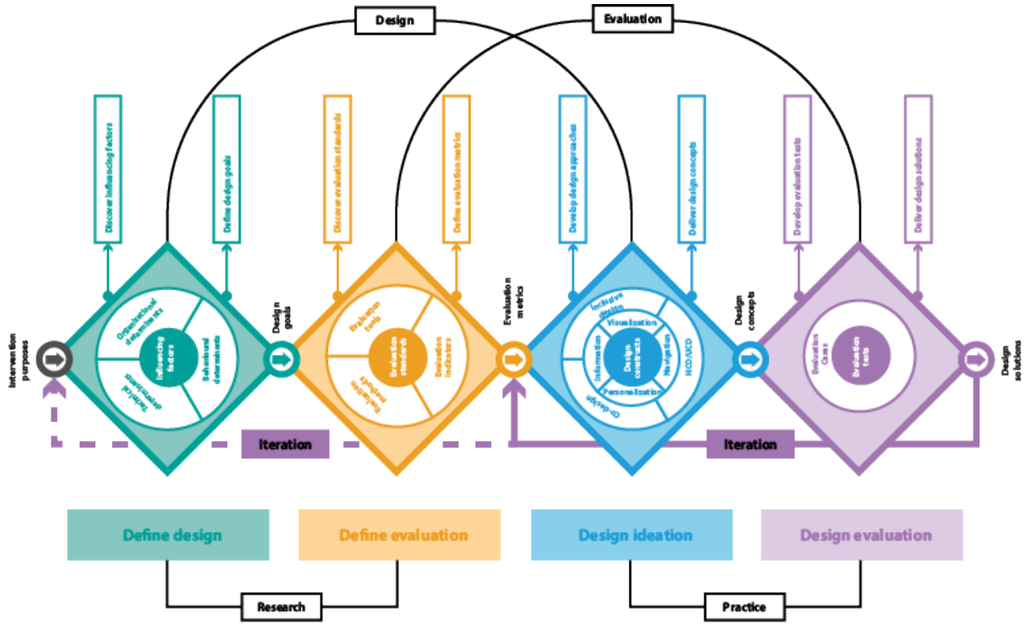


Figure 1.1. Digital Patient Experience Design and Evaluation Framework (Wang et al., 2022a).

Research 1
Define design

The umbrella review identifies factors that are relevant to the patient experience, which can aid designers in framing their design goals.

Research 2
Define evaluation

The knowledge of evaluation goals, audience, criteria (indicators), timing, and techniques should be learned to define the evaluation plan.

Research 3
Design Ideation

The knowledge of design constructs and methods supports ideating the concepts. In addition, nine factor-related design guidelines can solidify relevant considerations. Moreover, a practical design workflow is presented, which contains instructions, stakeholders involvement, and design challenges (see Figure 1.1)

Research 4
Design evaluation

This part of the research contains several real evaluation case studies.

Framework 2

In Research 3: Design Ideation, a design workflow is proposed, with design activities, stakeholders, challenges, and strategies. The whole research outcome could be integrated based on this design workflow as well, from a more design-centric and practical perspective (Wang et al., 2023b).

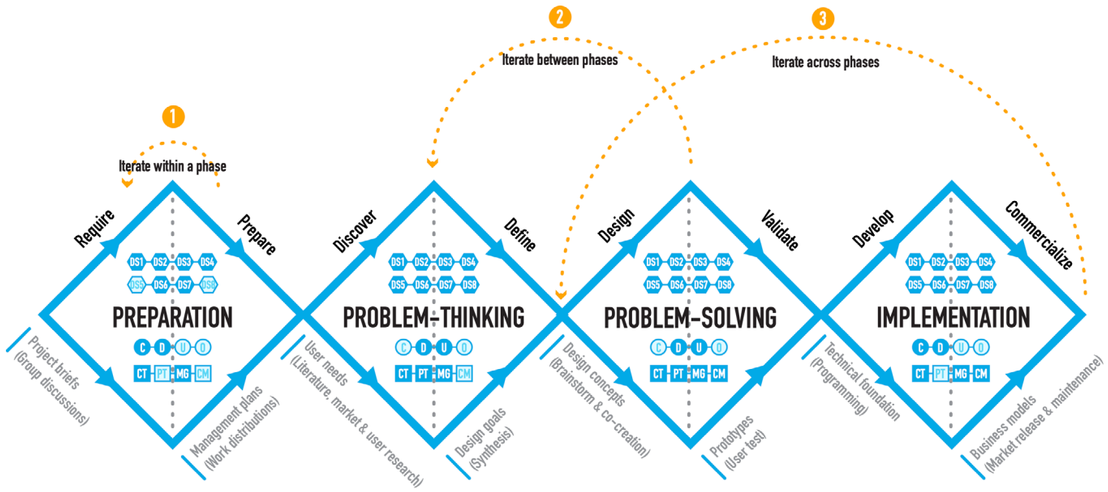


Figure 1.2. The Digital Health Design (DHD) framework (Wang et al., 2023b).

Design Phase 1 Preparation

Designers need to communicate with stakeholders and govern project requirements. Afterward, a project plan is proposed.

Design Phase 2 Problem-thinking

Designers should identify user needs, which could be facilitated by the influencing factors, and frame their design goals. This section is aligned with Research 1 Define Design.

Design Phase 3 Problem-solving

In this phase, designers should ideate their digital health concepts (Research 3: Design Ideation) and make prototypes for further validation.

Design Phase 4 Implementation

The last phase consists of development and commercialization activities. These activities are aligned with Research 2: define evaluation and Research 4: design evaluation.

1.2 The problem

Design knowledge, without doubt, aids designers in the design process. The primary research also targets this objective, specifically aiming to facilitate digital patient experience improvements. **The issue is that academic design research knowledge does not always make the expected impact in design practice (Zielhuis et al., 2022a), and it becomes especially hard when teaching design knowledge.**

The reason is that, on the one hand, it is diffcult for experts to teach their knowledge to newbies (Hoadley & Cox, 2008). Moreover, design researchers prefer to write in an academic way that conveys theories (Stappers and Giaccardi, 2017). On the other hand, various forms can be utilized to deliver design knowledge, for instance, papers, terms, frameworks, guidelines, principles, methods, tools, and artifacts (Höök and Löwgren, 2012; Gaver, 2012; Löwgren, 2013; Zielhuis et al., 2022b). In conclusion, it is challenging to choose suitable and useful formats to convey implicit and experiential design research knowledge to a larger audience in the practice field (Zielhuis et al., 2022a).

Therefore, while researchers conducted the primary research with the purpose of facilitating healthcare designers in improving patient experience, as we discussed before, whether the goal can be achieved or not is still in doubt.

1.3 Project focus

This project aims to transform the primary research outcomes for improving the digital patient experience into a web-based design guide, make the information more accessible to healthcare designers, and finally contribute to improving the digital health world.

Essentially, we explored three main research questions:

RQ1: What are the considerations for generating and evaluating a web-based design guide?

RQ2: How can we generate a web-based design guide?

RQ3: How should we evaluate this web-based design guide?

As we explored these questions, the project advanced in translating the primary research into a design guide, developing a website platform for this guide, and undertaking rounds of validation and refinement to ensure the web-based design guide's quality.

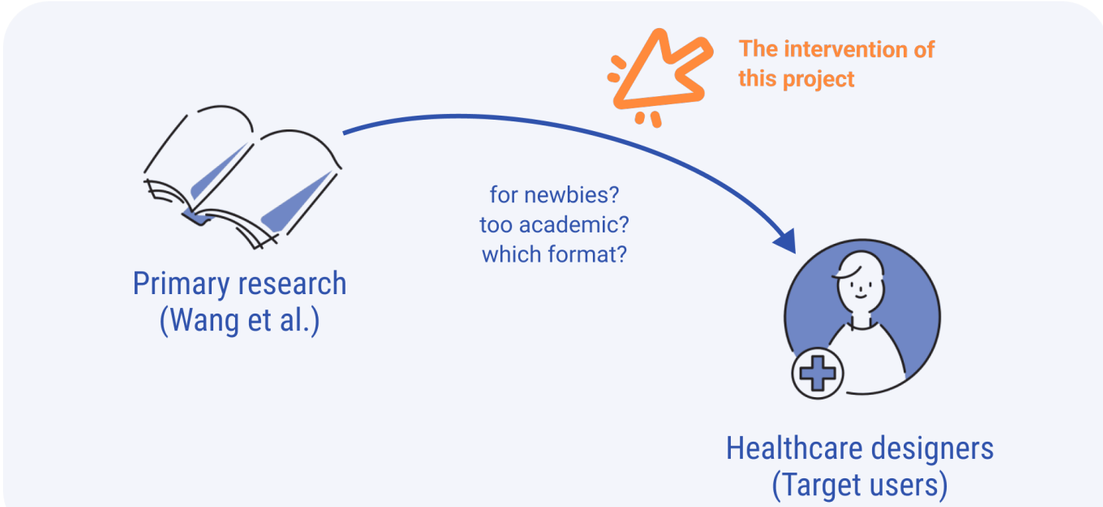


Figure 1.3. The Intervention of this project

1.4 Project approach

This project follows the double-diamond model proposed by the British Design Council, comprising four phases: discover, define, develop, and deliver.

Specifically, Chapter 2 discusses desk research supporting the subsequent development and evaluation of guidelines and the website. It also establishes a clear design direction for the entire project. Chapter 3 defines the design goal and corresponding design requirements. Chapter 4 brings these concepts to life, ideating the design goal into a web-based design guide through design activities such as selecting and analyzing of relevant website design cases, conducting walkthroughs, following accessibility color contrast standards, and analyzing information architecture.

To ensure the design meets the goal and the design requirements, an evaluation is conducted and detailed in Chapter 5. The completion of the evaluation workshop leads to an analysis, which offers insights for refining both the guideline content and the website.

These improvements led to the validation of the new solution and additional iterations, as detailed in Chapter 6. Chapter 7 presents the final design along with further recommendations. The conclusion in Chapter 8 outlines the project's outputs, contributions, and reflections.

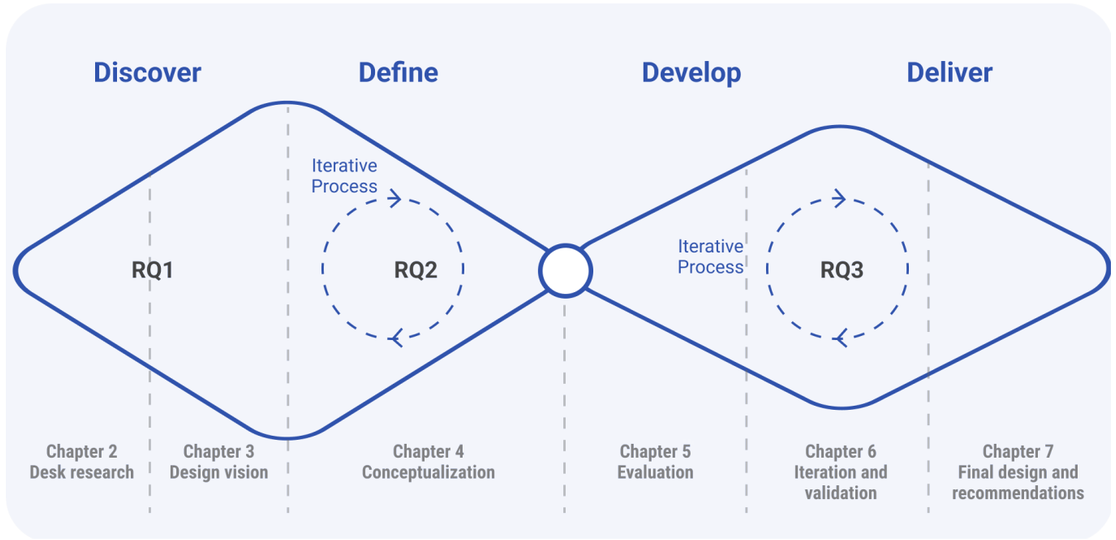


Figure 1.4. Project approach

Desk research

Understand and transform the primary research

This chapter tries to tackle the primary research question: What are the considerations for generating and evaluating a web-based design guide?

First, it describes the primary research as a background. Second, it discusses the reason for transforming the primary research into a design guide with a creation and evaluation framework and an evaluation procedure. Finally, it claims the considerations about choosing a website as the platform.

2.1 Understand the primary research of Wang et al.

This section attempts to address the first research question: What are the considerations for generating and evaluating a web-based design guide?

The primary research should be transformed to make it easier for designers to learn and use. Before starting, the primary research is understood to ensure the success of the transformation and manage the content structure. Activities, including meetings and reading, are done.

In brief, this primary research is understood to offer actions that a digital health designer can take to improve patient experience and includes some basic concepts, facts, and learned heuristics about the digital patient experience (e.g., what influences the experience) (Wang et al., 2022a; Wang et al., 2022b; Wang et al., 2023a; Wang et al., 2023b; Fu, Yang, and Wood., 2016). What should be noted is that this understanding influences the information architecture of the later design work, as described in Section 4.2.

2.2 Convert the primary research into a design guide

The transformation started after understanding the primary research. In this section, the reason why design guidelines become the preferred choice for the conversion of this primary academic research will be discussed.

The reason

What is a design guideline and why do we choose design guidelines? It's common to encounter some related terms, such as 'design method' and 'design principle', and it is easy to get confused with 'design guidelines'. Understanding these concepts is crucial, as their nuances can impact why they are chosen and how they are assessed. Consequently, it becomes essential to explicate their distinctions.

Design principles are fundamental regulations in the design field (Fu, Yang, & Wood, 2016). They are components of design guidelines, which also encompass rules, heuristics, and exemplary cases (Gerrike, Eckert, & Stacey, 2017). While principles provide basic rules, design guidelines go a step further. They are state-specific and context-dependent steps and are generally experience-dependent and more specific (Gerrike, Eckert, & Stacey, 2017) (Fu, Yang, & Wood, 2016).

Design guidelines can also be easily confused with design methods due to their similarities. Design methods detail specific ways to achieve particular outcomes. They influence various aspects of design, including information display, tools, actions, and tasks. In contrast to design methods, design guidelines offer more flexibility, allowing users to determine how to apply them (Gerrike, Eckert, & Stacey, 2017).

Engineering designers acknowledged the benefits of design guidelines (Reimlinger et al., 2019). Additionally, across diverse domains encompassing disciplines such as engineering design, human-computer interaction (HCI), user experience design, and social design, numerous design guidelines developed by researchers are available to aid design practice. For example, Apple offers human interface guidelines, which guide the experience design for their platform; IDEO provides the 'design kit' as their guidance for human-centered design; KLM collected multiple industry references to build their engineering design guidelines; and Amershi et al. (2019) concluded a human-AI interaction guideline to nourish designers involved with AI. The advantages of design guidelines have been widely realized.

Converting the primary research into design guidelines is therefore the first thing to think about, given the comprehension of this academic research, design guidelines, its features, and recognition.

Generate and evaluate design guidelines

Despite the bloom of design guideline development, only a limited number of studies have undertaken evaluations of the design guidelines. Some frameworks focus on generating an assessing framework for design methods (Cash, Daalhuizen, & Hekkert, 2023), facilitating the comprehension and development of design principles (Fu, Yang, and Wood., 2016), developing design methods (Gerrike, Eckert, & Stacey, 2017) and validating design knowledge (Frey & Dym, 2006), but the differences exist when coming to evaluating design guidelines.

This disconnect contributes to **the absence of a defined methodology and standards for the validation of design guidelines and their creation** (Frey & Dym, 2006). To effectively guide the development and evaluation of design guidelines, we examine four existing generation and evaluation frameworks for design methods, principles, and knowledge, to create an initial framework for generating and evaluating design guidelines. This initial framework is then examined by six articles that elaborate on existing, detailed, and practical design guideline evaluation processes to make necessary adjustments, ensuring the framework's accuracy and effectiveness in relation to design guidelines. Additionally, an evaluation procedure is yielded to guide the evaluation process.

The methodology consists of snowballing and keyword searching such as guidelines, design guideline evaluation, evaluation, validation, assessment, design framework, design methodology, design guide, design toolkit, design principle, design method, design mindset, design tools, and design canvas. Only published, full-text-available, English, design guideline evaluation-relevant articles are selected. Articles that are related to the healthcare field will be preferred to collect.

Only articles that elaborate on their design guideline evaluation process are included for second-round cases and the articles that don't set evaluation as the key subject but utilize this methodology as a medium for other subjects will be excluded. For instance, in Sluis-Thiescheffer's (2016) study, two design methods are used to let children create design solutions. Comparing the uniqueness of design solutions is the primary goal rather than assessing the design methods themselves.

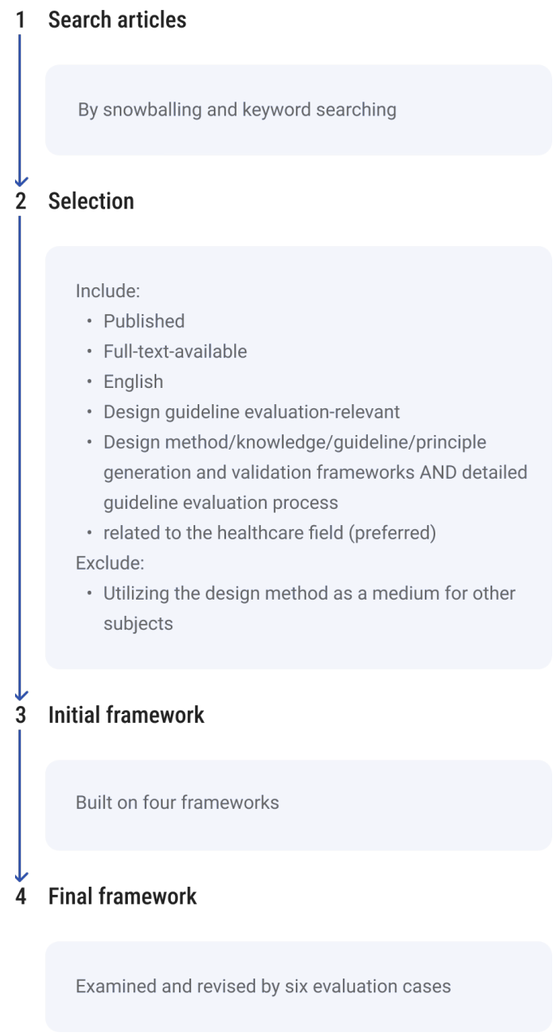


Figure 2.1. Selection process

An initial evaluation framework

The initial evaluation framework is built on four existing frameworks, focusing on developing and evaluating design methods, design principles, and design knowledge, as Table 2.1.

From these frameworks, key qualities are extracted to formulate the initial evaluation framework. The details are as Table 2.2.

Source	Abstract
Cash, Daalhuizen, and Hekkert (2023)	Implications for design method practice, research, and development.
Frey & Dym (2006)	A literature review of design methods validation.
Fu, Yang, and Wood (2016)	Examining the methodology for identifying, determining, creating, and confirming design principles.
Gerrike, Eckert, & Stacey (2017)	The clarity of a newly delivered design method in terms of its rigor, strictness, precision, and detail of its content.

Table 2.1. Four existing frameworks

Type	Quality	Source
Interaction	The interaction between the method's user and content	Cash, Daalhuizen, and Hekkert (2023)
Context	Adapt to the environment	Frey & Dym (2006)
	Context coherence	Cash, Daalhuizen, and Hekkert (2023)
	Dependency on context	Fu, Yang, and Wood (2016)
Content	Ensuring presentation, organisation, and content format	Fu, Yang, and Wood (2016)
	Defined	Cash, Daalhuizen, and Hekkert (2023)
	Scope-claimed	Gerrike, Eckert, & Stacey (2017)
	Consistency	Cash, Daalhuizen, and Hekkert (2023) ; Frey & Dym (2006)
	Predictable	Cash, Daalhuizen, and Hekkert (2023)
	Usable; Usability	Cash, Daalhuizen, and Hekkert (2023) ; Fu, Yang, and Wood (2016)
	Reliable	Frey & Dym (2006)
Outcome	Desirable	Cash, Daalhuizen, and Hekkert (2023)
	Effectiveness	Fu, Yang, and Wood (2016) ; Frey & Dym (2006)
	Benefit expected from the methods	Gerrike, Eckert, & Stacey (2017)
	Affected design outcome	Cash, Daalhuizen, and Hekkert (2023)
	Process quality and efficiency, and design quality	Cash, Daalhuizen, and Hekkert (2023)

Table 2.2. Initial qualities

Final evaluation framework

These qualities are then confirmed, integrated, and revised by six evaluation papers. The six articles practiced design guideline evaluation and enlarged on their focused criteria and qualities of the examined guidelines (see Table 2.3).

Built on them and the initial framework, this section constructs a framework specifically for the generation and evaluation of design guidelines (see Table 2.4). This framework defines the key qualities that a good design guideline should possess, which contains four categories with nine metrics (see Table 2.4).

Source	Evaluated guideline	Field	Qualities
Cooper and Cooper (1984)	"...a procedural guideline system...to aid the information design student and designer in coping with the technology available."	Information design	1. The product's design 2. Efficiency and suitablity 3. The satisfaction of users and the cost time for finishing the assignment
Reimlinger et al. (2019)	"The design guideline was a printable, thirteen-page pdf file containing information on the design of screw joints..."	Engineering design	The design guideline's impact on the participants' performance
De Souza & Bevan (1990)	"a draft standard containing human factors guidelines for menu interface design."	Interface design	1. Cognitive expenses (Error) 2. Emotional expenses (Pain) 3. Product quality
Kurniawan and Zaphiris (2005)	"a set of research-derived ageing-centred Web design guidelines."	Web design	Usability (understanding, reliability, practicality and usefulness)
Adamides et al. (2014)	"Taxonomy of design guidelines for robot teleoperation."	Design of Robot Teleoperation	Usefulness
Amershi et al. (2019)	"18 generally applicable design guidelines for human-AI interaction."	Human-AI interaction	1. Usability 2. Applicability 3. Clarity

Table 2.3. Six evaluation articles

Type	Quality	Explanation	Source
Context	Project relevance	The project is within the relevant context of the design guideline.	Cooper and Cooper (1984) ; Reimlinger et al. (2019) ; De Souza & Bevan (1990); Kurniawan and Zaphiris (2005) ; Adamides et al. (2014) ; Amershi et al. (2019) ; Fu, Yang, and Wood (2016) ; Frey & Dym (2006)
	Ability Relevance	Designers are able to apply this design guideline appropriately.	Cash, Daalhuizen, and Hekkert (2023) ; De Souza & Bevan (1990) ; Kurniawan and Zaphiris (2005) ; Adamides et al. (2014) ; Amershi et al. (2019
Adherence	Usage Adherence	Designers follow this guideline strictly or loosely.	Cash, Daalhuizen, and Hekkert (2023) ; Cooper and Cooper (1984) ; Reimlinger et al. (2019) ; De Souza & Bevan (1990) ; Kurniawan and Zaphiris (2005) ; Adamides et al. (2014) ; Amershi et al. (2019)
Outcome	Efficiency	The guideline enables designers to complete their tasks swiftly, without unnecessary effort.	Cash, Daalhuizen, and Hekkert (2023) ; Cooper and Cooper (1984)
	Effectiveness	The guideline can yield successful results and improve the design quality.	De Souza and Bevan (1990, August) ; (Frey & Dym, 2006); Cash, Daalhuizen, and Hekkert (2023) ; Cooper and Cooper (1984)
	Satisfaction	The guideline is perceived as highly valued and desirable by designers.	Cash, Daalhuizen, and Hekkert (2023) ; Cooper and Cooper (1984)
Content	Credibility	The content can be trusted and believed in (e.g. with robust evidence support).	Cash, Daalhuizen, and Hekkert (2023) ; Frey & Dym (2006) ; Kurniawan and Zaphiris (2005)
	Clarity	The content is structured, , explict, coherent, and easy to understand.	Fu, Yang, and Wood (2016) ; Cash, Daalhuizen, and Hekkert (2023) ; Gerrike, Eckert, & Stacey (2017) ; Frey & Dym (2006) ; Amershi et al. (2019) ; Kurniawan and Zaphiris (2005)
	Efficacy	The content is predictable towards the intended result.	Cash, Daalhuizen, and Hekkert (2023) ; Gerrike, Eckert, & Stacey (2017)

Table 2.4. Final framework

The following explains the details of this framework.

