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Designing a UX Checklist for Evaluation of Digital Solutions in a Professional Context

Identifying Important Factors to Create a Checklist

Master's Thesis in Computer Science and Engineering

SANDRA OHLÉN
KARIN SILVANDER

MASTER'S THESIS 2022

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Gothenburg, Sweden 2022

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Cover: First view of the checklist UTVÄRDERA.

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Abstract

IKEA of Sweden has been using a UX checklist to evaluate digital tools they have bought or built themselves. It was discovered that the UX checklist was incomplete and needed a redesign to better suit its purpose of evaluating usability of digital tools.

This thesis has aimed to research different checklists and the way of working at IKEA of Sweden to find what factors are necessary for a UX checklist. A user-centered design process has been executed while loosely following the double diamond framework. The different stages have included data gathering, creating a list of requirements and exploring potential design concepts.

The result of this study is a list of six important factors to be used when creating a checklist. These were established based on the analyzed result from several benchmarking sessions, five interviews, one focus group, two co-creation workshops and a short evaluation with members from the reference group. The factors have been implemented in UTVÄRDERA, an interactive prototype of a UX checklist aimed to be used by the UX specialists at IKEA of Sweden. UTVÄRDERA is the result of the important factors, list of requirements and several ideation methods.

Keywords: user experience (UX), user interface (UI), user research, interaction design, prototyping, design process, checklist, evaluation.

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Finally, to IKEA of Sweden, whom gave us the opportunity to perform this thesis. A special thank you to Rasika Carlsson who has welcomed us to the IKEA family in the best possible way.

The image shows two handwritten signatures in black ink. The signature on the left is for Sandra Ohlén, and the signature on the right is for Karin Silvander. Both are written in a cursive, flowing style.

SANDRA OHLÉN AND KARIN SILVANDER
Gothenburg, June 2022

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1

Introduction

How does one create a good user experience? It is very easy to apply a subjective approach to design for a good user experience, but many different factors can influence the users experience. For example, if the user is a beginner, intermediate or expert of the program, that creates different experiences [1] and so are depending on different requirements. This can also be applied to users of different backgrounds, such as users of a digital solution (for example, Catia V5, Microsoft Excel or Miro [2]) as well as UX (user experience) specialists. Thus, to create a good experience for every user, UX expertise is necessary to ensure that the chosen product or service provides good UX. For UX specialists, tools such as checklists and books used to create a good user experience looks different, but they evaluate similar elements such as navigation, design patterns and searching [1]. Two examples of UX checklists that can be used to evaluate the UX of a website are the WCAG Checklist [3], which evaluates the accessibility of a website, and the 23-point UX Design Checklist [4], which by 23 points allows the user to evaluate five different areas such as interactive design, visual design and typography.

Previously, a team of UX specialists at IKEA of Sweden has created a UX checklist that has been used when evaluating digital solutions, either ones developed internally or ones that might be bought for the company. The UX specialists have used it at IKEA of Sweden for a while, but they realized that it was missing some aspects of UX. Therefore, before this thesis project was created, they began to do some research and benchmarking to gain a deeper understanding of what needs to be applied.

In this master thesis, the authors will improve the current checklist used to evaluate digital solutions used internally at IKEA of Sweden. Previously, IKEA of Sweden conducted a project where they did initial research, so this thesis will continue the research using their gathered information as a foundation. The primary users of the thesis result i.e. the final checklist will be the UX specialists currently working at IKEA of Sweden, who research and verify that the digital products delivered and interacted with deliver the best user experience possible for IKEA employees.

1.1 Aim

The master thesis aims to find out what aspects are important when developing the UX checklist. Through the work with the checklist this will be fulfilled by writing a thesis report in which checklists and UX are discussed and researched. A

UX checklist will also be created with the report's findings as support. The UX checklist will be functional to the extent that it can be used to evaluate a program on the top most general and basic level, with the possibility to add other aspects to the checklist to give it more depth and levels which focuses more on specific details of UX and the evaluated program.

1.2 Research Problem

The UX checklist currently used at IKEA of Sweden was created about two years ago as a guide with the primary use of evaluating the user experience and usability of a digital solution before buying or creating a new one. The checklist was to ensure that the UX specialists have not missed any aspect of the user experience and compare different solutions from a user perspective. According to IKEA of Sweden, the current checklist has some challenges and needs improvement and therefore requires a redesign. The problem that will be researched during the thesis work is what makes a good checklist. Further aspects that will be researched are in what form the checklist should be presented and if the checklist should be static or if one should be able to add to the checklist. The research will focus on different aspects of evaluation, such as evaluation by structure, functionality or evaluation by heuristics. The thesis will also look into aspects of usability and accessibility and how to ensure that it is a part of the UX checklist and the evaluation. Finally, not only will the UX checklist have to evaluate usability and accessibility, the checklist itself must also be usable and accessible.

1.2.1 Research Question

What are important factors to be considered for a UX checklist when it comes to usability?

1.2.2 Expected Result

The expected result of the thesis work is a list of important factors to be used when creating a UX checklist. These will be implemented in an interactive, re-designed prototype of the current UX checklist at IKEA of Sweden.

The thesis will not explore what UX is on a deeper level nor research the extent of UX. The final result is expected to be an interactive prototype that is functional to some extent (e.g. for one track of the checklist) and the other tracks outlined to be filled with information.

1.3 Stakeholders

IKEA is a franchise business including multiple companies, whereas Inter IKEA Group is the company that connects IKEA franchisees with suppliers and range developers [5]. Within Inter IKEA Group, there are multiple companies such as IKEA of Sweden, which is the company this thesis is made in collaboration with.

The primary stakeholders of this project are the UX specialists at IKEA of Sweden. Together with their clients and stakeholders, the UX specialists at IKEA of Sweden will use the finalized UX checklist to evaluate potential new digital solutions so that no area of UX has been missed. The UX specialists make up a reference group to allow for identifying the problem or interest and which the solution should help [6]. Although they are called UX specialists, they may not all be specialists within UX but can be novices, intermediates or experts, depending on their background and knowledge. Furthermore, another stakeholder to consider is the end-users of the evaluated digital solution.

The UX specialists' work consists of project management, user testing and designing with the main focus on ensuring user experience. Therefore, their expertise is primarily in user testing and usability.

As the authors study interaction design and UX, their interests can be partly connected to that of IKEA of Sweden [6] and is something to consider when working on the thesis.

From IKEA of Sweden an advisor has been provided, Jonas Uddman, who together with another employee monitored the first version of the UX checklist. Other employees at IKEA of Sweden who will take part in the result of using the UX checklist are also stakeholders in this project.

Another stakeholder is Chalmers University of Technology, as it is the university at which the authors attend, and that will publish the thesis. An academic supervisor from the University, Sara Ljungblad, supports the writing of this thesis. The thesis is executed within the program of Interaction design and Technologies.

2

Background

In this chapter, the background to the thesis will be introduced. Usability and UX will be discussed, followed by an introduction to what a checklist is and what the UX checklist at IKEA of Sweden looks like today. Finally, related work such as design principles will be presented.

During the thesis, the UX specialist will be brought up frequently due to being stakeholders as well as the reference group during the work. They are the main group working on evaluating and creating UX for digital tools used internally at IKEA of Sweden. Furthermore, the UX specialists are the primary users of the checklist, but other users are also relevant during the thesis. In such cases, *users* refers to the primary users of the digital solution. A digital solution can also be referred to as a *program* or a *digital tool*.

2.1 Usability and UX

According to *the UX Book* [7], usability is an essential part of making technology transparent by making the user focus on what they will use the technology for and not how they use it. For example, when going through a list and checking items off, the user does not focus on how they read the list, search the interface and cross the item off the list, they simply think about what they are looking for and if that can be found. Usability is often evaluated by experts using expert methods such as usability checklists or heuristic evaluation [8].

Usability can be defined as a product that is effective, enjoyable and easy to learn [9] and can be divided into six usability goals[10]:

- Effectiveness - how well a product supports users when correctly carrying out actions.
- Efficiency - how a product can support users to manage tasks swiftly and easily.
- Engagement — how a product provides the correct type of functionality for its expected purpose so that usage can be achieved in a pleasant manner.
- Error Tolerance — how a product supports a range of user actions and how users can recover from errors easily. An error will only appear in an absolute error situation.
- Ease of Learning — how easy it is for a new user to learn how to accomplish

expected goals.

These factors are often measured in UX checklists [4], [11] as well but might be referred to differently. Usability factors especially mentioned in checklists can vary greatly, but some that rather frequently appear are accessibility [4], [11]–[13], error tolerance [4], [11], navigation [4], [11]–[13], structure [11]–[13], and visual elements [4], [13].

As stated, usability is an important part of design, but when designing for the human, one also needs to think beyond only usability and consider user experience. *The UX Book* states that "user experience entails social and cultural interaction, value-sensitive design, and emotional impact — how the interaction experience includes 'joy of use', fun, and aesthetics" [7, p. xii]. Additionally, *Interaction Design: Beyond Human-Computer Interaction* states that user experience "is about how people feel about a product and their pleasure and satisfaction when using it, looking at it, holding it and opening or closing it. It includes their overall impression of how good it is to use [...]" [9, p. 13].

These are all factors that need to be considered when creating an interface, so the checklist can be helpful as a tool to evaluate which programs fulfill the UX grade that IKEA of Sweden requires. However, it is unclear exactly how useful they are as a tool compared to other methods and what input they provide for the UX specialists.

2.2 UX Checklists

When evaluating UX within interaction design, there are many possible approaches such as user testing or evaluating through checklists [7]. A checklist can be used to ensure that all parts of UX are covered, but there are also methods such as design guidelines that can help ensure that.

A checklist can be used when evaluating certain factors deemed especially important to the usability of a product or tool. It can be design features as well as heuristics, and the purpose is to verify and evaluate a product, system or process [14]. Using a checklist can provide the designer (or the UX specialist) with a good foundation for further planning, revision, and improvements [15]. A checklist can be a valuable tool for evaluation as some digital solutions might be too extensive to use user testing. In such cases, a checklist can be helpful for a first evaluation of finding problem areas that can later be evaluated with user testing. Although checklists are useful, they have their limitations, as checklists can become subjective due to the result of the method being based on the thoughts, ideas and interpretations of the people evaluating the digital solutions.

When evaluating UX within interaction design, many different factors can be evaluated. For example, as mentioned in *IxD Checklist*, the following aspects of an interface can be considered [11]:

- Affordance
- Feedback
- Simplicity

- Structure
- Consistency
- Tolerance
- Accessibility

These factors have also been found in other checklists, but as stated previously, other checklists also evaluate different aspects.

2.3 The Existing Checklist at IKEA of Sweden

The first checklist at IKEA of Sweden was created over a decade ago according to findings, and has grown and evolved since then. When used last year, it was found that the checklist was incomplete and was missing some key aspects and therefore needed updating.

To begin the work, members of the reference group started benchmarking different checklists to find inspiration for the checklist. When used, the purpose of the checklist is to evaluate digital solutions created internally or ones that might be bought to be used by IKEA of Sweden.

Today's checklist is a list with detailed subheadings that are not evaluated but used as examples of what to look at. There are two versions of the checklist, a long version and a short version of which the short one is the one used (see figure 2.1, for long version see Appendix A). The checklist has reportedly been very good as a tool when discussing UX. Furthermore, the UX specialists reported that they seldom use the checklist alone, but in a group to discuss the UX and try to avoid the evaluation from becoming too subjective. The evaluation with the checklist is summarised with scores (figure 2.2) and then compiled with a pyramid and the factors shown on the level they performed at (figure 2.3). The evaluation triangle is based on the UX iceberg that visualizes how UI only is the tip of the iceberg with many levels below the water such as functionality and interaction [16]. The highest point of the pyramid is the hardest and most valuable to fulfill. This, in turn, is very similar to Maslow's Hierarchy of Needs [17].

2. Background





UX design principles		-3	-2	-1	0	1	2	3
	Error prevention Help users to avoid mistakes rather than informing them when something went wrong. <ul style="list-style-type: none"> • It is only possible to select valid options. • There are help, hints or samples when applicable. • Input fields are forgiving and allow different formats, e.g. for item numbers. • Workflow friction is added for critical tasks, e.g. confirm deleting of significant objects. 							
	Recognition and predictability <ul style="list-style-type: none"> • It is easy to recognize and predict how to use the solution. • The look and feel of the solution reminds about other solutions used by the user group. 							
	Tone of voice <ul style="list-style-type: none"> • The tone of voice matches the user groups experiences and expectations • The tone of voice is consistent throughout the solution. 							
...from consistency and conventions	Different with a meaning <ul style="list-style-type: none"> • New features and concepts are in line with what the users need and expects. 							
	Focus The solution provides primary and secondary focus when needed: <ul style="list-style-type: none"> • Tasks and actions that requires full focus are placed in primary work areas. • Less important features (e.g. settings and help) are placed in secondary work areas. • Information that aren't directly needed can be placed in tooltips. 							
...from simplicity and clarity	Chunking <ul style="list-style-type: none"> • Divide complex and seldomly executed tasks into smaller portions, e.g. wizards. 							

Figure 2.1: Picture of the existing checklist presenting the guidelines connected to UX design principles. Each guideline is presented with an image and text. Examples of titles are Error prevention, Recognition and predictability, and Tone of voice. The picture is used with permission from IKEA of Sweden.

Rating				
Visual design	UI components	Navigation	Functional pattern	UX design principles
Colours	Buttons	Navigation methods and components	Methods for save and cancel	Minimal effort
Text style	Checkboxes and radio buttons	Placement and access	Confirmation and reminders	Instant validation
Icon style	Dropdown lists	Additional methods and components	Concurrent editing	Personalization
Balance and hierarchy	Multi-select	Design of the navigation	Search, filter and sort	Guidance
Whitespace	General for selections	Sum	Wildcards	Error prevention
Alignment	Text fields		Result	Recognition and predictability
Sum	Tables		Multi-update	Tone of voice
	Accordions		Sum	Different with a meaning
	Cards			Focus
	Sum			Chunking
				Sum
				Total sum

Figure 2.2: Picture of the rating of the existing checklist. Each area of the checklist is represented in its own column with the titles of the guidelines presented underneath. Next to each title the score is written. Examples of areas are Visual design, UI components, and Navigation. The picture is used with permission from IKEA of Sweden.

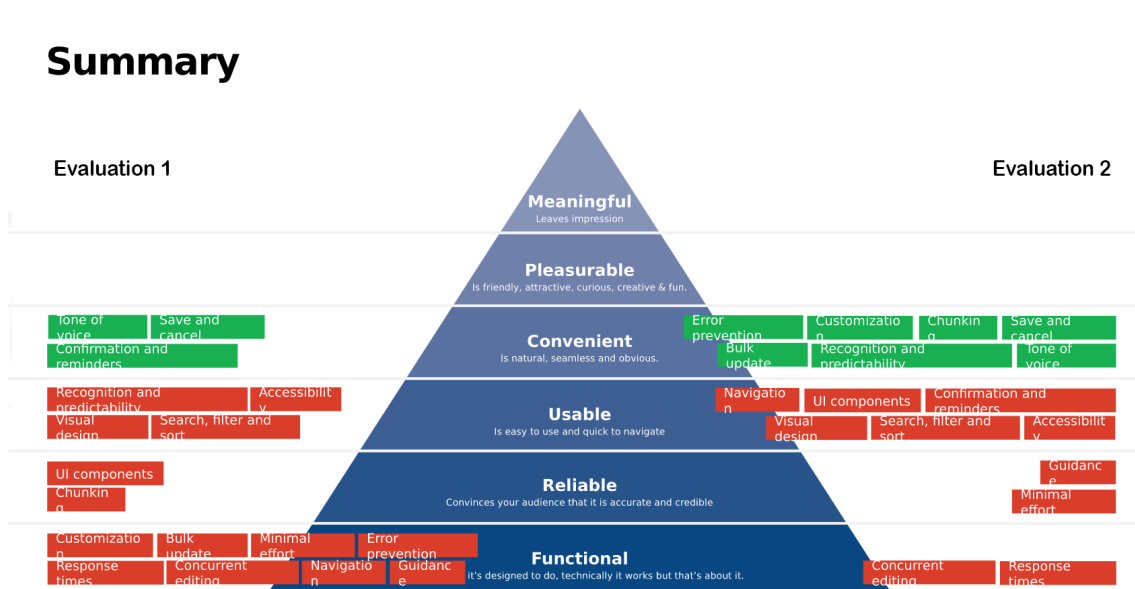


Figure 2.3: Picture of summary after using the existing checklist. Each guideline evaluated is placed on the level it is believed to have performed at. The box of the guideline is green if believed to have performed at a suitable area in relation to the goal, and red if the performance was not good enough. Examples are Tone of voice at the level for convenient and Guidance at the level for reliable. The picture is used with permission from IKEA of Sweden.

Each individual evaluator (or UX specialist) does not use the checklist often (yearly or about one time per project). However, when in use, is for a longer time of multiple weeks or even months and the digital solution being developed (or being available for purchase) is inspected and evaluated on what level it fulfills each category. The overall categories in the existing checklist are:

- Visual design
- UI components
- Navigation
- Functional patterns including subcategories
- UX design principles including subcategories

For each, the levels to be considered in an evaluation (see Figure 2.3) are *functional*, *reliable*, *usable*, *convenient*, *pleasurable* and *meaningful*.

2.4 Ethics

During the project of creating this UX checklist, some ethical aspects should be considered as well.

A different range of users may use a UX checklist. Even though they all work as UX specialists at IKEA of Sweden, they may have different backgrounds, capabilities

and disabilities. Therefore, this thesis could also consider accessibility, and the importance of designing for all, not only when designing the content of the UX checklist but also regarding the design of the checklist itself. According to European institute for Design and Disability (EIDD) [18], Design for All enables everyone to have equal opportunities to participate in every aspect of society, which can be described as "everything that is designed and made by people to be used by people – must be accessible, convenient for everyone in society to use and responsive to evolving human diversity". That being said, it is important to have an inclusive mindset when developing a UX checklist, so that it is available and accessible for a wide range of users. Due to the fact that accessibility typically requires access to users with disabilities to evaluate accessibility, this focus will depend on if this is possible to also integrate accessibility in the project with the current timeframe and the pre-conditions at IKEA.

During this project, the users (the UX specialists at IKEA) will be involved during the user studies and in the evaluation processes. Therefore, ensuring that their project involvement is on their terms is essential. For example, the users should be informed that they can exit the process at any time if they wish to and that their data or answers can be erased upon request. Before each interview, they will also be asked to sign a consent form informing them about their rights and how their data will be used throughout this project. GDPR will be considered and asked for consent regarding the data gathering, both when it comes to recording interviews or saving answers for the duration of the project. The thesis should also strive for anonymity and not collect any personal information if not strictly necessary.

When creating this UX checklist, precautions must also be taken regarding how it can be used and described. The aim is that the UX checklist will be used to evaluate digital solutions that IKEA of Sweden wants to buy or create, and to do that respectfully, the UX checklist should use a neutral language and not be condescending in any wording.

3

Theory

This section will present the theoretical frameworks, relevant concepts, and related research.

3.1 Research Through Design

When exploring different aspects of human-computer interaction (HCI), designers often perform research through design. Design involves many decisions that deal with various diverse and sometimes independent factors of an artifact [19]. All of these decisions are also affected by their specific circumstances and use. As a designer, it can be hard to make choices with an objective point of view since the choices taken discloses which issues they believe are important and their belief in the correct way to address them. When performing research through design, design practice is used to develop designs that embody the designer's judgment regarding how to address the possibilities and problems within their chosen situations [19]. Using this framework gives results that "allow a range of topical, procedural, pragmatic and conceptual insights to be articulated" [19, p. 937].

It is said that research through design "lacks clear expectations and standards for what constitutes 'good' design research", and thus would benefit from "some actionable metrics for bringing rigor in critique of design research"[20, p. 824]. It is also stated that not having these standards or specific ways of how to perform good design research could be seen as beneficial since theory can be underspecified by design since multiple aspects of a successful design can be missed by a given theory [19]. Gaver also states that "the goal of conceptual work in research through design is not to develop theories that are never wrong, it is to create theories that are sometimes right" [19, pp. 940–941].

According to Popper [21] a theory has a scientific status if it has falsifiability, but Gaver argues that "theories produced by research through design are not falsifiable in principle" [19, p. 940]. Compared to science, design tend to make generative statements instead of falsifiable ones, which is said to be one feature of scientific theories according to Popper [19], [21]. That would result in research through design not having any scientific status. Despite this, Gaver states that "whether research through design can be considered a science depends on account of science one adopts" [19, p. 941].

3.2 User Interface

A user interface (UI) is where the interaction between a human and a computer occurs. The most common way for UIs to be integrated is as a graphical user interface (GUI) [22] such as a mobile phone application, but there are other ones as well. In this project, GUI is the chosen interface that will be focused on. GUI are based on two design rules:

- "See and choose is easier than recall and type" [23, p. 125]
By showing the users their available options, their interaction with the GUI is eased [23]. This lets them choose among their options instead of needing to recall what action they wanted to perform and tell that to the computer using command lines. Still, controlling a software using written language can sometimes be needed and more efficient than using a GUI, for example in situations when the user can easily recall what to type.
- "Use pictures where possible to convey function" [23, p. 126]
Using pictures allows the user to recall associated information since pictures are easily recognized [23]. That can be applied to, for example, symbols and icons that are used as pictures today. The difficulty with using pictures is that the familiar meaning should resemble the intended meaning and not something else since that would disrupt the use of the pictures. It should also be noted that when using pictures, cultural aspects and associations need to be considered to fulfill the picture's intended meaning.

In this thesis, there will be two GUIs that are important to distinguish between. One interface is the digital solution that is evaluated using the checklist and the other interface is of the checklist itself.

3.3 Accessibility

An important aspect to take into consideration when designing UIs is that of accessibility. Designing for accessibility can include designing for users with physical and cognitive impairments to avoid discrimination and exclusion of users with different disabilities. Examples of physical impairments are color blindness, and limited mobility of limbs [24]. Examples of cognitive impairments are dyslexia and the autism spectrum. It is therefore important to consider physical load as well as mental workload when designing for accessibility as these affect performance [25].

When designing for accessibility, one can implement the methodology of inclusive design, which draws from diversity [26]. When using inclusive design, learning from people with different perspectives is most important to avoid exclusion. Exclusion happens when designers create solutions based on their own biases and ability. Exclusion does not have to be permanent but can be temporary or situational, such as a broken arm or a noisy environment.

According to *Microsoft inclusive design* [26] there are three design principles:

- Recognise Exclusion - By recognizing exclusion, one can design for how people

really are and open up products for more people.

- Solve for One, Extend to Many - By designing for people with disabilities, usability improves for everyone. By solving constraints for one, it can benefit many.
- Learn from Diversity - Humans are really good at adapting to diversity and through inclusive design people and their diversity is put in the center from the beginning. This allows for more fresh insights and diverse perspectives.

Additionally, when designing for accessibility, it is helpful to use standardized symbols that follow the ISO or IEC guidelines and should be easy to understand [27]. The reasoning behind this is that standardized symbols are generally recognized by the mass and is therefore easier to decode than those that are not standardized. To achieve proper understanding, standardized symbols must be used consistently.

3.3.1 Universal Design

Universal design is a form of accessible design which can be used to evaluate new or existing designs [28]. It is based in architecture [29] but is strongly connected to inclusive design. Accessible design, however, includes products that can be adapted for the "special" user group [28] which can lead to segregation. As opposed to this, Universal design is always accessible and integrated in the product, making it less noticeable. Therefore Universal design is always accessible, but not all accessible design is universal.

By aiming for Universal design, the products created will, to a greater extent, be possible to be used by users of all ages and abilities without added adaptation. So they will not only be usable to a more significant number of people but easier for everyone to use [28]. Universal design means to develop "with consideration for the needs of a diverse population" [28, p. 4] and allows usage for the common user as well as users with temporary or longer-term disabilities. In short, Universal design is developed to address all types of human variation and can be summarized with the seven principles of Universal design:

1. Equitable Use - "The design is useful and marketable to people with diverse abilities." [28, p. 8]
2. Flexibility in Use - "The design accommodates a wide range of individual preferences and abilities." [28, p. 8]
3. Simple and Intuitive Use - "Use of the design is easy to understand, regardless of the user's experience, knowledge, language, skills, or current concentration level." [28, p. 8]
4. Perceptible Information - "The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities." [28, p. 8]
5. Tolerance for Error - "The design minimize hazards and the adverse consequences of accidental or unintended actions." [28, p. 8]
6. Low Physical Effort - "The design can be used efficiently and comfortably and

with a minimum of fatigue." [28, p. 9]

7. Size and Space for Approach and Use - "Appropriate size and space is provided for approach, reach, manipulation, and use regardless of the user's body size, posture, or mobility." [28, p. 9]

Worth mentioning however is that the principles of Universal design do not address all aspects of accessibility but only focus on the usability [28]. That being said, other areas such as affordability and durability of products are neither considered in these principles. This is since the principles of Universal design "serve to specify those aspects of usability that are most affected by the range of human variation and that merit special attention from designers" [28, p. 10]. But as previously mentioned, Universal design is always accessible, which might be hard to notice since it is integrated from the start.

3.3.2 WCAG 2.1

WCAG 2.1 or *Web Content Accessibility Guidelines 2.1* [30] is a list of recommendations to assure that web content becomes accessible. The guidelines are divided into five areas; *Perceivable*, *Operable*, *Understandable*, *Robust* and *Conformance*. By following the guidelines and ensuring they are fulfilled, the developer ensures that the web content is accessible to a wider range of people with different disabilities. These can be disabilities such as visual, auditory, movement and speech, and therefore fulfill the laws that oblige to them, such as *Diskrimineringslagen*, *EN301549* and *Lagen om offentlig upphandling*. According to *Diskrimineringslagen*, those responsible for a business are obliged to provide adequate accessibility for those with disabilities [31]. The European Union established a law in 2018 that forces the public sector and public- and state-owned utilities to make their websites, intranets, documents and applications fulfill the accessibility requirements set by EN301549 [32]. Another law is *Lagen om offentlig upphandling* that states that accessibility for people with disabilities should be considered when technical specifications are set for the product or service [33]. Together, these laws make the public sector, business owners, and public- and state-owned utilities see accessibility as criteria to add instead of choice. It is important to note that some products and services are not obliged to follow these laws, such as those provided by private individuals. But even if not obliged to by law, accessibility should be included in products as accessibility and usability go hand in hand, and it is almost impossible to provide good UX without accessibility [26].

According to World Wide Web Consortium (W3C), following the guidelines will make content on desktops, laptops, tablets and mobiles more available and usable to more users in general [30]. The criteria of WCAG 2.1 is written in a way that they can be checked and checked off with guidelines on how to fulfill the criteria.

3.3.3 Design Elements and Accessibility

Choice of design elements can have a different effect in terms of accessibility, and different visual impairments need different support. For example, people with com-

plete blindness require a screen reader [34], and people with visual impairments require clear contrast and specific text sizes [30]. One element often discussed in checklists is visual elements [4], [13] such as choice of color. With WCAG [30] one can find guidelines and ratio requirements for color and contrast to ensure proper accessibility. This is important due to people having different visual impairments where colorblindness is one example of a common physical limitation. Contrary to the belief of many, colorblindness does not necessarily mean that a person cannot see color at all. It is rather that they are unable to distinguish red, green or blue light [35]. This, in combination with visual impairments, makes it important to consider the following when designing visual elements;

1. Use colors together with symbols to distinguish between different options. This will allow people to understand the information even if they are unable to distinguish between colors [35].
2. Using few colors allows for less of a risk for confusion [35].
3. Use patterns for contrast instead of different colors in, for example, a diagram to create contrast between options [35].
4. Contrast between text and background is very important [27]. The contrast ratio should be 3 to 1 if the font is 19px bold or 24px. If the font is smaller, the contrast needs to be increased to at least 4.5 to 1.
5. When using contrasting colors, the contrast and hues should be clear [35]. This will make it easy for all users to distinguish between different elements.
6. Bad color combos. Certain color combinations are worse than others for all users. It is easier to determine what combinations to avoid than which to use [35] and so the following combinations should be avoided;
 - Green and Red
 - Green and Brown
 - Blue and Purple
 - Green and Blue
 - Light Green and Yellow
 - Blue and Grey
 - Green and Grey
 - Green and Black

Of course, other design elements to consider when designing for accessibility are such that cater to other disabilities. For example, hearing impairments, psychological disabilities and reduced mobility of limbs.