Content Qualities

A guideline's content is the instructions or advice they provide. Efficacy, clarity, and credibility can be seen as the three key characteristics of good guideline content.

First of all, good content should be predictable for its functional outcome, impact, and validation when used in a given situation (Cash, Daalhuizen, & Hekkert, 2023; Gerrike, Eckert, & Stacey, 2017). That's what we call efficiency. Efficacy should be differentiated from effectiveness. Though they both strengthened the impacts, effectiveness is more inclined to contextual influence and outcome (Cash, Daalhuizen, & Hekkert, 2023) instead of a prediction.

In addition to efficacy, clarity has been seen as another dimension to develop and evaluate design guidelines. Fu, Yang, and Wood (2016) underscored the importance of format, structure, and detail in guidelines to guarantee maximum effects. Cash, Daalhuizen, and Hekkert (2023) treated "defined" as one of the key points of good design method content. They stated that defined content should be well-structured, accomplished, consistent, and explicit. Frey and Dym (2006), reviewing various frameworks for design knowledge and method validation, emphasized the importance of ensuring internal consistency and logicality for design knowledge. In practice, Amershi et al. (2019) highlights clarity and clarification as their essential guideline qualities for assessment. Similarly, Kurniawan and Zaphiris (2005) undertook a heuristic evaluation of web design guidelines with the web users. One of their primary objectives was to examine the ambiguity of this new set of guidelines and the conformance from website users' perspectives.

Credibility is the last essential factor. A design method should rely on meaningful and trustworthy information for it to be considered valid (Frey and Dym, 2006). Similarly, Cash, Daalhuizen, and Hekkert (2023) underscore the significance of having solid evidence during the development process of their design method assessment framework. In practice, Kurniawan and Zaphiris (2005) aimed to determine the reliability of guidelines during their evaluation, highlighting the critical role of trustworthiness in building guidelines.

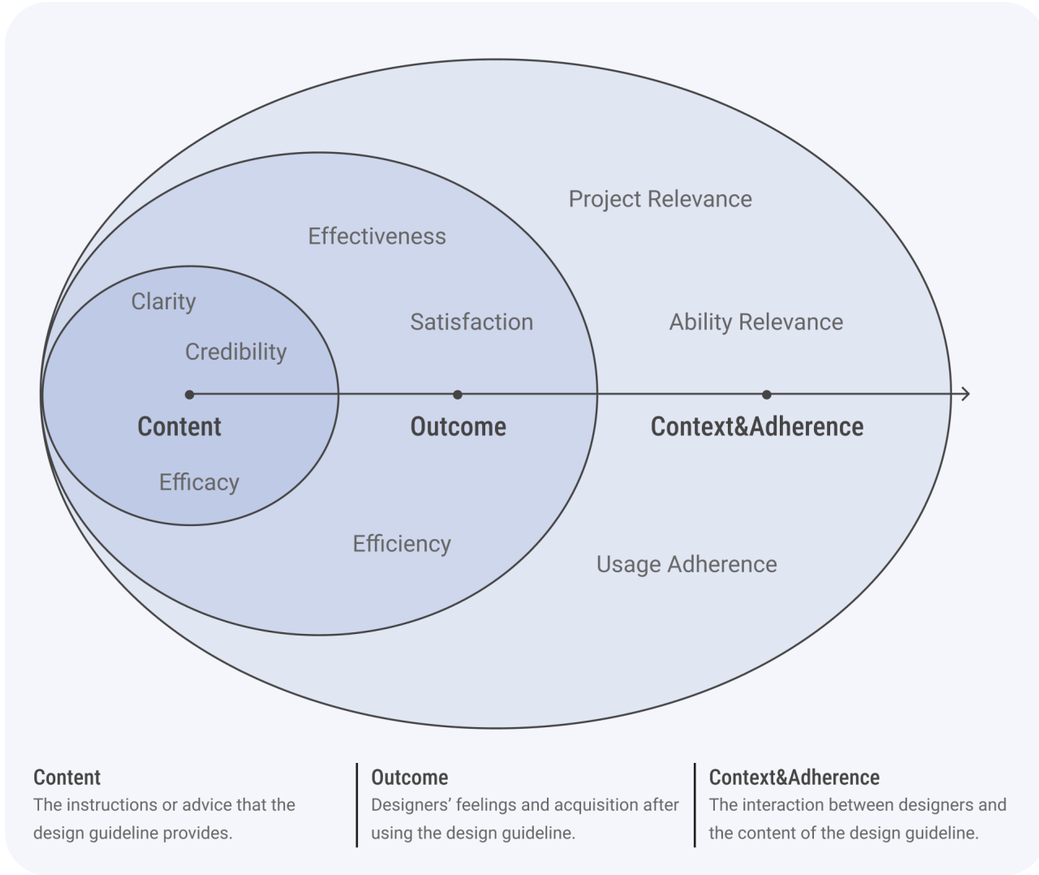


Figure 2.2. Final framework outline

Outcome Qualities

The content impacts how designers will experience and gain from using the design guidelines. **Though this experience and obtainment, which is the outcome, cannot be "created", it can be assessed and reflects the quality of the content.**

A frequently mentioned term to assess outcomes is usability. Fu, Yang, and Wood (2016) stress the importance of optimizing design guidelines to achieve maximum usability. Cash, Daalhuizen, and Hekkert (2023) referr to usability to explain the effectiveness of the method claim. In actual use, Kurniawan and Zaphiris (2005) tried to identify the usability issues of their new guidelines by rating their usefulness. Adamides et al. (2014) aimed to examine whether the suggested taxonomy is practical and beneficial for use.

The criteria employed for assessing usability varied widely. To unify our approach, we anchor this discussion on the definition of usability provided by the International Organization for Standardization (9241–11:2018) "The extent to which a system, product, or service can be used by specified users to achieve specific goals with effectiveness, efficiency, and satisfaction in a specified context of use". Effectiveness and efficiency imply the value of usability — that the product enables users to reach their objectives accurately and swiftly. Users' perceived contentment is the only factor that determines satisfaction (Barnum, C. M., 2020). The three dimensions have already gained recognition among the existing evaluation practice.

Being efficient has been seen as the speed of work completion (Barnum, C. M., 2020) and as a key metric for effect-driven design method measurement. Process efficiency is seen as one indicator to examine the quality of design methods (Cash, Daalhuizen, & Hekkert, 2023). Cooper and Cooper (1984) set efficiency as the criteria for the guideline evaluation activity.

Effectiveness, as mentioned before, is not the same as efficacy; it focuses more on the impact and outcome in a specific context (Cash, Daalhuizen, & Hekkert, 2023).

Cooper and Cooper (1984), in their experiment, concentrated on learning the effects their guideline could bring, partly in terms of design and production effectiveness. The case provided by De Souza and Bevan (1990, August) evaluated the effectiveness of their draft design guidelines. Theory effectiveness, or internal effectiveness, has been referred to as different design knowledge validation frameworks for a long time (Frey & Dym, 2006).

The last one is satisfaction. Desirability is a crucial factor in identifying an effective method, which signifies that the results obtained from this approach are both worthy and suitable (Cash, Daalhuizen, & Hekkert, 2023). In practice, Cooper and Cooper (1984) developed a Likert-type scale questionnaire to measure students' satisfaction and find out their feelings towards the guidelines.

Evaluate the context and adherence

While context and adherence are not qualities of design guidelines, they play a significant role in influencing the evaluation results. In other words, without considering these factors can lead to inaccurate or invalid comprehension of the design guidelines.

First, design guidelines are context-dependent (Gerrike, Eckert, & Stacey, 2017; Fu, Yang, & Wood, 2016). Their usefulness depends on how they are applied in particular design settings; therefore, they shouldn't be seen as independent of projects. This implies that the evaluation of design guidelines should consider the relevance between these guidelines with projects. In practice, examining its relevance was one of the main goals of a user study conducted by Amershi et al. (2019). Participants reviewed 20 products for guideline applications and violations, helping researchers confirm their relevance in the AI field.

Second, designer and design guidelines closely interact with each other in the design process. Design guidelines empower more possibilities of success, instead of assurance (Cash, Daalhuizen, & Hekkert, 2023). The effectiveness of these guidelines largely depends on how designers understand these guidelines and take them into action.

Therefore, the evaluation process should also include two aspects: designers' capability to understand the design guidelines and the extent of adherence by designers to these guidelines. In practice, researchers arranged study sessions (Kurniawan and Zaphiris., 2005; De Souza & Bevan, 1990; Adamides et al., 2014) and additional documents (Amershi et al., 2019) to improve user participants' understanding of guidelines. Tasks, including design tasks and heuristic evaluations, are assigned to ensure adherence. In short, the significance of design guidelines lies not only in their content but also in how designers adhere them to specific contexts.

Evaluation procedure

The six articles, focusing on the evaluation of various design guidelines, contribute not only to establishing criteria for generation and evaluation but also offer a comprehensive evaluation process (see Table 2.5) to support a guideline evaluation procedure. This procedure contributes to the assessment of the above nine qualities.

Source	Tasks for evaluation	Participants	Sample size	Task type	Task time
Cooper and Cooper (1984)	"Design a bus guide for Crosville Motor Company. "	Large groups of design third-year students	69 (A:7; B: 14; C: 14; D: 16; E:8; F:10)	Design Task	1 week
Reimlinger et al. (2019)	"To connect the housing parts of an original and existing product by means of screw joints."	"Participants were employed as design engineers at the company…were split into experts and novices."	17	Design Task	1 hour
De Souza & Bevan (1990)	"A task such as using guidelines to design a menu interface."	Three designers experienced in creating interactive programs for at least a year	3	Design Task	3 hours
Kurniawan and Zaphiris (2005)	"…evaluate the website in light of whether the site met a guideline or not by selecting 'Yes', 'No' or 'NA' on the heuristic evaluation sheets..."	Six young participants under 40, including HCI researchers and research students, for the exercise.	6	Heuristic Evaluation	N/A
Adamides et al. (2014)	"...comparing them with the eight categories of heuristics in order to identify usability problems. "	Four Human-Robot Interaction (HRI) experts	4	Heuristic Evaluation	N/A
Amershi et al. (2019)	"...assigned each participant to an AI-driven feature of a product... asked them to find examples (applications and violations) of each guideline."	Eleven members from the team; 49 HCI practitioners	11; 49	Heuristic Evaluation	1 hours; 1 week

Table 2.5. Six evaluation articles' evaluation details

Task-centred evaluation method

Researchers used a task-centered evaluation method for evaluating design guidelines. There are two types of tasks: design tasks and heuristic evaluation tasks. Assigning a design task to the participants to solve one or more design issues with the help of the design principles is a widespread validation methodology (Fu, Yang, & Wood, 2016). Half articles we selected used the design task as the main evaluation method (Table 2.5). Commonly, researchers will require participants to utilize the guidelines to generate an intended result.

Besides the design task, it's worth noting that the heuristic evaluation was used continually as another type of task (see Table 2.5). Initially, heuristic evaluation don't focus on guideline evaluation but aims to evaluate the usability of a product or interface with a series of usability guidelines (Amershi et al., 2019). Therefore, a modified heuristic evaluation is used in these articles. To avoid the risk of excessively concerning the interface, Amershi et al. (2019) asked the participants to point out instances of both following and breaching the suggested guidelines within an interface and continuously reflecting on the guidelines.

1 Before the task

Define the evaluation goal

In the previous section, we have already outlined the characteristics of a good design guideline, which should be considered as evaluation goals and we will not elaborate further here. It is worth noting that if the focus is on evaluating both the content and outcome of the guideline, the design task method can be prioritized for use. If the emphasis is only on content evaluation, heuristic evaluation can be particularly useful since participants are asked to thoroughly review and even find examples for every guideline (Amershi et al., 2019).

Recruit participants and consider the sample size

In most cases, the recruited participants are the people who have design experiences and knowledge (Table 2.5). Notably, though the design guideline serves the designers, the receivers of the design outcome that are instructed by the guideline might vary. This conflict leads to the evaluation cases conducted with the design receivers. For example, in the evaluation of the guideline that facilitates website design for old people, the researchers recruited old participants to perform a usefulness rating exercise towards the website and the guideline. However, the author also highlighted some drawbacks of this approach in the subsequent discussion, such as unfamiliarity with design terminology and no awareness of the differences between guidelines (Kurniawan & Zaphiris, 2005).

Even though recruiting designers from relevant fields as participants has become common sense, the standard of the sample size still requires further discussion. Among the selected articles, the number of participants ranges from a minimum of three individuals to a maximum of 69 participants (see Table 2.5).

Recruit Experts (only for design tasks)

To determine the extent to which the guidelines aided, one way is to examine the qualities of their design task outcomes between the experimental group and compared group. For instance, Cooper and Cooper (1984) recruited one compositor to evaluate the students' information design work.

Preparation

Researchers prepare for the success and completion of the task session. An early learning was scheduled by De Souza and Bevan (1990). They sent the guidelines and setup guide to the participants one week before the experimental session and requested a careful review and notes about the guidelines. Cooper and Cooper (1984) conducted a pilot test to recognize possible issues that might impede the evaluation process. In addition, they reserved one more week for the students who did the testing in the first two weeks of a new academic year compared with other groups, and the results appeared to be positive to this consideration.

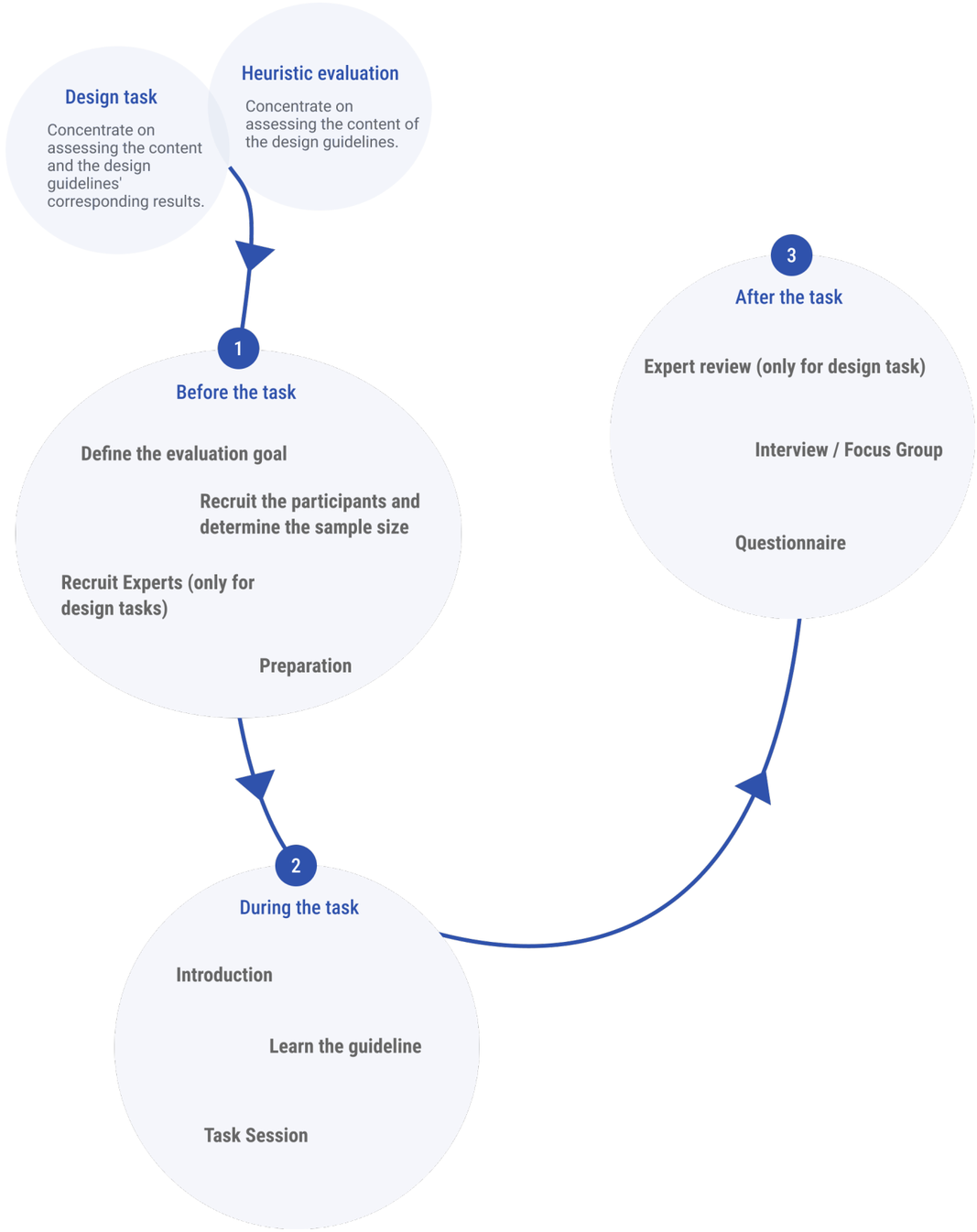


Figure 2.3. Evaluation procedure

2 During the task

Introduction

An introduction to the workshop or testing should be conducted, including introducing the context, signing the consent, and detailing the objectives. Reimlinger et al. (2019) prepared a short briefing part to present the background information to the participants. After the briefing, they interviewed participants to get relevant information such as age and design experiences.

Learn the guidelines

The learning activity can be varied. Kurniawan and Zaphiris (2005) requested every individual to score the website on their conformance with each guideline to force more in-depth thinking. De Souza and Bevan (1990) used the introduction session to let the designers study the guidelines. Adamides et al. (2014) let the designers study the guidelines while also freely exploring the test subject system. Amershi et al. (2019) provided an additional document with a bunch of examples for a better understanding.

Task Session

The tasks are various, based on the objective and intended outcome of the design guideline. What should be significantly considered is the task duration, as they differ sharply from one hour to one week (see Table 2.5).

3 After the task

Expert review

An expert review is a common approach to assess the outcome of the design task. Cooper and Cooper (1984) recruited designers and compositors to rate the quality of student's work. Reimlinger et al., (2019) hired three experts to collect and review the data during the experimental session. Amershi et al. (2019) conducted an expert review to verify the improvements in the design guidelines.

Interview / Focus Group

The interview can be used as the ending of the elevation for collecting feedback. Reimlinger et al., (2019) interviewed participants to wrap up the testing and learn the feelings of participants. Kurniawan and Zaphiris (2005) interviewed the attendants to supply supplementary information for criteria measurement and get advice, comments, and learn the difficulties.

Questionnaire

The questionnaire is one of the most common approaches to collect people's opinions and finish measurement. Among these cases, questionnaires were used for rating. Cooper and Cooper (1984) used three kinds of Likert-type questionnaires to assess three metrics, including design quality from the designer's perspective, the use of instructions from the compositor's perspective, and user satisfaction from the participant's view, to better calculate the effect of design guidelines. Reimlinger et al. (2019) used questionnaires to gather the participants' evaluations of the guidelines' advantages. Kurniawan and Zaphiris (2005) used a 5-scale questionnaire to rate the usefulness of the guideline. Amershi et al. (2019) used a 5-point questionnaire to determine the clarity of the design guidelines as well.

Limitations

This review establishes a framework for constituting an effective design guideline and a procedure for making an assessment. Despite its contributions, this review also presents mainly two limitations.

Although this literature review was conducted using a range of related keywords and snowballing techniques, resulting in a collection of relevant and insightful articles, it includes only ten articles. In particular, limited healthcare-related papers were discussed. This number is relatively limited for an effective literature review in the healthcare field. Consequently, this lack of sources may have undermined the comprehensiveness, robustness, and credibility of the findings. More broad, and digital-health-relevant evidence could be included in the future to improve the review's validity and scope.

While the review provides metrics for creating and evaluating design guidelines, it falls short in detailing the specific methodologies and instruments required to study these metrics. For instance, for guideline content, what consists of being clear? The answer might be connected with its title, storytelling, and logicality...but it isn't included in this framework. This absence limits the utility of this framework, as researchers and practitioners lack guidance on how to effectively utilize and measure these qualities in application. In the future, researchers could incorporate more details and tools to compensate for these aspects.

2.3 Choose website as the platform

A platform is needed to present the design guidelines. In this section, the reason for choosing websites as the medium is discussed.

The reason

When looking at the design world, it is easy to see design knowledge shared in many ways. Books, like the "Delft Design Guide," are popular for explaining design methods and techniques. Some toolkits give users a set of tools to use these ideas in real-life projects, such as the "Design Thinking Toolbox." These different formats make it easier for everyone to learn about design, whether they like reading about it or practicing it.

But which format should be chosen for our design guide? Websites offer the advantage of being readily and effortlessly available to people all over the globe (Daniluk and Koert, 2015). People ought to see web-based online learning as a strong option for teaching, especially for medical training, since it enables people to learn from anywhere, anytime, can teach a lot of people at once, and uses new ways of teaching (Cook, D. A., 2007). The website also advantage of being interactive, compared with paper-based resources.

Considering all the benefits, web-based design becomes the primary choice for delivering the design guide of this project.

Generate and evaluate a website

For this purpose, it is important to know what should be considered when designing and assessing a website. This section talks about usability, accessibility, and consistency. Integrating these three aspects into website design is vital for the creation and evaluation.

Usability

Usability is one of the vital concerns of successful website design. A website's usability refers to how effectively and easily it facilitates users to do tasks (Wang & Senecal., 2007). Assessing the usability of a website involves a thorough assessment including its usage, interface, interaction, development process, user-centered design ability, and application (Bevan, N., 2001).

Accessibility

From Google Material Design, ensuring website accessibility is fundamental for designing a website, which means making the website easily accessible and usable for everyone, including people with disabilities. This involves various aspects of design, such as providing text alternatives for visual content and ensuring color contrast.

Consistency

Consistency refers to maintaining uniformity in design across different pages and features of the website. This includes consistent layouts, color schemes, fonts, and interactive elements. Consistency is significant for designing interfaces (Bevan, N., 2001) that helps users easily understand and predict the functionality of the website, thus offering a more coherent and satisfying user experience.

2.4 Conclusion

In this chapter, we answered the first research question: What are the considerations for generating and evaluating a web-based design guide?

First, we revisited the primary research and summarized the key contents: actions, principles, concepts, and heuristics. This step helped us to deeply understand the core of this research.

Then, we reviewed different design knowledge formats, including design principles, methods and guidelines. After understanding and comparing their features and nuances, we decided to convert primary research findings into design guidelines. This decision was made because design guidelines empower effective designs and are more targeted, context-dependent, and flexible, aligning well with the primary research. Subsequently, we focused on the way of generating and evaluating design guidelines, paving the way for subsequent transformation and evaluation efforts. It is identified that to ensure the quality of design guidelines, we should concentrate on their content clarity, credibility, and efficacy to ensure that the results of applying these guidelines are effective, efficient, and satisfying. The assessment should also consider their relevance to the project, relevance to usability, and adherence to use, to ensure an accurate assessment result. An evaluation procedure is proposed to instruct the real-life practice.

Finally, we talked about the specific reasons for choosing to present design guidelines through a website. Using a website as the platform provides benefits: it is not only cost-effective but also readily, globally accessible, and interactive. To ensure the high quality of the website, special attention should be paid to three key aspects: usability, accessibility, and consistency.

In conclusion, this chapter has clarified our considerations for translating the research findings into a web-based design guide and the appropriate requirements to achieve success. In light of this chapter, we will address RQ2 and detail the design goal in the next chapter.

Design vision

A web-based design guide

This section will start to answer the second research question: How can we generate a web-based design guide? To answer this question, this section defines the design vision, including the design goal, the design requirements, user groups, and user stories.

3.1 Design goal

The design goal is...

To transform the primary research into a good and usable web-based design guide, enabling healthcare designers to utilize the primary research to improve the digital patient experience.

3.2 Design requirements

The desk research yielded a wealth of findings. To narrow down the design space and turn every insight into actionable design decisions, several requirements are developed.

Usable Web-Based Platform

The project's main focus is the website design. The website must have high quality to effectively display and convey the design guide. Otherwise, the guide would be disabled no matter how effective it is.