3.4 Design Principles and Other Checklists

The following sections will present relevant design principles and checklists as an example of what other evaluation frameworks that exist today.

3.4.1 Design Principles

The term *design principles* is a broad term but most often refers to guidelines or rules of thumb [36]. Design principles can help create a unified look or a certain level of usability for a product and state what kind of design is suitable and can be allowed. A checklist can be seen as a kind of design principle.

A design principle tends to describe a rule for a specific effect, but there are also design principles like Borenstein's which relate to the implementation process [37], or Gould and Lewis's design principles that include iterative design [38]. Design principles can thus be used not only to evaluate a result in the form of a checklist but can also be seen as a checklist for the design process.

Below, some design principles are presented.

3.4.1.1 Design Principles for Good Design

There are many different principles for good design such as *Dieter Rams - 10 principles for good design* [39] or *NielsenNorman Group - 10 Usability Heuristics for User Interface Design* [40]. Principles for design can also be expressed in the form of checklists such as the *IxD Checklist* [11].

Dieter Rams is a famous industrial designer [39] who set up 10 design principles for good design. Although they were shaped for physical products and product design, they can also be applied to UX and interfaces. The principles were listed about 50 years ago but are still as relevant today [39] and can be used when evaluating or creating a user interface.

Dieter Rams' 10 design principles:

1. Is innovative
2. Makes a product useful
3. Is aesthetic
4. Makes a product understandable
5. Is unobtrusive
6. Is honest
7. Is long-lasting
8. Is thorough down to the last detail
9. Is environmentally friendly
10. Involves as little design as possible

The 10 Usability Heuristics for User Interface Design by the Nielsen Norman Group is designed as tips to follow up and ensure that multiple factors are included in the design [40]. The usability heuristics can be used for a heuristic evaluation where the designers go through the 10 usability heuristics and make sure that they are fulfilled. It is written in text rather than a list with a focus on heuristics rather than simply UI elements. The 10 heuristics give tips on what areas to focus on but not hands-on checks to follow up on, quite similar to *Dieter Rams - 10 principles*

for good design. The focus is more on the user's cognition and experience than on web content's structural development.

Requirements such as *1: Visibility of system status* can be evaluated by the designers in a way where they check for feedback from the system and if an action is followed by a consequence [40]. Furthermore, when evaluating *2: Match between system and the real world* the designers will evaluate if the layout of the program or system co-relates to the mental model of the user. This can be checked by ensuring that the stove knobs are placed in a similar pattern to the placement of the burners they control [40]. A third example of heuristic evaluation is to check *4: Consistency and standards* to ensure that the system meets the standards set out and that there is consistency between action and consequence [40].

Finally, the IxD Checklist is a classic checklist in the sense that aspects are listed and checked whether they are fulfilled in difference to Nielsen Norman Group or Dieter Rams design principles. The criteria are divided into seven categories [11] and some more information can be found by expanding the box. The checklist is binary in its evaluation as the only option available for the evaluator is if the product fulfills the criteria or not.

3.4.2 UX Design Guideline for Samsung

The UX Design Guideline for Samsung is a research paper which was to find out how to guide UX designers when planning, designing and developing products related to accessibility [41]. When the research for the paper started in 2014, the aim was to identify accessibility UX rules that needed to be followed, establish a framework and provide academic and industrial results.

The design guidelines are presented as a checklist focusing on accessibility and comprehensive understanding for users with disabilities [41]. The purpose is to see if a product or service is sufficiently accessible for disabled users. Therefore, these guidelines seem appropriate for the current project and will be used as inspiration and perhaps also be incorporated within the final concept.

The methods used in the study were literature studies, user tests and councils from lawyers. The study's findings were that close communication and cooperation between accessibility researchers of different divisions were of importance [41] and that the user experience of disabled users is unique and should be shared to allow for better accessibility research.

The checklist created is a table with different columns and rows to be checked. The columns are *UX element*, *Disability type*, *UX rule*, and *Law/standard*. In the rows the type of device and the reference are added.

Finally, the paper suggests that two factors should be followed when considering accessibility: *Catering for people with disabilities* [41] and *Legal issues* [41].

3.4.3 Mobile Application User Experience Checklist

A checklist is not a substitute for an expert assessment of user studies but can be helpful for novice evaluators [42] when comparing many different mobile applications. The background to the research and creation of *the Mobile Application User Experience Checklist* (MAUX-C) was that information-presenting apps need to provide high-quality user experience. The paper *Mobile Application User Experience Checklist: A Tool to Assess Attention to Core UX Principles* emphasizes the need for high-quality information and a way to evaluate this [42].

The paper states that usability is important but not alone in contributing to good UX and therefore not sufficient to be the only aspect measured [42]. Thus, the goal of the created checklist is to determine if the apps align with the core characteristics of good UX and show each app's strengths and weaknesses. This could give developers insight into the user's satisfaction with the app before the actual interaction.

Many different tools have been created over the years to measure UX, but it has been found to often omit evaluation of accessibility and credibility [42]. The MAUX-C checklist aims to evaluate all core principles including accessibility, credibility, and desirability. Furthermore, the focus is on being a user-friendly assessment tool that presents "an evidence-informed, detailed evaluation of each principle to determine the overall UX quality" [42].

The checklist discussed in the paper is divided in seven principles with different number of items evaluated in each:

- Usable - 13 items
- Useful - 2 items
- Desirable - 5 items
- Findable - 6 items
- Accessible - 9 items
- Credible - 14 items
- Valuable - 5 items

Finally, empathy is put on the need to have a form of evaluation that allows for subjective evaluation and translation of user satisfaction into an objective report which is backed by theory [42].

3.4.4 The System Usability Scale (SUS)

As previously stated, a checklist can take many forms such as typical list [11], heuristics [40], and design principles [39]. However, a checklist could also be in the form of a questionnaire which becomes evident in *the system usability scale*. The System Usability Scale, or SUS for short, is a "quick and dirty" [43] yet reliable tool to measure perceived usability. It is organized as a questionnaire consisting of 10 questions, each with five response options ranging from strongly agree to strongly disagree [43] as a Likert scale. John Brooke, the creator of the System Usability Scale, states that;

"A consequence of the context-specificity of usability and measures of usability is that it is very difficult to make comparisons of usability across different systems." [44]

Therefore, comparing different systems should be avoided as one feature found incredibly useful in one system might not be helpful in another system, environment and with other users [44]. However, he discovered that a tool to get a general indication of one system compared to another was necessary to find which system had the greatest potential for usability. It was also found through varying studies and user testing that the tool needed to be quick and effortless to use.

The resulting tool is the SUS which is a rather subjective scale with questions such as "I think that I would like to use this system frequently" and "I found the system very cumbersome to use" [44]. It is primarily used after the respondents have had the chance to test the system for a while and graded by summing up the individual scores for each item with a total maximum sum of 100. Each item is also weighted to represent its importance.

3.4.5 The Standardized User Experience Percentile Rank Questionnaire (SUPR-Q)

The Standardized User Experience Percentile Rank Questionnaire (SUPR-Q) is a questionnaire that can be used for evaluation of websites. A more common way of evaluating websites is by observing several users tackling different tasks and scenarios [45]. During the observation, the user's attitude is being measured and considered. However, observations and interviews take time and this is where a checklist can provide a quicker, more comparable alternative. When using a checklist, the results are more reliable when using a standardized usability questionnaire such as SUPR-Q than a homegrown one [45].

According to Jeff Sauro, a useful questionnaire must be short enough not to burden participants and researchers [45]. It needs to contain references to gain trust and contain questions that are specific enough to be relevant but not so specific that they cannot be applied to multiple websites. It also need to be *generalisable, multidimensional, brief and normed*.

The SUPR-Q questionnaire measures four aspects of UX; usability, trust, appearance and loyalty [45]. And after completing the questionnaire, the scores are calculated and a rating is presented. This rating can be compared to other websites [46] and is one of the reasons the SUPR-Q is sometimes used as a benchmarking measure. The questionnaire itself consists of eight questions divided into four categories with two different scores; percentile and raw/component [46]. The seven first questions are measured with a 5-point Likert scale ranging from Strongly disagree to Strongly agree with the eighth question being a standard NPS question of "How likely are you to recommend...?" which is scored between 0-10 [46].

4

Methodology

This project reviewed the UX checklist currently used by the UX specialists at IKEA of Sweden. To succeed in this project, the methods used must be carefully selected. This since their purpose is not only to be a part of this design process of redesigning a checklist but to help build an understanding of how to *evaluate*, since that is the purpose of the checklist itself. Therefore, this section presents the possible methods to be used. There is also an explanation of the design process to clarify what framework will be used during this project.

4.1 Double Diamond

The Double Diamond (figure 4.1) is a design process model developed by the UK Design Council in 2004 [47]. It is a framework that highlights the design process and includes key principles and design methods used to achieve positive change. Design Council's Double Diamond consists of two diamonds representing different stages of the process. The first half of the diamond focuses on divergent thinking, while the second half focuses on convergent thinking. In the divergent phase, the designers have a broad approach when exploring the problem, while the convergent phase focuses on solving the problem. A reason why the Double Diamond has been around for almost 20 years and has not gone out of date is that it is adaptable [48]. For example, multiple diamonds can be added before, after, or even inside the core model if necessary. That makes it applicable to an extensive range of design processes. Although, a limitation of the Double Diamond is the belief that it is a linear process when it is not.

The two diamonds within the model are defined by four phases - *discover*, *define*, *develop* and *deliver*.

- **Discover**

Understanding the problem space is important to decide on what to design [9], rather than assume what is problematic. That is done through research and by gaining information from those affected by the issues[47].

- **Define**

Once the problem space is explored, it needs to be narrowed down. Using the previous phase's insights can help define what to focus on.

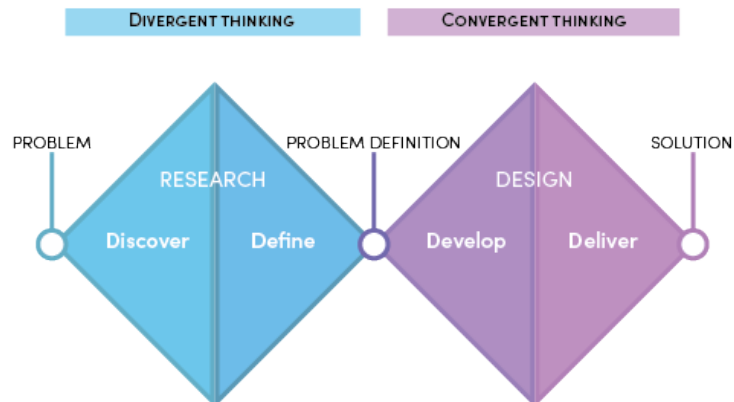


Figure 4.1: Double diamond created by authors

- **Develop**

Entering the second diamond, the focal point is to gain more insights and inspiration from others by, for example, co-designing with a range of different people [47]. All ideas and insights are checked against the requirements developed in the first diamond before prototyped and evaluated [9].

- **Deliver**

This phase involves testing in a small scale, removing those solutions that will not work, and improving those that will.

4.2 Data Gathering

Gathering data is a central part of the design process when deciding on requirements or performing evaluations. Data could be anything that helps understand a design or the users' needs and behavior [9]. Numbers, words, descriptions, videos, photos, sketches or comments are only a few variations of data that can be collected. There are many ways to gather data, and the methods used could depend if the data should be qualitative or quantitative.

4.2.1 Benchmarking

Benchmarking is used to evaluate the market and compare other products or services. When performing benchmarking, the aim is to identify opportunities in the market along with possibilities for improvement [49].

When performing benchmarking, the first step is to find data about competitors [49] and analyze it. This is followed by comparing and finding areas of improvement.

Benchmarking is an excellent way to confirm if the design process is on the right track through comparison with other companies. It also helps designers to assess the impact and improvement. Additionally, it is essential to have a critical eye during the benchmarking because if one, for example, has a too narrow perception of the competitive situation, that could lead to difficulties catching up with the competitive companies [50].

4.2.2 Focus Group

One way of interviewing a group of people is through focus groups [9]. This method is often used for qualitative research, and evaluation [51]. Between three to twelve [9][52] people are invited to discuss a specific topic while led by a trained facilitator. The chosen topics are usually presented to the participants in the shape of questions but can also be physical objects such as cards to sort, a movie to watch or a game to play [52].

Performing a focus group is often an excellent method to use because the discussion usually generates a chain effect of ideas that paves the way for new ones and "encourages the formulation of different interpretations resulting in better final knowledge of the topic investigated" [53, p. 1132]. Unfortunately, focus groups are an easy choice even when they might not be the best-suited research method to use. This since it is a cheap method to perform and easy to organize as it only requires a facilitator and participants. That being said, it is still a method that requires a lot from its researchers in terms of preparation and implementation [53]. The participants are selected to represent the chosen target population, which for example are not only creators but also buyers and users of the product [9]. This is to understand the whole target population since they interact with the product for different reasons. Here it can be useful to involve people with different disabilities to ensure that accessibility is considered. It is also vital that the participants are from the same social group so that they share similar characteristics since that could help the participants feel that they all have encountered similar situations regarding the chosen context [53]. However, this might result in a homogeneous group that might exclude valuable information from other groups.

4.2.3 Interview

Interviews are a good tool when gathering information about users and user patterns. This since interviews provide qualitative data about a context or user group and can be complementary to observations, as an interview allows the interviewer to collect thoughts and ideas of the users as well as firsthand experience, which can be valuable [8].

An interview can be seen as a conversation between two people. However, it is a rather particular conversation as one of the participants asks the questions and aims to discover the other person's experiences, views, and ideas [6].

Interviews can be conducted with individual users and in larger focus groups, depending on resources and time [9]. Hence, interviews provide possibilities to reveal

an overall picture and/or detailed information about a given context. As with focus groups, it can be useful to involve people with different disabilities to ensure that accessibility is considered, and that all users are being heard.

Typically, interviews are performed to generate quantitative and/or qualitative data. However, as interviews can be conducted in many different ways, there are various reasons and outcomes. Generally, there are three different levels of interviews; structured, semi-structured and unstructured. Structured interviews follow a script of questions to generate quantitative data [8] but can also generate qualitative data. Unstructured interviews have an open conversational format that will provide qualitative data [8] rather than quantitative data. The semi-structured interview lands somewhere in between in which there is commonly a loose script to follow, but that can be disregarded as the interview goes on [9].

There are many advantages to interviews, such as having the opportunity to dig deep and ask questions that helps identify the root of the problem. However, when interviewing, the person asking the questions must be aware that their way of presenting themselves and their approach can affect the interviewees' perception and willingness to answer the questions [6]. The interviewer must therefore consider if there is a need to change their image and if they are willing to do so.

In preparation for the interview, the interviewer must also consider what they wish to find out and what questions to ask. If the plan is to compare the answers later, the questions need to be standardized [6]. If the goal is to understand the situation, iterative questioning might be more helpful, meaning that the questions change between each set of interviews.

4.2.4 Affinity Diagram

When gathering data, an affinity diagram is one useful method to structure the content to get a good overview. An affinity diagram is performed by writing observations, concerns or requirements on individual sticky notes before clustering them based on affinity [8]. The result is multiple groups of information that tells a story about people, their tasks and their problems. It is said that affinity diagramming is an inductive exercise since it is performed "from the bottom up" [8, p. 12].

As mentioned, the affinity diagram is an excellent method to use when needing to cluster a lot of information, which is suitable for projects like this that often require a lot of data gathering. It can be seen as overwhelming though, due to a lot of data that needs to be structured and the fact that there is no right or wrong regarding the chosen categories.

4.2.5 Co-design

When performing a co-design workshop, the stakeholders become the designers and get to participate in the design work. During the workshop, the design process is turned on its head, designers and researchers act as facilitators of the activities, and the stakeholders act as designers [54]. One of the advantages of a co-design workshop is that experts in the field participate in the design process, which may highlight

the actual problems and limitations of the current situation. To ensure accessibility, the group of experts should not be too homogeneous but should include people with disabilities as well. A disadvantage, however, is that a co-creation workshop depends on the activities included, so the outcome may differ significantly depending on the activities.

4.2.6 Card Sorting

Card sorting is a participatory design method in which the participants are asked to sort and categorize a set of cards [8]. The method is used to find out how participants group concepts together and how they see that things relate. Therefore, by using this method it is easy to understand the user's subconscious and how they want to organize the information [55]. The method can also be used to help define certain terminology to make sure that everyone involved has the same understanding of the definition [8]. A further use for card sorting is to generate options for structuring information and evaluating categories. It should be mentioned that this method could be time-consuming, maybe not for the participants but for those who analyze the results [55].

In the beginning of the method, participants are given cards with printed concepts, terms, or features on them [8] and are then asked to sort them in different ways. The card deck also includes blank cards for the participants to fill in if anything is missing. The deck has 30-100 cards, and the participants are then asked to work individually or in small groups.

When all the sessions are completed, the sorting is discussed and moderators try to find consistent emerging patterns in the sorting [8].

4.3 List of Requirements

Having a list of requirements is a common part of the design process. The list could be used both to showcase what is the goal of the design process, as well as be the key guidelines during an evaluation [56]. An advantage of having a list of requirements is that it becomes clear what is necessary for the product to fulfill to be useful to the users. A disadvantage is that it can create a very rigid framework for the designer. The purpose of having a list of requirements is to create awareness of what is created and what factors should be considered in the final design. Here it is important to remember to include accessibility. The content of the list is requirements regarding what the product should achieve and is the basis for the ideation phase that decides how the product should fulfill the requirements [57]. The content of the list is specified and developed throughout the process [56].

The list is usually divided into five columns - *requirement*, *measurement*, *comment*, *necessary/wish (N/W)*, and *weighing*. The requirement column contains the requirement, often written as a short statement, preferably only a few words [56]. Any measurement that needs to be used for the requirement is added to the measurement column, for example, if measured in days, time, centimeters and so on. The comment column allows for further explanation of the requirement. It is also

important to think of if the requirements are necessary or if they are a wish that would enhance the product. If the requirement is crucial to fulfilling the purpose of the product, then it should be marked as necessary. Otherwise, it should be a wish. Finally, the weighing column is where each requirement is graded based on importance to fulfill the product's purpose, according to Jonas Tuveesson, lecturer in industrial design.

4.4 Ideation

The goal of the ideation phase is to come up with an assortment of ideas[7]. It is a collaborative and fast-paced phase where conceptual design starts and design problems are solved.

4.4.1 Brainstorming

Brainstorming is a method used in ideation that results in a large number of new ideas, concepts, and new knowledge in the problem space [8]. Typical for a brainstorming session is the focus on quantity over quality, which encourages the participants not to hem their creativity [58]. Though, it is essential to remember the overall objective of the session since that could easily be forgotten when producing a quantity of ideas [59]. During brainstorming there are no wrong ideas and every idea should be welcomed and can be built on by all team members [8]. The environment of a brainstorm should be judgement-free and each participant should feel free and safe to express their ideas without being questioned by the team [8].

A brainstorm session should be no longer than 60 minutes as this is how long a person can keep their physical and mental energy up that is required for a brainstorm [60].

4.4.2 Brainwriting

Brainwriting is an individual, silent and often anonymous form of brainstorming [61]. During brainwriting all participants have a set amount of time, usually a few minutes, and are tasked with writing down their ideas that are then presented in a pre-established format. This format could be using post-its, read aloud, or simply typed to be shared at some point in time. Since brainwriting is done under silence it allows participants to simultaneously create and build-upon ideas without the risk of falling into discussions where some opinions might be more dominant than others [61]. Due to it being a method where the participant express their ideas in writing, it is not suitable for everyone. Everyone might not be comfortable with that format due to not being proficient in spelling, grammar etc. [58].

4.4.3 Six Thinking Hats

The six thinking hats can be used to improve communication in a brainstorming session [62]. The method is especially helpful when the brainstorming session has been going on for a while, and the level of energy and creativity start to decrease

[63]. Still, it is also important to note that it can be time-consuming, and one should think twice before using it since "too many cooks can spoil the soup" [64, p. 88]. By using this method, the participants can expand their thinking capacity when taking on a role with a perspective that they usually do not have [65]. To change the perspective, the members of the brainstorming team can use the six thinking hats, which allows the members to look at concepts from a different point of view to build on and evaluate the concepts [62].

4.4.4 Concept Portraits

Thick concepts are described as concepts that have "high descriptive richness [...] i.e., they have diverse interpretations by different people" [66, p. 47]. To help designers put together well-defined requirements from such thick concepts, the method of concept portraits can be used. This method is based on six questions being asked about the concept. The questions asked could associate the concept with, for example, countries, animals, famous people, objects etc. By doing this, a common understanding of the concept is easier achieved within the group of designers, which further helps create acceptable design solutions.

A checklist can be used in many ways; therefore, concept portraits are a suitable method to unravel what each participant thinks about it. The questions should not be given too much thought, which may be one difficult part of this method. Even though this method helps create a shared understanding of the concept, it may create more confusion. It should also be noted that this method is used to broaden the participants' minds and does not produce any user data or new concepts.

4.4.5 Crazy 8

A quick and easy method to use when brainstorming ideas is the Crazy 8. It challenges the participants to come up with eight ideas in only eight minutes, urging them to push beyond their first idea and quieting their inner critique by allowing impulsive ideas - weird, impossible, or even impractical - to flourish [67]. To perform the method, each participant should have their own paper and either fold it or draw eight sections. The timer is set for eight minutes, and the participants do their best to fill out each section within the time frame. Once the timer has gone off, everyone needs to stop sketching.

Since it is a brainstorming method, it is useful during the ideation phase of design projects like this. This method can be seen as intimidating by team members who do not believe them to be artistic, creative or full of ideas. Therefore, the rest of the group needs to pinpoint that the sketches do not have to be beautiful; they just need to communicate the idea [67].

4.4.6 Morphological Matrix

A morphological matrix is used to produce a large number of ideas. The matrix is set up with a grid where each row contains a category of significant elements for the problem. In each box, a solution proposal to that category is drawn up

or written, and when the whole matrix is filled in, the variables are combined by drawing lines between the boxes. This produces many ideas that otherwise would not have been thought of [56]. This large amount of ideas is one of the shortcomings of this method since that can quickly be seen as overwhelming [68]. The structure of this method may also hinder the designer's creativity since they may think of it as modules instead of other possible concepts.

By using the morphological matrix, the user documents their process in a way that allows them to document "the different working principles she has considered, both the combinations that are relevant and the ones that are not, and the incompatibilities between working principles" [68, p. 3]. Solutions can also be created by drawing different ideas on pieces of paper and combining them. When the majority of solutions have been developed, the ideas that are not feasible are eliminated to leave the feasible solutions to be evaluated.

4.4.7 How Might We

When the problem areas of the users have been identified by defining themes and insights, these problem areas can be written as statements to be used in the design process [69]. By beginning the statements with "*How might we*" (HMW), one states that it is possible to find a solution to the problem and that it can be answered in multiple different ways. This method aims to find design opportunities, so if the problem areas result in several HMWs, that is good.

This method's difficulty is finding the perfect balance in the HMWs. It should not be too broad so that you do not know where to start the brainstorming, but not too specific so that it hinders creativity. That balance can be tricky to achieve, but once it has been, it is the perfect frame for innovative thinking [69]. To find that balance, read the HMWs and if it allows for a variety of designs, then make sure that it is not too broad, but if it does not, then broaden it.

4.5 Evaluation

Evaluation is used to ensure that the designed product is helpful to the users [9] and can be done both with or without users. When performing evaluations it is important to consider accessibility, by inviting people with disabilities to the evaluations. This to ensure that what is evaluated can be used by a wide range of users. There are different evaluation methods to consider depending on where in the development phase the designer is, what questions should be answered and what type of prototypes are used to represent the design. Other factors can include how quick or easy it will be to set up the evaluation or if the data collected should be quantitative or qualitative [7].

The two most common approaches to evaluation [6] are *open inquiry evaluations* and *audit review-style evaluations*. When doing an open inquiry evaluation, the goal is to find out what is being done, why and what people think about it [6]. For this kind of evaluation, questions such as 'Is that which is being evaluated of value?' are asked. The second type, audit review-style evaluation, focuses on the achievement

of what was previously deemed to be of value [6]. When conducting this kind of evaluation, the target is to understand the "previously established purposes, goals or objectives, and the desired activities and outcomes, and what is actually being done" [6, p. 112].

This section presents possible evaluation methods for assessing the result of this master thesis.

4.5.1 Cognitive Walkthrough

Cognitive Walkthrough is a method used to evaluate the ease of use and users' behavioral patterns in the way they anticipate the 'next steps' of a system [8]. The system can be measured by how well the user achieves the predicted steps, by the designer observing and writing down the expected steps of how to accomplish a task while the user is trying to complete the task [8]. The tasks that the user managed to achieve can be considered to have higher usability.

The method of Cognitive Walkthrough focuses on how people solve problems and requires that the following four theory-based questions are asked for each step of the action sequence:

- *"Will users want to produce whatever effect the action has?"*[8, p. 32]
- *"Will users see the control (button, menu, label etc.) for the action?"*[8, p. 32]
- *"Once users find the control, will they recognize that it will produce the effect that they want?"* [8, p. 32]
- *"After the action is taken, will users understand the feedback they get, so they can confidently continue on the next action?"* [8, p. 32]

A version of Cognitive Walkthrough that highlights accessibility issues is the Barrier Walkthrough method which can also be applied. This method includes setting up a scenario for a specific category of user which the evaluator then follows, and identifies possible barriers that could hinder the user from achieving the goal [70].

Cognitive Walkthrough is best suited for products that you just walk up to and interact with and that are primarily audio- or display-based, such as ATMs [8], but it can be applied to other areas as well. This method can identify specific problems early on in the design, which is seen as beneficial, combined with it being a simple method that is easy to learn [71]. However, the method is often time-consuming, and the number of problems it can identify is limited compared to usability testing. In contrast, Cognitive Walkthroughs often only find 40% of the issues.

4.5.2 Heuristic Evaluation

Heuristic evaluation is used to evaluate a graphical interface from the perspective of different heuristics. Heuristic experts usually perform the evaluation to identify problems that need to be adjusted before user testing begins [8]. Therefore, a heuristic evaluation can be done early in the project development as soon as a low-fidelity prototype is available. The evaluation should be presented as a written list where the deflections and how they are inconsistent are highlighted [8]. The

session usually takes one or two hours, but some interfaces need more extended evaluations, although that should preferably be split up into shorter sessions due to the concentration of the evaluator [72].

Performing a heuristic evaluation is smart since this method allows around three to five evaluators to evaluate the interface, which increases the chance of problematic areas being found [72], [73]. The evaluators' answers might be biased due to their previous knowledge and experience, which must be considered when reviewing the result [73].

4.5.3 Pugh Matrix

A method to help the designers evaluate concepts and decide on their strengths and weaknesses is the Pugh matrix. For this method, a matrix is created in which the concepts are compared with an existing product [57], usually the original product or competitors. The categories it is compared to are taken from the requirements list that should have been previously created. For each category a concept is given a symbol as a grade; the symbols are "+", "-" and "0". The "+" indicates that the concept fulfills the requirement better than the original product according to the evaluators, a "-" means that the concept fulfills it less or worse than the original and a "0" indicates that the concept and the original product performs equally [57].

When all categories have been evaluated, the number of "-" for each concept is subtracted from the number of "+" for the same concept. The concept receiving the highest final grade is deemed the concept with the most potential and should therefore be further developed [57]. This method gives a clear indication of which concept that is "the best". However, it is a somewhat subjective method in which the designer's beliefs play a part in evaluating, which could affect the result. Therefore it is recommended to perform a second round of evaluation with the Pugh matrix before continuing development [57]. This is especially important if some concepts were combined during the first evaluation to possibly give a better end result. In those cases, the method should be remade with a completely new matrix.

4.5.4 SWOT

SWOT stands for Strengths, Weaknesses, Opportunities and Threats. A SWOT analysis can be used to analyze concepts to highlight a concept, product or organization's strengths, weaknesses, opportunities and threats [74]. The SWOT analysis results in a 2x2 matrix where each square represents one of the four highlighted areas [74]. This analysis can be applied to various factors, such as brands, products, or even a partnership [75]. It is straightforward to use and does not require specific training, making it a suitable evaluation method. One disadvantage of the SWOT is that there is a risk of adding a subjective perspective to the evaluation that might give biased results, which should be considered.