To achieve this, it is essential to ensure high usability, consistency, and accessibility. Integrating these key aspects could make sure the website facilitates various designers to predictably interact with it and complete their tasks efficiently and easily.

Good Design Guide

Secondly, this project will also pay attention to the transformation of the primary research. To convert primary research into an effective design guide, it's crucial to ensure that the guide's content is clear, efficacious, and trustworthy. Achieving these means that the guide will serve as a reliable resource, and help healthcare practitioners to create effective, efficient, and satisfying digital health improvements.

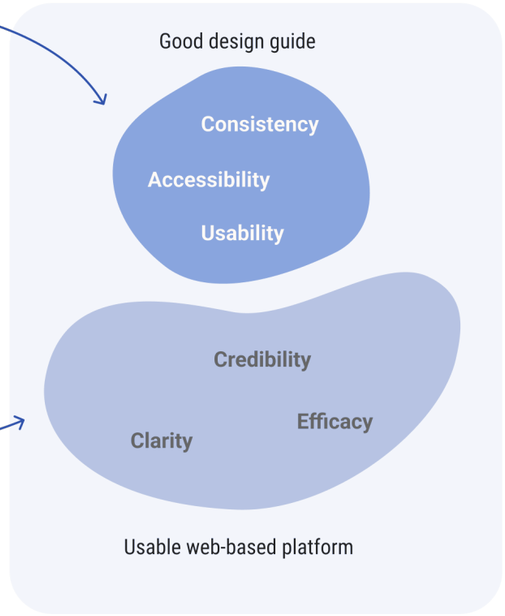


Figure 3.1. Design requirements

3.3 Users

Persona

The user groups are healthcare designers, including junior medical designers, design students, and other healthcare-related groups. For example, the expected persona can be:

Emily, a junior design student specializing in healthcare design, is working on a project that involves creating a user-friendly digital patient portal for a hospital.

Figure 3.2. Persona

User stories

This main scenario is that users could use this website while doing their healthcare design projects. This primary scenario could be detailed with three key user stories (see Figure 3.3):

1. Understanding the importance of improving the digital patient experience;

2. Acquiring the knowledge of improving the digital patient experience;

3. Practicing improving the digital patient experience.

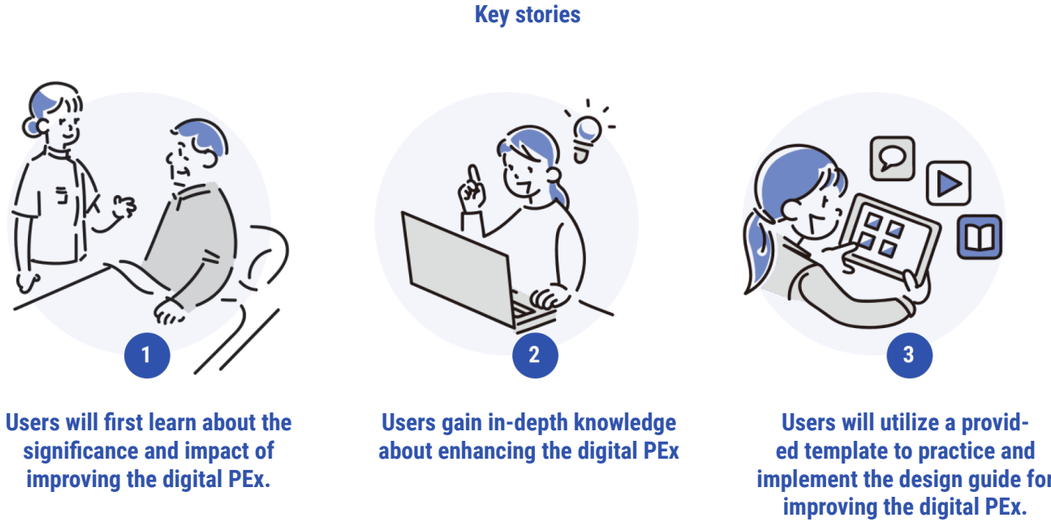


Figure 3.3. User stories

Conceptualization

Design the website

Now the concrete design space is built, this section keeps addressing the second research question: How can we generate a web-based design guide?

A conceptualization process will be elaborated, heading for the initial design. First, the primary research was transformed into design guidelines. Then, the website information architecture was accordingly generated. Then, to develop the website, a case study was conducted. Finally, the initial MVP wireframe and prototype are displayed.

4

4.1 Conceptualization approach

At the start of the ideation process, many approaches are considered to integrate the design requirements into the concept. The goal is to take previous considerations into action and ensure the expected design outcomes.

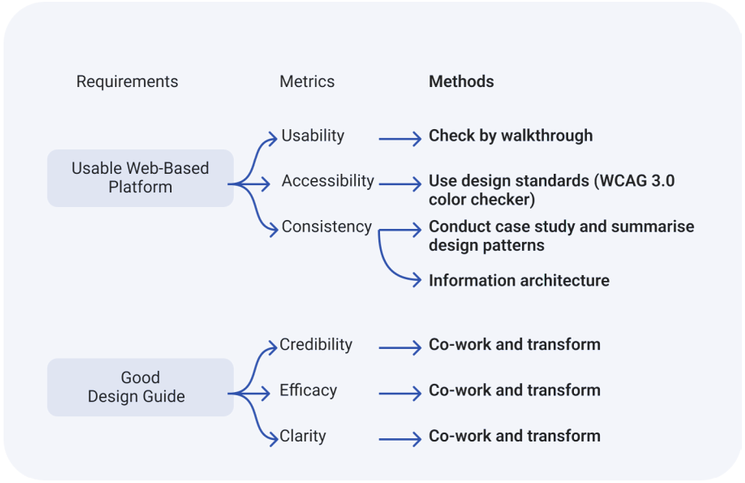


Figure 4.1. Conceptualization approach

4.2 Primary research transformation

Before starting the website design, the content should exist first. The transformation started by compressing and simplifying the original articles. A designer and a researcher worked together, to guarantee success.

First, we removed the methodology section, as it's usually not necessary for designers in practice. Then, we concentrated on showcasing the key findings and conclusions of the research, as these are crucial for enhancing efficacy. To ensure clarity for designers, we adjusted the academic language to be more concise and direct. At the same time, to maintain the rigor and credibility of the text, we utilized the high-level structure of the research process as the information architecture. In this way, readers not only receive practical guidance but also understand the scientific basis behind these instructions.

By doing so, we transformed the primary research content into a practical, efficient, and credible design guide.

Figure 4.2. Website content

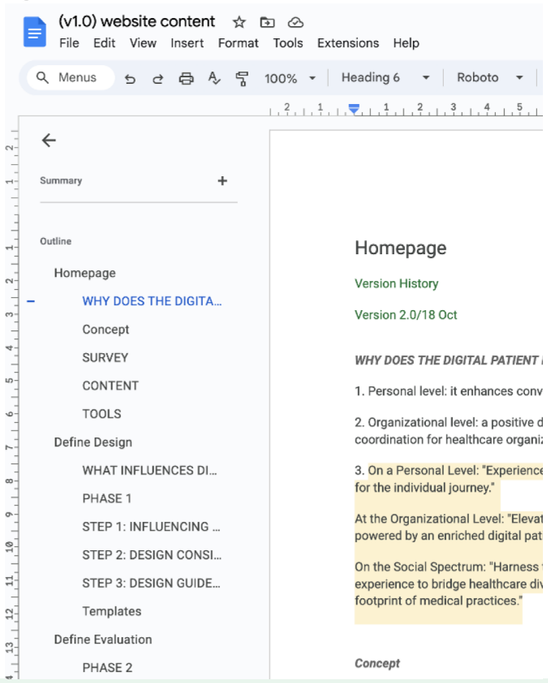
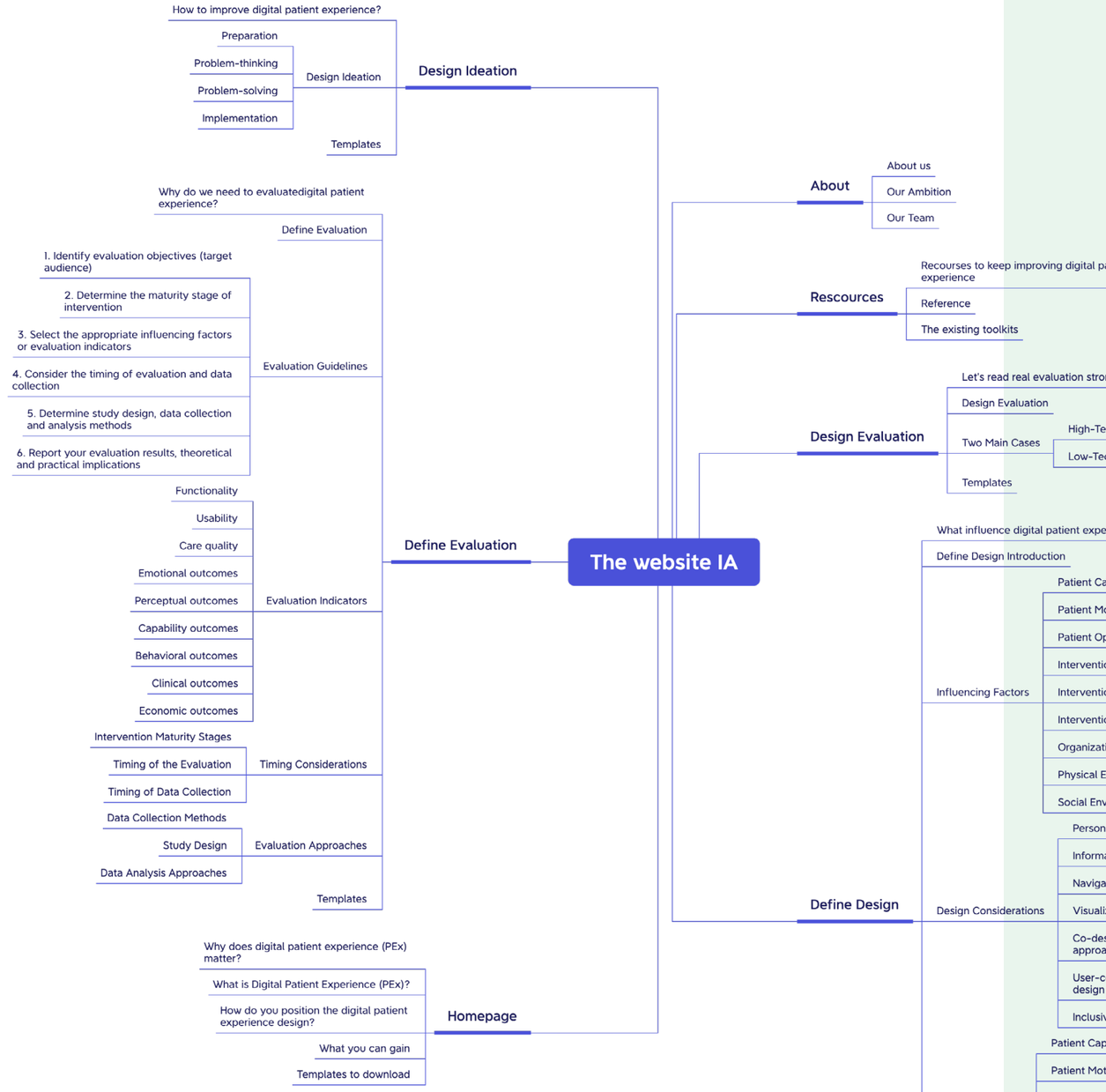


Figure 4.3. Information architecture



4.3 Information architecture

This transformation influenced the information architecture of the website, as we mentioned before in Section 2.1 and above. At this stage, the high-level framework was utilized. Accordingly, the information structure, which follows the research process from defining design to design evaluation, was conceptualized.

4.4 Website design

This section describes how the website was formulated while ensuring its usability, consistency, and credibility.

Case studies

In this project, one of the main goals of creating the website is consistency. Being consistent implies, besides maintaining internal coherence within the website itself, also maintaining similar patterns with the other websites. Stated differently, what is the existing design of other web-based design guides?

To answer this question, a case study method would be utilized. This approach is viewed as the most appropriate technique for undertaking research in design, especially answering “why” and “how” research questions. As an empirical method, case studies could help design researchers to describe a phenomenon or generate a theory (Teegavarapu, Summers, & Mocko, 2008). Referring to this thesis, the aim is to generalize design patterns across cases (Gerring, J., 2004) by investigate the current web-based design guides and support the design of this project.

Case Selection Approach

Figure 4.4 outlined the case-selection procedure.

Step 1 Case Collection

By searching keywords including design guidelines, design framework, design method, design principles, and design toolkit in Google, we collected design knowledge websites. Some cases were obtained by the snowballing method, recommended by designers and healthcare experts. **In total, 20 cases are collected at this step.**

Step 2 Inclusion and Exclusion Criteria

In step 2, criteria are set to determine the inclusion and exclusion of cases. The criteria are supported by the techniques from Seawright and Gerring (2008). This step can make the chosen cases relevant and help us to focus on the data that will directly contribute to this study.

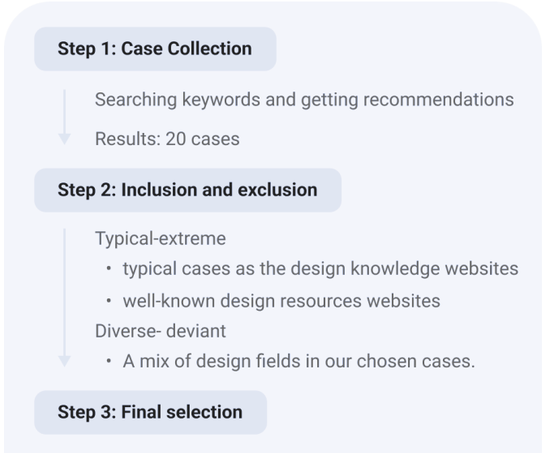


Figure 4.4. Case selection procedure

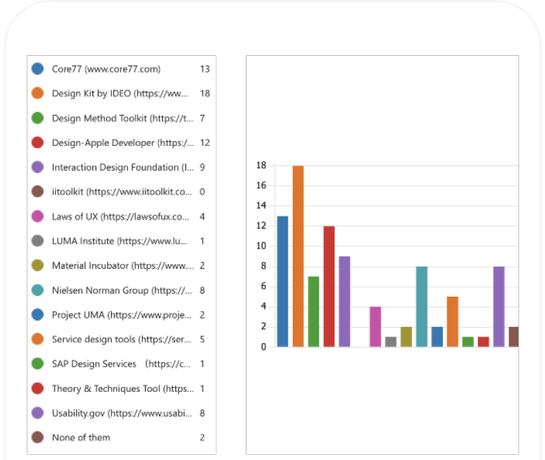


Figure 4.5. Survey result

Criterion 1 - Typical-extreme: Typicality means the chosen case can be representative of the diverse case world. Extremeness, in contrast, means unique cases (Seawright & Gerring, 2008). In our case, we first defined **typical cases as the design knowledge websites that mainly or only intend to provide design guidelines/framework/ methods/principles/toolkits/outcomes** that are formulated by research or industry experiences. If yes, then the case would be included, otherwise not. Therefore, we excluded five websites, such as Frog and UXpins, since all of them primarily have business intentions.

Additionally, **well-known design resources** could be seen as representative as well. Therefore, we presented the remaining 15 cases through an online survey to design students from the TU Delft industrial design faculty. Participants were required to select the website that they already knew before filling out the survey. By counting how often a website is picked, we can tell if it’s well-known or typical. 33 students responded to this survey (see Figure 4.5).

Criterion 2 - Diverse- deviant: Another consideration is the diversity of the cases. Keeping diverse cases embracing variety and increasing the level of representativeness of the multiple samples in the research area. Inversely, deviation chooses cases that have unitary and unique values while keeping the similarity with other cases (Seawright & Gerring, 2008).

For our purpose, we wanted **a mix of design fields in the chosen cases.** This meant we wouldn’t just stick to healthcare websites but would include a variety of areas like user experience and industrial design. This is also why some cases were included even if they didn’t show much popularity above, such as iitoolkit and Materialincubator. Other cases might be well-known, but they got excluded if they overlap with other websites in their design fields, including Nielsen Norman Group and Interaction Design Foundation, which share similarities with Design-Apple Developer.

Finally, eight cases were chosen (Table 4.1).

Step 3 Final Selected Cases

Website	Typicality (n=33)	Diversity (n=15)
1 Design Kit	18	HCD
2 Service Design Tools	5	Service Design
3 Design Method Toolkit	7	Design
4 Project UMA	2	Aesthetics
5 iitoolkit	0	Healthcare
6 Design- Apple Developer	12	HCI, UX
7 Core 77	13	Industrial Design
8 Material incubator	2	Speculative Design

Table 4.1. Final selected cases

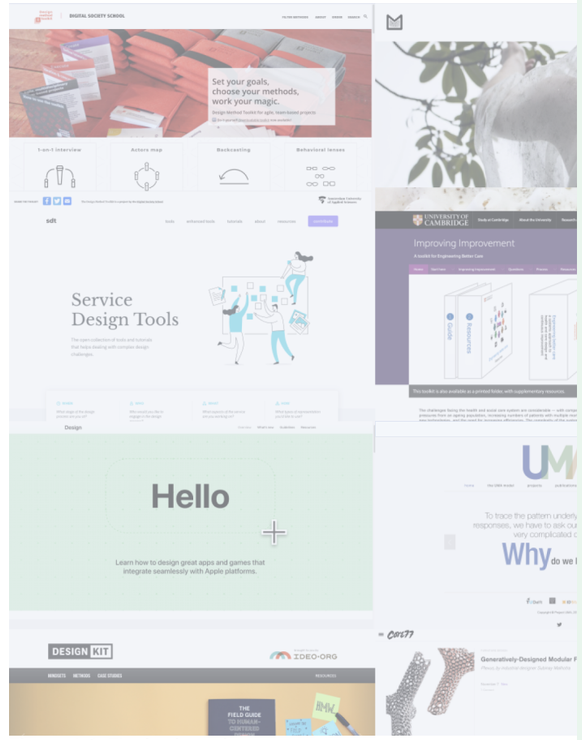
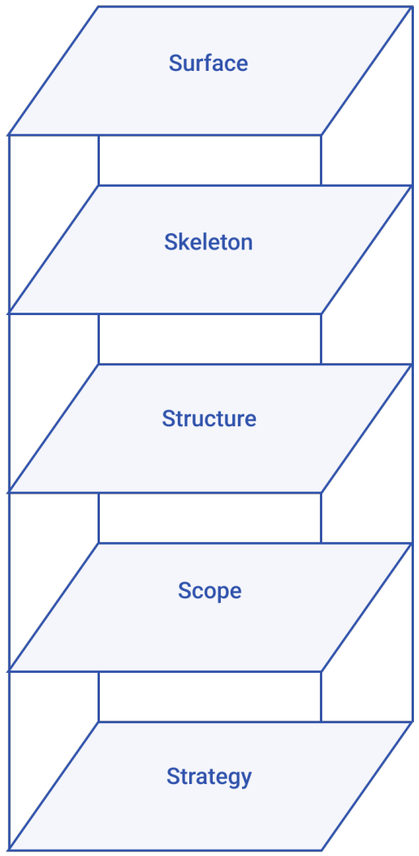


Figure 4.6. Final selected cases

Analysis framework

The analysis of these eight selected cases aims to support the development of the intended website. A framework titled “Five Elements of User Experience” by Jesse James Garrett (2010) was utilized. This framework encompasses the entire aspects of user experience and can contribute to a systematic review and robust foundation for design. The following briefly explains this framework.

This framework, as its name implies, contains five top-down considerations about designing the user experience.



The upper layer is called the surface, which is the aesthetic aspect of the product/system, such as colors, typography, illustrations, etc (Garrett, J. J., 2010).

Skeleton means the arrangement of information or layout. It can include navigation ensuring that users always know their location within the product, and presenting information in a quick and clear way (Garrett, J. J., 2010).

Structure is how all the information is presented. In detail, it contains the information architecture (IA) that organizes the content and interaction design that shapes the user's experience with the product/system (Garrett, J. J., 2010).

The scope layer defines the identified Issues and the accordingly requirements, including content (textual and visual elements) and function (Garrett, J. J., 2010).

The strategy layer lies at the bottom of the user experience framework. It includes the purpose, user needs, and business goal, which motivated this product/system (Garrett, J. J., 2010).

Figure 4.7. Five elements of user experience

Analysis

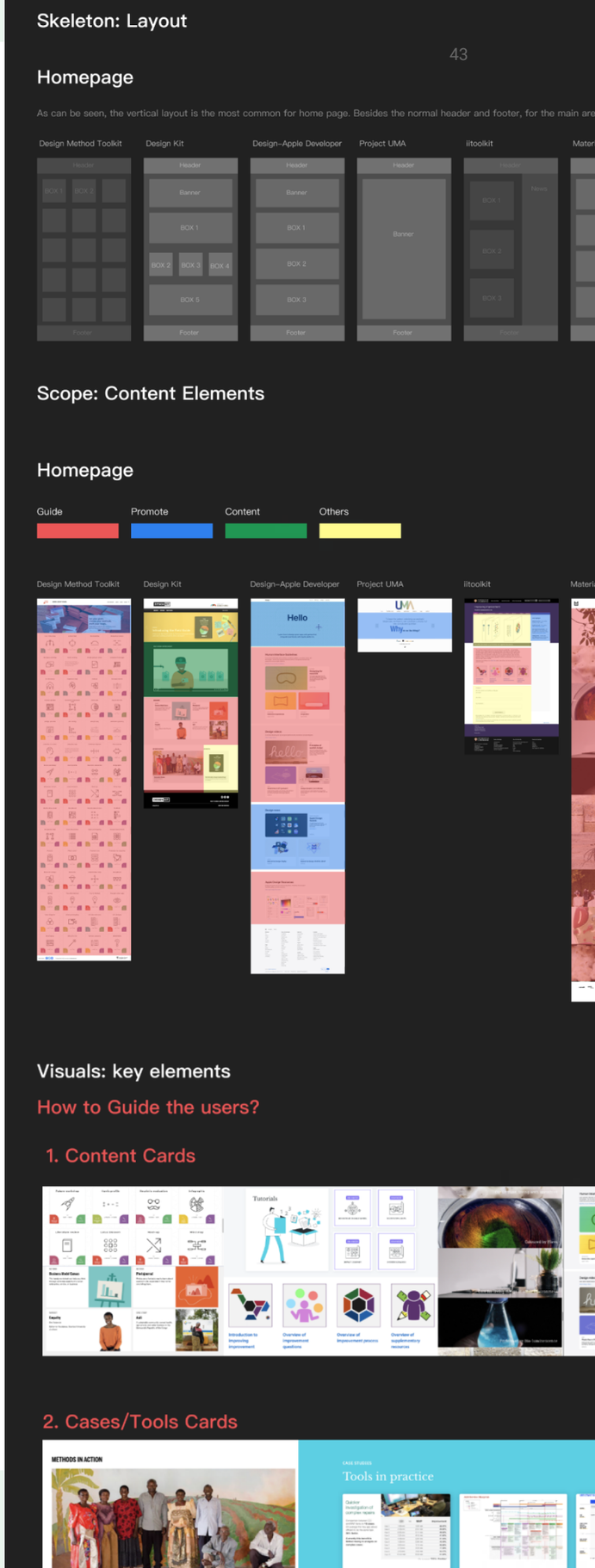
Based on this framework, the eight websites were analyzed.

The strategy analysis will not be repeated in the following analyses because the instances have already been filtered to only include websites that MAINLY or ONLY give design expertise.

Afterward, the structure, which refers to the information architecture (IA), comes into focus. The majority makes use of hierarchical IA to establish connections between various information and guarantee a deeper comprehension (Danaher, McKay, & Seeley, 2005). The webpages are then divided into three categories—home pages, list pages, and content pages, with different layouts(skeleton), and focus (scope).

Since visuals heavily depend on the branding styles of agencies and organizations, they won’t be the main focus. Rather, the design components’ skeletons are summarized.

Figure 4.8. Analysis



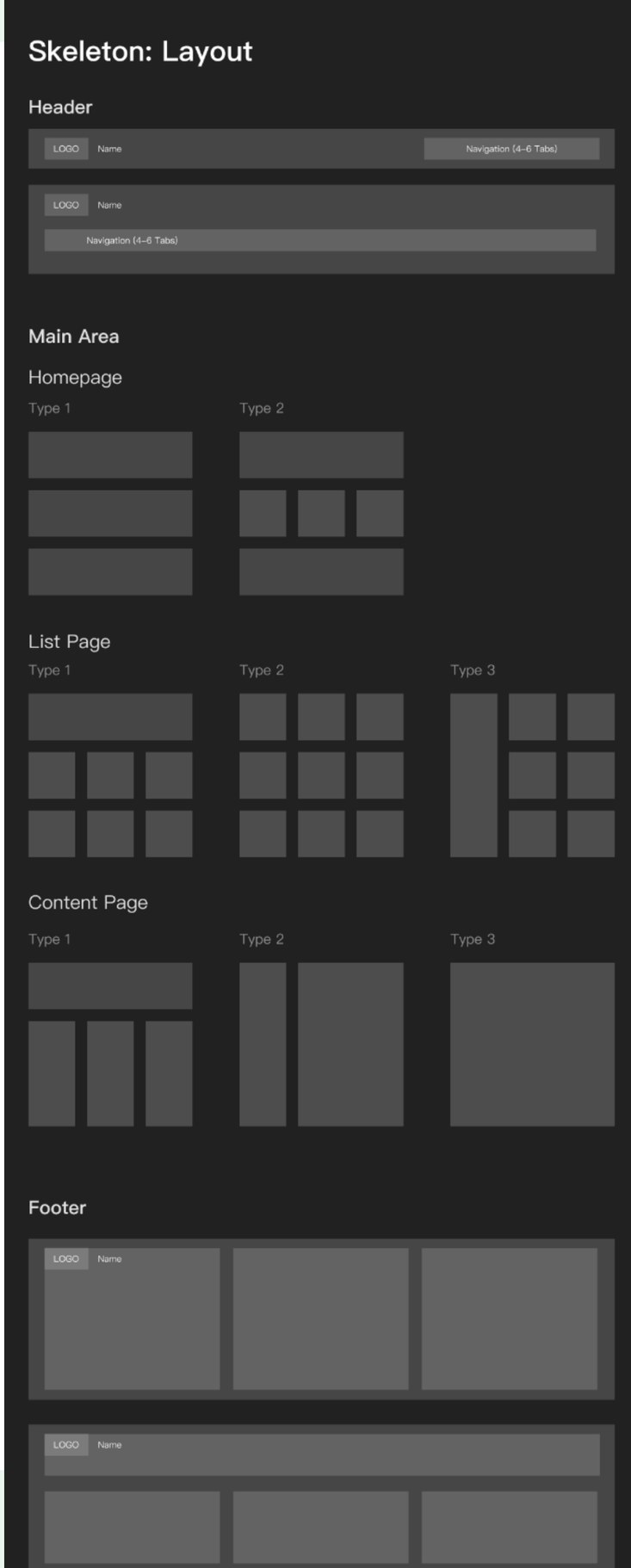
Analysis outcome

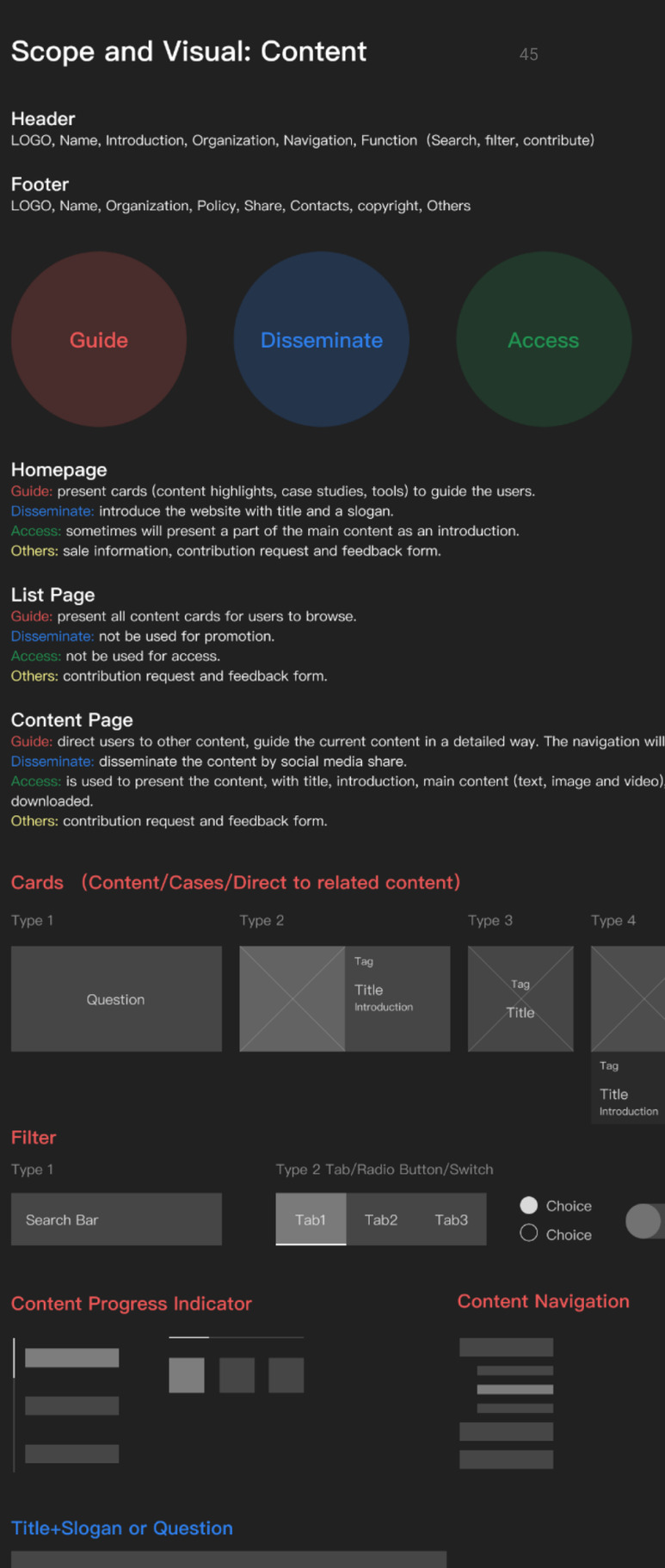
The case study concludes with a design system specifically for creating design knowledge websites, including design instruction about scope (content and function), Structure (IA), and skeleton (layout).

This system recommends using a hierarchical information architecture, narrowing three types of main pages: homepage, list page, and content page. It underlines the different content focus of each page. Additionally, it provides templates for building the website layout, including the design of the header, body area, and footer. A significant part is a list of content and feature components. It categorizes the content and features into four types based on different goals: to guide, to promote, the content, and others. With this design system, people can pick up components based on their intentions and easily build their interfaces.

The design system could speed up the process of ideating our design knowledge website by providing existing design patterns. Moreover, it has the potential to facilitate the design of other knowledge websites in the same field.

Figure 4.9. Analysis outcome





Create MVP interfaces

What is MVP?

A Minimum Viable Product (MVP) is created for the initial conceptualization. MVP can be seen as having “minimum feature” or using “minimum effort”. To achieve maximum cost-effectiveness, it is created as an early-stage prototype that facilitates saving time, effort, and usage (Lenarduzzi & Taibi, 2016, August).

The main screens for the MVP are defined as:

- Homepage
- Define Design Page
- Define Evaluation Page
- Design Ideation Page
- Design Evaluation Page
- Content pages

With the help of the case analysis, they are designed to cover every user story needs and present most of the guide information.

How to design MVP?

Interfaces were first designed in the form of wireframes. This is because wireframes are easy to make and revise, reducing unnecessary efforts when design comes to maturity.

Figma, a UX design tool, was used to develop them. The design system inspires the wireframes when it is combined with information architecture. Take designing the homepage as an example, as Figure 4.11 shows.

Webpage	Homepage	Define Design Page	Define Evaluation Page	Design Ideation Page	Design Evaluation Page	Content Page
Main content	Research Background, introduction, tools and templates	Knowledge and catalog of defining design research	Knowledge and catalog of defining evaluation research	Knowledge and catalog of designing ideation research	Knowledge and catalog of designing evaluation research	Knowledge and catalog of designing evaluation research
User story	Understanding the Importance	Acquiring Knowledge	Acquiring Knowledge	Acquiring Knowledge	Acquiring Knowledge	Acquiring Knowledge
	Practice	Practice	Practice	Practice	Practice	

Figure 4.10. MVP pages

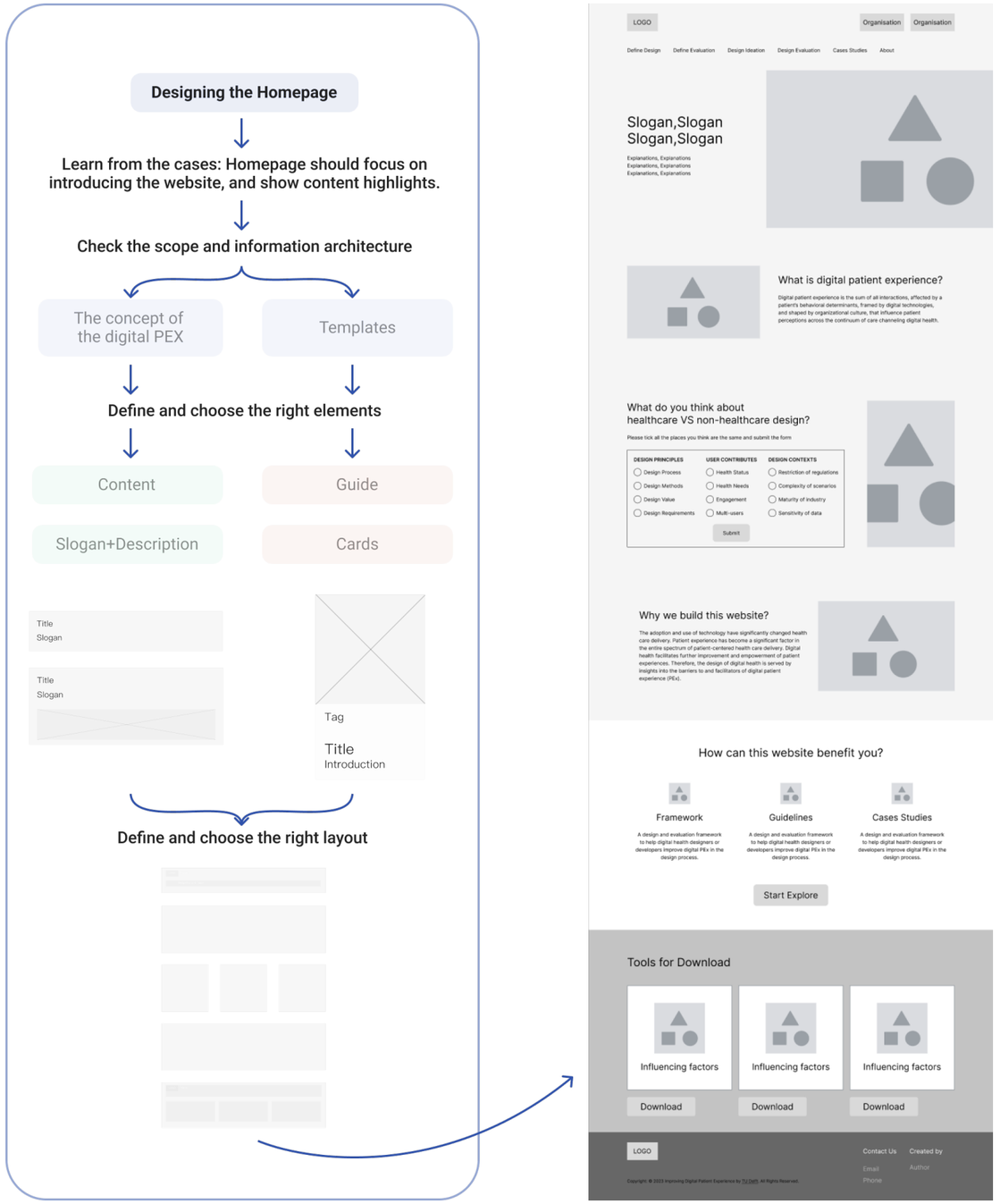


Figure 4.11. Wireframe creation process

4.5 Prototype

Creating a functional prototype is essential for several reasons:

- Ensuring that the guide is accessible and usable by diverse people worldwide.
- Increasing interactive elements, including buttons, links, forms, and other interactive components.
- Preparing for the subsequent evaluation workshop. A functional prototype will be more productive as it provides a tangible reference for discussion, leading to more specific and actionable insights.

The website prototype is made with the use of “Framer,”, a web development platform.

4.6 Iteration

This section will concisely introduce the efforts and iterations after finishing the prototyping.

Walkthrough

In this walkthrough, a collaborative review approach was adopted. A designer and a researcher checked the content and interaction on each webpage together, by focusing on several questions:

- Is the content correct?
- Is the content complete?
- Are the interactions effective and correctly functional?

The purpose of conducting a prototype walkthrough is to ensure the completeness of the prototype and prevent basic usability problems and content inconsistencies.

This effort also guarantees the effectiveness of this prototype as a tool for later evaluation.

Expert review

Additionally, the prototype was presented to several healthcare research experts to collect feedback for preliminary improvement. The suggestions are:

- The font size is small.
- The navigation bar is not prominent; especially for the key pages.
- Include a framework on the homepage; users can click on the framework to navigate to different pages.
- Add visual elements to the homepage, such as scenarios depicting different patients utilizing various digital solutions, to foster a deeper connection between the website and the digital patient experience.
- A summary for each resource could be provided, detailing the content, title, purpose, and how it relates to and complements our web pages. And includes references and tools.

We followed this advice and revised our prototype. Implementing these suggestions could enhance the usability and user experience of the prototype, making it more effective for evaluation.

4.7 Current state of design

Currently, the initial interface design is as below.

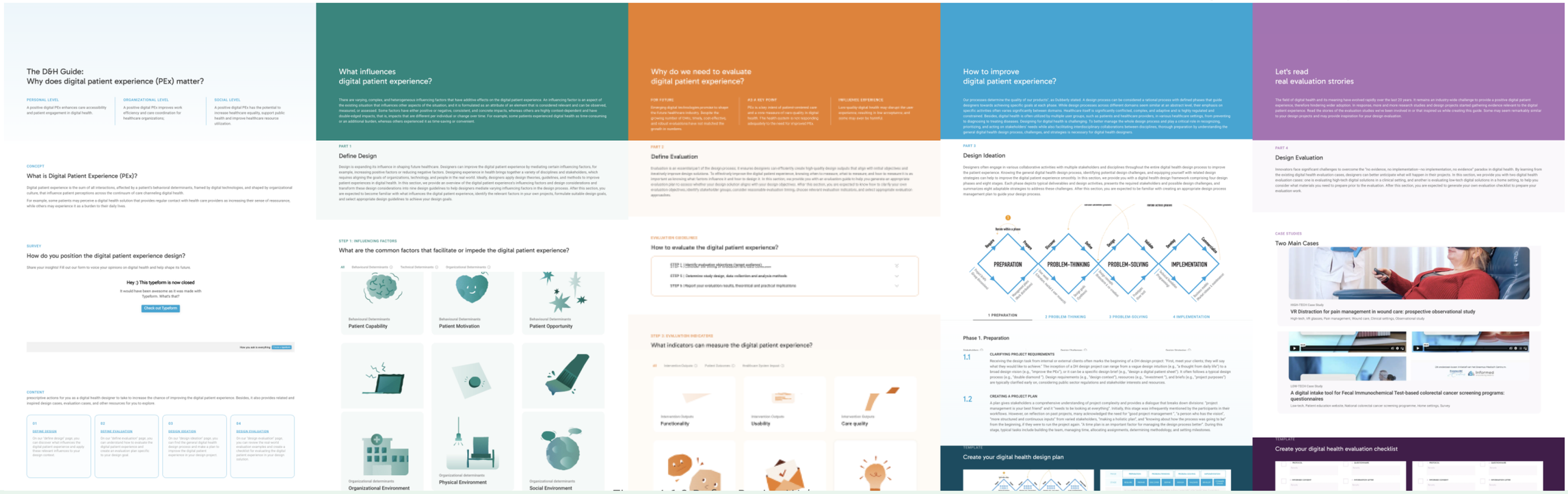


Figure 4.12. Current design overview

4.8 Conclusion

This chapter addressed the second research question: How can we generate a web-based design guide?

Building upon insights from previous desk research, the conceptualization process of the web-based design guide was presented. The approach began with defining strategies for design requirements and transforming the primary research into practical, efficient, and credible guides.

To ensure consistency and usability of the website, an investigation into web-based design guides was conducted through a case study method, analyzing eight selected cases within the ‘Five Elements of User Experience’ framework. This analysis led to the creation of a specialized design system for design knowledge websites, which focused on design instructions about scope (content and function), structure (information architecture), and skeleton (layout).

The development of this system contributed to the solidification of the website’s MVP (Minimum Viable Product) wireframe design. Subsequently, a prototype was formulated, making several efforts for preliminary completion and improvement.

Overall, this chapter went into the detailed process of creating the web-based design guide, from initial ideation to the development of a prototype.

Evaluation

How to improve the design

Now a web-based design guide is created, prompting the final research question of this thesis project: How should we evaluate this web-based design guide?

In this chapter, a design-guideline-evaluation evaluation will be hereby discussed and the results will be concluded. In the end, this chapter will enlighten several directions for the next iteration.

5.1 Conducting the evaluation

The evaluation is supported by the procedure in Section 2.2.3.

Objective, Aim, and Take Type

The objective of this evaluation is to find out if the design goal is achieved. The goal is to transform the primary research into a good and usable web-based design guide, enabling healthcare designers to utilize the primary research to improve the digital patient experience.

In consequence, the evaluation questions are:

- **Have we successfully transformed our research findings into design guidelines?**
- **Does the website make users feel useful for accessing and learning the knowledge?**

To evaluate both the content and outcome qualities and the website, a design task was assigned to participants.

The setup

The workshop was conducted in the classroom “Wim Crouwel”, in the faculty of Industrial Design Engineering at TU Delft. During the onsite evaluation, students were required to use their laptops to use the website and interact with it. Each group sat together at a table. Three researchers, during the task session, worked around to answer their questions and collect feedback.

Figure 5.1. The setup

The materials

The TU Delft IDE ethics committee has approved this research. Before the workshop, the consent form was signed by each participant and two researchers. To facilitate the evaluation session, an introduction slide was prepared and introduced at the beginning. Meanwhile, a workshop introduction and timeline sheet were given.

Before the task, participants had to complete several forms (see Appendix).

- An information form: Learn their background
- A design experience form: Learn their healthcare design experiences, interests, and preference
- A self-efficacy form: It is challenging to evaluate students’ work for effectiveness concerning cost, privacy, and ethics. As a result, self-efficacy was compared as the metric of effectiveness before and after using the website.
- Four design task templates: During the task, participants were asked to browse the website and perform four design tasks. Four templates based on the content of the design guide, containing four design tasks: frame design goals and select design guidelines; create an evaluation plan; and create an evaluation checklist, were created to help participants engage with using the website.

Once they completed all assignments, they were required to fill out several forms.

- A self-efficacy form
- A guide content experience form: Investigate project relevance, ability relevance, usage adherence, content clarity, content efficacy, content credibility, outcome efficiency, and outcome satisfaction.
- A System Usability Scale (SUS): To evaluate the usefulness of the website, a System Usability Scale (SUS) has been utilized. The SUS, developed by John Brooke in 1986, contains 10 questions and presents respondents with a five-point Likert scale ranging from “Strongly disagree (1)” to “Strongly agree (5)”.
- An overall experience form: learn their Interest, future usage, and recommendation, workshop Satisfaction, value gain, and effort.

Most of the above forms are 5-point Likert scale, ranging from “1 strongly disagree” to “5 strongly agree”, so participants can easily select. Some forms have blanks to fill out.

After the task, a semi-structured focus group was held to learn their experience and collect detailed feedback. The audio was recorded for each group.

The participants

19 master’s students enrolled in the Delft University of Technology’s Industrial Design Engineering faculty were recruited in the Netherlands. They were selected through an elective master’s course named Capita Selecta 2023.

Figure 5.2. The materials

Step 1: Before the task

Define criteria and data collection

To ensure a complete evaluation of the web-based design guide, all nine qualities were considered as the criteria of this test, in addition to website usability, as mentioned in Chapter 2.

Most qualities were assessed using a 5-point Likert scale, with the expectation that **each mean score should be at least 3**, indicating a moderately positive result. To evaluate effectiveness, an F-test comparing pre- and post-intervention self-efficacy was conducted. For this analysis, with a sample size of 16, the critical **P-value should be at an α level of 0.05 or less**, which was set as the cutoff value for determining significant improvement in the outcome effectiveness of the guide.

Recruit Participants

19 master students were recruited.

Step 2: Do the task

Introduction

Firstly, a ten-minute presentation was given to introduce the research background of this workshop. Students would go through the research process of this guide, and develop a deeper understanding. A procedure was introduced as well, to give a feeling of control to participants. Finally, students were requested to fill out a pre-questionnaire, which investigated their background, design experience and expectations, and self-efficacy (see Appendix).

Learn the guide

Before beginning the first task, a brief introduction and a walkthrough of the website were provided. Researchers guided the students through the website, followed by a few additional minutes for them to explore and ask freely.

Design task session

Then, participants were asked to work on a proposal to create a digital health solution with an enhanced patient experience for their pre-selected course assignments for four hours. This proposal consists of four design tasks with four templates.

Task 1: frame your design goal and select your design guidelines;

Task 2: create your evaluation plan;

Task 3: create your design plan;

Task 4: create your evaluation checklist.

Step 3: After the design task

Post Questionnaire

Upon completing the four design tasks, we assumed that students had gained a thorough experience with the web-based design guide. Consequently, a post-questionnaire was distributed to evaluate their self-efficacy, the usability of the website, their overall experience, and any advice they might have.

Focus Group

Finally, a semi-open focus group session was conducted regarding the limitations of the questionnaire. The researchers followed an outline based on eight key questions of interest during the discussion (see Appendix). Students were invited to voluntarily participate and the audio of their discussion was recorded for transcription.

Figure 5.3. Introduce the evaluation

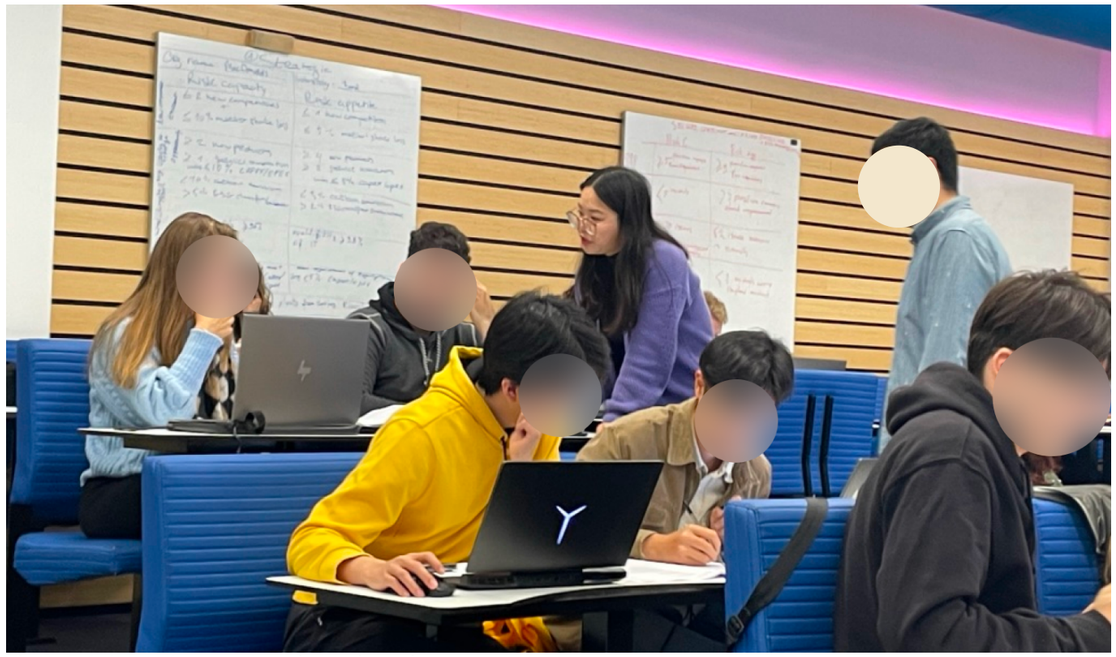


Figure 5.4. Answering questions during the task

5.2 Evaluation results

This section will present the insights gained from this evaluation and points the directions for iteration.