4.5.5 Dot Vote

When the ideation phase ends, and decisions have to be made, the dot vote method may come in handy. It is an easy method to use when making decisions and to achieve group consensus [76]. To perform this method, the ideas are placed next to each other so that it is possible to get an overview of all the ideas simultaneously. Before voting, it is good to review the requirements, problem statement or the goal to refresh the memory of what the solution should fulfill. Each participant gets to present their idea for a few minutes. When everyone has presented, each participant is given several dots and gets to vote on their favorite ideas. Finally, the idea with the most votes wins if the group reaches a consensus.

This method is simple to understand and perform [76], making it a good choice when making decisions within a design project. Despite that, it has its downsides. For example, it is easy to be biased and vote for your own ideas or to feel the pressure and vote for the ones the other participants have voted for. That is hard to get away from in this method, so that might have to be considered when performing the dot vote.

5

Planning

One of the most common traps when planning a project is to not allow enough time for the planning phase [6]. The authors will therefore aim to allow for a more extended planning phase which will cascade into the research phase. For planning, the authors will use a Gantt chart. The Gantt chart is a well-working method used to create an overview of the project quickly [57] and involves creating a chart with activities on the y-axis and time on the x-axis. The time span of each activity is displayed as a horizontal line, and the line length indicates the activity's duration.

The thesis aims to answer the research question: *What are important factors to be considered for a UX checklist when it comes to usability?* As part of usability, the authors will also look at accessibility as they believe this allows for usability. However, usability will be the main focus of this thesis.

At the start of the project, the authors will be attending information about the code of conduct at IKEA to understand the company and stakeholders better. This will be followed by understanding and reviewing the current UX checklist provided by IKEA of Sweden, benchmarking and reviewing the wish list from the UX specialists at IKEA of Sweden to gather a deeper understanding of their collected data and be able to analyze the information. A focus group will be held with the reference group to allow the authors insight into the work with the checklist and general opinions about the current list. The planned approach is then to proceed with literature studies of UX, usability and accessibility and what aspects should be included in the checklist. This will allow the authors to gather theory and knowledge of different UX aspects and methods for more in-depth planning and decision making. The literature studies will also help understand which requirements are important when and where during the evaluation process.

The information gathered will then be complemented by user studies in the form of interviews to better understand the users and their needs, followed by an analysis of the information collected and ideation for possible solutions. A co-creation workshop will be held with the reference group to allow for further input and ideas from the users of the Checklist. When sufficient information and input have been gathered, prototypes of the checklist will be created and evaluated. The prototyping will mainly take place using Miro, Figma, and pen and paper. Prototyping will then be followed by further analysis to understand what needs to be changed before a new round of iteration occurs, followed by the second round of prototyping. Finally, the prototypes will be evaluated and analyzed once more. The navigation of the checklist will be tested with the reference group, and the full extent of the checklist

will be tested on a real digital solution to find the final improvements needed to create the finalized design. For the evaluation, personas with different impairments will be created and used to ensure that the UX checklist is designed for accessibility.

During the whole time period of the project, the thesis report will be written and added to. When writing the thesis report, the division of analysis will be parallel [77], meaning that the parts will follow the same order in the method and the result section for ease of following the process when reading. For example, suppose the method section is divided into literature studies, user studies and prototyping. In that case, the results of the methods will be presented with the same subsections and not, for example, as literature studies, interviews, and prototyping [77].

In the final weeks, a thesis presentation will be put together and presented at the university and at IKEA of Sweden. During this time, the authors will also contact other groups to find opponents of the thesis for the final submission and act as opponents themselves. When acting as opponents and giving peer response it is important to start the feedback positively and post the criticism as questions [77]. This is something the authors will aim for as the purpose of the peer response is to help the other group improve their thesis report. The peer response will be divided into two sections; *Content & Structural Aspects* and *Language & Style* [77], to ensure that as much as possible is covered in the response.

The time plan will roughly follow the plan as seen in Appendix B.

6

Execution and Process

This chapter describes the execution of methods and the work process from the ideation phase to the evaluation. The methods used in the project were the most relevant to the thesis at the time and were chosen after careful consideration of the pros and cons.

6.1 Analysis of Benchmarking About Checklists

As IKEA of Sweden had performed a benchmark study before the beginning of the master thesis, both authors individually reviewed the Miro document containing the benchmarking to gain a common basic understanding of checklists. Notes were written into a shared document about each checklist. These notes were then assembled into a list presented to the advisor Jonas Uddman during a meeting where both positive and negative aspects of each checklist were discussed.

The meeting was approximately an hour long, held via Microsoft Teams and both group members and the advisor were present. All three navigated through the Miro document while discussing each checklist and presenting the chosen findings. This enabled Uddman to give specific feedback regarding each checklist and the presented findings. The feedback was noted in a document and later summarized, found in Appendix C.

The discussion with Uddman resulted in some interesting findings. One discussed topic was the structure of the checklist, and that it should preferably have a hierarchical order. That since it would give the UX specialists the ability to decide on which level they want to evaluate the chosen digital tool, such as either by a general overview or on a more detailed level. It was also noted that by having different levels, it would be hard to avoid redundancy. Which levels are desired would have to be further explored throughout the project.

Since the checklist is supposed to cover everything necessary to evaluate UX and not only be narrowed down to UI, it is not surprising that some areas do not apply to every evaluated tool. Therefore it was discussed that it should be possible to choose what topic one wants to evaluate regarding the digital solution, for example, by using filters or tags. Currently, some checklists have such a high level of detail that they could include things that might not even exist in the chosen solution. A checklist that exemplifies this is the GUI Screen Design Checklist [78]. Therefore the option to choose what to evaluate or not would make the evaluation itself become

more distinct and credible. Another thing that would strengthen the credibility of the evaluation would be to have well-known sources as a basis for the choices made, perhaps gathered within a summary to be used during the final presentation.

Other things mentioned were the importance of using visuals that are suitable for the topic, allowing the rating system to not only be yes/no, use explanatory headings and perhaps use external sources to explain hard words. One of the UX specialists also found cultural differences fascinating, so the possibility of adding that area to the checklist was mentioned. Finally, the checklist should be able to be used by whomever, no matter their experience. Therefore it needs to have an interface that can be used and understood by beginners, intermediates and experts.

All this input was very valuable and gave a good idea of what the stakeholders wished the checklist would fulfill. This was kept in mind further in the process, and the authors continued with the project's next phase, which was to conduct a focus group with the rest of the reference group.

6.2 Focus Group About Working with the UX Checklist

Since the authors had not yet met the whole reference group, it was decided to conduct a focus group that would act as an opportunity to meet the UX specialists. This session also aimed to get a brief understanding of the UX specialists' relationship with the current checklist and what they believed was important to evaluate. Together with the advisor Jonas Uddman, a date was set and a Teams-invitation was sent out to all participants beforehand. During the same time period, the authors prepared the focus group. Since the focus group would be held online, a Miro board was created and contained all of the exercises and information needed. There was also a separate document containing an agenda with appropriate questions, explanations of tasks and division of time.

As planned, the focus group was conducted over Microsoft Teams while using Miro and took about an hour. Five UX specialists from the reference group participated, but the sixth member could not participate. One of the authors moderated the session while the other one took notes, kept track of time and administered the Miro board. The result from the focus group was grouped according to related themes in Miro (figure 6.1) and can be viewed in Appendix D, while the notes were kept in a separate document.

The result from the focus group helped the authors to understand how the UX specialists currently worked with the checklist. One example of this was that they used the checklist maybe once or twice a year, but when they used it within a project, it could take several months before the evaluation was finished.

Another part of the focus group was to get their opinions of good and bad aspects of the current checklist, which was done by having them look at screenshots from some of the checklist material that the authors had access to. During the discussion about this task, it became clear to the authors that the checklist was available in

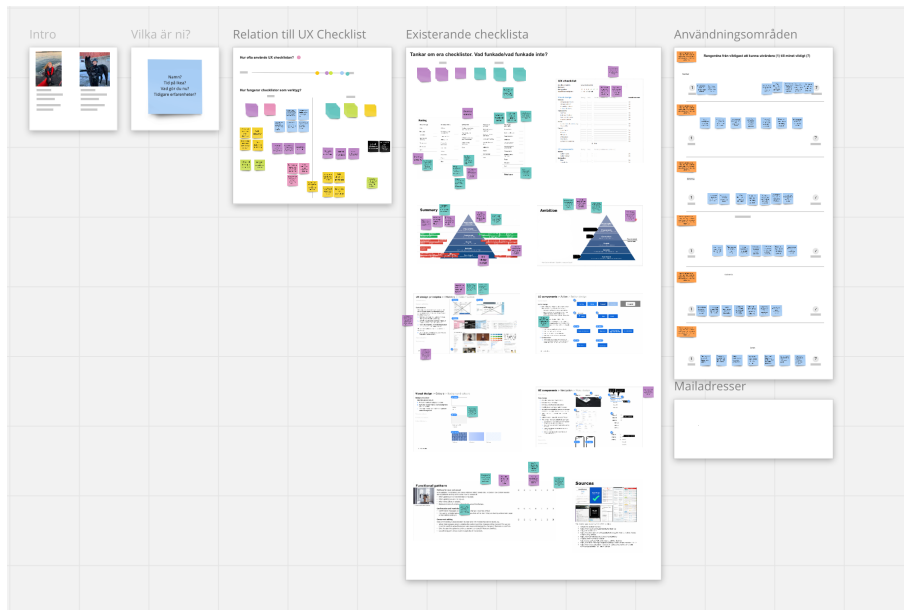


Figure 6.1: Overview of the Focus group done through Miro.

two versions - the short and the long versions. Since this was brought to attention after the task, it was revealed that some UX specialists had not worked with the long version. This lack of experience might have contributed to the result not being as thorough as it could have been. Finally, the way the UX specialists prioritized the information to be evaluated within a checklist, from least important to most important, was revealed. The topics they were supposed to prioritize had been taken from both their current checklist and some checklists used in the benchmarking.

6.3 Interviews Regarding Evaluation and the Checklist at IKEA of Sweden

The focus group gave a basic understanding of the checklist, but more clarification was needed. Therefore, it was decided to conduct interviews with the reference group to gather a better understanding of the checklist, the UX specialists' role, and how they worked with the checklist.

Before the interviews were conducted, a consent form was created based on a template from *The University of Edinburgh interview consent form* [79] and notes from the academic supervisor of this project. This so that the participants would feel comfortable with their involvement in the interviews and know that they could withdraw at any time. The consent form was sent by e-mail to the interviewees a week before the interviews were to take place, and all participants had signed the form before the interviews began. The consent form can be seen in Appendix G.

Out of the reference group, five of the six people were interviewed. The authors decided not to interview the advisor at IKEA of Sweden even though he is a part of the reference group, as this would complicate his role of giving feedback to the authors. Four interviews took place over Zoom while one took place in the home of

one of the participants.

The interviews were semi-structured, held in English, took about one hour each and were recorded to be transcribed later. The authors took turns interviewing and taking notes, and when all interviews had been carried out, they transcribed two and a half interviews each.

The questions for the interviews focused on, as previously mentioned, the way that the UX specialists use the checklist. Some interview questions can be seen below, but all of the questions can be found in Appendix E.

- How would you describe your role as a UX specialist?
- Within a project, how much time would you estimate is used to work with the UX checklist?
- Besides the checklist, in what other ways do you evaluate digital solutions today?
- How do you think the checklist works as a tool?
- How would you like to evaluate interfaces/solutions (no limitations and you could dream freely)?

Shortly before one of the interviews, it was revealed that one interviewee did not have the same background as the rest and had not worked with the checklist. This led to a last-minute change of the questions to make them suit the interviewee's position better. These questions can be seen in Appendix F.

During the interviews, it was revealed that the checklist is not only used by the UX specialists for evaluation but can also be used as a medium during workshops. This meant that another dimension of users needed to be considered in the following ideation phase so that non-UX specialists could also use the checklist. Another finding from the interviews was that the UX specialists understood the checklist on different levels due to their level of proficiency and experience with the checklist. Some UX specialists have used one of the UX checklists for years, while others are new to working with checklists. This, of course, greatly impacts their understanding of the checklist, especially in the case of one interviewee that had never worked with the checklist.

The transcribed interviews were to be printed, and then quotes that were believed to add information would be cut out and used in the affinity diagram, but more about that below.

6.4 Analysis of Interviews

To summarize the information retrieved from all interviews, an affinity diagram was used to analyze the result. Analyzing the interviews gave the authors a better view of the different problem areas with the checklist. To perform the affinity diagram, the previously performed interviews were transcribed and then printed. During a couple of days, the authors highlighted important and interesting quotes from the interviews. These were later cut out and individually placed on a big whiteboard

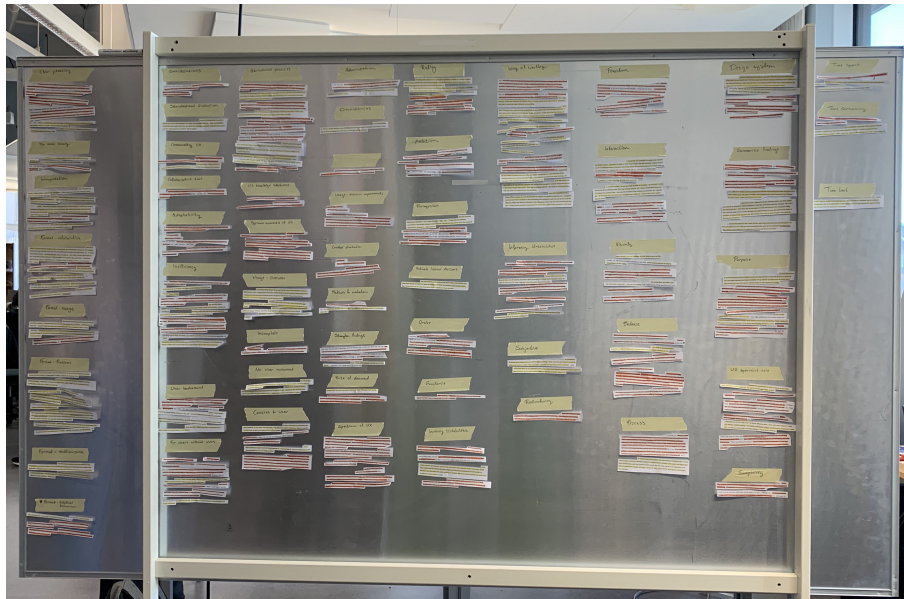


Figure 6.2: Photo of the finished affinity diagram created on the back of a whiteboard.

(see figure 6.2). The next step was to read through the quotes and group them into a few bigger sections. These sections were gone through with a more critical eye to sift out and divide the remaining ones into groups based on a higher level of detail than before. Finally, the authors read through, rearranged and sifted the quotes one last time before giving each group a heading. The finalized diagram consisted of 53 groups, and in total it took one week to analyze the result from the interviews. These 53 groups were divided into 11 areas, seen below, together with a short summary of each group's content.

6.4.1 Importance of UX

UX Knowledge Interference

The users of the checklist are the UX specialists at IKEA of Sweden, and for them to get that role they have a certain UX knowledge and UX background. Therefore, with the checklist stating some UX aspects, the knowledge of the UX specialists and the information within the checklist could interfere. One interviewee describes using the information within the checklist as an obstacle since it includes many things they already know.

Spread Awareness of UX

The checklist is not only a tool for evaluation, it is also a way of communicating the importance of UX and making other people realize what they are exposed to when using systems. By doing this, you can raise awareness, desire and knowledge about UX and help create an understanding of UX at large.

"[...] suddenly people realize that this tool is not good enough for us, and then we needed to have a structured evaluation of it and highlight why it is not good enough. [...] now we have raised awareness." - Participant 5

Several Purposes

As IKEA of Sweden has an internal design system, the checklist should be more about discussing the soft values and the overall values of user experience design rather than UI components. The checklist should preferably be used when IKEA of Sweden is in the process of buying a tool, but preferably before paying for it to evaluate the tool and to find the most suitable one from a UX perspective.

Another purpose of the checklist is to ensure that the users are considered when buying a new tool. It needs to be a balance between business, technology and user needs and today user needs are often neglected in this balance. One cannot buy a tool and expect it to solve all problems if users are not considered in the buying process. Therefore it is important to include their perspective.

Moreover, it is believed that the overall experience of a tool is much more important than the color of the components, and so a third purpose of the checklist is to communicate and give validity to UX. It is very easy to dismiss UX as being about pretty colors. Therefore the checklist is a tool that should make people understand the importance of UX and create a common understanding of it.

Communicating UX

The way of communicating UX must be given careful thought. If not, people without UX knowledge or expertise may have trouble understanding the content and bypassing the purpose due to limited understanding.

Spectrum of UX

UX is a big field with many different areas. Some such areas are tone of voice, colors, clean and simple layout. It is about visuals as well as patterns, navigation and minimal effort. UX can be easy to evaluate as well as deep and complex, and the checklist need to communicate all the different spectrum of UX.

6.4.2 Format of the Checklist

Collaborative Format

The checklist needs to be in a collaborative format. That includes other users being able to edit the document and that it can easily be shared with other groups such as users and stakeholders. One central aspect is using a format that people within the company are familiar with and understand how to use.

Format - Usage

The format of the checklist needs to feel like it is alive in the sense that it has real-time updates and that it is updatable. By using that kind of format, it is easy to know that it is the current version they are working in which also makes it easy to collaborate. The UX specialists also wish to have some sort of free space where they, for example, can copy and paste things.

Problems of Format

As of today, the UX specialists work in multiple programs. They mainly use a PowerPoint presentation and Miro, but also Excel files when necessary. They jump back and forth between these tools due to their different strengths and weaknesses, for example, they take screenshots from their PowerPoint presentation, paste that

into Miro to use and then put it back into the presentation.

The interviewees describe PowerPoint as an inflexible tool that, for example, looks different in presentation mode and edit mode between users, and there are difficulties regarding collaboration since they want to keep their current version for review, but other users want to continue working which leads to them creating new versions. They also find it hard to collaborate in it since it does not feel as smooth as, e.g., Google Drive or Miro. Miro boards, on the other hand, are smooth to use but can get quite messy, which is why they would only send it out together with the checklist if it were very structured. It was also mentioned that they transferred information into an Excel sheet, even though one interviewee stated that they do not want to work in Excel.

"[...] not so nice to collaborate in the current version and that's also, we were jumping between PowerPoints and Miro... So screenshotting things from PowerPoint and putting them in Miro and then moving it back." - Participant 3

Multipurpose of Format

The format used needs to fulfill multiple purposes. It needs to be something that can be used in a presentation, but it should also be a document that can be understood separately since it is often requested that the document is sent out after a presentation is held.

Format - Habitual Behaviour

There is a wish to work with the tools that are commonly known, both for the UX specialists individually but also regarding internally at IKEA of Sweden. By using widely used programs, it becomes more accessible and understandable for those involved since it is a lower threshold than if they were to use an unknown program. As of now, PowerPoint is very often used at IKEA of Sweden when people show documents or share something.

"By doing it the same way other people document their things it becomes more accessible for people it becomes simpler it is a lower threshold to step into and using" - Participant 5

Collaborative Tool

Currently, the checklist works well as a collaborative tool in the sense that it can be used and understood by people without UX expertise. This is fulfilled by having a helpful and easy structure.

Interaction

Interaction with the new checklist should be easy and intuitive, with the possibility of skipping sections that do not apply to the digital solution. It should also be easy to jump back and forth between different sections of the checklist.

Additionally, it was expressed that when multiple UX specialists are working with the checklist, there should be a possibility to leave comments on other people's grading and comments. Updates made to the checklist would also take immediate effect with some information regarding what has been changed, which would be received when entering the checklist. Finally, comparing evaluations of similar but

different digital solutions should also be possible, and the checklist should be divided into core and extended content.

6.4.3 Features of the Checklist

Visuals

During interviews, wishes regarding the visuals of the checklist were expressed. The wishes concerned a simple and intuitive interface that could be understood at first glance. The checklist should also contain visual and clear examples of what is considered good and bad systems/navigation etc. at IKEA of Sweden. There was one concern raised regarding that visuals can sometimes hide the message of UX, so the visuals need to be carefully considered. Furthermore, the workflow should be nice and easy and have visual indicators of how far into the checklist they have come if the checklist follows a linear flow. Finally, a clear tone of voice was requested.

Simplicity

While the UX specialist expressed their belief that UX writing should be simple and direct, they also expressed some concerns that the content of the different areas of the checklist might be too simplified. Furthermore, the IKEA tone of voice states that the UI should be simple and clean.

Balance

When presenting the result of the evaluation, it is important to present multiple sides, both the positive and the improvement points. Currently, the checklist focuses mainly on improvement points which should shift to involve more positive aspects, according to interviewed UX specialists. A lot of negative feedback and red minus symbols can be quite psychological and hard to take to heart, a balance is therefore important. The tool should work as a checklist but handle both qualitative and quantitative data as well as give a good indication of what is good or bad. This could, in turn, signal to the UX specialist whether a tool can be bought and immediately implemented, bought but modified or bought on the condition that the users will receive training for work with the digital solution.

Strengthen Findings

The interviewees mentioned that using screenshots, quotes, user inputs and performing user journeys to show pinpoints and improvements are good ways to strengthen their findings from the evaluations.

6.4.4 Usage of the Checklist

Overview of the Evaluated Tool

During the interviews, it was stated that the checklist is preferably used at the beginning of the evaluation. By doing that, it is easy to get an overview of the evaluated tool, and since not all UX specialists have knowledge about best practices, it is preferred to have it collected in one space. It was also mentioned that the checklist should begin with looking at UI components to give a good overview of the evaluated tool.

Usage - Measure Improvements

The checklist can be used as a tool for measuring improvements and evaluating what the UX specialists have done.

Process

During the interviews, the UX iceberg was brought up as a guideline for how you should work with UX. A necessary process to follow according to this is to start by figuring out and understanding why you shall do something, you then need to understand for whom you are doing it and in which context they use it. This is followed by looking at workflow, workflow design and user experience design. The next step is where in the workflow you will add in content and which content you will present where. After that, you need to look at the interaction and the visual design. The purpose of the iceberg process is to ensure that all aspects are covered, which is important since if you fail from the bottom with the 'why' then the solution will fail. It might be able to cover it with visual design, but it will have failed at its core. Therefore, it is vital to use the checklist to create an overview and a functional process. An expressed desire from the interviewees was to use the checklist to gain an overview of the system and follow up on this with users and user research that could be connected to the checklist.

Subjective

UX is subjective, and so the result of an evaluation will always depend on where the interest of the evaluator lies and everyone will find different things when evaluating. The result will also always differ depending on which users are interviewed. Therefore, it is good to evaluate in group to get a fair view of what is happening.

6.4.5 Involving Users and Stakeholders

For Users Without Users

Users of the evaluated tools are not always available during the evaluation. When that is the case, the UX specialists must use their UX expertise and best practices to make decisions. Therefore it is good that the checklist can be used both with and without users, depending on the context.

"What we felt all the time was that we can not confirm this before we have users in it but... it was also used in a sense to prevent users if we thought it was... at the beginning not good enough." - Participant 2

No User Involvement

There are cases where the UX specialists do not have any users to involve in the evaluation. When that is the case, their go-to is to evaluate the tools based on their own knowledge and opinions.

Guided Evaluation

During the use of the checklist, one interviewee mentioned that they guide the users through the evaluation with the use of the checklist. This is since the checklist contains a lot of information that is easier to communicate to other participants.

User Involvement

During the interviews, it became clear that, in some cases, users are involved in the evaluation with the checklist. It can be used as discussion material and a compliment

when talking to users. The interviewees mentioned that they want the users to be heavily involved in the process so that they do not have to act as some kind of expert when making the decisions since they believe that the results get better with user involvement.

Involving Stakeholders

The interviews revealed that sometimes the UX specialists had done evaluation together with stakeholders, which has been a good exercise as the stakeholders then find valuable things for their backlog, such as new user stories. Furthermore, they have invited stakeholders to show them what they have been developing in the tool and had solution architects contact them to get feedback on their solutions from a UX perspective. Finally, communication and collaboration with UX groups at tool suppliers have been established to better cater to and fulfill requirements and design systems.

6.4.6 Clarify Result to All Involved in Evaluation

Informing Stakeholders

Through interviews, it became apparent that one of the main functions of evaluation with the UX checklist is to be clear towards management about what they have bought. The checklist has previously been used to help stop businesses and agreements unsuitable for the users as it provided concrete statements. The evaluation through the checklist can be used to convince business people that the background for the rating is facts and competent evaluations, not just ideas and thoughts. This, in turn, can show how digital solutions can be improved as well as help change the mindset about UX amongst stakeholders.

Motivating Internal Decision

The checklist could be useful to motivate internal decisions towards suppliers and stakeholders, such as what is stated in the design system.

Summarize Findings

The interviews revealed that today it is tough to communicate the findings of the evaluation with the checklist in a clear and easy way. It is believed that UX knowledge is required to be able to grasp the result. Adapting the checklist to be presentable and for others to understand the result takes a lot of time, and when working on the checklist and presenting it, there was a sensation that non-UXers did not understand the work. This left the UX specialist with a bittersweet feeling of questioning why so much effort was put into the work with the checklist. A new way of presenting the result is therefore essential.

It is challenging to create a summary that communicates how much work was put into the work with the checklist and explains the importance of all the different parts. When summarising the findings, stakeholders must understand that just because only one area is performing poorly in the evaluation does not mean that they can go ahead and buy it. At the same time, no one will go through 100 slides even if the work is good. So the findings need to be boiled down to its essence for presentation.

Rating

The rating should indicate why something is good or bad and if it breaks convention, but as evaluating UX is not black or white, the rating should be a guidance indicating the degree of performance rather than a judgment. Today numbers are used for rating, which might not be necessary to evaluate the solutions but some sort of indication of performance would be helpful. The reason why the current grading does not work well is that it is unclear what the grading is based on. Therefore support is needed if the grading is with numbers to be able to put a number on something.

"I think that the current sort of grading system doesn't work well [...] you have I think from minus three to three. But what do you base that on?" - Participant 3

Size of Document

In the interviews, the UX specialists mentioned the size of the document and how it, during evaluation, became huge. This made it impossible not to miss parts, and the size would also mean that people would not read the evaluation. The size of the document would again lead to not getting the point across to the people in charge, so the evaluation would feel like wasted work.

6.4.7 User Context

Context and Users

During evaluation, it is important to understand and consider the user but also the context. It should be clear what values the user has and who the user is, for example, if they are experts, since their background and knowledge could affect their expectations of a tool. One interviewee mentioned that the current checklist lacks focus on who the user is. Regarding the context, things such as the environment of use and culture are also important aspects to consider during an evaluation.

Circumstances

The circumstances of the evaluation are important to consider within the checklist. For example, the user participating in the evaluation could be using the tool for the first time and therefore some mistakes are made due to them not having enough experience.

Considerations

When working with the checklist multiple things need to be considered. During the interviews, it was stated that it is important to know in which culture the checklist is to be used, but it is also important to consider the business, technology and the users.

6.4.8 Flexibility in Use

Adaptability

Adaptability and flexibility are two important characteristics of the current checklist that the UX specialists approve of. By having these, they can customize the checklist to their needs, such as easily adding or removing certain parts of the checklist so

that it becomes more presentable.

Freedom

The UX specialist expressed wishes that the new checklist should be a tool that supports the UX specialists in their work but also allows them to maintain a sort of freedom and trust in their competencies. They wish it would be some sort of standardization but also allow them the freedom to choose another method if another one would suit the purpose better. Additionally, the checklist must help them find a way to communicate things that resonates with the receiver of the result.

Ambition

When evaluating, the result depends on what the UX specialists aim for, so a common ambition must be established. This means that the checklist could show that a solution is functional, but if that is not the aim of the solution, it is not good enough.

6.4.9 Time

Time Spent

The interviews revealed that different amounts of time were spent working with the checklist. Generally, it was one or two months, but the entire process could take up to four months. Depending on the length of the project this amount of time could feel proportionate.

Time Consuming

According to interviews, the checklist as it is today can be very time-consuming and working with it in evaluation takes longer than it should, according to some users. A reason for this could be its complexity and the checklist is therefore not as straightforward as what is associated with the word 'checklist'.

Time Limit

Finally, the interviews revealed that people at IKEA of Sweden are very short on time. Therefore it is important that the results of the checklist can be communicated without using an appendix, but having an appendix available that is not crucial for understanding the result could work.

6.4.10 Issues

Incomplete

Although the checklist is good to evaluate UI and best practice, its current execution does not cover every UX area according to the interviewees.

Order

The order of the checklist today is not helpful or inspiring as the most important parts are placed towards the end of the checklist, so when people get to those parts, they are tired. Some parts of the UX checklist, such as UI components, are easier to evaluate and are typically placed towards the beginning of the checklist.