Descriptive information

In this study, 19 individuals were divided into 11 teams to further develop assignments from a previous course, focusing on two projects: 'Teleconsultation Room 2030' (Project A) and 'HollandPTC' (Project B). Of these, 11 participants, forming 6 teams, opted for Project A, while 8 students, divided into 5 teams, chose Project B. Most teams collaborated in pairs, except for teams A4, B2, B3, and B5, which worked individually, and team B4, which comprised three members. It's important to note that any incomplete data provided by the students would be departed from the subsequent analysis.

19 participants involved age from 22 to 30 (M=25, SD=2.64). Female (n=10, 52.6%) and male (n=9, 47.4%) are almost half and half. Almost all participants (n=18) have bachelor's degrees. Among 15 participants who reported their highest education background, 11 participants have industrial design engineering backgrounds, followed by product design (n=2), mechanical engineering (n=1), design (n=1), and management (n=1). Their current majors are integrated product design (n=11), strategic product design (n=5), design for interaction (n=2), and BMD (n=1). Participants rely more on design rationality (M=3.2778, SD=.95828) than design intuition during the design process.

Healthcare-related experiences

Most participants (n=14) are interested in healthcare design. Some focus on healthcare design in hospital settings (n=11) or home environments (n=8). There is a higher interest in non-digital (n=12) compared to digital (n=8) healthcare solutions. A few of the participants (n=8) have experience in healthcare design projects. The majority uses general design toolkits (n=16), such as the Delft Design Guide, as well as healthcare-specific design tools (n=14), like the patient journey map, across various contexts including design practice (n=13), education (n=9), and research (n=6).

However, fewer than half regularly try new design toolkits (n=7) or healthcare-specific tools (n=5). The most common ways to learn about a design toolkit or tool are education activities (n=19), like lectures and workshops, followed by teamwork (n=11), search engines (n=6), and online self-learning courses (n=5).

Design preference

Participants think digital tools (n=15), paper-based tools and templates (n=14), card decks (n=3), checklists (n=2), instructions (n=3), and examples (n=2) to be the most useful.

The participants think that an ideal design toolkit should have clear instructions, context, structure, approach, and outcomes, ensuring certainty, usability, flexibility, and creativity. In contrast, they find toolkits with unclear objectives, overmuch complex information, academic language style, and being time-consuming to be less appealing, as these characteristics impede practicality, learnability, adaptivity, and credibility.

Generally speaking, there is moderate interest (M=3.39, SD=1.09) in a design guide for developing digital health solutions that improve the digital patient experience.

Our design guide is expected to include a clear scope definition, usage guidelines, necessary knowledge, and actionable design steps and directions, along with real-life case studies. Participants also look forward to the guide providing inspiration and informing them of the advantages and drawbacks of different methods. Such a guide is supposed to enhance their performance or capabilities during the design process, such as a better understanding of context, fostering creativity, maintaining focus, increasing work efficiency, and saving time and money.

Answer the evaluation questions

Overall, participants reported that they were less likely to use the design guide in the future (M=2.82, sd=1.131) or recommend it to others (m=2.71, .849), despite they gained valuable knowledge from the workshop (M=3.41, SD=1.004).

Q1: Have we successfully transformed our research findings into design guidelines?

To answer Q1

This result is persuasive since the design task was seen as relevant to the guide, the students felt they closely adhered to the guide and they know how to apply it.

Although the credibility of the content and the outcome efficiency met the expected standards, it did not attain a high level of recognition. Meanwhile, the aspects of clarity and efficacy received critical feedback, demonstrating the need for improvements in these areas.

The experience of the guide content is reflected in the task outcome participants perceived. The guide made the design and evaluation process a bit better but did not fully meet what the users needed. While the guide was effective in certain areas, such as enhancing understanding and aiding in design and evaluation plan creation, its effectiveness was limited in other aspects, notably in creating improvement evidence, identifying relevant factors, and creating design concepts (see Figure 5.5). In general, the guide was not satisfying in creating outcomes.

The following will explain the details.

As revealed in Section 2.2, nine principal metrics are identified to determine if a design guide is well-formulated, which were assessed:

- Context Relevance: The content of the provided workshop tasks is strongly related to the digital patient experience.
- Knowledge Relevance: I possessed the necessary design expertise and knowledge to successfully complete the given workshop tasks.
- Usage Adherence: I closely adhered to the guide when working on the given workshop tasks.
- Content clarity: The guide is clear, coherent, and easy to understand.
- Content credibility: The guide is trustworthy and can be believed in.
- Content efficacy: The guide consistently leads me toward achieving the intended design and obtaining the anticipated evaluation results.
- Outcome Efficiency: Using the guide enhances my efficiency in developing design and evaluation solutions, allowing me to complete tasks without detours and ensuring smooth progress.
- Outcome Satisfaction: After using the guide, I perceive significant value and am satisfied with its impact on my design process.

For the sixth metric: effectiveness, we implemented a self-efficacy questionnaire to measure participants' perceived self-efficacy in digital patient experience design before and after engaging with the guide.

The descriptive statistical analysis revealed that the content of the provided workshop tasks was perceived as related to the digital patient experience (M=3.88). Participants believed that they possessed the necessary design expertise and knowledge to complete the given workshop tasks (M=3.47). Participants adhered to the design guide when working on the given workshop tasks (M=3.35). These contextual data enhance the trustworthiness of the following assessment.

The clarity (M=2.29) was seen as the lowest, reflected in a negative opinion towards the clarity aspect of the design guide. This means that there was a general perception that this guide was difficult to understand or the information was not presented clearly enough.

"...I was so confused. I didn't know where to look or which to choose, and I didn't really understand it, actually."

"... It seems like everything is important, and we need to read everything very clearly to understand what's happening. But by reading so much text, it eventually makes it more confusing."

The credibility (M=3.59) was seen as the highest. This value indicates that participants to some extent agreed or found the design guide to be credible, but there is still room for improvement.

The result of efficacy (M=2.65) shows the predicted effectiveness of the design guide is leaning toward the lower side of the scale, implying that there were concerns about how effective the guide is in achieving its intended purpose.

"...I think I will not use it because I will not never come to an assignment with in which I have to use it."

The outcome efficiency (M=3.29) was just above the middle on the scale. This indicates that participants' views on the efficiency of the design guide are moderately positive.

The outcome satisfaction (M=2.76) shared a similar result with the efficacy, indicating that participants were moderately critical of the guide and there is a clear need for improvement to fully meet user expectations.

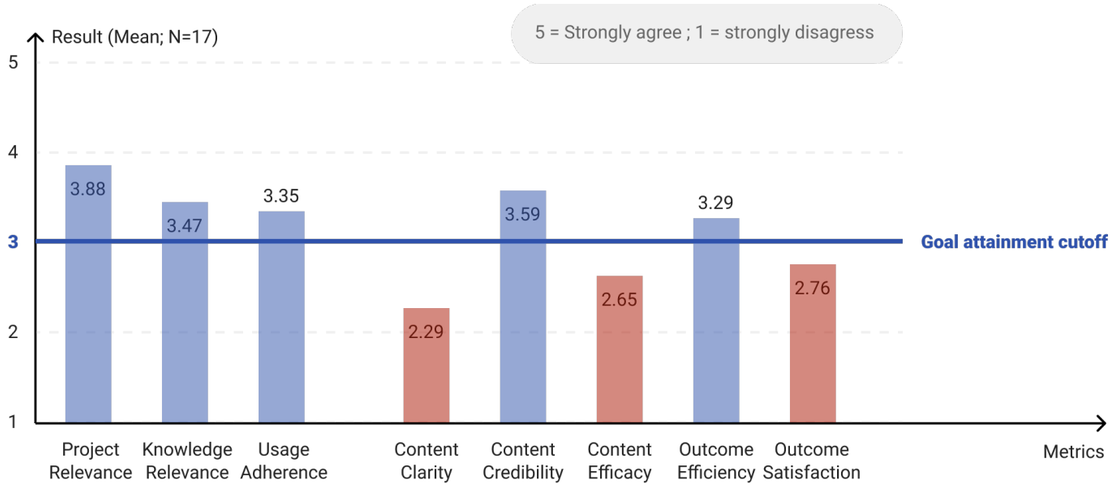


Figure 5.5. Content evaluation result

Finally, for effectiveness, it is hard to evaluate students' work due to ethics, privacy, and cost reasons. Therefore, a comparison between self-efficacy before and after using the design guide was conducted. The self-efficacy that people perceive refers to one's belief in their competence to carry out specific tasks (Bandura, A., 2006). The concept of self-efficacy serves as a solid foundation for evaluating results within social work education (Holden et al., 2017). Figure 5.6 illustrates the findings and highlights the following:

The guide significantly improved participants' comprehension of the digital patient experience (the digital PEx), as evidenced by the statistical results (see Figure 5.6).

"I think there is a lot of useful and interesting content to consider and prompt you to broaden your view when designing DHI."

"I wasn't even thinking about, like the the goals. Like divide them into technical goals, organisational goals and I think that's something nice to have."

There was no statistically significant effect observed in assisting participants with the creation of the digital PEx improvements. While the guide facilitated the formulation of design plans significantly, it had an inadequate impact on the identification of pertinent factors and the generation of design concepts.

"I felt that it's more like an overview of a project than really tools helping you to develop each phase of the project."

"I like the design ideation part of the design guide as it was the most clear."

"I think it provides a good guideline to walk through a design process and think more considerations."

The guide's most pronounced effect was on aiding students in developing evaluation plans, potentially attributed to the formulation of evaluation checklists. Conversely, it did not significantly aid in creating evidence for improvements.

"Use it as a checklist was the most helpful."

"It guided me through the steps and therefore I didn't have to think about a plan myself."

"It is useful for for project manager to make plan."

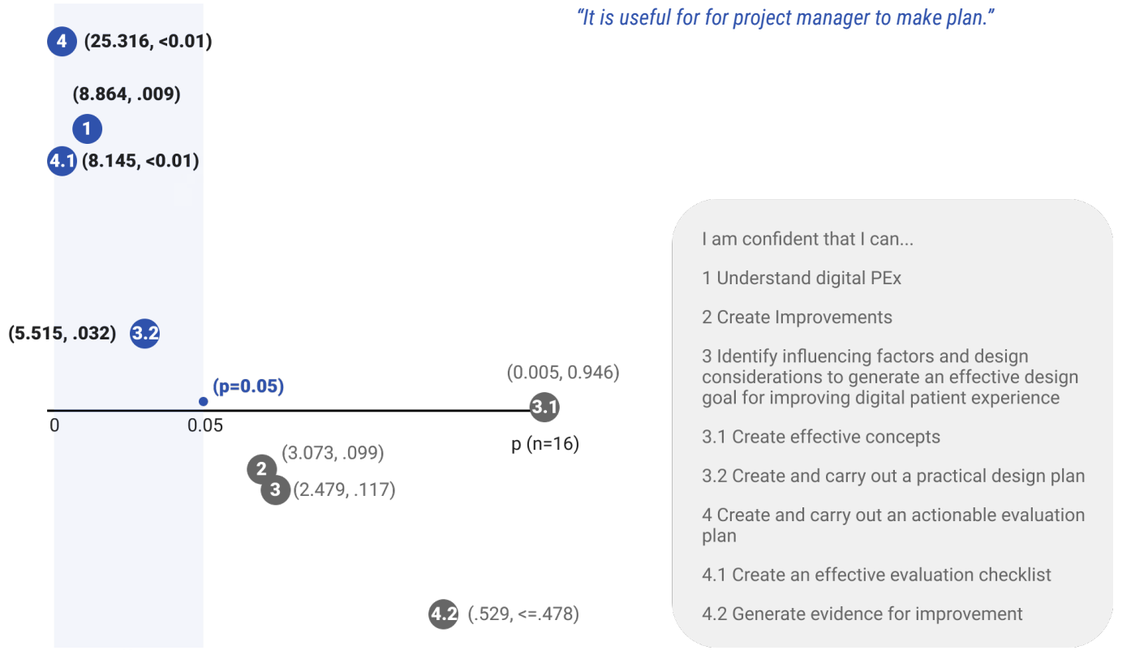


Figure 5.6. Effectiveness evaluation result

Q2: Does the website make users feel useful?

To answer Q2

The website can somewhat be seen as useful and usable since the overall average SUS score was 63.1, above 50.9, which is the cutoff point of being "OK" (Bangor, Kortum, & Miller, 2009), but still indicating the necessity for usability issue investigation and improvement.

Notably, the high levels of agreement with content-independent items, such as Q3, Q4, Q5, and Q9, imply that the website's content might have a significant negative impact on the overall usability score. Consequently, it is logical to assume that alongside solving the usability issues, improving the quality of the guide could lead to an enhanced overall user experience.

"I think the website went quite well."

"Surfing the website is quite easy in my opinion."

To evaluate the usefulness of the website, a System Usability Scale (SUS) has been utilized. The SUS contains 10 questions and presents respondents with a five-point Likert scale ranging from "Strongly disagree (1)" to "Strongly agree (5)" (Brooke, J., 1986).

The results reveals that participants found the website was easy to use, and didn't need extra technical support to use the website. They found the various functions in the website were well integrated, perceived less inconsistency in the website, believed that most people would learn to use the website very quickly, perceived that the website was not very cumbersome to use, and felt somewhat very confident to use the website, and no needed to learn a lot before using the website. However, they were less likely to use the design guide frequently, and found the website was unnecessarily complex.

The result of the mean SUS is 63.1, which is lower than the median of 70, It implies a negative skew in the dataset. In other words, lower values are more common. A SUS above 50.9 qualifies as "OK," but it fails to satisfy the Good (71.4) standards (Bangor, Kortum, & Miller, 2009).

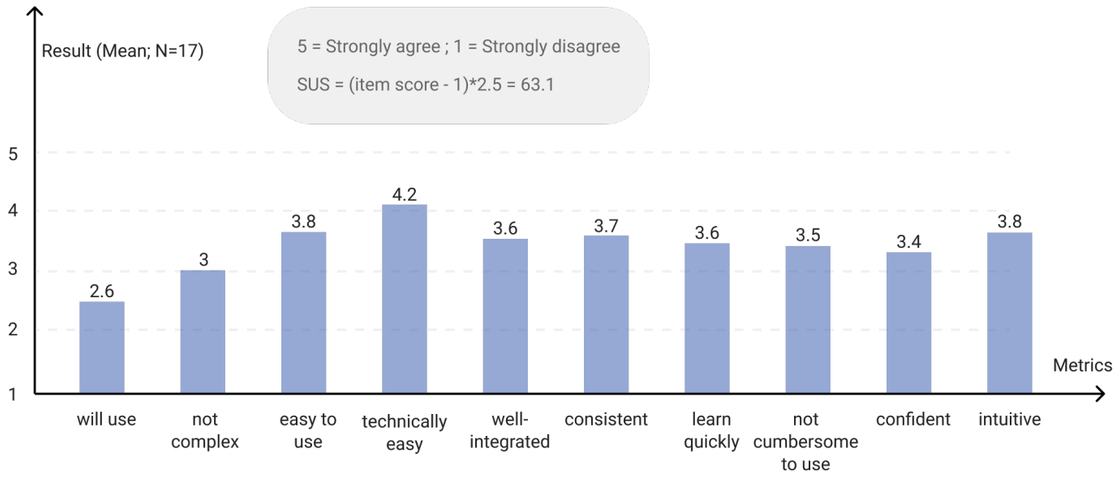


Figure 5.7. SUS score

5.3 Limitation

The first limitation is the timing of this evaluation. Conducting the workshop at the semester's end proved to be less ideal, as students were under considerable stress due to final examinations and deadlines. A student explained:

"Lot of stress finishing deadlines and this is why I could not fully focus."

Meanwhile, the participants just started their conceptual design project, so they were at the very beginning of their design processes. These limited their engagement with using the design guide, especially aspects related to design evaluation.

The second limitation is the participants' design experience and interests. Participants reported a moderate interest in having a digital health design guide and only 8 participants have been involved in healthcare projects. Additionally, 11 participants were from integrated product design majors, and they preferred more on producing physical and tangible products instead of digital solutions. 12 out of 19 participants chose non-digital delivery channels as their preferred. This disinterest limited their engagement with creating digital patient improvements.

"I don't even know if the solution for the project we're doing now is gonna be digital."

To increase their engagement, we asked them to imagine a design proposal based on their current projects and provided them with four design templates to help them step by step. In the near future, we look forward to recruiting individuals with a preference for digital healthcare solutions for more evaluations.

The third arises from the organization of the workshop. This workshop had less connection with the previous lectures of this elective and made the participants feel a bit confused about why they needed to join the workshop and what they could get from it.

Fourth is related to the workshop duration. A continuous four-hour workshop made participants feel quite intensive and a bit tired, which might reduce their design interest and work efficiency.

The last is about the evaluation of the website. It ignored the assessment of consistency and accessibility, which limits a comprehensive understanding of the website's overall performance.

To tackle these limitations, we plan to first revise the design guide based on suggestions we collected from the participants, and then perform small tests and another workshop to validate the updated design guide in the near future. The second workshop is not in the scope of this project.

5.4 Identifying improvements

It’s obvious that while we’ve achieved certain objectives, there are still many opportunities and demands for further improvement. The question now is: how can we improve? To address this, we’ve considered the quantitative and qualitative data drawn from the evaluation workshop, including the responses to open-ended surveys and the insights gained from the focus group discussions, aiming to discern issues.

Using mapping to categorize Insights

Following the context mapping analysis method (Sanders & Stappers, 2012), a process that involves gathering statements, analyzing and categorizing them, and then clustering these categories was conducted (see Figure 5.8).

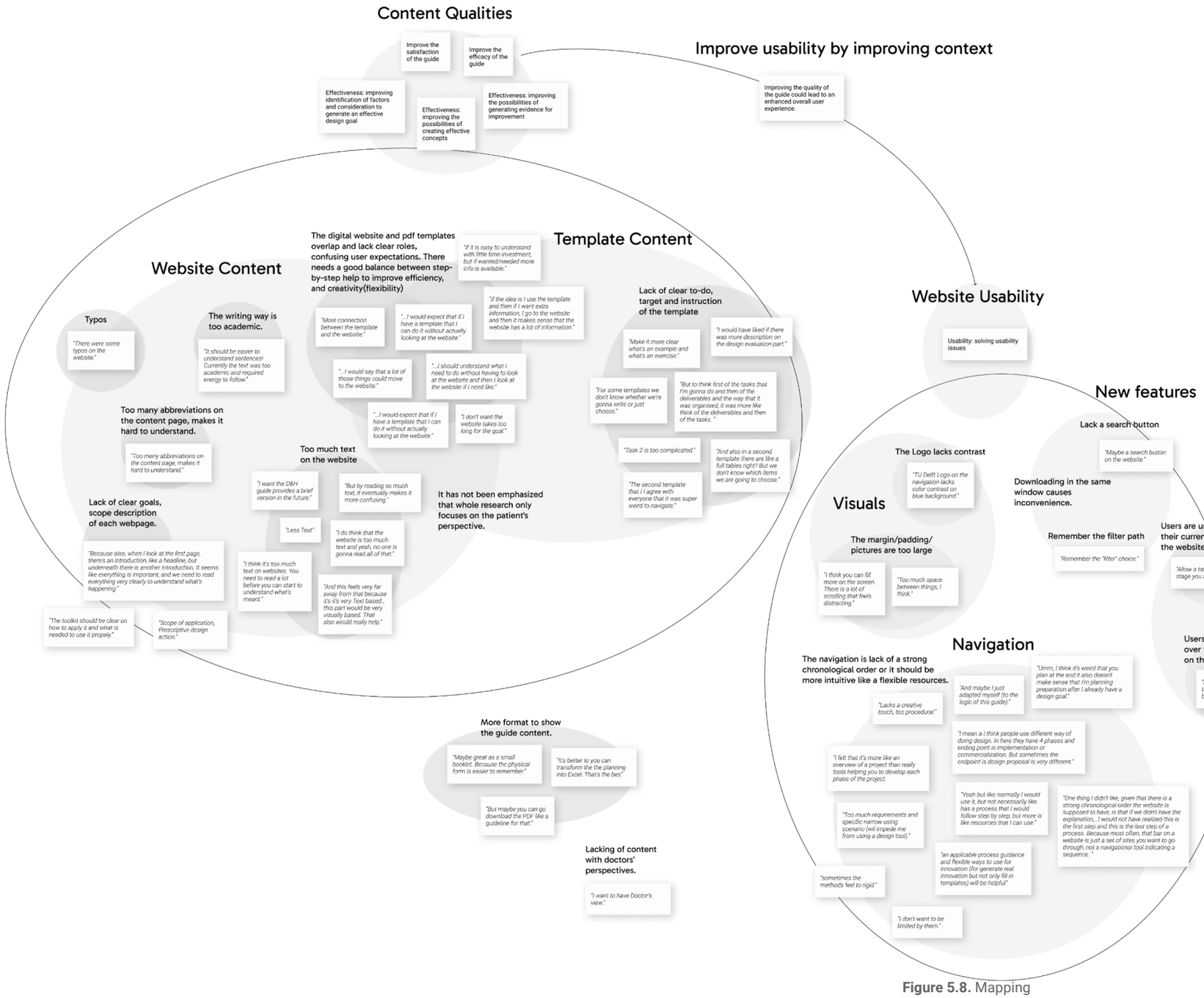


Figure 5.8. Mapping

The problem

Based on the user experience model, key directional insights were extracted.

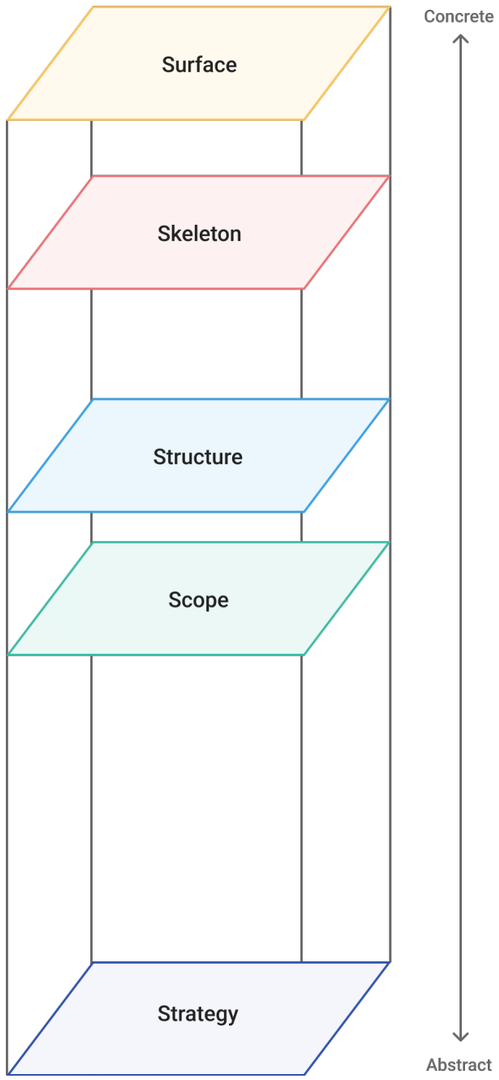


Figure 5.9. Five elements of user experience

For the visuals, pictures, and colors of our website, we gathered the most approval from users with only a few recommendations.

1. TU Delft Logo on the navigation lacks color contrast on blue background.
2. The margin/padding/pictures are too large.