Redundancy

A problem with the current checklist is that of redundancy. The UX specialists

can evaluate one chapter and then move on to the next to find that the exact same elements are to be evaluated again. This makes the checklist inefficient.

Inefficiency

In its current state, the checklist has a high level of inefficiency since it requires a lot of reworking due to it not fulfilling the needs of the UX specialists. For example, those needs could be that it was not presentable but also that it required a lot of discussions due to it not being clear enough regarding the assessment. Since reworking is needed, that contributes to multiple different versions, leading to many documents. There is no automation regarding the entered rating in the different areas. If they have given a rating, then they need to re-enter that on the summary page. That creates a lot of unnecessary work and administration, which contributes to the checklist being inefficient and time-consuming.

"[...] then we just have a bazillion versions [...]" - Participant 3

Administration

The current workflow with the checklist involves loads of jumping back and forth between programs and a lot of copy-pasting. Therefore it is stated that there is a lot of administration with the checklist as it looks like today.

Guidance

There is no guidance in the checklist of what needs to be done before starting the evaluation.

Interpretation

It has been discovered that there are interpretation issues with both the information within the checklist and its usage. One highlighted area was the rating system, where the users explained difficulties with understanding the meaning of the numbers within the numeric scale. They also experienced problems understanding the checklist in detail and figuring out what the actual purpose was. Finally, when working in the collaborative documents, one could be hesitant to take action and delete or edit someone else's work, since one simply could have interpreted their information wrong or not understood it correctly.

6.4.11 Other

Clear Phrasing

The phrasing within the checklist is of high importance. If the phrasing is unclear, then the checklist will not reach its desired effect since the users will interpret the information differently or not understand it. Two UX specialists interpreted the information within the checklist differently, and they mentioned that the phrasing could have been one of the reasons. Therefore it is important that the phrasing and the language used are easily understood and not "too UX nerdy" as said by a participant, otherwise the information will not come across in the right way.

Prerequisites

Before evaluating with the checklist, the earlier research phase must be completed with customer interviews and data analytics. Furthermore, it is essential to make sure that the UX specialist is familiar with the digital solution before evaluating

and so they need to begin by trying out the solution and make some assessments.

Way of Working

The way of working with the checklist today is to go through it chapter by chapter and set grades on each chapter depending on how well it fulfilled the checklist's requirements. The result of the rating is then used for the presentation although sometimes only parts of the presentation is used in certain presentations such as the finalized rating or specific areas. The checklist is structured at different levels which does not match everyone's workflow and makes it hard to grasp occasionally.

When starting a new evaluation, a template for the checklist is downloaded from the internal database, saved and then the UX specialists start working on the evaluation. The work can sometimes be stressful with deadlines and a mix of individual and group work. There are many discussions which might sometimes slow down the work as all the decisions are made in group and everyone wants to get their opinion and evaluation across. Another way the checklist is used today is in full-day workshops with non-UXers.

Too Text Heavy

The checklist has too much text in its current execution, making it feel heavy. According to one interviewee, that could be due to it being too detailed in some parts.

Standardized Evaluation

If there were no standardized evaluation or a checklist to follow, the parameters used would differ from time to time, affecting the outcome. Therefore, having a checklist with fixed parameters would help create a more unified evaluation that is less dependent on who is using it.

"[...] if you're not having the checklist, it would most likely differ between who does the evaluation and [...] what different parameters the output would be, so I think the checklist would help make that more unified and less dependent on [...] who's using it." - Participant 4

Design System

There is a design system in place at IKEA regarding colors, fonts, white space size of icons, specific buttons and so on. Therefore the checklist should not duplicate information covered by the design system. However, it would be appreciated to have the checklist refer to the design system as an explanation of why certain elements are not thoroughly explained in the checklist. However, the design system does not cover all internal needs for internal IT solutions as some more complex drop-down menus and tables are missing. Therefore the team of UX specialists has their own additions to the design system that is used with the checklist. Furthermore, it would be appreciated if the checklist could remind the users to check the design system and its contents regularly to ensure they are updated about its content. A final important factor regarding the design system is that when working with design systems, it is crucial to know the difference between bought systems and systems developed by IKEA of Sweden. This since developed solutions need to follow the design system, but bought systems can rarely be adapted to follow it.

Methods for Evaluation

It became clear that when performing an evaluation, the preferred methods of the UX specialists are workshops, observations and interviews.

UX Specialist Role

The role of UX specialist at IKEA of Sweden is an extensive role where the UX specialists work on multiple projects at the same time. Their primary focus is to highlight and raise concerns when the products do not meet the users' expectations. To do this, the UX specialist conducts user research and user testing to understand the users. Their role also includes understanding the business needs and transforming them into something tangible for the team. Finally, the UX specialists develop internal IT tools, digital product and solutions, and design experiences and make them user-friendly.

6.4.12 Summary of Findings of Analysing the Interview

In conclusion, it was found that working with the checklist today is unfortunately very inefficient and believed to be time-consuming, according to the interviewees. This can, in part, be due to administration's struggles and redundancy as people are reworking the checklist, leading to a lot of time spent on the evaluation. Unfortunately, the people at IKEA of Sweden are short on time and thoroughly worked evaluations tend to result in large documents that no one has time to read.

Furthermore, what was highly requested from the UX specialists is a checklist that is a collaborative tool in a collaborative format that supports them structurally when working. It should be in a format that is easy to update and preferable be in a more flexible tool than today's used PowerPoint. The format should allow for a comprehensible presentation of the result while also allowing for understanding the content separately. The UX specialists expressed that they would like to work with commonly known programs, but it is more important that the structure and presentation are supportive. Additionally, it was expressed that it is very important to have a rating system that is understandable, easy and intuitive to use and that should highlight the aim of the evaluation and how well the digital solution meets that. The result also needs to be balanced, showing both negative and positive aspects of the solution that is to be presented. Furthermore, the phrasing of the checklist is critical so that it is easy to understand, avoids different interpretations and is not text-heavy. This becomes important as various UX specialists have varying knowledge and interests and if the phrasing is unclear, then conflicts can appear as the knowledge, interpretation and wording interfere with each other. Additional outcomes were that the checklist should consider different points of view such as business, technological, user, and context. Today in some teams, the evaluation is solely based on knowledge and best practices and therefore, it is important that the checklist can act as a kind of standardized evaluation. However, it should not limit the freedom of the UX specialists regarding choosing methods and allow for a certain degree of adaptability.

The purpose of the checklist was stated through interviews to be to evaluate digital solutions when users are not always available, communicate UX and have people

understand the importance of UX. This is partly done through user involvement, having stakeholders informed about the process, and using the checklist as guidance when evaluating. However, the spectrum of UX is large and having all areas covered is difficult, which has led today's checklist to be incomplete and struggling with strengthening its findings. Furthermore, the checklist has been used to stop bad businesses, but it was also expressed that it could be used to measure improvement when developing.

Another issue that arose was that of missing prerequisites and guidelines informing or reminding the UX specialists of actions to perform before starting the evaluation. The order and sequence of the structure were also reported not to follow the workflow and process, making it difficult to understand and work with.

Finally, requests were made for the new checklist to motivate internal decisions, connect to the design system, and avoid subjective reviews. Another wish was for it to be simple with intuitive interaction and a visual and clean interface.

After restructuring the affinity diagram and coming up with a final division, the result was used as a basis for the creation of the list of requirements.

6.5 Co-creation for Exploring Structure

After analyzing the interviews, it became clear that more input from the UX specialists was needed. The input most required was related to how they wished to work with the checklist and what areas they believed should be included. To gain this information, a co-creation session was performed. The co-creation session was executed in Miro (figure 6.3) and Zoom. Ahead of the co-creation session, the authors considered the session's goal and decided to find the UX specialists' preferred structure when working with the UX checklist. Therefore, the co-creation session structure was carefully considered and clearly communicated to the participants.

It was quickly decided that the participants should be divided into two groups to allow for a better discussion. As two of the five participants have management roles, it was decided to put them in the same group to minimize the risk of having a hierarchy in the groups and give everyone an equal opportunity to have their opinions voiced. However, different group constellations were also considered, such as dividing them according to opinions and wishes expressed in the interviews, or dividing them according to who had created the previous checklist and who were solely users of the checklist. In the end, it was decided through a discussion with the academic supervisor to stick to the grouping of managers and UX specialists.

To decide on which exercises to use in the co-creation session, the authors researched possible activities for a digital co-creation session. Methods to encourage discussion and involvement were discussed with Mafalda Samuelsson-Gamboa (lecturer at Interaction design and technologies), and the flow of exercises was then discussed with the academic supervisor. This caused the authors to change the setup and structure of the session to have better use of time but also make sure that enough time was allocated to the most prioritized exercises such as card sorting and priority timeline while letting go of exercises such as *"how can this be designed to give a good*

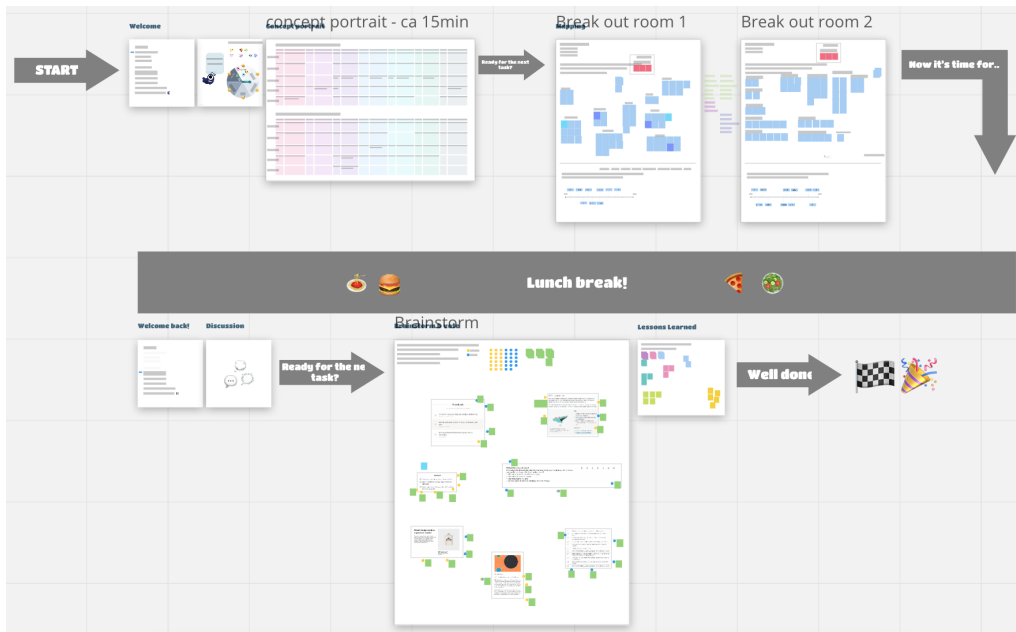


Figure 6.3: Overview of the Miro board used for the co-creation session, containing concept portraits, card sorting, and priority timeline.

overview?". In the end, the structure was decided to have two sessions, one hour before lunch and one hour after lunch.

The structure of the co-creation worked very well, and having a break in between the two sessions was a good choice. The output from the co-creation was valuable later on in the process of finalizing the prototype.

The result of the co-creation for exploring structure was understanding the mental models of the UX specialists better. This was achieved by getting an idea of what areas they believed should be evaluated and what each area should contain. It was also revealed in what order they wished to evaluate the areas for an easy workflow as well as what is believed to make a checklist suitable for beginners vs. experts and thus what makes it easily understood. The findings can be summarized as:

- Understanding their perception of what areas should be named and what they should contain.
- What makes a checklist easily accessible and easy to understand and what makes it difficult.
- The timeline for in what order one should evaluate things.

6.6 Creating the List of Requirements

When sufficient information regarding how to work with the checklist had been gathered, the list of requirements was created. The list of requirements was created to be a base for ideation and ensure that the needs of the user were fulfilled in the final prototype. The result of the affinity diagram was used to create the list

of requirements (see figure 6.4 and figure 6.5) and the list was based on Österlin's [56] method for requirement specification list. The list of requirements consisted of a table divided into function, measurement, comment, necessary/wish (N/W) and weighing from 1-5, with 1 being the lowest.

The difference between Necessary and Wish was set to be if the requirement was needed to be able to execute an evaluation or if it was more of an extra feature. The weighing of the statement was decided by asking to what degree it was necessary of how much it would aid an evaluation. In some cases the wishes became contradictory to certain statements and in those cases it was decided to keep the wish but give them a lower weighing as the statement they were contradictory to was often found to be necessary.

During the benchmarking session, it became clear that a lot of information about UI components can already be found in the design system of IKEA. Therefore, to avoid making the list of requirements redundant, it was decided to explore the design system to find out what exact information could be found there. The kind of information found in the design system was mostly related to the UI, semantics of color and layout, but there were also areas regarding accessibility. Therefore it was decided to add one point regarding UI and one point regarding checking the design system to the list of requirements. Regarding accessibility, one point was added referenced to WCAG 2.1.

The final list of requirements was sent to the advisor Jonas Uddman for approval and also discussed with the academic supervisor who approved it and from this point on, the list of requirements worked as a guide for ideation.

Requirement	Measurement	Comment	N/W	Weighing of grades				
				1	2	3	4	5
General usage								
Flexible usage		Should be able to use before, during and after buying a tool/system	W					
Adaptability		Adapt the checklist for specific needs such as skipping irrelevant parts	W					
Flexible amount of information		Should suit for both beginners, intermediates and experts within the UX field	N					
Distinct preparations		It should be apparent what needs to be done prior to the start of the evaluation.	W					
Avoid redundancy		Avoid evaluating the same areas and functions in multiple chapters	W					
Adaptable methods		Freedom to change and adapt methods to suit the purpose better	W					
Implement accessibility	standard	The evaluated tool should at least meet WCAG AA Standards	N					
Process different data		Qualitative and quantitative data should be handled by the checklist	W					
Do not duplicate design system		Do not add things already existing within the design system	W					
Counteract subjective input		Evaluation should aim to avoid subjective input	N					
Standardised evaluation		Standardised content, not being able to add certain parameters to the checklist	N					
Measure improvements		The checklist can be used to measure improvements of a digital solution	W					
Comprehension								
Clear phrasing		Understandable and not too complex	N					
Main text should be brief		Avoid being text heavy with high level of details	W					
Provide clarification		Interpretation should not be an issue	N					
Communicating UX		UX need to be explained in a clear way	N					
Clear rating		It should be clear to the evaluator what the grading system is based on and then make it easy to set grades.	N					
Comprehensible grading		It must be clear to people who have not evaluated what the grade means.	N					
Clear ambition		It needs to be clear what each specific part of the evaluation should fulfill	N					
Contain UX		Raise awareness of UX and how it affects peoples work	N					
Provide overview		Provide an overview of the evaluated tool	W					
Extensive coverage		Make sure that multiple areas of UX are covered	N					
Format								
Collaborative format	number	Multiple users should be able to edit the checklist at the same time	N					
Stored in cloud		Live, updateable document.	W					
Flexible format		Format should be understandable both separately and during presentations	W					
Limit size of document	number	Should be presentable within one hour	N					
Program used								
Minimize number of programs used	number	Avoid jumping back and forth between programs	W					
Familiar program		Use a program commonly used by the users	W					
Efficient work								
Maximize efficiency		Avoid dubbleworking and reworking the chapters, presentation and administration	N					
Consider time spent		The work should be proportionate and efficient regarding the time spent	W					
Interaction								
Intuitive interaction		Easy to interact with the checklist.	N					
Possibility to comment		Evaluators should be able to comment on each others work	W					
Possibility for non-linear navigation		Evaluators should be able to skip chapters that are unneccessary to the digital solutions and jump straight into relevant ones.	W					
Possibility to compare		Evaluations of different solutions should be viewable simultaneously to compare result	W					

Figure 6.4: List of requirements for the checklist prototype page 1

Content			
Motivating internal decision		The checklist should be useful to motivate internal decisions towards suppliers and stakeholders	N
Order supporting the workflow		The checklist should have an order that supports the workflow	N
Consider the ice-berg model		To understand the purpose behind each process	W
Avoid simplification		Make sure that the content is not too general	N
Consider the design system		Refer to design system when applicable to the checklist	N
Considerations			
Consider context		In what environment and context is the checklist to be used	N
Consider culture		Appropriate for the culture it is used in	N
Consider technology		What technology is available	N
Consider business		Cost and businessmodels	N
Consider circumstances		Experience of the tool	N
Consider users		Who the users of the checklist and the users participating in the evaluation are	N
Users			
Involve users		Take their opinions into consideration	N
Enable work without users		When users are not available	N
Collaborative with users and stakeholders		Can be used in collaboration with users, stakeholders and UX specialists	N
Presentation			
Motivate evaluation		Use e.g. quotes or screenshots to strengthen findings	W
Balanced feedback		Positive and negative feedback should be equally presented in the checklist	N
Visualize negative feedback		Consider choice of symbols and colours when presenting negative feedback	N
Clarify summary		Summary should be boiled down to its essence so the result becomes easily understood while showing the amount of work that has gone into the evaluation.	N
Communicate result		In an understandable way communicate the result of the evaluation for stakeholders	N
Enable efficient presentation	Time	People at IKEA are short on time, the result need to be communicated efficiently.	N
Presentable result		Result should be presentable and if modifications need to be made to the solution after buying, it should be presented.	N
Visuals			
Clear tone of voice		It should be clear that the product is made and/or used by IKEA	N
Include examples		Visual examples of what is considered good/bad should be included in the checklist	N
Show progress		How far they have come and how much they have left of the checklist	W
Non-distracting visuals		Visuals need to be carefully considered so that they do not hide or disturb the message of UX	N
Consistent interface		Interface should look the same for all users in all modes.	W

Figure 6.5: List of requirements for the checklist prototype page 2

6.7 Ideating with Crazy 8

When the list of requirements had been decided, it was time to enter the ideation phase to begin finding a solution to the defined problems. To get started, the authors began to use Crazy 8 to get their creativity flowing.

The authors decided to have 10 minutes for this method, whereas 13 ideas were produced, as shown in figure 6.6. The ideas were in multiple different areas, such as how to visualize progress, the navigation of the checklist, and where the score should be written. It became clear during the session that the area to create ideas about was very broad. Therefore, to better focus the ideation it was decided to divide it into different areas.

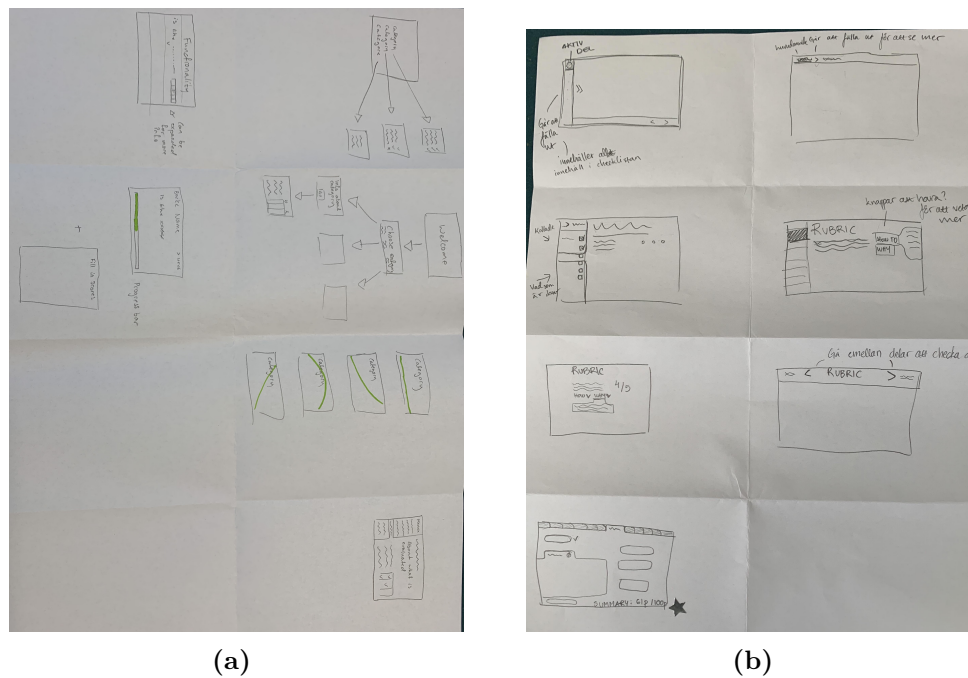


Figure 6.6: Result of the Crazy 8 method during ideation, a) shows the creations of one of the authors and b) shows the creations of the other.

6.8 Brainstorming Around Different Areas

To gain a bigger range of ideas, it was decided to ideate around specific areas instead of the whole solution. When deciding to ideate around smaller areas of the solution, it was decided to brainstorm around visualizing progression, navigation layout, how to navigate, presentation of content and finally rating. These areas were decided on after looking through what had emerged during the Crazy 8 and what areas had been missed. The time was set to 30 minutes, and 41 ideas were created. When going through the ideas, it was clear that some ideas were duplicates. These were then discarded which made the final amount of ideas 36.

The ideas from the different areas from the brainstorming were brought to the next step of ideation, the morphological matrix, to combine and create new solutions.

6.9 Creating Solutions Using a Morphological Matrix

In order to come up with new ideas and to combine the ones created in previous methods, a morphological matrix was used. Through the previous brainstorming session, five areas of interest had been identified; visualize progression, navigation layout, navigation how, presentation of content and finally rating. These five areas were added to different rows, and a total of 10 ideas (see figure 6.7 and Appendix I) were created by drawing lines between the rows and finally sketched into possible solutions with the authors creating five each.

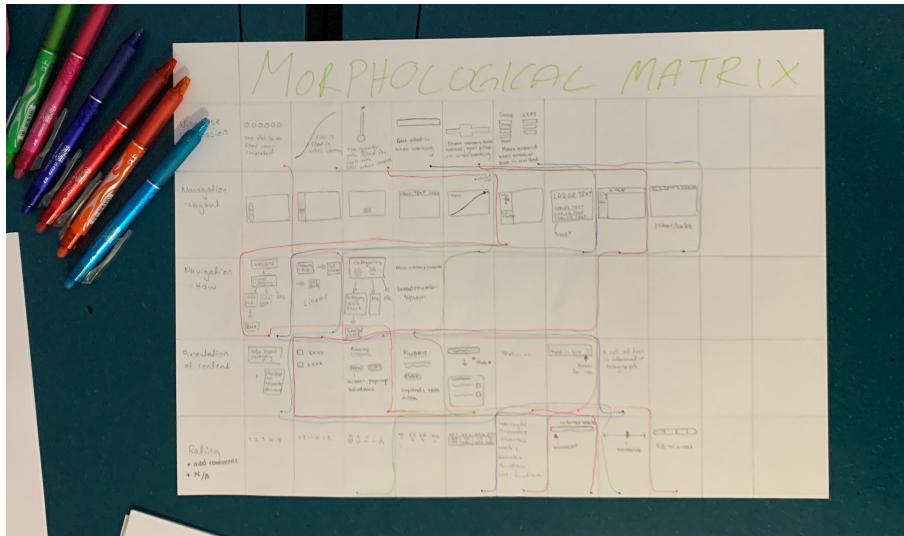


Figure 6.7: The Morphological Matrix used for further ideation, consisting of rows and columns containing different possible ideas.

When drawing the lines between the different areas and ideas, the authors tried incorporating as many different concepts as possible without overthinking feasibility. Consequently, some combinations were much harder to merge, and some ideas were a little too simple. It was revealed, however, through this method that there were many different ways of combining ideas for different workflows, and more might have been found if all concepts could have been incorporated.

After performing this method, it became clear that the ideas were extensive and that most of them would only be able to be created using a programmed tool instead of a currently existing one. Therefore, a decision was made to pause the ideation phase and look deeper into what kind of collaborative tools exist in the market today to decide on which program to create the checklist in. This since that would frame the ideas in a better way, making them more feasible and realistic. An important finding from this method, however, was that there was a wish and need for the new UX checklist to be interactive and engaging and that there was a need to explore linear and non-linear workflows.

6.10 Researching Collaborative Tools

Before continuing the ideation phase, it was necessary to look into different collaborative tools to find inspiration for the final program in which the checklist would be created. Thus, a small benchmarking of that area was conducted with both known and newly found tools. These were placed within a table for comparison. The table contained and checked aspects such as if the tools required a license or subscription, what the toolbar contains, and if it could change the canvas size. Below are the collaborative tools that were found, together with a short description of each tool.

- **Figma**

Figma is a well-known prototyping tool used at IKEA of Sweden today. Ex-

pensive with licenses but not every user needs a license to see the prototype. Has many functionalities required for collaborative work as well as separate views for presentation and work [80].

- **Adobe XD**
Adobe XD is part of Adobe Creative Cloud and is a program used for creating UI/UX designs. It needs to be bought for it to be used, but users can collaborate in the same document if they also have Adobe XD installed [81]. It has many of the functionalities that Figma has, and the possibility to add plug-ins makes the tool very adaptable.
- **PowerPoint**
PowerPoint is a well-used presentation tool from Microsoft[82]. It is the tool used today for the checklist but has some limitations, such as having the content displayed differently for different users. It is, however, well-known amongst all users at IKEA of Sweden.
- **Pitch**
Pitch is an online tool that mainly focuses on creating presentations or a pitch. It is not a very free, adaptable and creative workspace, but it seems to handle collaboration for presentations well [83].
- **Ludus**
Ludus is another online tool for creating presentations. It allows for connecting with adobe creative cloud and highlights the fact that it makes collaboration easy with the possibility to define roles for each collaborator [84]. However, key features such as commenting were not available when tested by the authors and currently it is only possible to sync Ludus with third parties such as Dropbox, Google Drive and Adobe Creative Cloud Libraries.
- **Miro**
Miro is a whiteboard tool with an infinite canvas [85] that is frequently used among UX specialists today. It is a well-liked tool due to its flexibility and is believed to be easy to collaborate. The tool has functionalities such as making notes, adding shapes, frames and PDF documents, and the possibility to create and reply to comments. Unfortunately, it does not have a functional presentation mode.
- **Lucidspark**
Lucidspark is an online whiteboard tool that is quite similar to Miro. It allows multiple people to collaborate and has a fun feature called breakout boards which enable the team to split up and work separately as well as together [86].
- **FigJam**
FigJam is part of Figma but works as an online whiteboard. It has the possibility to chat, use a timer and add shapes. Additionally, it has templates such as storyboarding and diagramming and can be used in collaboration with Figma prototyping [87].
- **Mural**
Mural is an online whiteboard tool that can be used online on their website

or be downloaded as a desktop app, similar to Miro. Dissimilar to Miro, the board is not infinite but many of the functions can be found in Mural as well as Miro. The functionality for collaborating shows everyone working on the board allows for commenting, reacting and presenting [88].

- **Conceptboard**

Conceptboard is an online whiteboard tool with an infinite canvas for collaboration [89]. The tool has different templates that can be used as well as a presentation mode where specific frames can be chosen to be included. The presentation can then be exported to google slides if needed.

- **Microsoft Whiteboard**

Included in the Microsoft office package is Microsoft whiteboard [90]. This tool works as an online whiteboard but is unfortunately quite limited in functionality apart from that required from a whiteboard of writing and adding shapes.

- **ClickUp**

Clickup is an app that is marketed as "one app to replace them all" [91]. It is a collaborative tool that can be used to organize work in the team, create documents, whiteboards and boards. Furthermore, it has a chat function and can be used on multiple platforms.

- **Explain Everything**

This tool is marketed as a collaborative whiteboarding platform that can be used either in the browser or integrated with another platform, for example, Microsoft Teams. The project worked in is easily shared with others using a link. With Explain Everything, one can access an online whiteboard on which it is possible to add items to your liking, such as drawings, PDFs, videos or documents. It is possible to record sessions as well as present directly in the tool. There is a limit of 25 people using the whiteboard simultaneously, but the recommended number is eight [92].

- **Excel**

The purpose of Excel is to help with organizing data in many different ways [93]. It is a spreadsheet that can be used for many different areas depending on the user's ambition. It is a part of Microsoft Office, but it can be bought separately [93].

- **Google Slides**

Google slides is a free-to-use tool used to create presentations and the program is quite similar to PowerPoint. It is a browser-based program that can be used on multiple devices [94]. One can access Google slides by having a Google account, which is a part of Google drive. It is easy to collaborate with others by just sending a link.

- **Trello**

To make collaboration within the team easy, the program Trello can be used. It allows the users within the team to create boards, cards and to integrate other plugins that ease the workflow. It is a browser-based tool that can also be used on other devices [95]. The main functionality consists of moving cards

between different categories.

- **Adobe InDesign**

Adobe InDesign is part of Adobe Creative Cloud and is the professional choice to use when creating layouts and page design. It needs to be bought to be used, and it is not that well suited for collaboration since you cannot work in the same file simultaneously as in other programs [96].

After reading and researching the different collaborative tools, it was revealed that there were many good options and possible tools to work in. Many of the tools were found to be rather similar to the look and function of a whiteboard for their layout. Further comparison needed to be made, so the collaborative tools were put into a Pugh matrix and compared to find a suitable tool. However, the functions and features of many tools were locked behind a paid subscription which the author did not have. This led to the research of the tools might not being completely fair as some tools had limited functions, and some could be researched using all the features. This also meant that all the tools researched had to already be accessible to the authors and have a free version or trial period, which might have led to missing out on possible tools that did not offer this.

6.11 Evaluation Using the Pugh Matrix

Two Pugh matrices were conducted to decide which program was the most suitable to build the checklist in. From the list of requirements, 17 requirements were taken and added to the Pugh matrix. The requirements used were the ones that were applicable to the look and function of the checklist, such as allowing for collaborative work and having the possibility to comment. Requirements that were not added were not relevant to the choice of program, such as the requirement to measure UX or be able to present within the hour. Further aspects added to the Pugh matrix were nine aspects that were used during the first comparison of the programs, such as size and number of canvases. The authors chose these since they considered them suitable for evaluating different programs, and they were used for both matrices.

The first matrix seen in Appendix J had PowerPoint as a reference since that is the current program of the UX checklist. In this matrix, all 16 programs were compared against the reference. When calculating the result and deciding the ranking of the programs, it was decided that if two or more programs had the same result, the number of negatives would determine their ranking. Additionally, the number of necessary requirements that had gotten a minus sign would also be a part of determining the program's ranking since a choice was made that a negative necessary requirement was worse than a negative wish. The authors made this decision as it was believed that a necessary requirement was of greater importance than a wish.

The five programs with the highest score from the first matrix were Lucidspark, Conceptboard, Adobe XD, Miro and Figma. These were then used together with PowerPoint in the second matrix, found in Appendix K, where Figma was used as reference. This since Figma together with Miro had gotten the highest score in the first matrix, but also since it is quite similar to Adobe XD and it would be interesting

to see the result of comparing those two programs. In the second matrix, the same requirements and aspects were used.

When calculating the result of the second Pugh matrix, Conceptboard came in sixth place, then Lucidspark, Adobe XD and Miro. In second place, PowerPoint was found, and the winner was Figma. This made it clear that Figma would be the chosen program to create the checklist in, and this was kept in mind when preparing for the next step of ideation.

The Pugh matrix evaluation was helpful in deciding what program to use when building the UX checklist. However, the comparison might not have been completely fair in all regards as some tools gave limited access to their functionality which might have led them to score lower. The comparison also revealed that a collaborative tool means that it can be collaborative in many different ways. Some of these were not suitable for the context of a UX checklist but might be useful in other areas. For a UX checklist, it was found that a whiteboard or prototype tool is most suitable as it fulfilled a certain degree of adaptability that was found to be required. A requirement that was found to be important to fulfill during the evaluation was that of being able to hide certain boards and information in the case of, for example, a presentation with stakeholders and the programs performed very differently in that area. Finally, it was found to be very valuable to have a tool that was well-known among the UX specialist.

6.12 Co-creation About Structure and Presentation

The authors felt that new, fresh eyes were needed to ideate possible ways of structuring the content of the checklist and how to present the result. Therefore, a second co-creation workshop was held with six fellow students outside of IKEA of Sweden. The co-creation began with showing parts of the existing checklist and was then divided into three parts; warm-up, main activity and discussion and took a little over an hour altogether.

6.12.1 Warm-up

The participants were asked to create a persona on a folded paper for the warm-up. Everyone started with a paper and was asked to draw a head and write a positive and a negative trait, then fold the paper to hide the head and pass it on to the next person who drew the body and added two more traits before passing it on to the third person who drew the legs and feet. When all personas had been created, they were presented and given names.

The second part of the warm-up was an association exercise where the participants were asked to say the words that come to mind when hearing the word checklist. The words and sentences mentioned were:

- Lots of things in a row with a space to tick off.

- Checkboxes
- Grocery shopping
- Structure
- Pilot, checklist. They have their process of having to check off before take-off.
- Efficient
- Everything must be gone through, do not miss anything, all points must be gone through.
- Progress
- Complete solution
- Keep track of the situation, make sure you solve everything.
- Qualitative, it is about quality.
- Clarity, you have to go through and understand, so you have to know what it means, it can not just be a checkbox.
- Throughout, you more or less go through everything.

6.12.2 Main Activity

For the main activity, the participants were divided into three groups of two people in each group and tasked with three "how might we" statements:

- How might we build a structure with different levels?
- How might we show that more information is available elsewhere?
- How might we present the result of the evaluation?

The groups were given these statements on papers with frames to be filled by the groups. Also available during the workshop were inspiration photos, colored markers and post-it notes. The groups were given 20 minutes to draw and add to the frames and during the workshop participants mentioned things such as

"Part of me wants numbers, it got like this in this part but in the part it was so... quite subjective"

and

"What can a checklist look like? Does it have to look a certain way?"

Participants also mentioned Likert scales, which are convenient to measure using numbers as that makes it measurable.

6.12.3 Presentation of ideas and discussion

When the 20 minutes were up, the groups were asked to present their ideas and a group discussion was held (see Appendix L).

Group 1

Group 1 mentioned that building structure depends on what the structure looks

like and that it is important to show what the relationship between the different parts looks like, is it hierarchical or something else? Furthermore, they mentioned that somehow you need to show how to navigate your way to subcategories and subcategories should indicate how many subcategories there are.

One idea mentioned by the group was to have slides that indicate how far the method can be applied, this would provide an overview as well as show which areas overlap and which do not.

Information can be displayed through hyperlinks or symbols, and regarding presenting the result, it is important to not only show the result but also show it in relation to what should have been achieved.

Group 1 brought up the use of the pyramid for presenting the result and how a pyramid can create confusion by indicating that something is above something else which might not be the case. Furthermore, it was mentioned that different programs need to reach different levels depending on the area.

Group 2

Group 2 wrote that they liked numbers and that it should be concrete, not so subjective, which can be achieved with numbers. However, they also mentioned that it is really only usability that can be measured, the other areas become very much based on opinion, and so an idea of measuring through do/don't was presented.

Regarding structure, they were inspired by online shopping and having fold-down menus. Their idea about how to inform about more information was to use icons that are well known to indicate if more information can be found in another place. They also mentioned that if links are used, the name of the link must be super clear.

Group 3

The structure mentioned by group 3 was to expand using arrows and that it should be clear how many subcategories have been achieved. Presentation-wise, an idea using a radar diagram to show results were presented. For this presentation, each leg would be a category, different programs can be placed in the same diagram with different colors and perhaps red lines indicating the ambition. The presentation of the result should also include pictures that show and motivate why it was scored as it was.

The thought of having a radar chart as a way of visualizing information was found interesting by all participants of the co-creation workshop. It was explored if Figma had specific plugins that could be used for that purpose, but neither of those found (NB Charts, Chart and Chart maker) could create ones that initially were believed to be suitable. This led to the authors considering creating their own plugin with a radar chart, but this idea was decided to be explored if time allows it.

After the co-creation session, it was decided to create the UX checklist in the edit mode of Figma and use the presentation/prototype mode for presentation. It was also decided to use a rubric style for grading and evaluation as this allows for both numbers but also an explanatory text. A final decision was to explore using a chart

to present the result of the evaluation. And the most important findings from the co-creation about structure and presentation turned out to be the following:

- Data visualization needed to be explored.
- There might be a need to change their way of working with the checklist. The purpose of the checklist is not to be an encyclopedia, it is supposed to be a checklist that is easy to use.
- Solidified suspicion that the rating needs to include both numbers and words, so it was decided to use the rubric style.

6.13 Brainstorming Around Solutions

After the co-creation sessions, the authors felt inspired and it was decided to hold a last brainstorming session before deciding on a final design to develop and finalize. The time for the brainstorming session was 1h 30min and focused on four parts of the checklist; start page, layout, detailed layout and presentation.

Multiple ideas were created during this session as can be seen in figure 6.8 and what became clear was that information visualization and graphs had a strong influence on the ideas. It was decided to use data visualization to show the result. It was also decided to work with two levels; overview and detail, since it was a logical and reasonable division and a request from the primary users. A final decision was that the UX specialists were to work in edit mode using components and the prototyping mood was to be used for presentation. This as changes in components made in prototyping mode is not applied to the actual file, and so it was believed to be treacherous to conduct the complete evaluation in presentation mode. The result of the brainstorming session was brought to the next step of deciding on a design.

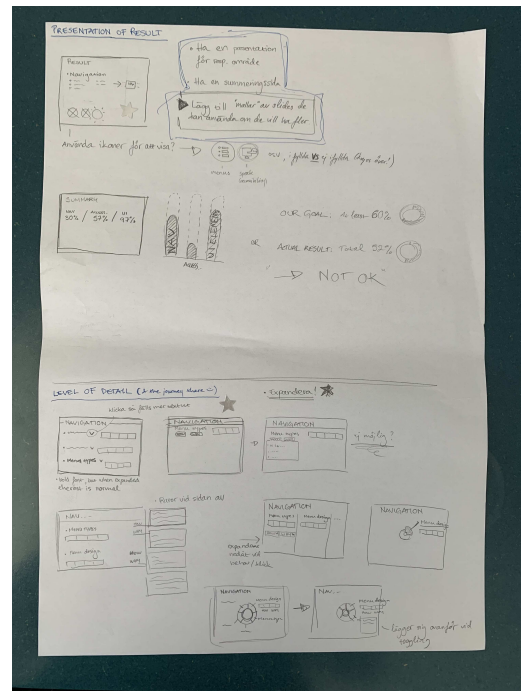
6.14 Deciding On a Design

When nearing the end of the project, it was time to decide and settle on a design to prototype and finally present to IKEA of Sweden. This was done in two stages of dot voting and going through the list of requirements. The dot voting was performed by putting all the designs and ideas from the crazy 8, morphological matrix, co-creation sessions and brainstorming on the floor so that they were all clearly visible. The authors were then given 15 dots each to place on the ideas they liked the most (see figure 6.9). The ideas that were left with no votes were eliminated and the ideas and designs left were checked against the requirements list. As all the remaining ideas fulfilled the requirements, it was decided to combine them into a final design and a complete solution through wire-framing in Figma.

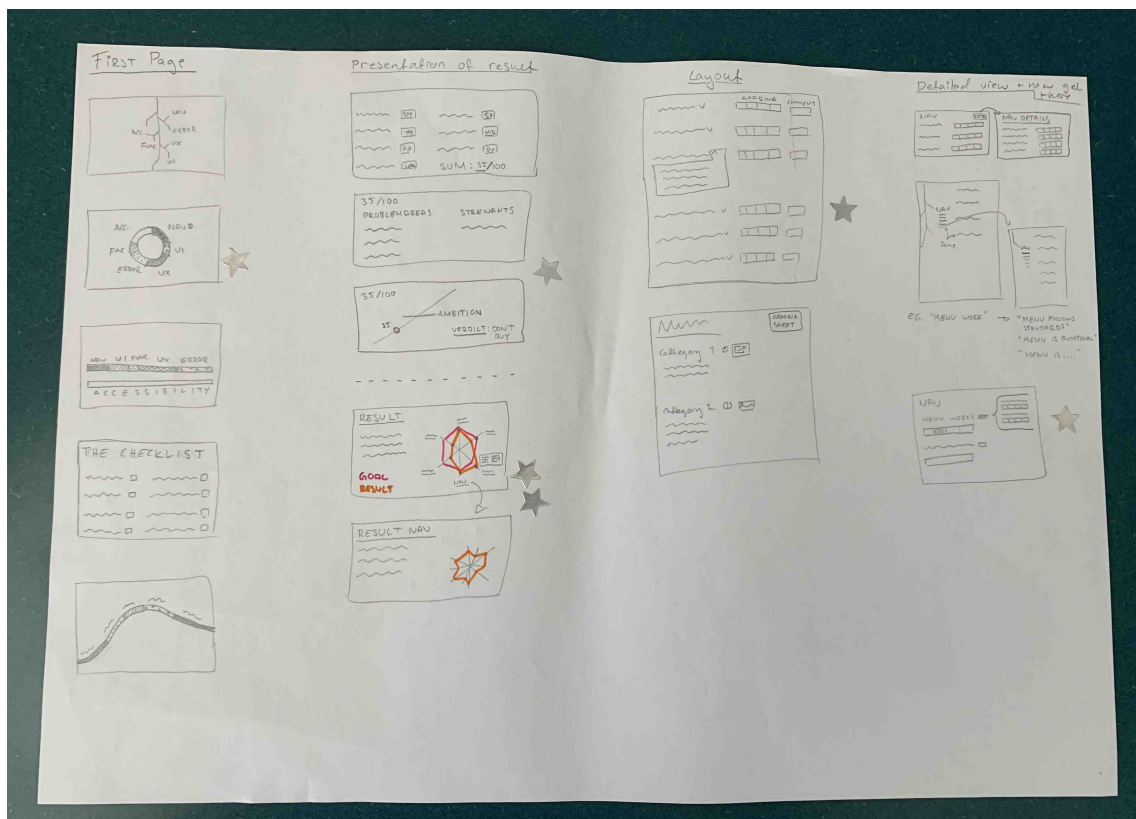
6. Execution and Process



(a)



(b)



(c)

Figure 6.8: Result of Brainstorming around solutions for the prototype. Information visualisation was incorporated in all concepts and focus was also placed on showing what was evaluated.

During this session of combining concepts and checking against the list of requirements, it was decided that the workflow should be non-linear. Furthermore, it was solidified that graphs are to be used at the beginning and the end to give an overview, decide on goal and show how they compare. Combining different concepts made it clear what components and layout seemed functional and possible to combine. The content of the solution was decided regarding links and how further information should be available through further interaction, such as opening/closing a box for information or when to send the evaluator to another frame for instructions such as How and Why to evaluate.

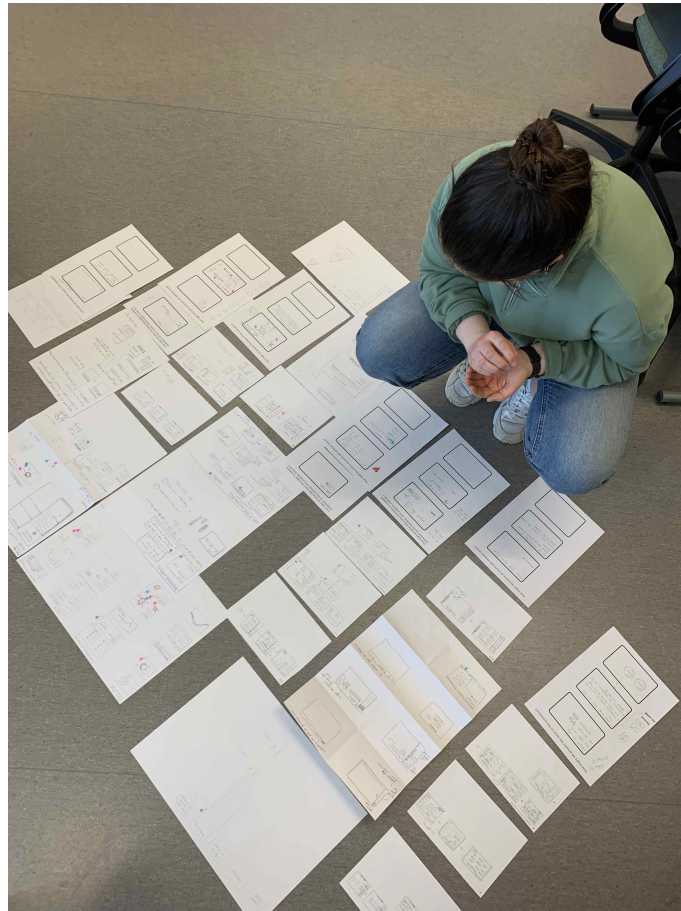


Figure 6.9: One of the authors performing dot voting on preferred ideas for the solution.

6.15 Prototyping

When the final design was established, it was time to start prototyping to better motivate the choices for the final UX checklist to IKEA of Sweden. The prototyping was done in Figma, as was previously decided through evaluating different collaborative tools. However, when starting the prototyping, there was an issue with the editor access from IKEA which was solved quickly. This, however, posed a question of whether or not there would be an issue with evaluation for non-UXers if people

6. Execution and Process

could not get edit access with a free account.

The prototyping started with a loose wireframe to get a structure to work around, with a focus on one area both for a quick review and a detailed review. This was followed by creating different layouts (see figure 6.10) that could be presented in the evaluation for feedback. During this session, components and overlays were explored and found useful and fun. However, as the potential with Figma became clear, so did the limitations in the form of not being fully automated as one cannot add input and have it show up somewhere else.

Possible solutions for showing the workflow when working in editor mode were also explored to clearly show possible users where they should navigate to next.

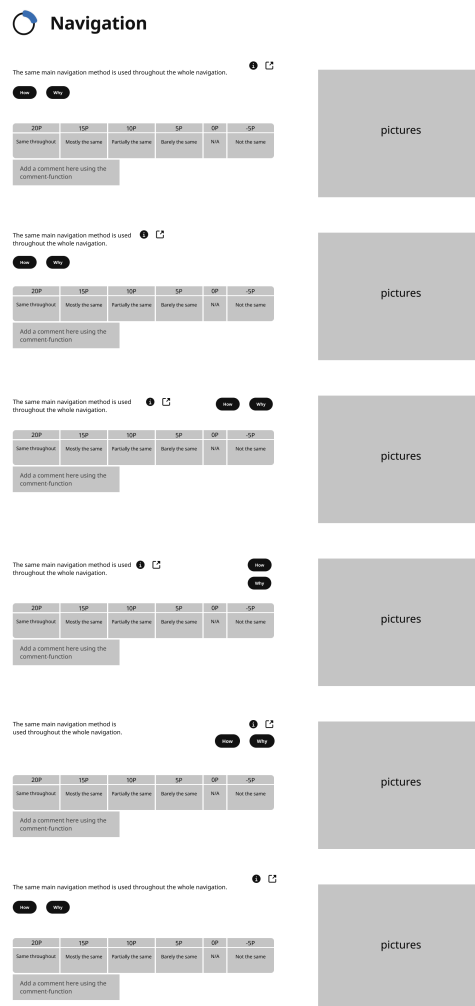


Figure 6.10: Exploring different layouts of the prototype.

6.16 Evaluation of Early Prototype

After prototyping, it was deemed that an evaluation with the reference group was necessary to gather initial feedback. Two UX specialists were shown the prototype at two separate sessions. One session was a physical meeting which allowed the UX specialist to explore and move around Figma. The other evaluation was virtual. In both sessions, the authors explained and showed the prototype and the UX specialist could then ask questions and give feedback. Overall, both of them liked the prototype and appreciated that the way of working had been changed. However, they also had some feedback and thoughts on improvement.

One UX specialist pointed out that comments in Figma stay in the same place even if a component is moved. It was also revealed that any user could move a comment. During the evaluation, it was found troublesome to use the toggle button in the menu to switch between states of a component and one UX specialist mentioned that they thought evaluators would prefer to change the color of the box instead. The second UX specialist later confirmed this, and mentioned the same problem and solution.

During the second evaluation session, the UX specialist expressed dissatisfaction regarding using Figma's potential. This was something that the authors had thought of as well, and a new idea came together with the UX specialist. This idea was then realized in the final stage of finalizing the design.

6.17 Finalizing Design

After the evaluation with UX specialists, the prototype was edited and refined. By re-imagining the way of working with the checklist, the full potential of Figma could be accessed, such as working in the prototype mode by primarily placing comments that are later to be put together by the person in charge of the evaluation. Certain layout changes were discussed for better cohesion as well, such as visually grouping the statements with the rubric by placing the rubric directly underneath the statement.

When a good enough layout had been created, it was decided to tackle the statements that are the content of the checklist. The statements of the old checklist were rephrased and sorted according to the result of the card sorting from section 6.5, and the categories were then named based on the result of the co-creation for exploring structure. The areas and order decided on were:

1. Visual Design
2. Navigation
3. Functionality
4. UX Principles
5. UX Writing
6. UI Components

The order was based on the result from the co-creation session, where it was expressed that it was preferred to ease into the evaluation by starting with an area that gave a good overview. Therefore, Visual Design was chosen to be the first area if following a linear workflow.

To counteract the evaluation becoming too heavy at the end, it was decided to finish with a relatively straightforward area. Here UI Components were believed to fit nicely. This despite the fact that there were discussions that UI elements actually belong to visual design and functionality. However, the participants of the co-creation expressed that it would be cumbersome in the end if the checklist only became more detailed, so the linear order was decided based on that information.

The final area to refine was that of setting up the goal page. When deciding how to present the result previously, it was decided to use the radar chart. Therefore there was a wish to use the radar chart when setting up the goal as well to have a good connection and smooth transition between goal and result. To help the users of the checklist set the goal, it was decided to use a version of Maslow's Hierarchy of Needs as this was a model they were familiar with from the start. The modified version is called Bradley's Design Hierarchy [97] as it is angled toward design and was therefore believed to be a more suitable model. When this final decision was made, it was time to implement it into the prototype and finish it.

7

Results

In this chapter, the final result of the project will be described. That includes the prototype of the UX checklist called UTVÄRDERA, as well as the findings that helped answer the research question *What are important factors to be considered for a UX checklist when it comes to usability?* These findings are gathered in a list of important factors.

In this section, *evaluator* indicates the person using the checklist to evaluate the digital solution, and *user* indicates the person using the digital solution.

7.1 Final Design of UTVÄRDERA

The final prototype of the checklist UTVÄRDERA is created in Figma. An overview of the checklist can be seen in figure 7.1. When IKEA of Sweden evaluates interfaces with support from the checklist, it will be conducted both in prototype/presentation mode and in edit mode. This will allow for more flexibility and invite users without a Figma account to evaluate a digital solution using the checklist. This means that people who are not IKEA employees can help with the evaluation, allowing for technical accessibility. Multiple flows have been created in Figma, where one flow is used for *evaluation*, and another flow is used for *presentation* with stakeholders.

When the checklist is used to evaluate an interface, the group will start with appointing a person responsible for the evaluation. This person will lead the group through the evaluation and will also be the only person working in edit mode.

Before heading into the evaluation, the group is tasked to set up a goal with the evaluation of what level the different areas need to perform at. This goal is later used in the presentation of results to visualize better how the digital solution performed according to what was needed and aimed for.

The group will start the evaluation by pressing *present* and then follow the steps of the checklist. When deciding on a score, they will place a comment using the comment function in the rubric box they find most suitable. The person in charge of the evaluation will then summarize all the comments and color code the rubric accordingly (see figure 7.2) in edit mode.

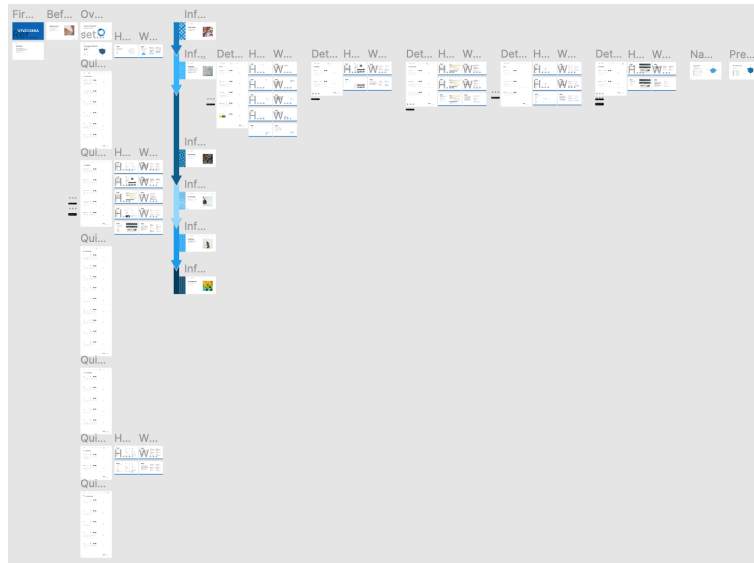


Figure 7.1: Zoomed out view of the checklist UTVÄRDERA showing all the frames that has been created in edit-mode.

10P	5P	0P	-5P	-10P
Very easy	Easy	N/A	Difficult	Very difficult
Add further thoughts here using the comment-function.				

Figure 7.2: Rubric in UTVÄRDERA that has been color coded according to votes. Green color with thick frame indicates the result. Yellow color indicates votes but not a majority.

The checklist is divided into two levels: a *Quick Review* and *Detailed Review*. That allows the evaluator to choose what level to evaluate depending on time and need. As insinuated by the name, the Quick Review will take less time and evaluate the digital solution with bigger strokes. Whereas the Detailed Review will look at the details and so demands more time.

Both *Quick Review* and *Detailed Review* have different areas, and no matter which level one chooses to evaluate there are six different areas to go through:

- Visual Design
- Navigation
- Functionality
- UX Principles
- UX Writing
- UI Components

When evaluating a tool using the checklist UTVÄRDERA, the evaluator can choose to either follow the workflow created by going through the areas one by one in a linear manner. Or, they can use a non-linear workflow and choose freely which area to evaluate first, second, third, and so on. The linear workflow was designed by considering the wishes of the reference group of not having all the more challenging and detailed areas towards the end. The workflow, therefore, begins with an extensive and broad area of visual design that is easily understood and assessed, followed by navigation that narrows it down slightly as a warm-up. After navigation, one is to tackle the heavier areas of functionality and UX principles to then cool down with UX writing and UI components that are easier to grasp and evaluate.

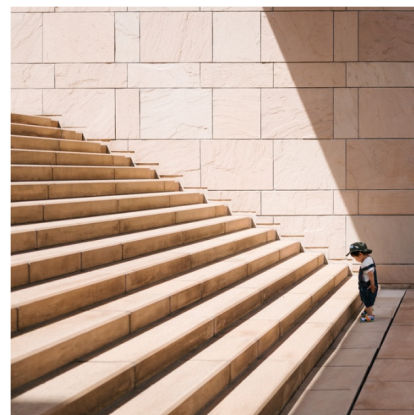
At the end of the evaluation, there is a reference slide to showcase where the information stated in the checklist comes from. This is used to give validity to the checklist.

7.1.1 Main Page and Navigation

When starting the evaluation, the evaluator is faced with a start screen that fades into the introduction page. This page asks the evaluator if they performed certain actions that are prerequisites to the evaluation (see figure 7.3). These are actions such as looking at the digital solution to be evaluated before starting the evaluation, completing the early research phase such as customer interviews, and setting up a common goal with the rest of the group. The evaluator can continue without doing these three things, but they are a reminder to finish these before evaluating to have a more accurate result.

Before you start

- Have you assessed the digital solution to be evaluated?
- Is the early research phase completed such as data analytics and customer interviews?
- Have you set a common goal with the rest of the team in edit mode (see goal slide)?



Start the evaluation >

Figure 7.3: The introduction page in UTVÄRDERA that is shown before the main page, where the preferred evaluation is selected. This page lists the prerequisites informing evaluators what should be done before using the checklist UTVÄRDERA.

After checking the boxes for the prerequisites, the evaluator can click the button saying *start the evaluation*. This will take the evaluator to the main page (figure 7.4) that provides an overview of what areas to evaluate, and the possibility to choose between the *Quick Review*, the *Detailed Review* and *See Goal*. The overview is illustrated using a donut chart that shows how much of the checklist that is dedicated to each area. This is the same for each evaluation. By clicking the *See Goal* button, the evaluator is taken to a view where they can see the goal previously set up by the group. The goal is based on Bradley's Design Hierarchy [97], and is decided on if a digital solution needs to perform at the top level (Creative) in all areas to work or if some areas are more important (figure 7.5). The goal is placed using the pen tool in Figma to draw a radar chart. The pen tool works by placing and connecting dots on desired levels of the goal circles. This, in turn, creates a shape symbolizing the goal of evaluation for a specific tool. When finished with the goal, the evaluator can navigate back to the main page, decide how to start the evaluation and navigate accordingly.