"The graphics are nice and useful."

"I do like the visuals of the website. I think like the illustrations, they were all very nice."

Advice focused on improving the navigation.

3. Users lack a sense of control over the amount of content on a single webpage.
4. Users are unable to discern their current location within the website.
5. The navigation lacks a strong chronological order or it should be more intuitive like a flexible resource.

"Lacks a creative touch, too procedural."

"One thing I didn't like, given that there is a strong chronological order the website is supposed to have, is that if we didn't have the explanation,…I would not have realized this is the first step... Because most often, that bar on a website is just a set of sites you want to go through, not a navigational tool indicating a sequence."

For the hierarchical information structure of this website, we didn't get opinions towards it. Therefore, we will keep the current situation that how information is grouped and categorized.

" I think the website went quite well."

"Surfing the website is quite easy in my opinion."

Regarding the content and features of the website, diverse advice focused on the content's scope and detail was gained.

6. There are typos on the website content.
7. Too much text on the website and template.
8. The writing way is too academic
9. It has not been emphasized that the guide only focuses on the patient's perspective.
10. Too many abbreviations on the content page, makes it hard to understand.
11. Lack of clear goals, scope of each webpage
12. Lack of clear to-do, target and instruction of the template
13. Remember the "filter" choice/the filter path
14. Lack a search button
15. Downloading in the same window causes inconvenience.

"I want the D&H guide provides a brief version in the future."

"Less Text."

"I do think that the website is too much text and yeah, no one is gonna read all of that."

"But by reading so much text, it eventually makes it more confusing."

"And this feels very far away from that because it's it's very text-based…"

Based on the feedback, it is obvious that even though we provided enough or even overwhelming information, the website and templates haven't met the users' demand for keeping efficient.

16. The digital website and PDF templates overlap and lack clear roles, confusing user expectations. There needs a good balance between step-by-step help to improve efficiency and flexibility.

"...I would say that a lot of those things could move to the website."

"...I would expect that if I have a template that I can do it without actually looking at the website."

"I don't want the website takes too long for the goal."

"If it is easy to understand with little time investment, but if wanted/needed more info is available."

Others

There is some advice that falls outside the scope of what we will consider at this stage. However, it does provide a potential direction for the near future.

- More format for learning the research findings.
- Lack of research with doctors' perspectives.

"Maybe great as a small booklet. Because the physical form is easier to remember."

"It's better to you can transform the the planning into Excel. That's the best."

"I want to have Doctor's view."

5.5 Conclusion

This chapter addressed the final research question of the project: How should we evaluate the web-based design guide?

The chapter started by elaborating on the process of conducting an evaluation supported by the procedure mentioned in Chapter 2. The evaluation involved 19 participants who examined both the effectiveness of the design guide and the usability of the website. The findings indicated that while the current design meets expectations of content credibility, efficiency, and certain aspects of effectiveness, there were areas requiring improvement in clarity, efficacy, effectiveness, and finally satisfaction. Additionally, the usability of the website was identified as another area for improvement.

To facilitate further improvements, a mapping technique was employed to cluster the feedback. Supported by the 'Five Elements of User Experience' model, 18 issues were identified.

In summary, this chapter described the evaluation process, demonstrated the results, and pinpointed areas for future refinement.

Iteration and validation

Improvements

This chapter covers the problem-solving process, the details of each solution and the validation of these solutions.

6.1 Priority of the issues

Under time constraints, not all issues could be resolved. Hence, we assessed 18 problems by employing two dimensions: “user value” and “workload,” placing them in a coordinate system.

- User value refers to the impact on the user, which is determined by the frequency of the issue raised by students during the workshop and whether it interfered with their task completion.
- Workload reflects the subjective time and difficulty required by the designer.

The priority of the issues was ranked from high value with low workload, to high value with high workload, to low value with low workload, and finally to low value with high workload, as Figure 6.1.

High Value - Low Workload

1 TU Delft Logo on the Navigation lacks color contrast on blue background .

4 Users are unable to discern their current location within the website.

5 The navigation lacks a chronological order or it should be more intuitive like flexible resources.

6 There are typos on the website content .

10 Too many abbreviations on the content page, which makes it hard to understand.

High Value - High Workload

7 Too much text on the website and template.

8 The writing way is too academic.

11 Lack of clear goals, scope of each webpage.

12 Lack of clear to-do, target and instruction of the template

16 The digital website and PDF templates overlap and lack clear roles, confusing user expectations.

Issues won’t be addressed

For issues with low user value and high workload, addressing them at this stage is not feasible.

In detail, Issue NO.3, having been raised by only one participant can likely be solved through text simplification to enhance content clarity. Issues NO.13 and NO.14 require advanced programming abilities, entailing a significant time cost, which is impractical within the current project timeline. Furthermore, issues NO.17 and NO.18 are beyond the scope of this project, as our focus is on the patient perspective and website development.

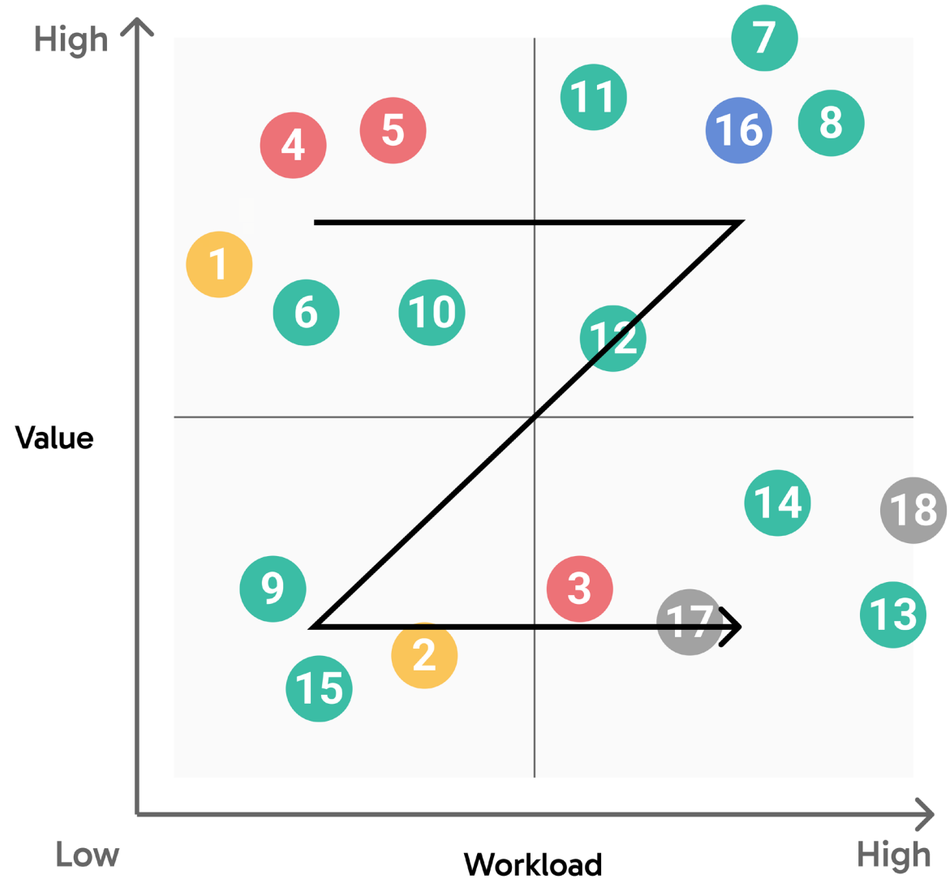


Figure 6.1. Priority mapping

Low Value - Low Workload

2 The margin/padding/pictures are too large

9 It has not been emphasized that the guide only focuses on the patient’s perspective.

15 Downloading in the same window causes inconvenience.

Low Value - High Workload

3 Users lack a sense of control over the amount of content on a single webpage.

13 Remember the “filter” choice/the filter path.

14 Lack a search button.

17 More format for learning the research findings.

18 Lack of research with doctors’ perspectives.

6.2 The solutions

Focusing on the soluble issues, we proposed the following solutions. In general, it can be categorized into six types.

High-priority solutions

1. Change the navigation
- Change the TU Delft logo;
- Add current page indicators;
- Rename the navigations to avoid strong chronological order and be flexible.

2. Revise the existing text
- Typos;
- Delete abbreviations;
- Writing in a more easy-to-understand way instead of being academic.

3. Clarify the content scope for both the template and the website
- The website should function as an overview with simple information;
- The template can be used for a to-do list, with little instruction and blanks to fill in;
- Add article links for the most detailed information;
- Simplify the text on the website, making it simpler and less.

Figure 6.2. Solution mapping

Medium-priority solutions

4. Add content
- Add content about the focused perspective and replace text with more visuals;

5. Adjust the layout
- Make the layout tighter for more information.

6. Open new window for download button

6.3 Iteration

Change the navigation and information architecture

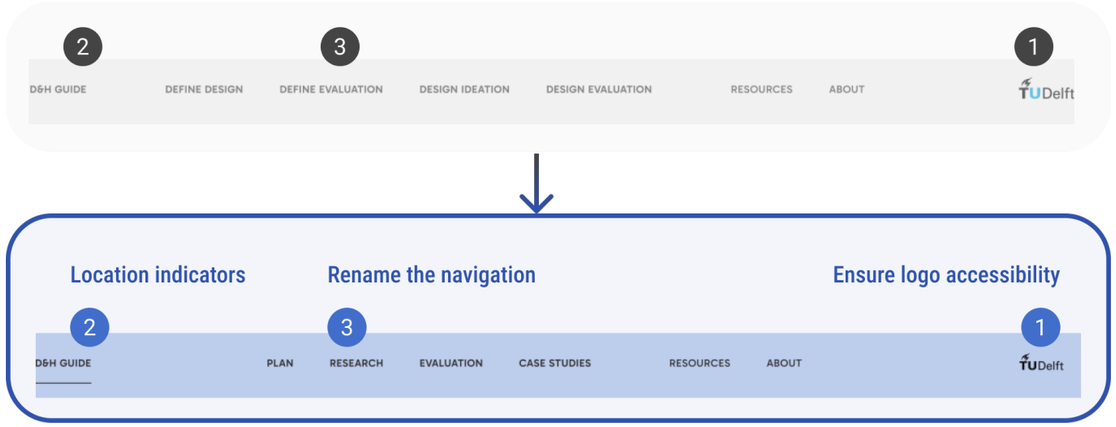


Figure 6.3. Change the navigation and information architecture

Revise the existing text

The designer and the researcher worked together again, to revise the existing content. The goal is to make the content more concise, less academic and ready-to-use.

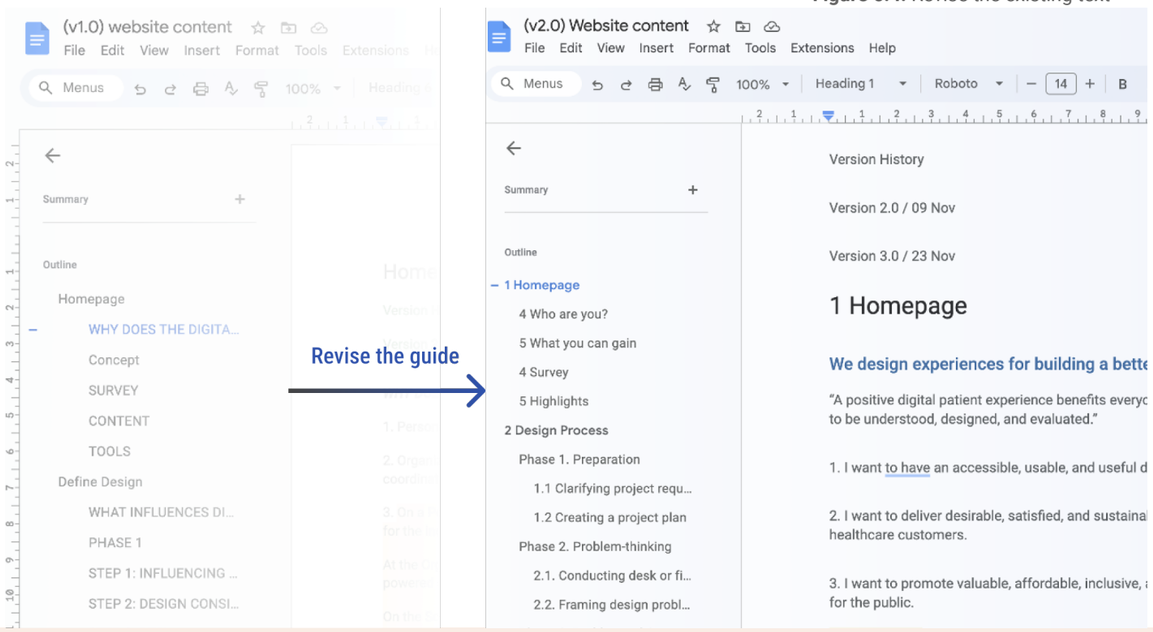


Figure 6.4. Revise the existing text

Clarify the content scope for both the template and the website

1. Terms, their explanations, and research backgrounds have been removed from the website to simplify the content. Instead, a greater number of related resources, including links and templates are now provided.

2. To meet the diverse needs of audiences with different interests, original articles are made available for those seeking detailed investigation.

3. Additionally, the templates have been simplified and made more flexible by removing detailed instructions and adding more blank spaces for users.

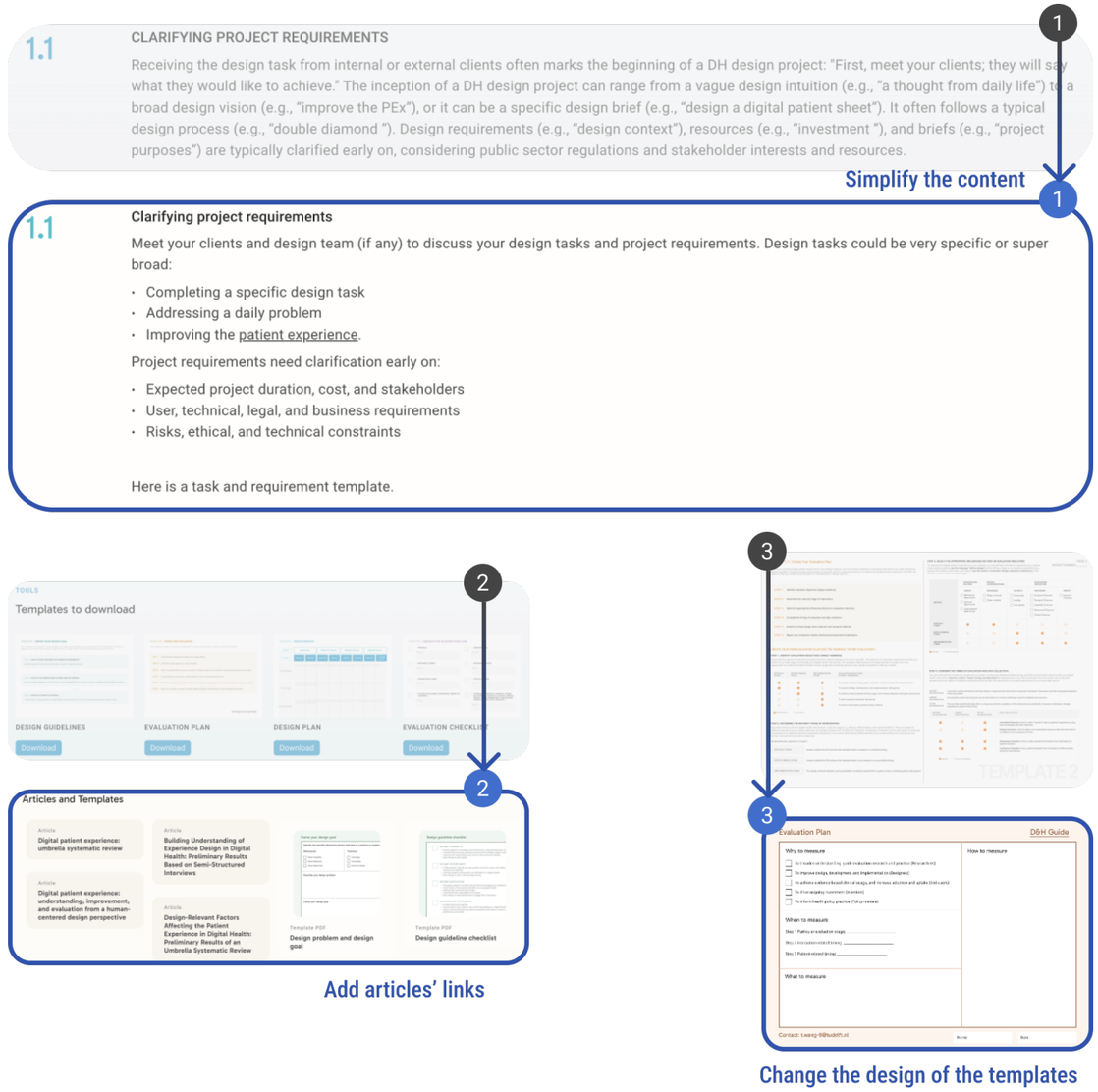


Figure 6.5. Clarify the content scope for both the template and the website

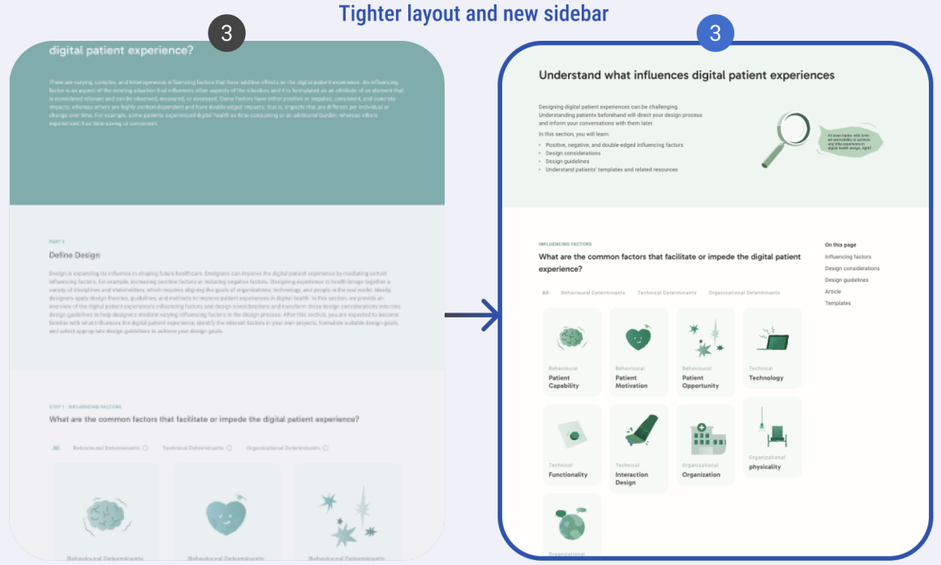
Add visuals and focused perspective

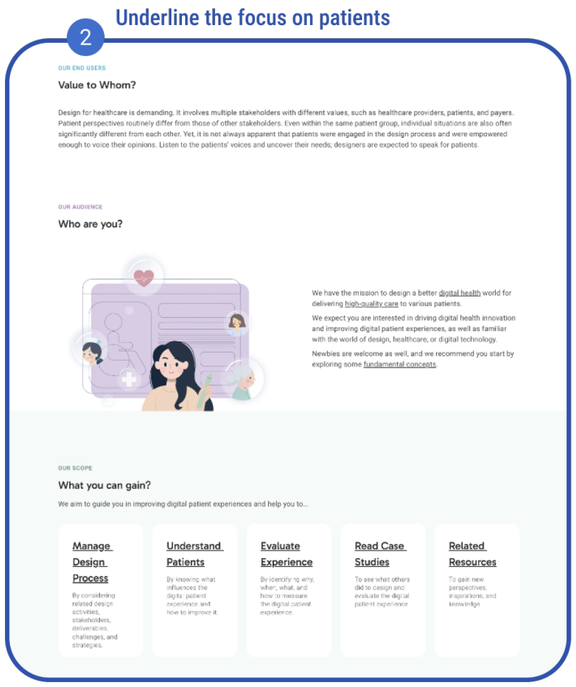
1. Illustrations have been added to the website to make it more vivid and to directly convey information.

2. Furthermore, the website now highlights its focused perspective, emphasizing that it is primarily concerned with the experiences and needs of patients.

Adjust the layout

3. The layout is adjusted to be tighter, for increasing information efficiency. The addition of a sidebar improves the sense of guidance.





Open new window for download button

4. Users can click the button to see the preview of the templates, instead of directing download them.

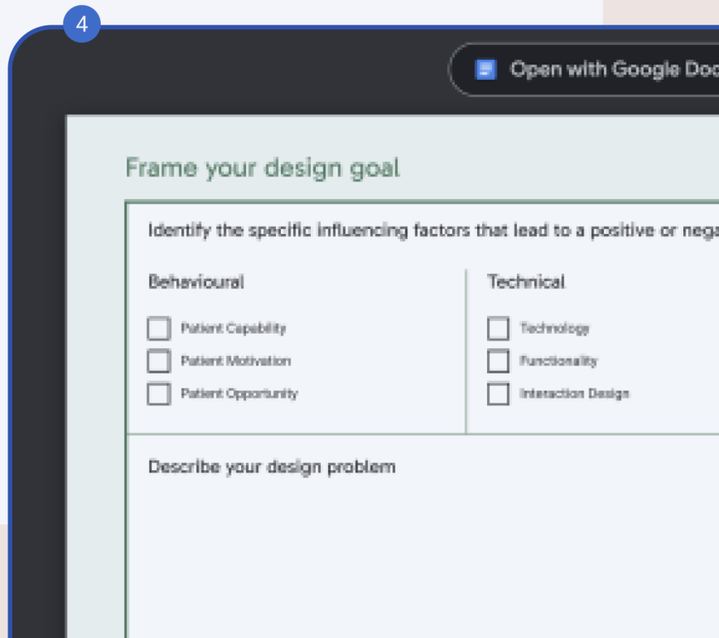
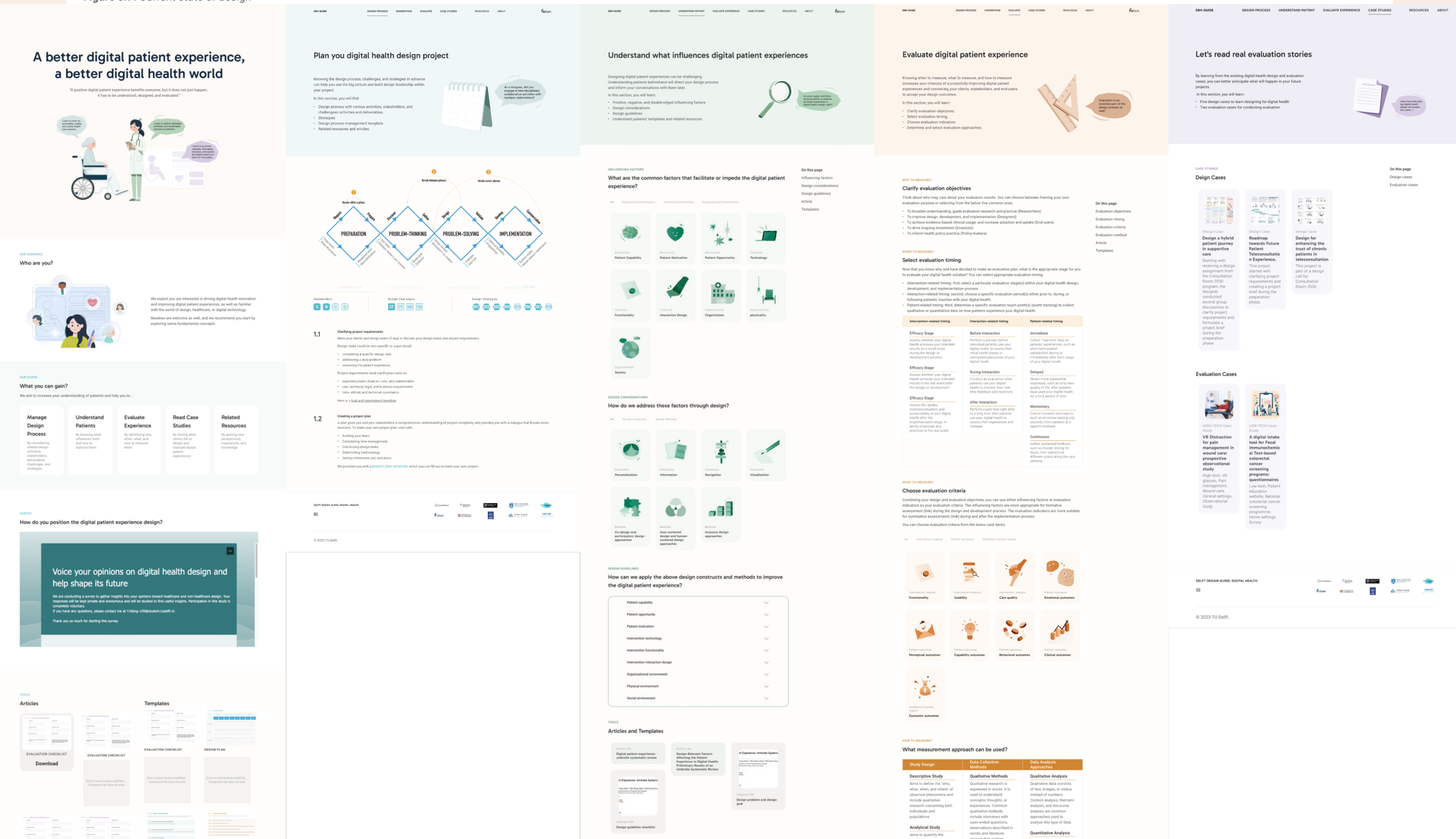


Figure 6.6. Add visuals and focused perspective

6.4 Current state of design

Figure 6.7. Current state of design



6.5 Validation

As soon as most high priority issues are resolved, the idea of validation appears. The iteration will be evaluated to ensure it achieves the design goal. Taking into account factors such as recruitment, time constraints, and the project schedule, this evaluation will not address the evaluation of the guide's outcomes. Instead, it concentrates on assessing the content quality and the usability of the website. This section will describe the setup, the procedures, the participants and the validation results.

The setup

The one-to-one evaluation mostly took place at the faculty of Industrial Design Engineering at TU Delft. One test was conducted online. During the onsite evaluation, a laptop was used to display the website and interact with the website. Both the participants and I were sitting beside at a table. They were encouraged to think aloud during the tasks. This setup allowed me to observe their operation, assign the questionnaires, and take notes.

For the online test, a Microsoft Team was used for communication. Audio and video were turned on all the time. The participant, similarly was required to think aloud. Even though I couldn't see her interaction, it still allowed me to get insights. Meanwhile, the online forms were used to collect data.

The materials

This study has received approval from the ethics committee of TU Delft IDE. A consent form was signed before starting the test. Additionally, a task description sheet and the website were introduced at the beginning. During the test, a basic information form, a content experience form, and an SUS form were provided for data collection. No audio or video was recorded.

The participants

Four participants are master students from IDE TU Delft. One participant recently graduated from the same faculty.

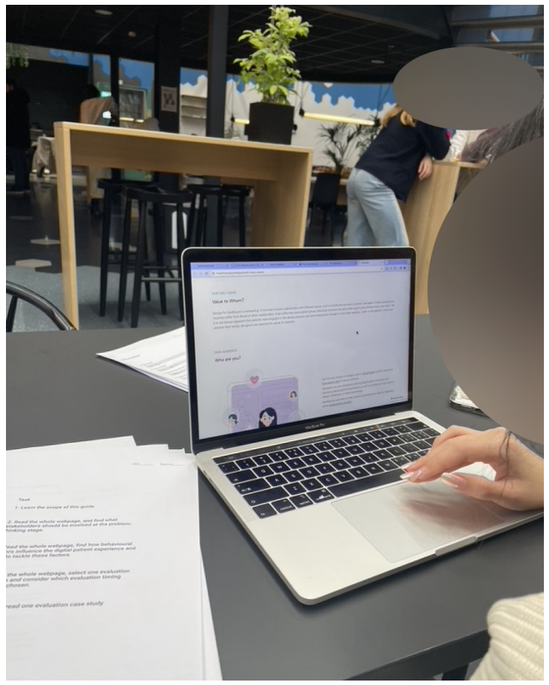


Figure 6.8. Onsite test

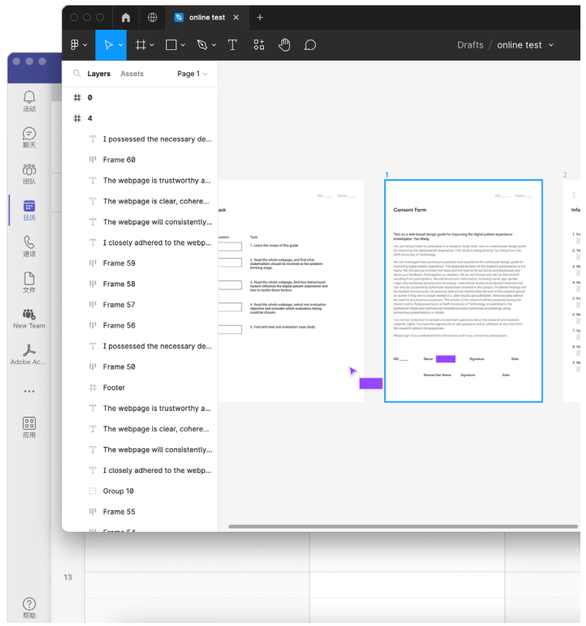


Figure 6.9. Online test

The procedure

Introduction and consent

At the beginning, an explanation about the project background and the upcoming test was given. The consent form was later given to the participants to sign.

Doing tasks

Then, five tasks were given to the participants. The tasks were designed to let them comprehensively explore the website and gain knowledge, aiming to assess the guide content and website usability.

Task 1: Learn the scope of this guide.

Task 2: Read the whole webpage and find out what stakeholders should be involved at the problem-thinking stage.

Task 3: Read the whole webpage, find how behavioral factors influence the digital patient experience and how to tackle these factors.

Task 4: Read the whole webpage, select one evaluation objective, and consider which evaluation timing could be chosen.

Task 5: Find and read one evaluation case study.

Fill out forms

The first task was set as an exploration activity. During this task, participants can freely explore the website and ask questions. After finishing it, no form was asked to be filled out. For the other tasks, a content experience form was asked to be finished for each task. Once five tasks were finished, a website usability form would be provided. All the forms kept the same questions and format as last time's evolution workshop.

Feedback

In the end, a feedback session was held to gather their opinions and experiences.

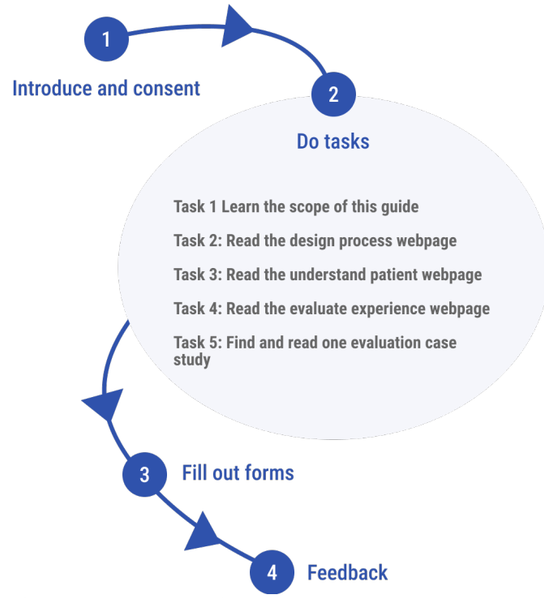


Figure 6.10. Test procedure

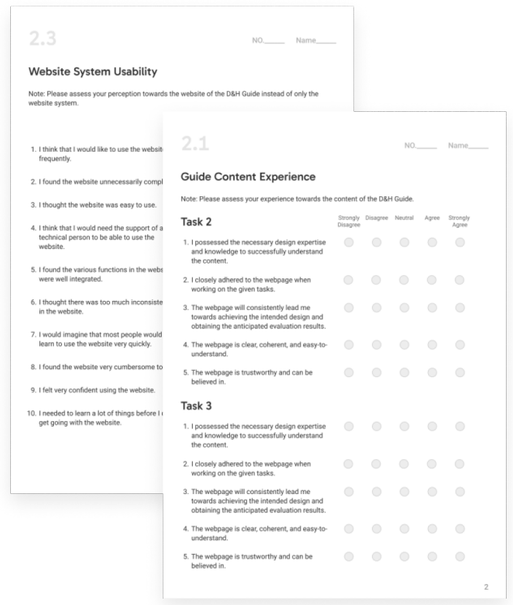


Figure 6.11. Materials

6.5.5 Results

This section will compare the results of the first evaluation and this test in order to determine if the iteration enhances the user experience and accomplishes the design goal. The goal is to transform the primary research into a good and usable web-based design guide, enabling healthcare designers to utilize the primary research to improve the digital patient experience.

To validate if the content clarity, credibility, efficacy, and website usability are improved.

Answer

Given that the students adhered closely to the guide and possessed sufficient knowledge before using it, the resulting outcomes are convincing.

In conclusion, while the clarity and credibility of the guide have been enhanced, its efficacy remained unchanged, and its usability has decreased.

Specifically, the clarity of the guide has seen notable improvement, with each of the primary pages meeting the expected standard of clarity. However, the evaluation webpage continued to have the lowest clarity, indicating that efforts could be taken to improve this page. The guide's credibility remained strong and has shown some increase. Efficacy, however, appeared to be neutral as before, suggesting that participants were uncertain about whether the guide could help them achieve the expected outcomes (Figure 6.12).

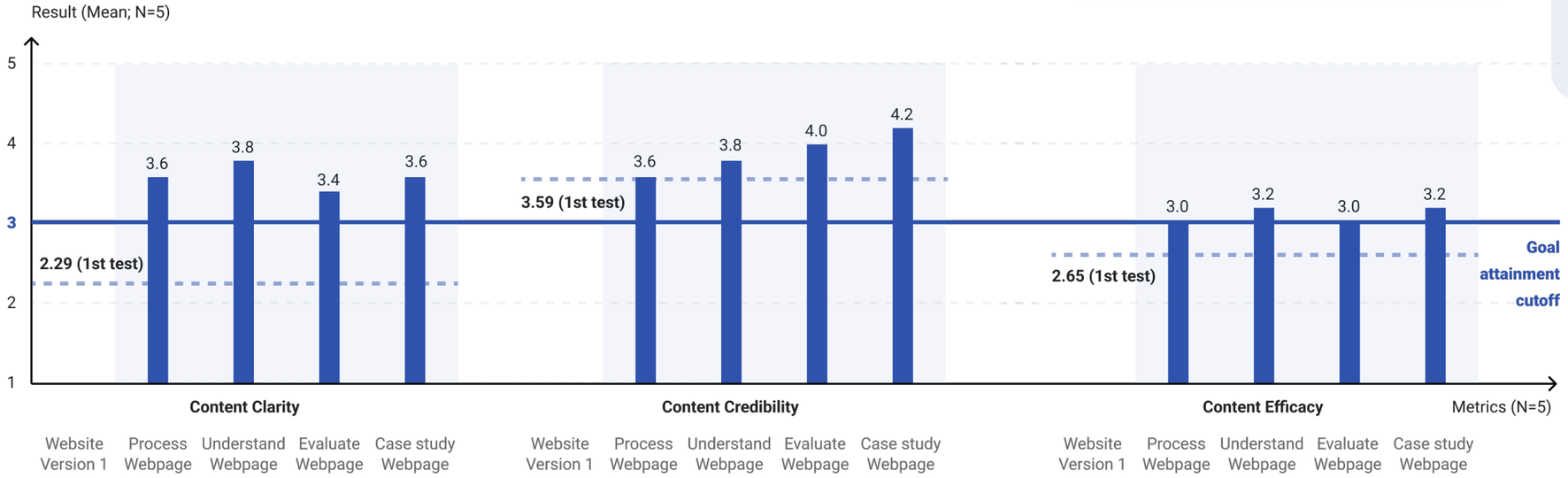


Figure 6.12. Content evaluation results

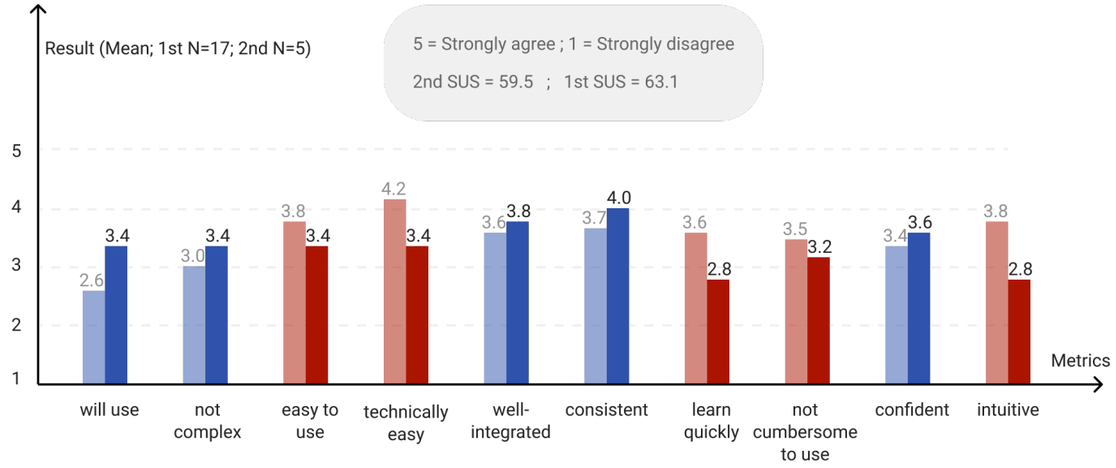


Figure 6.13. SUS results comparison

Nonetheless, the usability results were not as positive as expected. The overall SUS score decreased to 59.5 from the previous (63.1), indicating a slight decrease in usability, while it could still be seen as "OK" (Bangor, Kortum, & Miller, 2009).

Figure 6.13 suggests that the new website decreased its ease of use, indicating users' need for more technical support than before.

Additionally, learning to use the guide was not as quick as before. Participants found the guide to be cumbersome to use. They felt it required more effort and learning before they could use the website.

It is worth noting here that the second result might not be trustworthy enough. A SUS sample size of less than 6 participants would lead to less than 40 percent accuracy (Stetson & Tullis, 2004). However, it can still be concluded that the usability didn't get a great increase in the sight of these five participants.

Limitation

Several limitations might affect the accuracy and reliability of the results.

First, not all participants had a background in healthcare or had experience with healthcare projects. Compared to the previous workshop, where all participants had attended the “medisign” healthcare elective, this time only two participants had been involved in medical projects. Having a healthcare background or not significantly impacted assessment. For instance, a participant without such a background complained about the overwhelming content of the guide, while a participant who had project experience before didn’t find the website unnecessarily complex and said, “Medical design is inherently complicated, and this website provides many resources.” Based on this insight, participants should be grouped and assessed according to their healthcare design knowledge level in future evaluations.

Another limitation is the sample size. Although the sample size met the standards for usability testing of 5 to 8 persons (Barnum, C. M., 2020), it is still relatively small for SUS evaluation. A sample size of at least 12 participants is required to guarantee a 100 percent accuracy rate for SUS; a sample size of less than 6 can yield an accuracy rating of less than 40 percent. Because of this, it can be confirmed that the sample size of the second test could only ensure identifying enough usability issues but could not accurate SUS results (Stetson & Tullis, 2004).

Furthermore, the sample lacked diversity since all the participants were Chinese, leading to a bias in the results. The bias could be a lack of accurate understanding of the instrument translation influenced by different cultural and language backgrounds. Several words, such as “cumbersome”, can easily yield confusion and should be adjusted or explained to accommodate diverse responders (Wang, Lei, & Liu, 2020).

Lastly, limited by time and cost, participants only spent approximately 5 to 10 minutes to finish each task, which was relatively short. This duration might not enable a thorough evaluation of the guide’s content.

6.6 Identifying improvements

Involving five people is enough to acquire diverse usability issues (Barnum, C. M., 2020). To continuously improve the website, particularly in terms of usability, this section will conclude with insights gathered from these participants.

For “design process” webpage

1. Abbreviation icons are confusing.

2. The annotation in images is overwhelming.

3. The difference between the annotation within images and the icons below is not clear.

For “understand patient” webpage

1. The connection between different modules is not clear.

2. The design guidelines seem to be unimportant.

For “evaluate experience” webpage

1. The timing for evaluation is not presented clearly.

2. The criteria cards, the filter and the main text are not aligned.

For “case studies” webpage

1. The introduction on the card is too lengthy.

Overall

1. Users don’t immediately understand the website’s content.

2. The whole guide lacks storytelling, thus reading it is less engaging and appealing.

6.7 Iteration

For “design process” webpage

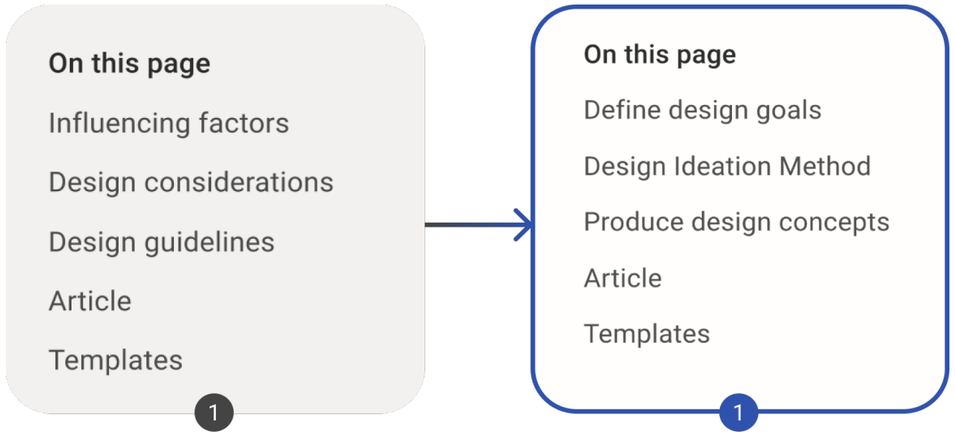
Modify the interaction and information presentation for annotations to enhance clarity.

Figure 6.14. Improvements for “design process” webpage

For “understand patient” webpage

1. Improve the connection between the three modules for better coherence.

2. Optimize the display of design guidelines.



Before: the tags are not related

After: the tags are more goal-centred and linked.

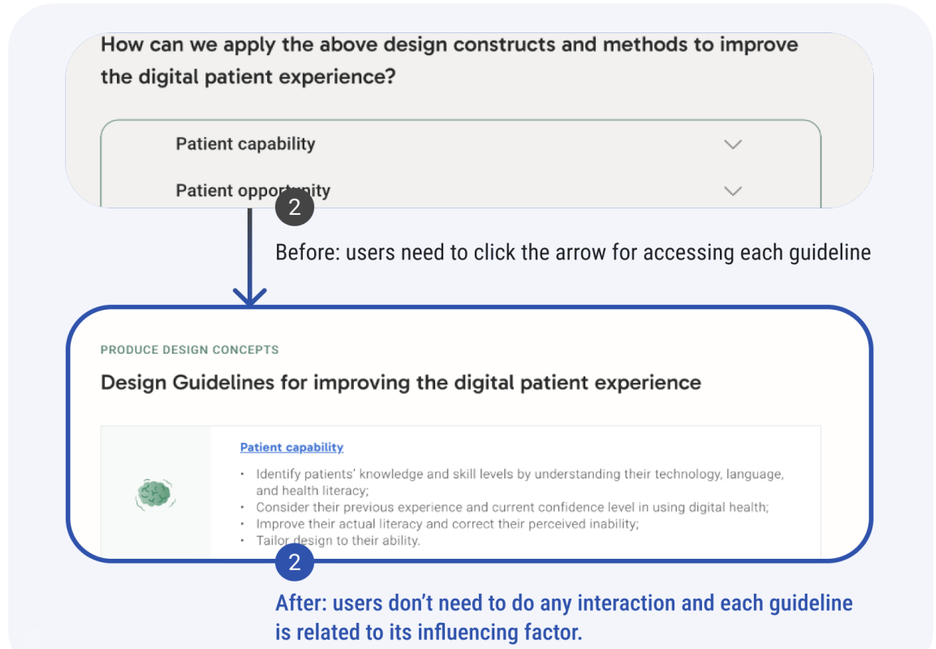
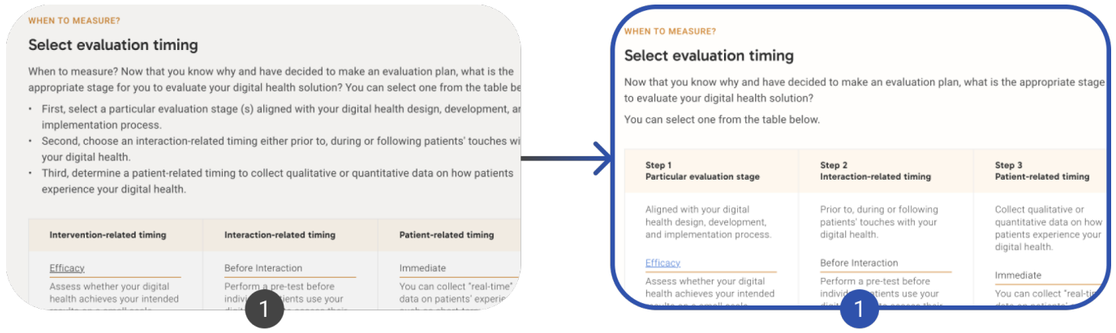


Figure 6.15. Improvements for “understand patient” webpage

For “evaluate experience” webpage

1. Improve the display of the timing for evaluation.

2. Add titles to the cards to clarify its content.



Before: the text is overmuch and the form doesn’t clearly indicate the steps

After: the text is less and the form implies the step-by-step procedure.