Content of evaluation

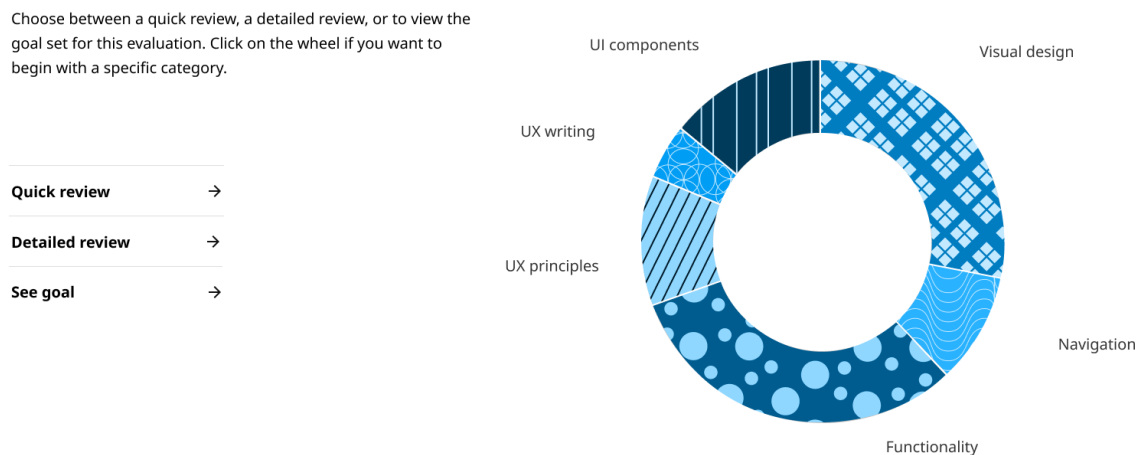


Figure 7.4: Main page of UTVÄRDERA. This shows the the donut-chart indicating the different areas that evaluators use to evaluate the interface in digital solutions.

7.1.2 Quick Review

If the evaluator chooses to follow the *Quick Review track*, they can click the corresponding button on the main page to navigate to the page for Quick Review. Here, a horizontal menu is displayed at the top of the page, allowing the evaluator to navigate between the six main areas as seen in figure 7.6. This design was used instead of side navigation since top-navigation is considered the preeminent approach [1], while "side navigation makes the page crowded and occupies the page's visual entry point, forcing the user to scan past it to read content" [1, p. 572]. The active area is highlighted in the menu with a black font color and a blue underline to show the evaluator what area they are evaluating clearly. The area's title is displayed at the

← Main

Goal - [name of solution]

Decide on a goal together and mark the figure in edit mode to create a radar chart.

How Why

Creative	Circle A
Proficient	Circle B
Usable	Circle C
Reliable	Circle D
Functional	Circle E
Fail	Circle F

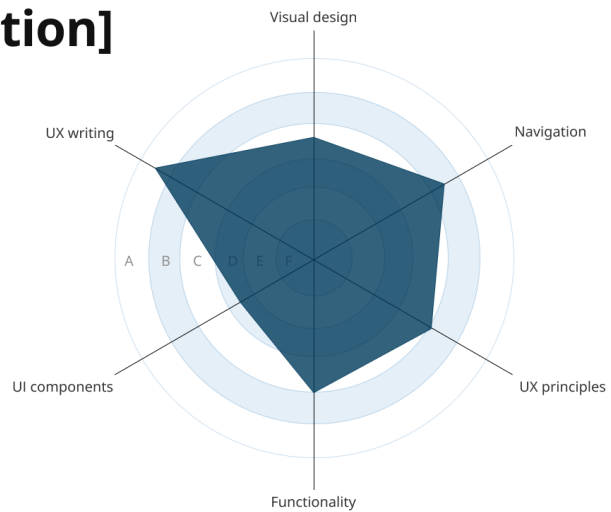


Figure 7.5: Goal page of UTVÄRDERA. Here the evaluators specify the goal for each area of their digital solution. For example, here UX writing has been set to circle A - Creative. This indicated that it should fulfill all needs, be beautiful and provide value to the user according to Bradley's Design Hierarchy [97]. The evaluator in charge of the evaluation draws the shape using the pen tool in Figma, by placing dots and drawing lines connecting the dots.

← Main Visual Design Navigation Functionality UX Principles **UX Writing** UI Components

UX Writing

The labels are easy to understand. ⓘ ↻ How Why

40P	20P	0P	-20P	-40P
Same throughout	Mostly the same	N/A	Barely the same	Not the same

Add further thoughts here using the comment-function.

Add pictures

Figure 7.6: Layout of the Quick Review track, in this case for the UX writing area, with horizontal navigation at the top of the page.

top of the page together with a symbol indicating its position on the donut chart used on the main page. The areas are given their own pages for a good overview, but also since it would be a lot of information to scroll through. That would make

7. Results

it less accessible since keyboard and screen-reader navigation does not work well with infinite scrolling [1], which all of the information within the checklist almost would simulate. Within the top-navigation, the user is also given a chance to go back to *Main* which is indicated with a back arrow, since the back button is the second-most-used navigation feature that ensures the evaluator that they can be returned to familiar territory by clicking the back-button [98].

The content of the *Quick Review* is an assortment of broad statements for each area accessed through scrolling. The statements are then evaluated to what degree they conform to the digital solution, ranging from *always* to *never*. Here, the evaluator places their comment in the box they believe to be the most suitable (see figure 7.7). If they feel more clarification about the statement is needed, they can hover the *i*-symbol, and if more information can be found externally the *source*-symbol will be available to press (see figure 7.8).

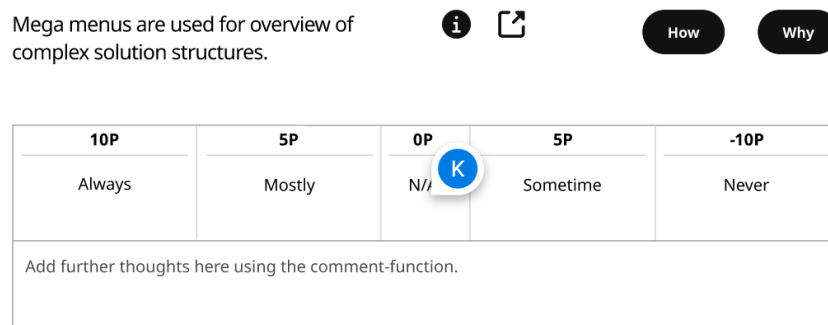


Figure 7.7: Look of rubric when evaluating with UTVÄRDERA. The blue icon represents a comment made with the comment function in Figma. The comment indicates the vote of one evaluator when evaluating a digital solution using UTVÄRDERA.

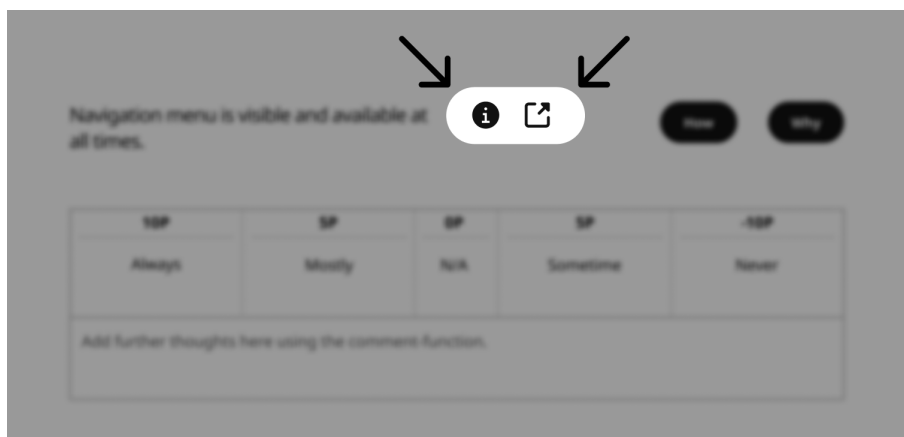
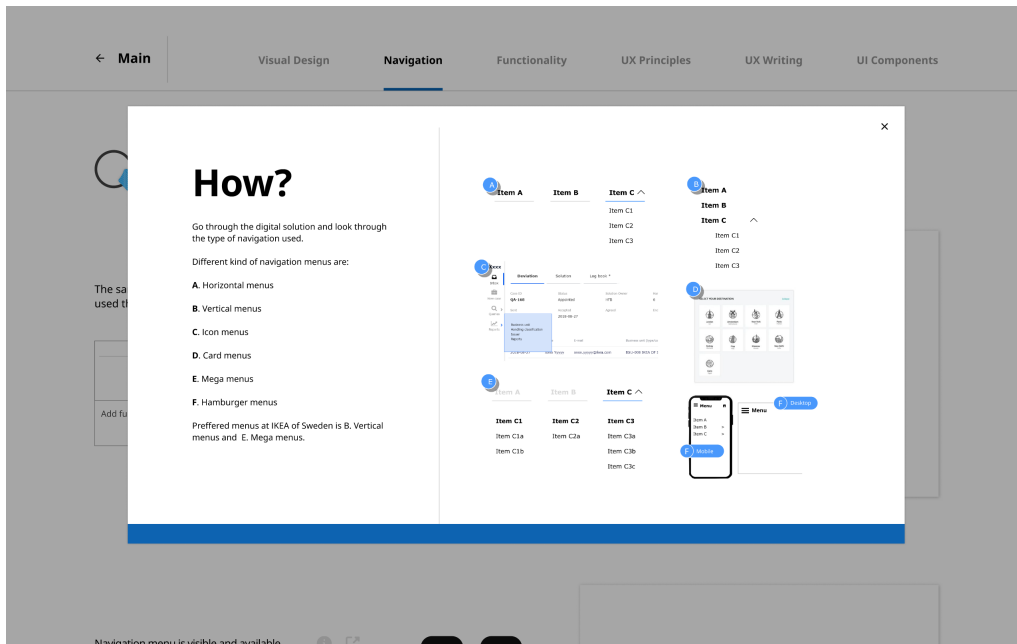


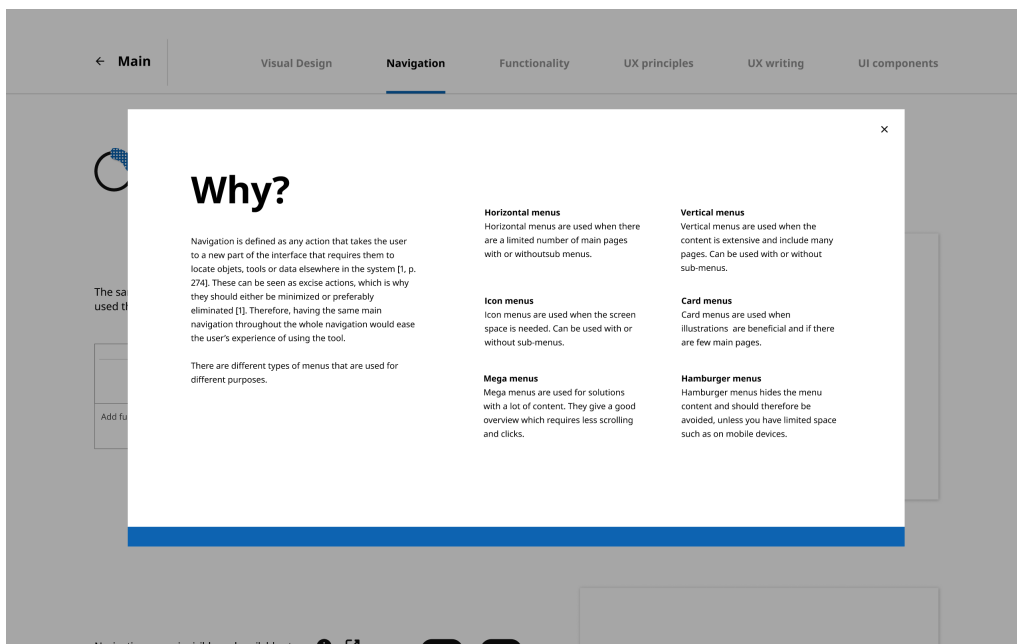
Figure 7.8: Next to the statement there are information- and source-buttons allowing the evaluator to find more information if needed.

The evaluator also has the possibility to press the *How*-button or the *Why*-button

for further reading about the statement, what to look for and why it is important. This information will be presented to the evaluator as an overlay, as shown in figure 7.9. According to Cooper et al., links are to be used for navigation and buttons for action [1] which is why the overlays are retrieved by buttons that require to be clicked. When all statements have been evaluated, the person responsible for the evaluation can compile the result and write the total sum in the down-right corner of the page in edit mode. There is also room next to each statement to add pictures showing examples from the digital solution.



(a) Overlay for a 'How'-button.



(b) Overlay for a 'Why'-button.

Figure 7.9: Overlays for 'How' and 'Why' for a specific statement within the *Navigation* area. When clicking the 'How'-button the overlay for 'How' will appear providing the evaluator with information regarding how to evaluate. When clicking the 'Why'-button the overlay. for 'Why' will appear, providing information to the evaluator why it is important to evaluate this area.

7.1.3 Detailed Review

As mentioned, the main page allows the evaluator to choose to perform a detailed review. It is accessed by either clicking the button *Detailed Review* or interaction with one of the areas in the donut chart that visualizes the different areas available in the checklist. If the *Detailed review* button is clicked, they are navigated straight to the first area of the checklist which is *Visual design*, but it is also possible to choose whatever desired area in the donut chart to begin with.

No matter in what way the evaluator navigates to the *Detailed Review*, the first view is always an introduction to the chosen topic (for example, see figure 7.10). This view introduces the chosen area and allows the evaluator to either navigate forward and begin the detailed evaluation by clicking *Next* in the bottom right corner or go back to the main view by clicking *Main* in the top left corner.

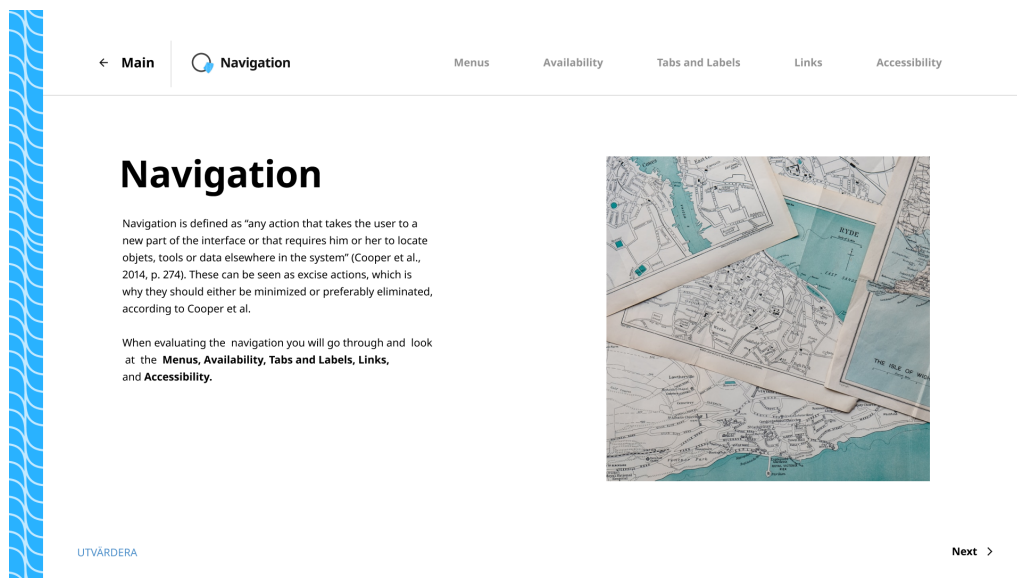


Figure 7.10: First view when entering the Detailed Review for a specific area, in this case 'Navigation'. This page provides information about the area to be evaluated and shows the subcategories of the area through the top menu.

When navigating forward, the following view looks like the one seen in figure 7.11. The chosen area is divided into the number of topics as the questions available in the *Quick Review*. For example, navigation has five statements in the *Quick Review*, resulting in five topics in the *Detailed Review* where each topic contains detailed questions about that specific subject. These questions are placed in a view that can be scrolled vertically to see all associated questions. At the bottom of the page, the final score of the topic can be entered, but that is mainly made by the one responsible for the evaluation. It is possible to navigate freely between the topics within the chosen area simply by using the top bar.

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← Main | **Navigation** | **Menus** | Availability | Tabs and Labels | Links | Accessibility

Menus

Horizontal menus are only used for a limited number of pages. ⓘ ↗ **How** **Why**

10P	5P	0P	5P	-10P
Always	Mostly	N/A	Sometime	Never
Add further thoughts here using the comment-function.				

Add pictures

(a) Subcategory layout of 'Navigation' with statements

Hamburger menus are by default hidden. ⓘ ↗ **How** **Why**

10P	5P	0P	5P	-10P
Very easy	Easy	N/A	Difficult	Very difficult
Add further thoughts here using the comment-function.				

Add pictures

Sum: _____

(b) Total score will be added to Sum in the lower right corner of each subcategory

Figure 7.11: Layout of Detailed Review for the subcategory 'Menu' of the *Navigation* area. Here the evaluator can read the statement, find more information using the information-, source-, 'How'-, or 'Why'-button. They can also place their vote.

7.1.4 Presentation

When the evaluation has been executed, the group will decide on the most important findings within each evaluated area. The result is then put together in edit mode by the person responsible for the evaluation and displayed as shown in figure 7.12. Here the result of the evaluation can be compared with the goal that was set up in the beginning. In presentation mode, the evaluator or presenter can navigate between the presentation of the big result and the presentation of area-specific results by clicking on the name of the areas. These presentation slides are also created in

edit mode by the person responsible and used to better visualize the result to the stakeholders. It is also created as a second flow with specifically chosen pages for the presentation.

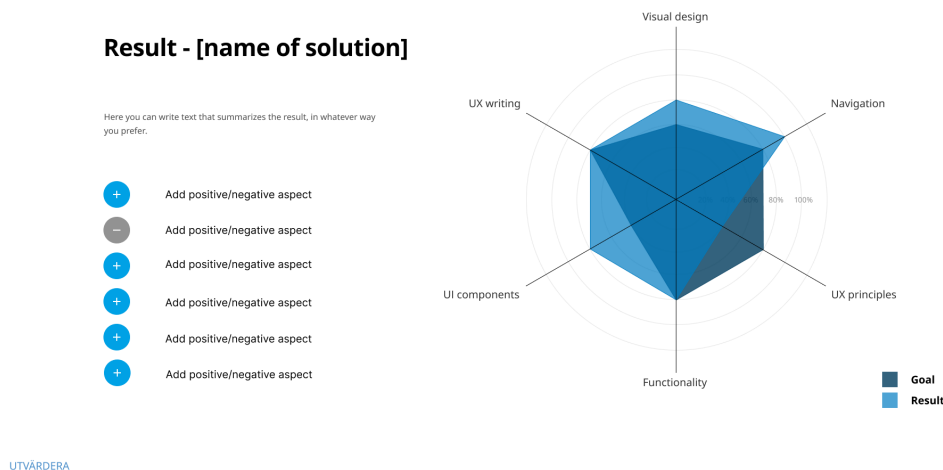


Figure 7.12: View of the Presentation in UTVÄRDERA, where the previously set goal and the result is shown together with pros and cons from each area. The pros and cons are found through the evaluation.

7.2 Important Factors

This thesis project resulted in a prototype for the UX specialists at IKEA of Sweden to use, but it also answered the research question "*What are important factors to be considered for a UX checklist when it comes to usability?*". Below is a list of the important factors that were revealed during this thesis project and can be used as a general guide for people wishing to create their own checklist. This list is followed by a short description of each factor about why it is important and how it was found, together with how it is incorporated with the final prototype.

- Providing Flexibility in Workflow
- Clarifying Content in a Credible Way
- Considering Platform for the Checklist
- Allowing for Evaluators with Different Roles to Use the Checklist
- Providing an Interactive and Engaging Checklist in Both Evaluation and Presentation
- Providing a Rating System That is Easy to Understand

7.2.1 Providing Flexibility in Workflow

There are many different kind of evaluators and each one has their own preferred way of working [1]. To provide them an equal user experience of the checklist, it is important to present a flexible workflow to not exclude any user [26]. To ensure this one can look to *Flexibility in Use* [28] and Universal Design as no literature regarding workflow and checklist was found. It is also important to consider the mental workload that the workflow can pose on the evaluator, as a high mental workload can limit performance [25]. This can be aided by having a cohesive layout that makes the checklist easy to understand and follow [28], and in some cases it may also involve changing the evaluators way of working.

Providing Flexibility in Workflow deals with five focus areas as can be seen below.

Providing Different Levels of Details for Evaluation

Just as different users have divergent knowledge within their field [1], different evaluation has divergent need of detailed levels. To allow for a flexible evaluation, multiple levels of details for evaluation should therefore be provided to ensure Universal design and flexibility in use [28].

By researching different checklists during benchmarking, it was discovered that checklists with varying levels of detail were easier to apply to different evaluations. It was also revealed that one more general and one more detailed level is preferred. Additionally, it should also be possible for the evaluator to choose what topic to evaluate and on what level. It became clear during benchmarking (subsection 6.1) that checklists with a hierarchical order and different levels of detail, such as WCAG 2.1, would allow the evaluator to decide on which level to evaluate the digital solution. In UTVÄRDERA, this was solved by having two different tracks; the *Quick Review* and the *Detailed Review*, so that the evaluators can choose how they want to evaluate (see figure 7.1). Either with bigger strokes and less time or get down into details which requires more time and concentration.

Providing a Non-linear Workflow

The workflow should be non-linear to accommodate for different evaluators' workflow, and the need to evaluate different parts of a digital solution to allow for flexibility in use [28]. This has not been found through checklist-related literature but can be strengthened with literature regarding Universal design and inclusive design. One way of implementing this is by having a non-linear workflow that allows different users to use their preferred workflow, and so does not exclude any users [26].

The need of a non-linear workflow became clear during the interviews with the reference group (see section 6.3) and co-creation sessions (see section 6.12), as when asked to explain their way of working it differed significantly. Additionally, sometimes during evaluation, the evaluators are only interested in how a certain area scores. Therefore they should not be forced to go through areas that are not relevant to the case to be able to evaluate the area of interest. In the prototype, this was achieved by allowing evaluators to choose which category they want to evaluate and constantly provide a navigation button that leads them back to the main page (see figure 7.4), where they can choose to evaluate a different area of the digital solution.

Providing a Functional Order of Evaluation

Even if a non-linear workflow is to be preferred, there should also be an option of a linear flow. In such a case, it is important to consider the order of the areas to be evaluated to not create a demanding mental workload [25]. Furthermore, the order of areas need to be structured in a way that allows the evaluation to be effective and efficient [10].

The structure of UTVÄRDERA aims to follow the mental model of the evaluators regarding the content of each area, as was researched during the focus group (see section 6.2) as well as the co-creation workshop with the reference group (see section 6.5). During the workshops, the participants were asked to group statements and create their preferred timeline for evaluation, this was then used as inspiration for UTVÄRDERA.

The non-linear workflow should also consider the mental workload that each area places on the evaluator, and so the order should ease the evaluator into the evaluation before tackling the most challenging parts. The order should then provide areas that are easier to evaluate before finishing the evaluation. During the co-creation session about structure (see section 6.12), all participants agreed that the first area needed to be easily understood and evaluated. This was strengthened by the usability goals (see subsection 2.1) stating that a functional order provides effectiveness and efficiency to the checklist, which provides usability to a checklist. This validates what is evaluated by fulfilling it itself. In the prototype for UTVÄRDERA, this has been implemented by considering the mental models from the co-creation presented in section 6.5, where participants were asked to create their preferred timeline of evaluation. In UTVÄRDERA, the linear workflow is inspired by these timelines and can be followed by pressing the item *Detailed Review* on the main page (see figure 7.4).

Providing a Cohesive Layout

Simple and intuitive use makes it easy to understand and use a product [28], no matter what background the evaluator has. The checklist layout should therefore be cohesive to ease the use of the checklist for the evaluator, as was found when researching the seven principles of Universal design (see subsection 3.3.1).

When creating UTVÄRDERA, certain layout changes were discussed with the advisor at IKEA of Sweden and implemented for better cohesion. For example, always having the navigation back to the main page in the same place. Other changes made were the placement of the statement over the rubric (see figure 7.6) instead of having the statement next to the rubric, as this groups them visually as belonging together. Further changes were made to UI components to create a clear difference between components used for navigation to another page and components to start an action such as open overlays, information or confirm the next step.

Reconsidering the Evaluators Current Workflow

When creating a checklist, it is important to look into the users' way of working and make sure that it is the most efficient way they can perform their work, to enhance usability [10]. If it is not, it might be necessary to change the way of working.

As was briefed at the beginning of the project, the current way of working with the

checklist was not efficient and needed to be evaluated, according to Participant 3.

"[...] not so nice to collaborate in the current version and that's also, we were jumping between PowerPoint and Miro... So screenshotting things from PowerPoint and putting them in Miro and then moving it back." - Participant 3

The UX specialists were open to the idea of changing their way of working, which eased the process of evaluating their current checklist and finding the problem areas. When creating a checklist, it is therefore important to make sure that the evaluators are open to changing their way of working since that could ease the process and make it more efficient. Regarding UTVÄRDERA, the content of the UX checklist has changed from being filled with information to mainly focus on being a list to check off. This since the second co-creation workshop (see section 6.12) revealed that the purpose of a checklist is not to be an encyclopedia, it is to be a checklist that is easy and quite quick to use.

7.2.2 Clarifying Content in a Credible Way

To reduce the risk for errors and unintentional actions, the design needs to be clear and credible [28]. When creating a checklist, this theory regarding Universal design should be applied to the content. This can also be achieved through understandable phrasing [10] as well as providing references [45]. This is further explained in the two focus areas as can be seen below.

Providing Clear Phrasing

Clear and understandable phrasing is of great importance according to usability goals [10]. When creating a checklist this usability theory should be applied to ensure that the intended areas and statements are evaluated. Furthermore, clear phrasing allows for perceptible information which in turn can minimize the risk for error [28].

This was brought to light during the interviews (section 6.3) and the co-creation for exploring structure (section 6.5), as it became clear that it is important to make a checklist easily accessible and easy to understand. It was also revealed that language using challenging words and difficult phrasing made it difficult to use and understand a checklist.

"Had some struggle understanding it, like into details, I remember me and participant 3 discussing some of the, not overall topics, like the five big areas, but more when we went into more detail. Like, [...] is this the purpose or is this the purpose or [...] what's good or bad, [...] We had some troubles understanding it sometimes." - Participant 2

This leads to the conclusion that a checklist should have clear and understandable phrasing. This was considered when creating UTVÄRDERA as the old statements used were put under scrutiny, divided and rephrased to become clearer and easier to understand.

Providing References

To add credibility to a checklist, it is important to provide references regarding in-

formation stated to gain trust [45]. As was stated in the *Mobile Application User Experience Checklist* in subsection 3.4.3, many checklists lack evaluation regarding credibility [42]. Therefore, it is important to provide references about the checklist to convince stakeholders that a well-informed and credible evaluation has been performed.

During benchmarking the authors found checklists with references more credible, and the advisor at IKEA of Sweden expressed a desire to include references in the checklist for credibility. Preferably well-known sources and standards such as WCAG 2.1, that strengthen the statements and the choices made. This is to move away from too much subjectivity and opinions during the evaluation. Credibility through references is added to UTVÄRDERA by having references when information is presented. This is used in the *How* and *Why* overlays (see figure 7.9). References are also provided by having a summary of the references that can be used for the final presentation with stakeholders (see figure 7.13).

References

Cooper, A., Reimann, R., Cronin, D., and Noessel, C. *About Face: The Essentials of Interaction Design*, ser. 4th edition. John Wiley & sons, Incorporated, 2014.

Interaction Design Foundation. (2017). *Needs Before Wants in User Experiences - Maslow and the Hierarchy of Needs*. Available: <https://www.interaction-design.org/literature/article/needs-before-wants-in-user-experiences-maslow-and-the-hierarchy-of-needs>

McLeod, S.A. (2018). *Maslow's Hierarchy of Needs*. Available: <https://www.simplypsychology.org/maslow.html>

UTVÄRDERA

Figure 7.13: View of the reference slide.

7.2.3 Considering Platform for the Checklist

When building the checklist, it is important to thoroughly consider the platform in which it should be built. A checklist should allow for a quick and effortless evaluation [43], [44]. The authors argue that this can be achieved by having the checklist not span over multiple programs. Additionally, a well-known tool among the users is also desired as it creates a lower threshold for the evaluators by being familiar and easy to learn [10]. Furthermore, a well-known tool among users allow for technical accessibility [28] as it does not require the evaluators to learn to master a new tool.