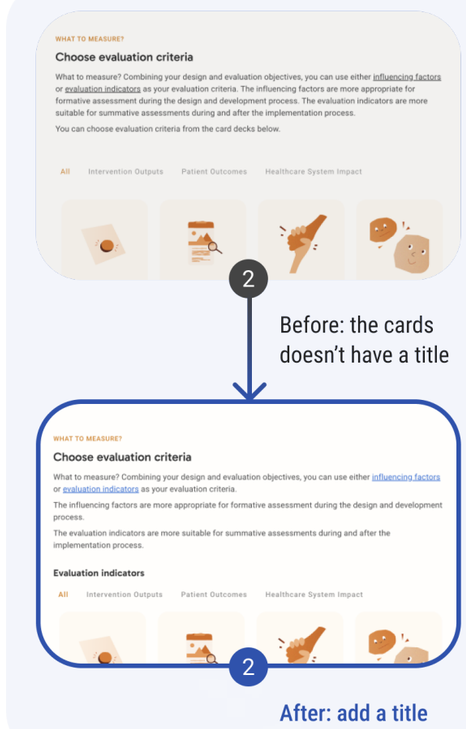


Figure 6.16. Improvements for “evaluate experience” webpage

For “case studies” webpage

3. The introduction on the card is too lengthy.

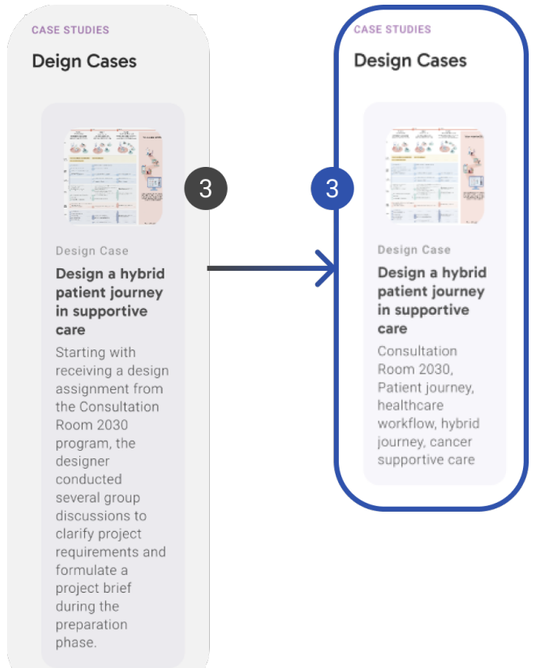


Figure 6.17. Improvements for “case studies” webpage

For overall

1. Add cards at the first viewpoint.

2. Change link color to ensure accessibility.

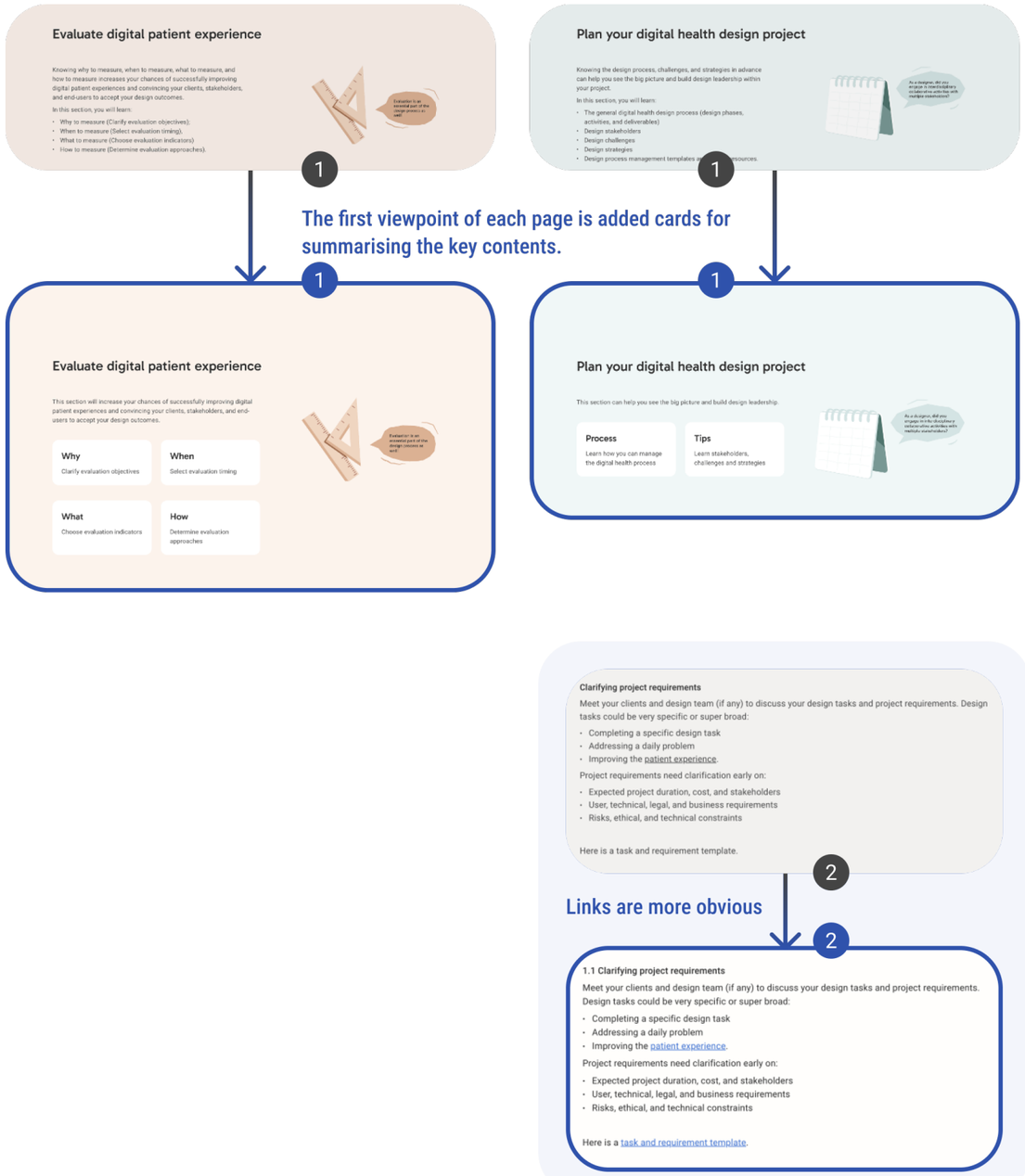


Figure 6.17. Improvements for overall pages

6.8 Final walkthrough

To make sure the prototype and this project are finished, the final walkthrough was performed. The procedure was the same as the last time, that a designer and a researcher checked the web pages together, by focusing on several questions:

- Is the content correct?
- Is the content complete?
- Are the interactions effective and correctly functional?

Through this walkthrough, some sentences and typos were revised. Besides, the color contrast was confirmed to meet the WCAG 2.0 standard, with a minimum 4.5:1 contrast ratio for text or text-based illustrations, and at least 3:1 for larger text (see Figure 6.18).

We also examined the website's responsive design, to ensure the website can adapt to screens ranging in size from 1280P to 1920P. A collapse could occur if this range is exceeded or lowered.

This effort ensured the quality of the website and that the website will serve as a useful platform for subsequent usage, promotion and assessment.

13.27	12.65	12.52
12.46	11.96	7.58
8.19	4.52	4.82
4.55	4.99	13.77

Figure 6.18. Color contrast check

6.9 Conclusion

Based on the directions provided by the last chapter, this chapter expanded on the corresponding iterative process, including validation and refinements.

Solving every issue was not always feasible, taking into account user value and the workload for designers. At the beginning of this chapter, a priority determination process was discussed, leading to a list of preferred solutions. The iteration process was then elaborated, including six types of modifications.

Following the initial iteration, an assessment was conducted to evaluate how well the design objectives were met. This evaluation confirmed whether the content quality and website functionality were improved. The findings indicated a notable increase in both content clarity and credibility while the content efficacy modestly increased. These three qualities met the intended expectation. However, there was a slight decline in usability, decreasing from 63.1 to 59.5, which was 'OK' but still fell to be seen as 'Good'. This decrease might be attributed to the limited diversity in participant backgrounds and an inadequate sample size.

Although the sample size did not meet the standard for SUS evaluation, it was enough to gain insights into usability improvements. Therefore, a second iteration was then discussed, including five kinds of improvements. Finally, a walkthrough was conducted again to make sure ensure the design's quality and entirety.

7

Final design and recommendations

Final website and future directions

This chapter presents the details of the final design and provides recommendations for future implementations.

Learn the expectations about users

https://thedelftdesignguidedigitalhealth.framer.website/

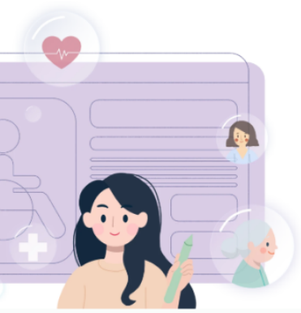
EIVERS

hom?

sion to design a better digital health world for delivering high-quality care to various patients.

hcare is demanding. It involves multiple stakeholders with different values, such as healthcare providers, patients, and payers. ives routinely differ from those of other stakeholders. Even within the same patient group, individual situations are also often erent from each other. Yet, it is not always apparent that patients were engaged in the design process and were empowered their opinions. Listen to the patients' voices and uncover their needs; designers are expected to speak for patients.

u?



We expect you are interested in driving digital health innovation and improving digital patient experiences, as well as familiar with the world of design, healthcare, or digital technology.

Newbies are welcome as well, and we recommend you start by exploring some fundamental concepts.

an gain?

you in improving digital patient experiences and help you to...

Understand Patients

By knowing what influences the digital patient experience and how to improve it.

Evaluate Experience

By identifying why, when, what, and how to measure the digital patient experience.

Read Case Studies

To see what others did to design and evaluate the digital patient experience.

Relat Reso

To gain perspec inspirati knowled

7.1 Final design

Homepage

The homepage serves a triple purpose: it functions as a portal for users to acquire background knowledge, set expectations for intended users, and also facilitate access to templates and webpages.

Get access to tools

https://thedelftdesignguidedigitalhealth.framer.website

TOOLS

Articles and Templates

Article
Digital patient experience: umbrella systematic review

Article
Building Understanding of Experience Design in Digital Health: Preliminary Results Based on Semi-Structured Interviews

Article
Digital patient experience: understanding, improvement, and evaluation from a human-centered design perspective

Article
Design-Relevant Factors Affecting the Patient Experience in Digital Health: Preliminary Results of an Umbrella Systematic Review

Template PDF
Design problem and goal

Template PDF
Evaluation Plan

Understand the patients and design

https://thedelftdesignguidedigitalhealth.framer.website/

We design experiences for building a better digital health world

"A positive digital patient experience benefits everyone, but it does not just happen; it has to be understood, designed, and evaluated."

Before Using
Learn how you can use this guide

Using D&H Guide
Got to know the guide and our content

Our Value
Learn how you can influence patients

IDE: DIGITAL HEALTH

SyncVR Medical

TUDelft

UNIVERSITY OF CAMBRIDGE

Figure 7.1. Homepage final design

1. “Understand Patient” page

This page is designed to help designers understand patient experiences and address related issues. It displays factors affecting digital patient experiences, with interactive cards detailed explaining their positive, negative, and ambiguous impacts. The page also includes design considerations for deeper insight and presents specific design guidelines addressing these factors.

2. “Evaluate Experience” page

This page aims to facilitate evaluation planning. Designers can learn how to conduct evaluations step-by-step.

3. “Case studies” page

This page includes evaluation and design case studies, serving as real-life inspirations for designers.

4. “Design Process” page

This page provides an in-depth explanation of the design process, clarifying the involvement of various stakeholders, identifying the possible challenges, and proposing strategies. This page also connects the content of the whole guide, integrating each piece of information.

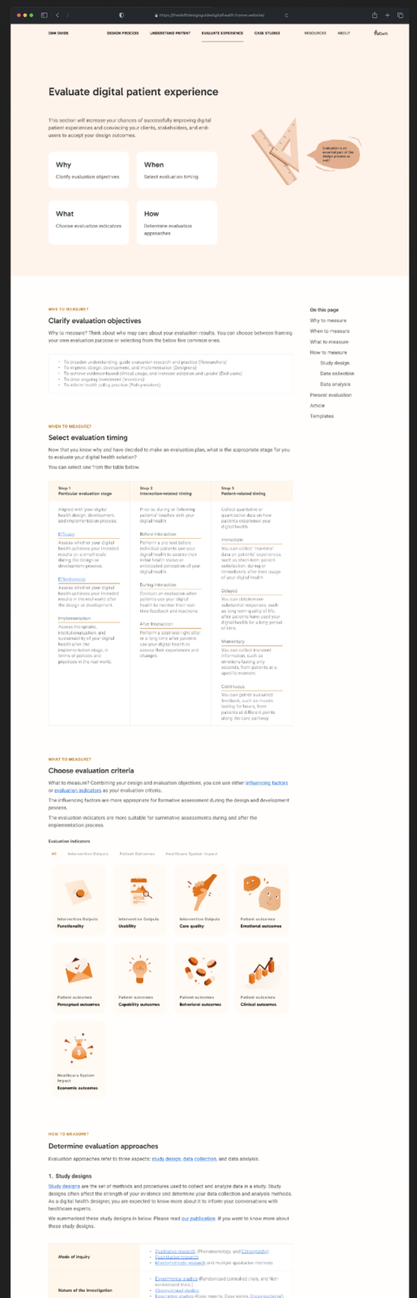
5. “Resources” page

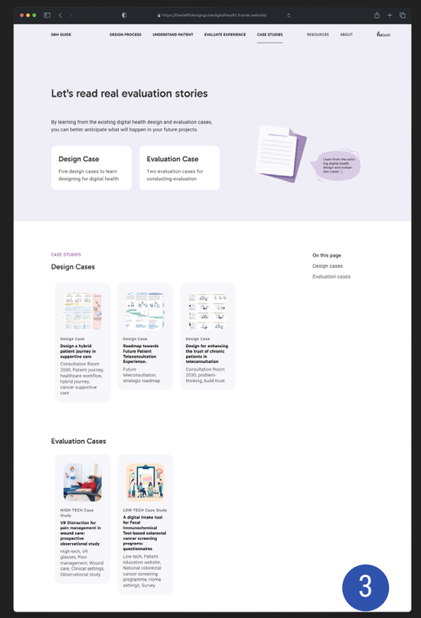
This page accumulates the term explanations, primary research articles, and other healthcare toolkits.

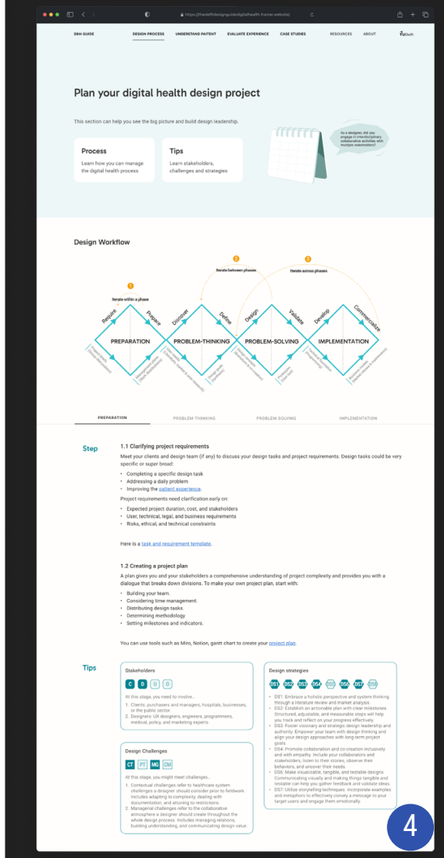
6. “CMS” page

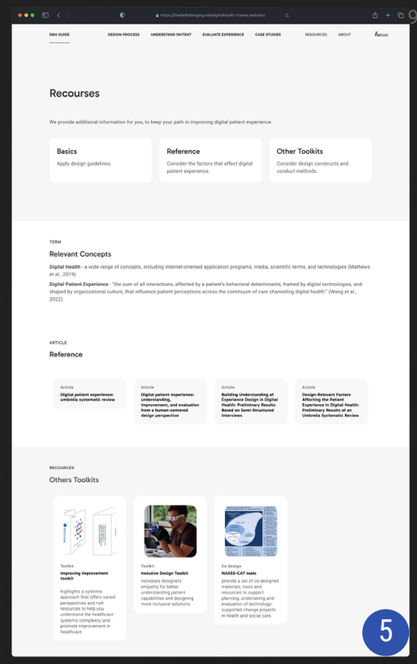
CMS means Content management system. In this system, 30 pages are organized and presented with the same layout. These pages include all the pages after clicking the cards of the home page, the “Understand Patient” page, the “Evaluate Experience” page, the “Case studies” page, the “Design Process” page, and the “Resources” page.

[A link to the website]









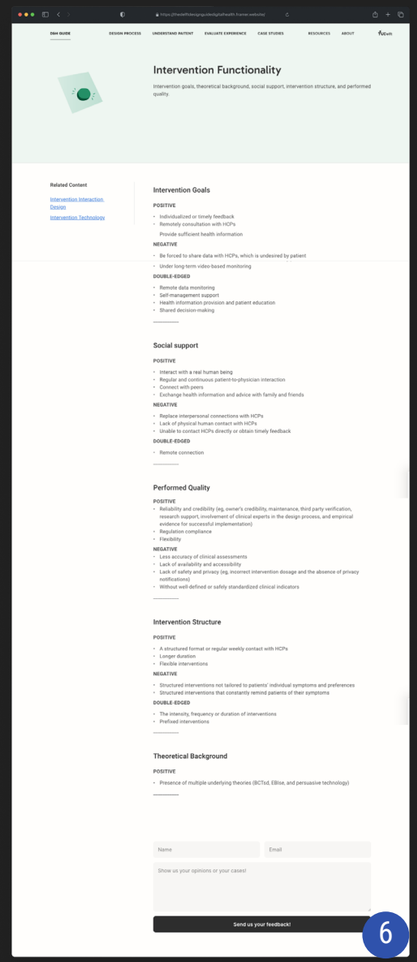


Figure 7.2. Other pages final design

7.2 Recommendations

In the previous chapters, a web-based design guide was built and iterated in response to the evaluation results. Yet some issues remain due to the time and cost limitations. This section will discuss the recommendations for future implementation.

7.2.1 For the guide content

Enhance the storytelling

The current guide attempted to translate the primary research into practical, concise and comprehensive instruction and the recent evaluation has proved the guide as clear. In the next step, the guide should focus on storytelling to make the content more consistent and engaging.

Diverse Content Presentation

Currently, the guide uses graphics and text to present the content. It is recommended that videos, animations, booklets, cards and other methods be considered to increase diversity and vitality.

7.2.2 For the website

Enhance Website Functionality

More functions should be added, such as a search bar, dynamic survey, or even a chatbot.

Research the needs of users with different knowledge level

The project only did desk research in the beginning and might have overlooked users' deep needs. In the future, user research should be conducted, especially dividing user groups with varying degrees of healthcare design understanding.

Make sure the other aspects of accessibility

The final website ensured that color accessibility meets the WCAG 2.0 standards. However, it overlooked the other types of accessibility, which include but are not limited to icon size, alternative text, embedded text of images, and more. These factors should be considered for a larger group of users.

7.2.3 For the future evaluation

Evaluate with more designers

The second evaluation (individual tests) involved a smaller group (n=5) of participants compared to the initial one (n=19). Additionally, since all participants are Chinese, this could cause bias in the results. Therefore, it is recommended to conduct another larger evaluation with more than twelve people.

Evaluate with patients

The guide is designed to assist designers in improving the digital experience for patients. Consequently, the healthcare receivers, who are the patients who will benefit from the digital health improvements, should not be ignored. It would be beneficial for researchers to investigate their ideas about the guide.

7.3 Future plan

This website will be used and promoted to healthcare designers and design researchers worldwide. This frequent utilization and exposure will bring more and more feedback. Meanwhile, as the primary research from Wang et al. keeps going on, new content will generate. These factors will promote consistent improvements to the website.

Moreover, in the near future, an evaluation workshop will be held again, to assess the qualities of this website. As this workshop is expected to recruit more participants compared with the second one (n=5), more trustworthy data is looked forward to validating the quality of this website.

Conclusion and reflection

This chapter concludes the thesis and reflects on this experience.

8.1 Conclusion

Recognition challenges

Previously, primary research, including four key studies focusing on the improvements in digital patient experience was conducted. This thesis aims to address the complexities of translating this primary research for practitioners to use, discerning two key challenges: interpreting research insights for designers from a researcher's viewpoint and selecting a suitable presentation format.

RQ1: What are the considerations for generating and evaluating a web-based design guide?

Responding to these obstacles, the project was initially defined to convert the primary research into design guidelines, as design guidelines not only facilitate effective designs but are also more specific, context-dependent, and flexible (Gerrike, Eckert, & Stacey, 2017; Fu, Yang, & Wood, 2016). In addition to that, the guidelines were decided to be presented through a website to undertake interactivity, accessibility, and cost-effectiveness (Daniluk & Koert, 2015; Cook, D. A., 2007).

From the above desk research, the design goal was therefore defined. The goal is to transform the primary research into a good and usable web-based design guide, enabling healthcare designers to utilize the primary research to improve the digital patient experience. The corresponding design requirements were ensuring high usability, consistency, and accessibility of the website, along with assuring the guide's content is clear, efficacious, and trustworthy.

RQ2: How can we generate a web-based design guide?

To meet these requirements, various tools and approaches, including walkthroughs, case studies, WCAG 2.0 contrast ratio principle, information architecture, co-creation, expert review, wireframes, and prototypes, have been utilized in the design process. An initial MVP website was then created, which comprised five main pages, titled: Homepage, Define Design, Define Evaluation, Design Ideation, and Design Evaluation.

The target users, healthcare experience designers, can comprehend the significance of digital patient experience improvement, acquire relevant concepts and knowledge, and carry out exercises through this website.

RQ3: How should we evaluate this web-based design guide?

The initial MVP website was assessed and scored by participants to determine if it meets the design requirements and achieves the design goal. 19 participants were involved in this evaluation workshop for four hours. They were requested to propose a digital health solution by using the design guide. The results indicated that the design goal was partially completed. However, the content's clarity and efficacy need improvements. The lack of these qualities led to insufficient effectiveness and satisfaction. The usability score was rated at 63.1, indicating significant room for improvement.

These results provided directions for improvements, and an iteration was accordingly generated. Due to time and cost constraints, the iteration focused only on several relatively high-priority issues. The main pages were renamed: Homepage, Design Process, Understand Patient, Evaluate Experience, and Case Studies.

Usability tests with five participants were conducted to validate the effectiveness of the iterated design, showing an increase in content clarity, credibility, and efficacy. However, the website usability did not increase as expected and even decreased slightly to 59.5.

Conclusion

In conclusion, there was proof that the final design met the goal of having expected clarity, efficacy, and credibility. The color contrast matched the 4.5:1 standard to guarantee color accessibility. The design system extracted from the case studies incorporated consistent walkthroughs ensuring its internal and external consistency. The final SUS score was 59.5 out of 100, which was acceptable but implied room for improvement (Bangor, Kortum, & Miller, 2009).

For future implementation, there are some steps to take. These steps include enhancing content storytelling and increasing the diversity of content presentation; for the website, adding more advanced functions and accessibility considerations is important. Meanwhile, it should satisfy users with different healthcare design backgrounds and various accessibility needs. Finally, more designers and patients should be involved in future evaluations.

The contribution

This project bridged the gap of lacking frameworks for generating and evaluating design guidelines and a procedure for conducting the design guideline evaluation. Meanwhile, this project analyzed website design cases and proposed a design system that narrows down the basic scope, structure, and skeleton of design knowledge websites. Designers who intend to design similar websites could acquire insights from this analysis.

Last but not least, this project made progress on the project Consultation Room 2030, in terms of the work from Wang et al. The primary research, from Wang et al., has successfully transformed into a clear, efficacious, trustworthy, usable, consistent, and accessible web-based design guide. The website, therefore, empowers healthcare designers to access, learn, and practice the knowledge of improving digital patient experience, and ultimately, benefit the patients' digital world, and even society.

While this project reaches its conclusion here, the development of the website (named "The Delft Guide: Digital Health) represents just the beginning. We expect it to offer invaluable assistance to healthcare design practitioners and researchers, thereby making a profound and lasting impact in the field.

8.2 Reflection

I chose this project primarily because it aligned well with my existing skills. In other words, it fell within my comfort zone. However, it has significantly exceeded my expectations.

The first lesson I learned is ‘always having a Plan B’. In the start, I planned to involve users to explore their demands and establish the design goal. However, due to the summer break, the ethic approval process was delayed. While I waited for the permit within the scheduled five weeks, it was not received. Therefore, I switched to the ‘plan B’ , which focuses on desk research and case studies, to ensure the project’s progress. The second lesson is ‘Completion is more important than perfection.’ Sometimes I was so focused on the design details, taking too many days to go on to the next key phase. As the project progressed, I realised it was a waste of time. Users’ feedback always challenges my ideas and it is more beneficial to do quick iteration at the beginning rather than perfect design. Additionally, as a designer, I anticipate encountering overwhelming requests similar to the situation I experienced in this project. My takeaway is to assess the priority and urgency of each demand, a skill I have practiced within this project.

During the evaluation, I noticed an interesting phenomenon. As the target users of this project are designers, all user tests involved design students and designers. Interestingly, participants tended to offer solutions rather than pointing out their experiences and the issues. For instance, they suggested, “Maybe you can add more illustrations.” However, the real issue was the overmuch text and adding illustration is just one of many potential solutions. This experience has made me more aware of this pitfall, and I’ll approach future evaluations with greater caution.

The last but one of the most important lesson is about communication. Through this project, I’ve become greatly aware of the importance of effective presentation, storytelling, and negotiation skills. Beyond learning the basics like providing background information, using questions for guidance, preparing materials before meetings, avoiding excessive information, lowering my speaking speed, and observing the audience’s reactions, I realize there’s still much to learn. I am excited to carry these valuable insights forward and continue refining my communication skills.

Aside from the above, I am excited to learn more about the digital patient experience through this project and influence designers directly.

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Appendix