This factor deals with two focus areas as can be seen below.

Reducing Number of Programs Used

The System Usability Scale (SUS) [43], [44] states that a tool needs to be quick and

effortless to use. This theory can be applied to a checklist by not having it span over multiple programs. By keeping the checklist within one tool, the authors argue that it allows for a better and more efficient workflow through the theory of the six usability goals [10].

A wish to create a more efficient checklist and avoid working in multiple programs was expressed by Participant 1.

"If we needed to answer something or add something different in Excel then we would do that [...] but our group would only work in the Powerpoint mainly. But we would also kind of, I think we used Miro for brainstorm and stuff but the document itself was a Powerpoint presentation where we added stuff and kind of explained our reasoning and so on." - Participant 1

This became clear in the affinity diagram as seen in subsection 6.4.2 regarding problems with the format. This is since they jump back and forth between different programs as not one of the programs fulfills all their needs.

To avoid working in multiple programs, Figma was carefully selected through comparison with other programs using a Pugh matrix (see section 6.11). Furthermore, the way of working with checklists was slightly adjusted.

Creating the Checklist Using a Commonly Used Tool

By using well-known tools, a checklist becomes more accessible and understandable since it creates a lower threshold for the evaluators compared to if an unknown tool were to be used [10], [23]. Additionally, it allows for simple and intuitive use since it is already a well-known tool among the users which allows for technical accessibility [28]. Therefore it is important to make sure that the users are familiar with the tool used for the checklist.

Multiple tools are available that suit different purposes as became clear during the research of collaborative tools (see section 6.10). It is, therefore, necessary to look into what tools are commonly used in the context in which the checklist is to be used. The developed prototype is built in Figma. This is a commonly used tool among the UX specialists at IKEA of Sweden according to correspondence with the advisor at IKEA of Sweden. This is important as the UX specialists are the primary evaluators of the checklist.

7.2.4 Allowing for Evaluators with Different Roles to Use the Checklist

Usability checklists are considered an expert method used by experts [8], but it does not have to be like that as a checklist can be useful for novice evaluators [42]. Additionally, when deciding what tool to build the checklist in it needs to be clarified who should use the checklist, as that will affect what tool it should be built in.

During the interviews with the UX specialists at IKEA of Sweden, it was revealed that they sometimes use their checklist together with stakeholders and users outside of their organization. This finding challenges the view that checklists are an expert method used by experts [8], and must be considered when creating a checklist.

"[...] *doing it together with solution owners and users and the other people [...]*" - Participant 5

Therefore, in this case, the involvement of users and stakeholders needed to be considered when deciding on what tool to use. This is since it should preferably allow for collaboration without purchasing either the tool or a subscription. Figma was chosen for the prototype using a Pugh matrix (see section 6.11) due to it allowing users to view the prototype by having a free account [80]. Furthermore, the different participants have different roles, backgrounds and need for information to be provided, which was revealed during the interviews (see subsection 6.4.11). This was implemented by the use of *How* and *Why* overlays (see figure 7.9) as well as the *information* and *source buttons* (see figure 7.8), that allows the evaluator to access more information regarding the statement if needed.

7.2.5 Providing an Interactive and Engaging Checklist in both Evaluation and Presentation

If a product provides the proper functionality and allows users to perform actions in a pleasant manner, it is engaging [10]. This can be applied to a checklist and becomes important when using the same tool for an extended time. A tool such as a checklist should therefore be quick and effortless to use [44] both for evaluation and presentation, as this supports users to manage tasks swiftly, easily [10], and provide good interaction.

This factor deals with two focus areas as can be seen below.

Providing an Interactive and Engaging Checklist

A challenge with many checklists is that it can easily become very big and complex [1], which can have a consequence of users not using them. To better engage evaluators, the checklist should be interactive, as using a checklist when evaluating should be pleasant. This can be achieved by allowing users to work with a checklist that is functional and allows for performing actions in a pleasant manner [10]. This became clear during ideation when using a morphological matrix (see subsection 4.4.6), as the ideas that had the most potential, interest and that the authors tended to gravitate to were all based on interaction and the checklist displaying a degree of dynamic usage. This was added to UTVÄRDERA partly through design but also by choosing to create the checklist in Figma, as this is a very interactive tool that allows for an engaging layout and workflow [80].

Providing Results Using Data Visualisation

A checklist can contain a lot of information, but it is useless if the result is not graspable [1]. By providing results using data visualisation the information becomes more easily recognised and understood [23] due to its similarity with pictures. Additionally, the tool needs to be quick and effortless to use [44], which also includes the way the result is presented.

During interviews with the reference group (see section 6.3), it became clear that the result needs to be communicated without using an appendix, as stated by Participant 3 below.

"[...] whatever you're trying to communicate cannot be dependent on the appendix [...]" - Participant 3

This puts greater pressure on the way the result is presented. This is since it needs to be understood by the evaluators but mainly by those to whom the result of the checklist is presented.

During the second co-creation workshop described in section 6.12, it was revealed that the currently used pyramid within the UX checklist is hard to understand in several ways. For example, the participants in the workshop had many questions about how the result is transformed from numbers to a level in the pyramid or simply where the result came from. Therefore, different ways of presenting the result using data visualization were explored in the ideation phase. The final prototype uses radar charts to visualize the set goal and the actual result of the checklist (see figure 7.12), which was inspired by an idea from the second co-creation workshop.

7.2.6 Providing a Rating System That is Easy to Understand

For the rating to be useful and functional, the evaluators need to be able to understand the meaning of the rating. This can be achieved by having more options in the rating than yes/no, as well as combining numbers and words. This can be seen in studies and checklists such as the SUPR-Q [45], [46] or the SUS [43], [44]. In those checklists the Likert scale has been used to provide an easily understood rating system.

This study showed through interviews that the rating needs to indicate what is good and bad in an easy and understandable way.

"we had some interpretation issues with the rating"- Participant 2

In the previous UX checklist at IKEA of Sweden, the rating consisted of a scale ranging from -3 to 3. The issue with such a scale was that it was unclear what the meaning of -3 was and what the difference between 1 and 2 was. This became clear during the interviews and can be read in subsection 6.4.6.

"And I also think that the scaling, rating system, was hard to understand. I had to ask about that, like what is a zero, what is a minus three" - Participant 2

The rating of the previous checklist was clearly an issue. Therefore it was a priority to solve. It was also evident through benchmarking (section 6.1) that the rating needs to be more than yes/no as some areas might not always be applicable and as some areas are fulfilled to a degree but not completely. This was further strengthened through the interviews where the participants expressed a desire to rate based on a scale (see subsection 6.4.6). This method was also found in other studies and checklists such as the SUPR-Q [45], [46] and the SUS [43], [44] where the Likert scale is used for rating as previously discussed in subsection 3.4.4 and 3.4.5. This was an inspiration for the new rating system of UTVÄRDERA.

The SUPR-Q uses two different scales when evaluating, a 5-point Likert scale and

a 10-point Likert scale. The SUS also uses a Likert scale, but this scale uses words ranging from *strongly agree* to *strongly disagree*. In UTVÄRDERA, it was decided to incorporate both these Likert scales and create a rubric-styled rating system consisting of words and numbers (figure 7.7). This will hopefully clarify the meaning of the score and make the score tangible and easy to sum up and present, making it possible to use the score to compare different programs or how a program performed compared to the goal. This was presented to two from the reference group at IKEA of Sweden during the evaluation of the early prototype (see section 6.16) and received positive feedback.

8

Discussion

This chapter discusses the development of UTVÅRDERA and how well-identified problems have been solved. Furthermore, difficulties that arose during the work and how the work with UTVÅRDERA can proceed are discussed.

8.1 Result Discussion

The thesis work was done remotely due to the COVID-19 pandemic and the different locations of IKEA of Sweden and the authors. This has been concluded not to notably affect the result as the prototype is an online tool that could be worked on and evaluated online. Additionally, the academic result did not require the authors to be at the IKEA of Sweden office.

The thesis has two main results; an academic result, a prototype. These will be discussed in this section.

8.1.1 Research Question

The research question for this project has been "*What are important factors to be considered for a UX checklist when it comes to usability?*", and the authors find that the question has been answered through the list of important factors that were presented in section 7.2. The list can be seen as a summary of the findings from the literature review and the design process. These factors are aimed to be used as a supportive list when creating a checklist. They might not cover all aspects, but they have been sufficient for this process. One contributing factor is that the authors did not need to design a checklist from scratch. Instead, they re-designed one that already had a specific structure and was filled with content. That allowed them not to perform extensive research on, for example, what the checklist should contain on a more detailed level since they reviewed the current content of the checklist and structured it differently.

The importance of usability when creating a checklist has been researched throughout the thesis. However, the accessibility that the authors see as a part of usability, has not been given as much space as desired. Since WCAG 2.1 already exists, the authors did not want to recreate that content but instead refer to it in the checklist, which was a conscious choice since it is unnecessary to recreate the wheel. Regarding how accessible the final prototype of UTVÅRDERA is, it has only been checked towards level AA in terms of color contrast. It has not been evaluated how well it

fulfills other requirements of WCAG 2.1 concerning accessibility, which could have affected the outcome of the important factors. Also, it has not been researched how well Figma meets the requirements of accessibility as a program. Figma is a well-known and commonly used program within IKEA of Sweden, a conclusion was drawn that Figma allows for technical accessibility, as it is a lower threshold to use the program. It has not been researched how well Figma meets the requirements of accessibility according to WCAG 2.1 and is left to be explored in the future. This could be researched by inviting people with different disabilities to the evaluation.

8.1.2 Challenges with the Project

Using checklists as a method for evaluation can itself be seen as challenging. During the benchmarking, it was revealed that a checklist could be designed differently and serve different purposes. Therefore, the purpose of this checklist needed to be set early on in the project. Another finding was that even though a checklist is used as an expert method, in this case used by UX specialists, it does not diminish the importance of performing a thorough user study. It can be used to complement a user study but should not be the single method used during evaluation since many important findings can be lost. A negative aspect of using a checklist is being unable to avoid subjectivity, which is hard to avoid since the statements are evaluated based on the evaluators' knowledge and interpretations.

Additionally, some challenges occurred during the project. The authors have not been based at the same location as the office of IKEA of Sweden, and a lot of communication with the reference group has been held digitally. That was not a problem but provided challenges since the authors had to conduct and moderate a focus group, interviews and a co-creation workshop digitally, without prior knowledge of those methods despite individual experiences. By consulting the academic supervisor and Mafalda Samuelsson-Gamboa (lecturer at Interaction design and technologies), who provided the authors with reassuring guidance, these events felt more manageable.

At the beginning of the project, the authors had to participate in a course to get access to IKEA's Figma and their design system. Unfortunately, a few months into the project, when the authors were to begin prototyping, they realized that they had no edit-access and could only view their document. The ones responsible for granting access to IKEA's Figma were contacted, and a few days later it was sorted out. In the meantime, the authors began to prototype in their personal accounts and could copy-paste their result into their IKEA account file. During this period, the authors began to think of how the users could access the file and work with it if they did not have edit-access. With the academic supervisor, this was researched and noted that without an account, one could only view the document. Still, it was possible to create a free account that would give limited edit access. At IKEA of Sweden, only certain users can have a Figma account with edit-access. Therefore it could not be guaranteed that other users could edit the Figma file. This is a limitation of Figma as a program, but it motivated the authors to find a new way of working which did not call for all users to have edit-access.

8.1.3 Findings from Benchmarking

The benchmarking session provided valuable insights and an excellent basis to keep working on. A finding that was specifically important to the resulting prototype was the insight that the checklist needed to be used and understood by beginners, intermediates, and experts. Although the primary users are all UX specialists they have varying knowledge regarding evaluation with checklists. Therefore they can be considered beginner, intermediate, and expert specialists in checklist work. This needed to be catered for and dealt with by allowing the possibility to quickly find more information if needed without having to see and read it if unnecessary. Another important finding from the benchmarking was that the checklist should not be outdated fast. This was dealt with by using links for more information if available, redirecting the user to for example WCAG 2.1 that is up to date. The thought behind this was that this would ensure that the latest information was always available. However, this could become tedious to navigate to new web pages, adding another window and for the user to find the correct part of the website. It could also not be guaranteed that the links used are up to date. Therefore most statements are also provided with a local overlay of information.

8.1.4 The Prototype UTVÄRDERA

When ideating around possible concepts, it was clear that the way of working needed to be changed to allow for more innovative solutions. The UX specialists lacked an interactive and engaging checklist and their way of working had to change to fulfill that. Hopefully, the change will allow the UX specialists to work more efficiently without losing valuable information and knowledge. The way of working was changed by steering the evaluators toward using comments when voting and making them stay in the program. When they used screenshots, they switched between multiple programs and wrote directly in the checklist, causing them to save version upon version of the same evaluation. Through evaluation with two primary users from the reference group, this work change seemed appreciated. Still, as it has not been thoroughly tested, so the new way of working need to be evaluated to find out if it is suitable and efficient for their workflow.

Further possible problems with the new way of working with UTVÄRDERA is that it is not as automated as desired. A moderator still needs to manually summarize the result of each participant's evaluation on each page as it cannot be transferred automatically. However, this limitation cannot be solved with the knowledge and programs available to the authors today, as this can only be solved by creating UTVÄRDERA as a digital solution.

The limitation with the possibility to automate UTVÄRDERA is also why the rating will be made using the comment function instead of the component function available in Figma. As accessible and easy as the components are to use, they unfortunately are only active when one is in the presentation mode. Therefore, whatever change has been made with the components in presentation mode is lost as soon as the presentation is closed, whereas the comments stay. Using the comment function instead of the component makes it possible to take breaks and close down Figma

during the evaluation, which is necessary as the evaluations take up to several weeks to finish.

Limitations such as time have also made it challenging to complete the prototype fully. This means that the goal of avoiding redundancy is difficult to ensure, as this can only be evaluated and confirmed when the prototype is fully completed.

Finally, the prototype UTVÄRDERA is not complete because only one area is fully developed, this being the navigation. The authors have written and grouped the statements, but the UX specialists at IKEA of Sweden need to fill in the rest of the checklist themselves.

8.1.5 The Important Factors

Through evaluating, researching and working with the checklist, factors about creating a checklist were developed and stated below.

- Providing Flexibility in Workflow
- Clarifying Content in a Credible Way
- Considering Platform for the Checklist
- Allowing for Evaluators with Different Roles to Use the Checklist
- Providing an Interactive and Engaging Checklist in Both Evaluation and Presentation
- Providing a Rating System That is Easy to Understand

The list of important factors started out being 10 and was then boiled down to eight. As some of the factors were believed to be quite similar they were merged, and the final number of important factors became six.

Apart from answering the research question, the important factors also provide the reader with what to consider when creating their UX checklist. The factors were compiled from important factors found during the work through ethnographic and literature studies. One such finding that was considered extra interesting was how the UX specialists appeared to work with users and stakeholders of the digital solution. The revelation that they seemed to be evaluating together with users was groundbreaking as this is not commonly done. During the study, it became clear that one reference group member mostly did this process. However, it was still believed to be a significant finding and something that should be encouraged in other checklist evaluations.

Regarding the important factors, it is vital to mention that they are based on findings during this thesis work and literature studies. Therefore, the important factors might not cover all aspects and might not apply to all areas. Hence, there are areas of the checklist yet to be explored before it is fully completed.

8.1.6 Comparison with Other Checklists

At the beginning of the thesis, literature studies were made to find information about other checklists used for a similar purpose. In particular, three checklists stood out

and influenced the prototype UTVÄRDERA.

8.1.6.1 Mobile Application User Experience Checklist

The most apparent similarity between UTVÄRDERA and *Mobile Application User Experience Checklist* (MAUX-C) is that both checklists divide the items (e.g., learnability, delightfulness, and appealing nature for MAUX-C and menu, links, accessibility for UTVÄRDERA) into different principles, also known as areas (e.g., desirable, findable or credible for MAUX-C and navigation, functionality and UX principles for UTVÄRDERA), with each area containing a different amount of items to be evaluated. A second and perhaps more critical similarity is acknowledging that a checklist cannot be a substitute for an expert assessment with user studies. However, it can help when evaluating and comparing different solutions. UTVÄRDERA is not meant to replace user studies and evaluations completely but rather be the first step in evaluation or action when no users are available. Here, the MAUX-C is similar and in agreement as it has a goal to determine if the solution aligns with the core characteristics of UX, show its strengths and weaknesses and then decide if the solution is worth continuing with.

8.1.6.2 The System Usability Scale (SUS)

The System Usability Scale (SUS) brought up the use of a Likert scale ranging from strongly agree to strongly disagree. This was a new way of rating in comparison to the checklists found by IKEA of Sweden for benchmarking. The fact that the scale had five response options and phrasing that made them easy to understand was intriguing and something that inspired the scale for UTVÄRDERA. *The SUS* was also stated to be a 'quick and dirty' method which UTVÄRDERA might not be completely. There has been an effort to make it possible to do a quick and effortless review with UTVÄRDERA as well, which will give an overview of the solution's potential. This is similar to *the SUS* as the paper states that testing a tool must be quick and effortless and provide information on which system had the most significant potential for usability [44]. *The SUS* also states that comparison between different systems should be avoided, and this is an aspect where UTVÄRDERA differs from *SUS*. Although the argument for avoiding comparison is valid, UTVÄRDERA has been designed to highlight the strengths and weaknesses of each solution without judging and is therefore believed to work for comparison. Another area where UTVÄRDERA and *SUS* differs is in the statements being evaluated as *SUS* are very subjective, which UTVÄRDERA is trying to avoid. This can be seen in statements such as 'I think that...' which is perceived to be more subjective than 'The main navigation is consistent'. Furthermore, *SUS* is weighing each factor measured. This was discussed for UTVÄRDERA, which could be desirable but need to be evaluated to determine the need. Due to time limitations, this evaluation had to be pushed to future work.

8.1.6.3 The Standardized User Experience Percentile Rank Questionnaire (SUPR-Q)

Both UTVÄRDERA and *the Standardized User Experience Percentile Rank Questionnaire* are checklists that provide quicker and more comparable alternatives to a full-scale user study. However, they do not replace them. The *SUPR-Q* states that a standardized checklist is more reliable than a homegrown one [45] and this is something that UTVÄRDERA will aim to achieve at IKEA of Sweden by being a standardized evaluation tool. Another similarity between *SUPR-Q* and UTVÄRDERA is that they both allow for brief and more detailed evaluations, which is helpful when the evaluators have different amounts of time. However, the difference between the two checklists is how the scores are set. The scoring of UTVÄRDERA is based in a Likert scale which *SUPR-Q* is too. However, *SUPR-Q* uses two different score sheets, are somewhat subjective and has the same amount of questions for each category[46]. For UTVÄRDERA, this was decided against as some areas had fewer questions than others, so it felt unfair to push for more statements or limit the bigger areas. Furthermore, the subjectivity of evaluation was something asked to be avoided by the primary stakeholders. Having two different scores for the evaluation was found to complicate the evaluation and work against the usability principles Ease of Learning [10].

8.1.7 Future Work

There are several opportunities for future work with the checklist. One such aspect is that of completing the prototype. All the statements that should be contained in the list have been created and sorted into areas. Therefore, the next step is to revise the statement to ensure that the phrasing is correct and understandable and add the statements to UTVÄRDERA.

After more statements have been added, UTVÄRDERA can be tested to evaluate a real digital solution. This should be done to ensure that UTVÄRDERA is practical and functional during an actual evaluation and that relevant areas are being evaluated. UTVÄRDERA should also be tested with non-UXers to ensure that the statements are understood by non-UXers as well, with the help of the How-, Why-, Information- and Source buttons.

A further development that could be tackled in the future is that of continuing to develop UTVÄRDERA as a digital solution. For example, one possible function to add is to summarize scores, so that the result appears automatically without having a moderator summarize different evaluators' scores. UTVÄRDERA would also become more dynamic by having it coded into a digital solution. Then features such as adding pictures directly to the checklist without switching between presentation and edit mode would be possible.

UTVÄRDERA could also be evaluated on a more detailed level regarding how well it fulfills the accessibility requirement set by WCAG 2.1. That includes the content of UTVÄRDERA and the tool it is built in, Figma. By making sure that it is accessible in several ways, its user experience improves since the checklist itself is accessible in all possible ways.

Another aspect that could be developed further is the references in the checklist and how to refer to a specific reference (e.g to WCAG on accessibility). Currently, the references are continuously presented in the UTVÄRDERA prototype with a reference slide at the end. A preferable function to add would be that by clicking the reference, one would be directed instantly to it and the exact area where the information had been gathered.

Additionally, the slide presenting the goal could be researched and evaluated further.

8.2 Method Discussion

The project used the Double Diamond model as a basis for structure regarding the working process. Therefore methods suitable for those phases (Discover, Define, Develop, Deliver) have been used.

8.2.1 Possible Issues with Size of Reference Group

When working with the reference group for data gathering, ideation and feedback, such as in focus groups, interviews and co-creation, the validity of the result had to be contemplated. This as the same group of five to six people was used for all methods apart from the second co-creation session (section 6.12). The dependability of the result was considered early on and still is to a degree. Still, it was finally agreed that since the reference group are the primary users and they are the ones that will use the finished product, it was valid enough to use their small and highly profiled group of participants for the different sessions.

8.2.2 Potential Conflict of Interest in the Focus Group

In the focus group the participants had different experience of the checklist as three participants were fairly new to IKEA of Sweden and two were the creators of the original checklist. Furthermore, they had worked with different versions of the checklist and this was something that had not been understood by the authors previously. As a consequence of this the task where the participants were asked to point out errors with the current checklist was unsuccessful. One of the creators of the original checklist is also the manager of the reference group, so there was a risk that participants felt uncomfortable voicing their opinions freely. Furthermore, there was also a risk of bias as two participants were the creators of the original checklist. It became apparent during the thesis work that this was not the case, as they voiced their dissatisfaction with the checklist.

8.2.3 Interviews

To gain practical experience and practice interview techniques it was decided to take turns interviewing and taking notes of the interviews. This could have affected the quality of the interviews and changed what kind of follow-up questions were asked since those depended on who conducted the interview. Although, it is essential to

note that when performing semi-structured interviews, the goal is to have more of a discussion with the interviewee. Therefore, all participants were asked different follow-up questions to maintain a good flow in the conversation. The factor that probably affected the results of the interviews the most was finding out, with relatively short notice, that one interviewee had no experience with the current checklist. This compelled the authors to modify the interview questions in very little time and change the goal of that particular interview session.

Many interesting findings were revealed during the interviews, which immensely helped the thesis work. One surprising and interesting revelation were the use of the UX checklist in workshops with users of the digital solution and stakeholders. This was an interesting find as one tends to think that a checklist evaluation is an expert method as that is how theory describes it. According to the interviews, checklist evaluations can be used with nonexperts, which was kept in mind throughout the thesis.

8.2.4 Selecting the Checklist Platform

The Pugh matrix was used to decide on what tool to build the checklist in. In this method, the requirements from the list of requirements were used, and although some requirements were quite clear, it was still hard to convert them into suitable ways of looking at different tools. Since each tool was discovered during the evaluation with the Pugh matrix, the meaning of each requirement was sometimes lost in translation between the authors. Although the authors attempted to complete the evaluation without any mistakes, it can not be guaranteed that all grades for each requirement are correct. That said, the authors are content with the final decision to use Figma but may also be biased due to their previous knowledge of the program.

While evaluating the collaborative tools, some tools required subscriptions to get access to all functions. However, no subscriptions were bought solely for that purpose. Therefore some tools may have other functions that were not available with the free/trial version the authors used. It should also be noted that the chosen collaborative tools were similar to those used by the UX specialists today, such as Miro and Figma. Therefore, tools with a whiteboard or canvas to work in or other ways to add graphical content were chosen for the evaluation. That being said, it can not be ensured that all available programs have been considered in this evaluation since the research for tools was only conducted for a limited time. Finally, some tools that were researched were found not to be suitable for this context of a UX checklist. They could still be fantastic tools and work great when creating a checklist, but it might require a more significant change in the way of working than is required for UTVÄRDERA.

8.2.5 Evaluation

When evaluating the prototype using feedback from users and primary stakeholders, it became clear that some adjustments needed to be made to fully take advantage of Figma and make it easier to use. One such adjustment was changing the way of evaluating to primarily use the presentation mode for evaluation and having one

person work in edit mode. By changing this, the full potential of Figma could be accessed. This was realized by changing the way of voting to placing comments instead of using components. Components would not affect the actual files, and changes would be lost when closing Figma, but comments would stay, allowing the evaluator to take breaks during the evaluation.

A second change was that of not using the switch button in edit mode to change the state of a component. It became clear that it was more tedious to click a component, recall how to change the state, find the switch and press it than just clicking the box and changing the color. This was strengthened by the theory regarding user interfaces (see section 3.2), in which it is stated that see and choose is more manageable than recall and type [23], and so the decision was to remove the use of components with different states when it comes to rating.

8.3 Ethical Considerations

UTVÄRDERA is thought to be used not only by the UX specialists at IKEA of Sweden but also by others such as stakeholders, users of the evaluated tool, and other people who may be of interest. That said, there are multiple aspects in terms of accessibility that should be considered.

Internally, IKEA of Sweden has a design system that should be used when designing digital tools. That includes colors, fonts, white space, size of icons, specific buttons, and so on. UTVÄRDERA contains statements that ask if the digital solution fulfills the design guidelines of the design system. It is not credible to have a checklist asking that other tools meet the design guidelines while not fulfilling them. Therefore, UTVÄRDERA was created following the design system as the authors felt obliged to follow the already set design system. This may have negatively affected their initial desire to dig deeper into adapting UTVÄRDERA in terms of accessibility and design for all. It has also not been confirmed that the design system is accessible in all terms. Therefore it may be problematic to follow a design system without thoroughly evaluating its usability and accessibility beforehand.

The reference group of this project has been relatively homogeneous and lacked diversity, prominently due to it only consisting of five to six people. Due to this limitation of participants, UTVÄRDERA has not been evaluated with users who may have other qualities or disabilities, such as trouble with language, understanding of content or blindness. Therefore it can not be guaranteed that UTVÄRDERA is useful for users outside the reference group since that has not been evaluated. In the future, people with various disabilities should be included in the evaluation of UTVÄRDERA to ensure accessibility.

Throughout this thesis, the authors have been cautious with the participants' integrity. On each occasion, they have been informed of their voluntary participation in the study, if they have been recorded, and that they can withdraw their contributed information afterward at any time. Before the interviews, they had to sign a consent form so that they were informed of their rights and how their data would be used in the project. The authors hope that by taking these precautions regard-

ing the users' involvement in the project, they feel secure and confident with their participation.

Performing an evaluation using a checklist leads the evaluator to apply a subjective approach when answering questions because their answers are based on their knowledge and interpretation. It can therefore be discussed if it is even possible to avoid subjectivity when designing a checklist, which fundamentally is based on decisions being made by individuals. The authors conclude that one cannot, but it can be limited by using tools to ensure that all evaluators have the same information and provide a neutral and non-condescending language. Additionally, precautions have been made to reduce the area of interpretation, allowing for hopefully a common understanding with the evaluators.

Finally, UTVÄRDERA was developed in close collaboration with IKEA of Sweden. It can therefore be questioned if UTVÄRDERA is general enough to be transferable to other companies and situations. UTVÄRDERA is created to be reusable and tweaked to fit other organizations, perhaps most of all as a framework and inspiration to create a checklist of their own.

9

Conclusion

This project aimed to conduct user studies to answer the following research question:

What are important factors to be considered for a UX checklist when it comes to usability?

Six important factors were found based on the findings of literature studies and user studies. The user studies included methods such as interviews to gain knowledge about the use of the current checklist, an affinity diagram to map the issues with the current checklist and desires for the new checklist, and co-creation workshops to understand the desired structure.

The important factors are as follows:

- Providing Flexibility in Workflow
- Clarifying Content in a Credible Way
- Considering Platform for the Checklist
- Allowing for Evaluators with Different Roles to Use the Checklist
- Providing an Interactive and Engaging Checklist in Both Evaluation and Presentation
- Providing a Rating System That is Easy to Understand

The important factors result from a process following the double diamond framework. Throughout the process, 15 people were involved in the design work, of whom six were users, experts and stakeholders from IKEA of Sweden.

The important factors were created in parallel with the concept UTVÄRDERA. It is a high-fidelity prototype created in Figma with one track fully functioning. The other areas and tracks have been created as frameworks to be filled with information by the reference group. Future work is needed to validate the credibility of the important factors and the usability of the completed checklist UTVÄRDERA.

In summary, the research question was answered through a user-centered design process, and the prototype created was aimed to fulfill the user's needs.

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A

Appendix: Old Checklist

Visual design > Colours > Background colours

Background colours
Clean background colours.

- A. White is the default background colour.
- B. Light grey is used when a second background colour is needed.
- C. There are no textures, gradients or patterns used as background.

Primary colours
Secondary colours
Colour blindness

A Good
White
#FFFFFF

B OK
Light grey 100
#F5F5F5

C Don't
Texture Gradient Pattern

5 UX checklist

UI components > Action > Button design

Button types

Button design

- A. The design and behaviour of buttons makes them easy to identify and interact with
 - The height is sufficient to context and platform.
 - The button change design in different states (at least at mouse over and for disabled, but sometimes also for in focus, pressed, loading etc.)
 - No shadows
- B. Icons are normally placed before the label.
- C. In buttons for navigation the icon is placed according to progress direction (backward to the left and forward to the right of the label).
- D. Clear labels
 1. Labels clearly describes the action with verbs
 2. Labels are short, not full sentences
 3. Labels use sentence style capitalization
 4. Labels are limited to one line, not wrapped
- E. Consistent icon
 1. When labels are combined with icons the icon colour matches the label font colour and they are middle aligned, not stacked above each other.

A Active Hover Pressed Disabled Inverted

B Icon + text
Print Back Next

C Don't

D Do Don't
Approve version Approval Click here to approve the file CLICK HERE

E Do Don't
Continue Continue

6 UX checklist

A. Appendix: Old Checklist

UX design principles > Efficiency > Customization

Minimal effort

Instant validation

Customization

Customization allows the users to set up the tool to fit their needs. But although it gives them control, 95% of the users never change the default settings.

- A. Optimize the design of a table rather than leaving it to the user to set it up.
- B. Simplify or personalize searches instead of enabling saving of search statements.
- C. Follow the corporate visual branding instead of enable changes of colour scheme.

Allow customization when it adds substantial value, e.g.:

- D. Users can save favourites to quickly access frequently needed content.

Personalization

Redundancy

7 UX checklist

UI components > Navigation > Menu design

Menu types

Menu design

- A. Keep the menus in a fixed position
- B. Indicate the current page
- C. Indicate when there are sub-menus
- D. Provide big enough hover and click areas
- E. Vertical menus should be possible to collapse when there is a need for more screen space
- F. Don't split a menu row into multiple click areas.
- G. Label the menu icon with the word "Menu".
- H. How to open menus is suitable to each case
 1. If to use click or hover depends on how frequently the sub-menu is used, the context etc.
 2. If you use hover, add a short delay before opening the menu.
 3. Expand and collapse vertical sub-menus with a click, not hover.
 4. Open or close second column sub-menus with either a click or hover.

Tabs

Hyperlinks

Breadcrumbs

UX design principles > Consistency & conventions > Recognition & predictability

System landscape

Recognition & predictability

Consistency and conventions helps the user to **recognize** what they can or can't do. It will be easier to **predict** how to use new features, pages and tools. Users will feel safe and secure and the learning curve will be shorter.

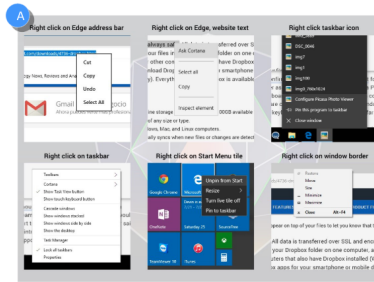
A. Use components, words, behavior and visual design in a consistent manner.

→ In the example only one of four dimensions is fulfilled. It is possible to understand, but the hurdles add unnecessary friction for the user.

- Same type of component
- OK
- Different behavior
- not OK
- Different wording for same action
- not OK
- Different visual design
- not OK

B. Components that looks the same but behaves differently in some cases will be confusing for the users,
→ In the example a flag leads to a product page. Clicking on a flag normally translates the content or leads to a local version of the page.

Repetition



UX design principles > Efficiency > Instant validation

Minimal effort

Instant validation

Assume that the user is asked to enter several fields of information on a page and that it has to be in a specific format or range.

A. The data validation of each field is done instantly, not after entering all fields.

B. No feedback is visible if the validation is successful (it is implicit).

Customization

Personalization

Redundancy

A Do

E-mail
ingvar@ikea.com

E-mail
ingvar.ikea.com

✖ Incorrect e-mail

B Don't

E-mail
ingvar@ikea.com

✔ Existing e-mail

B

Appendix: Planning

	Week 3-4	Week 5-6	Week 7-9	Week 10-11	Week 12	Week 13	Re-exam week	Week 15	Week 16	Week 17-18	Week 19-22
Code of conduct #1											
Code of conduct #2											
Start with planning report											
Make sure registration gets done											
Review checklist 1.0	X										
Put together findings of reviewing											
Research use of Checklist	X										
Complementary benchmarking											
Literature studies											
Prepare focusgroup											
Meeting with reference group/ conduct focusgrupp											
Prepare interviews											
Conducting interviews			X								
Analysis			X								
Summarize requirements			X								
Ideation			X								
Co-creation											
Prototyping checklist #1				X							
Evaluation (UX and non-UX people)					X						
Analysis					X						
Ideation						X					
Research medium for checklist											
Prototyping checklist #2								X			
Evaluation									X		
Analysis										X	
Finalizing design											X
Presentation											
Opposition of classmates report											
Thesis report											

C

Appendix: Benchmarking

Generellt för alla:

Har egentligen inte hittat så många som utvärderar hur bra när det kommer till att checka av. Det är mer ja/nej och ibland ett kanske. . .

Många utförliga listor blir väldigt jobbiga att ta sig igenom. Hade kanske varit bra att kunna välja nivå att undersöka från början?

Vi behöver tänka på hur vi vill att vår ska se ut - ska det gå att utvärdera en produkt snabbt & lätt, eller kan det ta flera dagar att utvärdera en produkt? Vad önskar våra användare, vad passar bäst i deras arbetssätt? (tänker främst på de delar där utvärdering krävs, t.ex att användaren ska uppleva det på ett visst sätt)

Slutsatser efter möte med Jonas:

Den borde vara hierarkiskt

Den borde gå att välja vad man ska utvärdera, vissa saker är inte applicerbara och bör då inte utvärderas som saknas.

Länka till Wikipedia för svåra ord

Vi behöver en struktur med olika nivåer.

Svårt att undvika redundans totalt när man har olika nivåer.

Taggar och filter är intressant (funktionell eller Visuellt material)

Vill inte ha icke-binär (ska vara mer än ja/nej)

Inte avsmalnad bara till UI

Handritat är populärt på Ikea - hellre handritat än clipart

Ger trovärdighet med sammanfattning av stora välkända källor

I information architecture - trevliga rubriker inte enbart riktat mot UI

En av kollegorna tycker det är jätteintressant med kulturella skillnader.

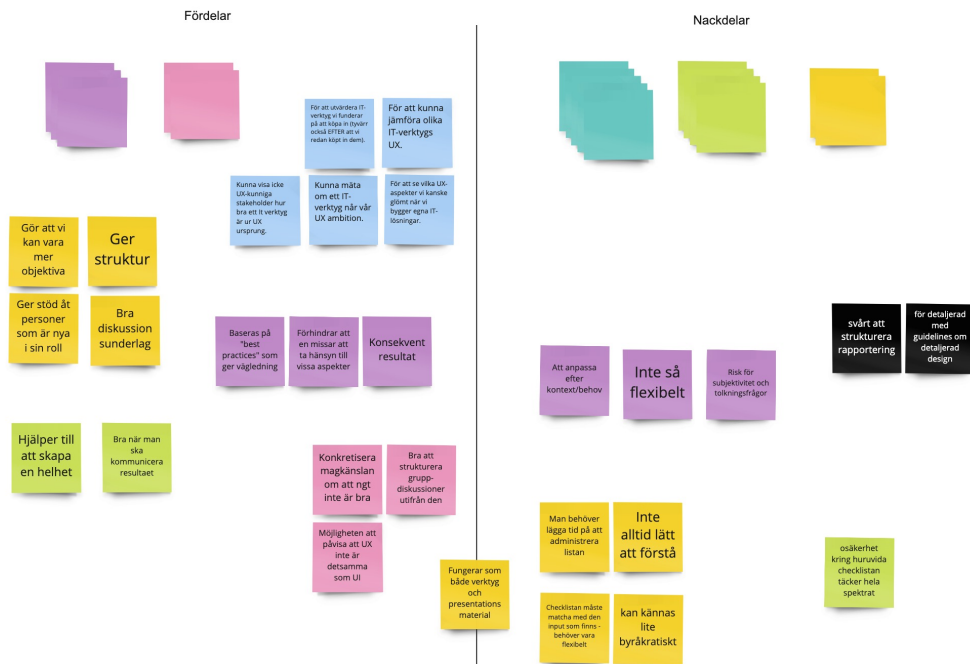
D

Appendix: Focus Group

Hur ofta används UX checklisten? ●



Hur fungerar checklistor som verktyg?



Tänk inte på innehåll i frågan utan mer på vilken aspekt som utvärderas (t.ex. accessibility, UI, funktioner, känslor osv)

Rangordna från viktigast att kunna utvärdera (1) till minst viktigt (7)

1 **Viktigast**

- The program is secure, honest and ethical.
- The program supports the mental model of the user.
- Icons and images that are specific to certain countries are avoided.
- Major headings are clear and descriptive.
- Image element tags use the alt attribute to configure an alternative text description.
- Command buttons are used to trigger application processes.
- No more than three primary colours.

7 **Minst viktigt**

Tänk inte på innehåll i frågan utan mer på vilken aspekt som utvärderas (t.ex. accessibility, UI, funktioner, känslor osv)

1 **Viktigast**

- Major headings are clear and descriptive.
- The program supports the mental model of the user.
- Icons and images that are specific to certain countries are avoided.
- Image element tags use the alt attribute to configure an alternative text description.
- Command buttons are used to trigger application processes.
- No more than three primary colours.
- The program is secure, honest and ethical.

7 **Minst viktigt**

Tänk inte på innehåll i frågan utan mer på vilken aspekt som utvärderas (t.ex. accessibility, UI, funktioner, känslor osv)

1 **Viktigast**

- The program supports the mental model of the user.
- The program is secure, honest and ethical.
- Major headings are clear and descriptive.
- No more than three primary colours.
- Command buttons are used to trigger application processes.
- Image element tags use the alt attribute to configure an alternative text description.
- Icons and images that are specific to certain countries are avoided.

7 **Minst viktigt**

Tänk inte på innehåll i frågan utan mer på vilken aspekt som utvärderas (t.ex. accessibility, UI, funktioner, känslor osv)

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- Command buttons are used to trigger application processes.
- No more than three primary colours.
- Icons and images that are specific to certain countries are avoided.

7 **Minst viktigt**

Tänk inte på innehåll i frågan utan mer på vilken aspekt som utvärderas (t.ex. accessibility, UI, funktioner, känslor osv)

1 **Viktigast**

- The program is secure, honest and ethical.
- The program supports the mental model of the user.
- Major headings are clear and descriptive.
- Command buttons are used to trigger application processes.
- No more than three primary colours.
- Image element tags use the alt attribute to configure an alternative text description.
- Icons and images that are specific to certain countries are avoided.

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Tänk inte på innehåll i frågan utan mer på vilken aspekt som utvärderas (t.ex. accessibility, UI, funktioner, känslor osv)

1 **Viktigast**

- The program is secure, honest and ethical.
- The program supports the mental model of the user.
- Major headings are clear and descriptive.
- No more than three primary colours.
- Command buttons are used to trigger application processes.
- Icons and images that are specific to certain countries are avoided.
- Image element tags use the alt attribute to configure an alternative text description.

7 **Minst viktigt**

E

Appendix: General Interview Questions

1. How would you describe your role as a UX specialist?
 - Work tasks etc.?
2. Could you tell us a bit about the checklist?
 - e.g. your experience from it, in what program does it exist today (PowerPoint etc)?
3. Besides the checklist, in what other ways do you evaluate digital solutions today?
 - What are these? Why are they divided? Pros/cons with these?
4. What is your first thought about the checklist?
5. Within a project, how much time would you estimate is used to work with the UX checklist?
 - eg. how long can a project be (if not given in the answer)
 - What do you think about the amount of time it takes to work with the checklist? Is it too long, too short etc.?
 - Why do you think it takes that amount of time to work with the checklist?
6. Can you describe the mode of operation when you work with the checklist (methods etc.)?
 - Do you work alone? In a group? Discussions? How are decisions made? etc.
7. Where in the process do you believe that the checklist can be most useful?
 - Can you show any examples?
8. How do you think the checklist works as a tool?
9. What do you think about working with the checklist?
 - Advantages, disadvantages, easy, cumbersome, etc.?
10. What is the greatest potential of the checklist?
11. What is the most negative (aspect) about the checklist?
12. How would you like to evaluate interfaces/solutions (no limitations and you

could dream freely)?

13. We have heard that you have an UX iceberg, could you please show us and/or explain?

F

Appendix: Changed Interview Questions

1. How would you describe your role at IKEA of Sweden?
 - Work tasks etc.?
 - Relation/work with the UX Specialists?
2. Can you describe the mode of operation when you work (methods etc.)?
 - Do you work alone? In a group? Discussions? How are decisions made? etc.
3. Do you evaluate digital solutions?
 - In what ways do you evaluate digital solutions today?
 - opinions about those? pros/cons?
 - If checklists are used, which ones?
 - opinions about those? pros/cons?
4. What do you know about the checklist?
 - e.g. your experience from it, in what program does it exist today (PowerPoint etc)?
5. In what ways do you believe the checklist to be useful for your team?
 - Why?
 - What aspects would be most necessary to evaluate?
 - Why?
6. Within a project, how much time would you estimate is used for evaluation?
 - e.g. how long can a project be (if not given in the answer)
 - What do you think about the amount of time it takes to evaluate? Is it too long, too short etc.? What would you prefer?
 - Why do you think it takes that amount of time to evaluate?
7. Where in the process do you believe that the checklist can be most useful for your team?
8. What is the greatest potential of a checklist?

- advantages, easy to use etc...
9. What is the most negative (aspect) about a checklist?
 - Disadvantages, cumbersome to use etc..
 10. How would you like to evaluate solutions (no limitations and you could dream freely)?
 11. Is there anything else you'd like to share that we haven't talked about?

G

Appendix: Consent Form

Interview Consent Form

Research project title: UX checklist for evaluation of digital solutions

Research investigator: Sandra Ohlén and Karin Silvander

Academic supervisor: Sara Ljungblad

Research participants name:

This interview will be a part of information gathering for the master thesis at Chalmers University of Technology regarding the UX checklist at IKEA of Sweden. The result of the interviews will be one basis when developing the UX checklist and will be recorded and transcribed before analyzed. When proper analysis has been made the result will be used to create a requirement list. The purpose of the research is to analyze what is needed when developing a UX checklist as well as developing one that can be used by the UX specialists at IKEA of Sweden.

The interview will take a maximum of one hour. We don't anticipate that there are any risks associated with your participation, but you have the right to stop the interview or withdraw from the research at any time.

Thank you for agreeing to be interviewed as part of the above research project. Ethical procedures for academic research requires that consent is given from interviewees regarding how the information contained in their interview will be used. This consent form is necessary for us to ensure that you understand the purpose of your involvement and that you agree to the conditions of your participation. We would therefore like you to read the accompanying information sheet and then sign this form to certify that you approve the following:

- the interview will be recorded and a transcript will be produced
- the transcript of the interview will be analysed by Sandra Ohlén and Karin Silvander as research investigators
- access to the interview transcript will be limited to Sandra Ohlén and Karin Silvander and academic colleagues and researchers with whom they might collaborate as part of the research process

- any summary interview content, or direct quotations from the interview, that are made available through academic publication or other academic outlets will be anonymized so that you cannot be identified, and care will be taken to ensure that other information in the interview that could identify yourself is not revealed
- the actual recording will be kept until end of the master thesis and then deleted
- any variation of the conditions above will only occur with your further explicit approval

Quotation Agreement

I also understand that my words may be quoted directly. With regards to being quoted, please mark next to any of the statements that you agree with:

	I wish to review the notes, transcripts, or other data collected during the research pertaining to my participation.
	I agree to be quoted directly.
	I agree to be quoted directly if my name is not published and a made-up name (pseudonym) is used.
	I agree that the researchers may publish documents that contain quotations by me.

All or part of the content of your interview may be used;

- In academic papers, policy papers or news articles
- On our publication website and in other media that we may produce such as spoken presentations
- On other feedback events
- In an archive of the project as noted above

By signing this form I agree that;

1. I am voluntarily taking part in this project. I understand that I don't have to take part, and I can stop the interview at any time;
2. The transcribed interview or extracts from it may be used as described above;
3. I have read the Information sheet;
4. I don't expect to receive any benefit or payment for my participation;
5. I have been able to ask any questions I might have, and I understand that I am free to contact the researcher with any questions I may have in the future.

G. Appendix: Consent Form

Printed Name	
_____	_____
Participants Signature	Date
_____	_____
Researchers Signature	Date
_____	_____
Researchers Signature	Date

Contact Information

If you have any further questions or concerns about this study, please contact:

Name of researcher: Sandra Ohlén

Tel: 072-528 30 30

E-mail: olens@student.chalmers.se

OR

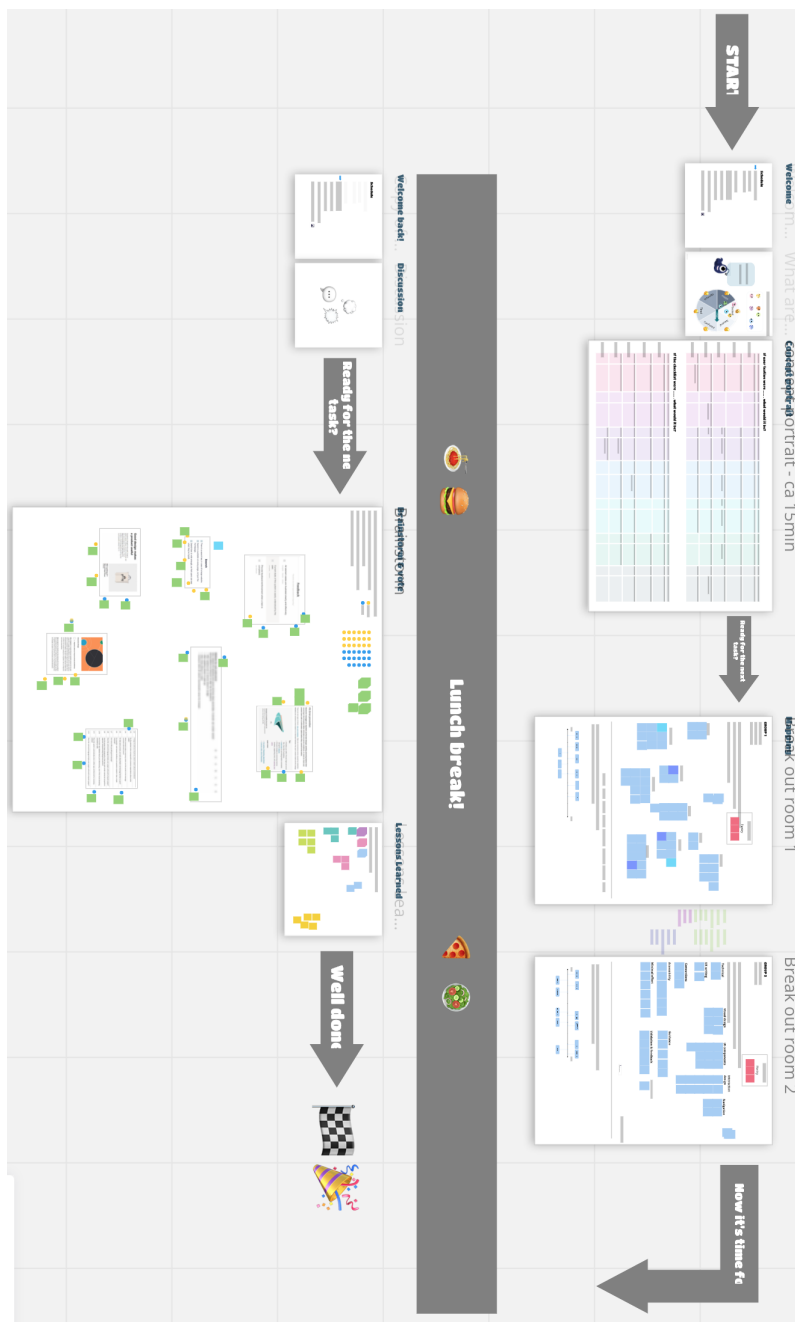
Name of researcher: Karin Silvander

Tel: 070-633 14 69

E-mail: karinsi@student.chalmers.se

H

Appendix: Co-creation for Exploring Structure



If user testing were, what would it be?

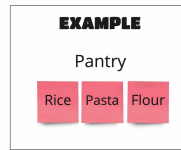
POINT	MEANING	HISTORICAL EVENT	MEANING	SUBJECT	MEANING	PUBLIC BELIEF	MEANING	PERSONAL	MEANING	MATERIAL	MEANING	ANIMAL	MEANING
Starting position	You have to understand your partner in co-creating	Coming in	It is provided next to users to improve	Most things (ideally)	Very important	Easy?	At the point where	Problems?	A metaphor	Color	Temperature	Big	Easy to understand
Change	You need to be open to what others are doing and be ready to adapt	A jump	Every week, meeting and plans	Private	As if people would get on top	Significant	The way right solution would be someone	Water	Color	Temperature	Big	Grate	Meeting that had to be to solve the important things
Endless	Start point to the next step is not the end but the start of a new journey	Start point	Use things to solve existing problems, but avoid creating new ones	Private	As if people would get on top	Significant	The way right solution would be someone	Water	Color	Temperature	Big	Grate	Meeting that had to be to solve the important things
Participate	Be open to what others are doing and be ready to adapt	Start point	Use things to solve existing problems, but avoid creating new ones	Private	As if people would get on top	Significant	The way right solution would be someone	Water	Color	Temperature	Big	Grate	Meeting that had to be to solve the important things
Final	As you need to understand your partner in co-creating	Start point	Use things to solve existing problems, but avoid creating new ones	Private	As if people would get on top	Significant	The way right solution would be someone	Water	Color	Temperature	Big	Grate	Meeting that had to be to solve the important things

If the checklist were, what would it be?

POINT	MEANING	HISTORICAL EVENT	MEANING	SUBJECT	MEANING	PUBLIC BELIEF	MEANING	PERSONAL	MEANING	MATERIAL	MEANING	ANIMAL	MEANING
Conclusion	Copy a bit of everything	Conclusion	Very important and type	Checklist (part)	List of feedback	Participation in safety	Requirements to all	Development	The way right solution would be someone	Color	Temperature	Big	Meeting that had to be to solve the important things
Score	Well known, everyone can participate, easy to follow	Meeting the score	5-10 minutes when you have the solution	Lightweight	The easiest starting point	Easy to use	Well known, simple, focused, focused work	Significant	The way right solution would be someone	Color	Temperature	Big	Meeting that had to be to solve the important things
Preparing	Needs preparation and a lot of things to do and learn	Preparing the	Good when you have the solution, less to learn, you are	Private	As if people would get on top	Significant	The way right solution would be someone	Water	Color	Temperature	Big	Grate	Meeting that had to be to solve the important things
Checklist (part)	There are a lot of things to do	Checklist (part)	As if people would get on top	Private	As if people would get on top	Significant	The way right solution would be someone	Water	Color	Temperature	Big	Grate	Meeting that had to be to solve the important things

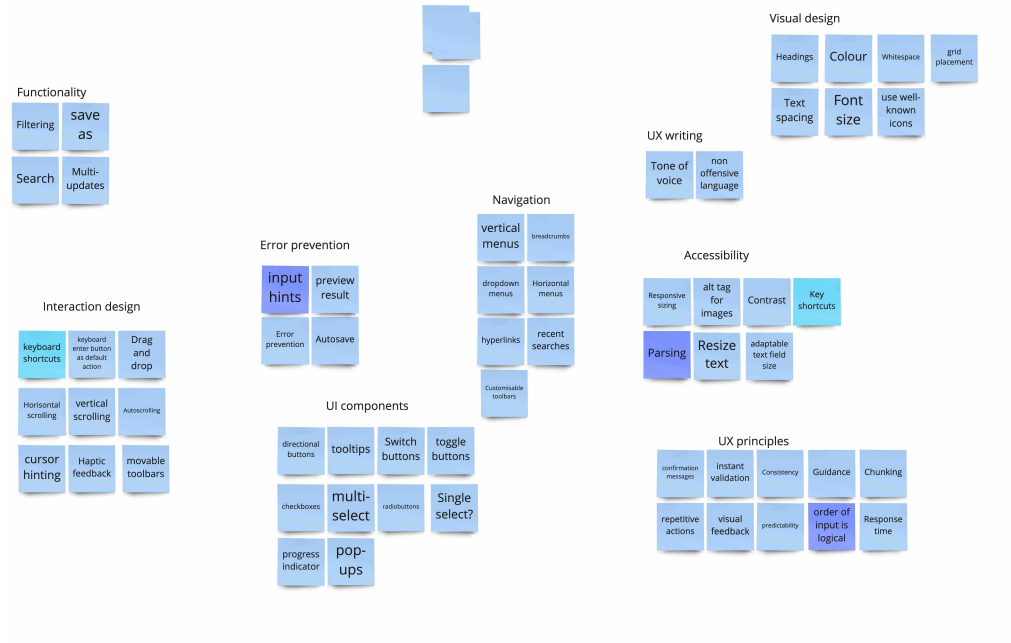
H. Appendix: Co-creation for Exploring Structure

GROUP 1



EXERCISE 1 - CARD SORTING

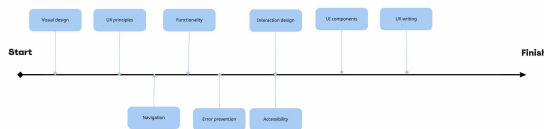
Group the cards according to how you believe they relate. Then add names for each category you have created! (some cards have been left blank if there are any words you feel is missing and would like to add)



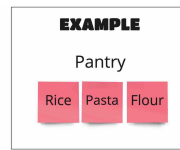
UX principles Navigation Functionality Visual design Interaction design Error prevention UI components UX writing

EXERCISE 2 - PRIORITY TIMELINE

Use the categories created in the card sorting and place them on the timeline. Place them in the order you wish to work when evaluating a tool.



GROUP 2



EXERCISE 1 - CARD SORTING

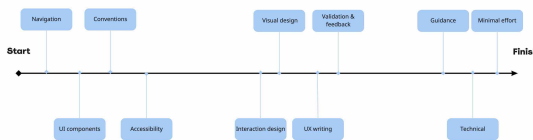
Group the cards according to how you believe they relate. Then add names for each category you have created! (some cards have been left blank if there are any words you feel is missing and would like to add)



- Logik?
- icke överlappande?

EXERCISE 2 - (PRIORITY) TIMELINE

Use the categories created in the card sorting and place them on the timeline. Place them in the order you wish to work when evaluating a tool.



H. Appendix: Co-creation for Exploring Structure

EXERCISE 3 - Brainstorm vote

Here you see an assortment of different ways of structuring a checklist. Please place a **yellow** dot on the screen(s) you believe is suitable for beginners of evaluating with checklist, and place a **blue** dot on the screen(s) you believe is suitable for expert users of evaluation.

Next to your dot vote, please add a motivation for **why** you believe it to be or **how** it could be suitable for your chosen user.

● [Beginner]
● [Expert]



Feedback

"Should be clear which response/choice is happening?"

- All element states are illustrated clearly and effectively. (Beginner)
- Current state of the system is easily understood by the user. (Beginner)
- Provide feedback/reinforcement when a task is completed. (Beginner)

!S: Error prevention

Quick error messages are important, but the best design identifies prevent problems from occurring in the first place. Either eliminate error-prone conditions, or check for them and prevent users with a confirmation question before they commit to the action.

There are two types of errors: slips and mistakes. Slips are unintentional errors caused by momentary lapses or confusion errors based on a mismatch between the user's mental model and the design.

Tip:

- Prevent your effort. Prevent high-cost errors. Check the buttons.
- Just click by removing textual constraints and good defaults.
- Prevent mistakes by removing memory burdens, supporting cues, and explicit goal labels.

Learn more:

- Feedback, Reinforcing User Errors
- Stimulus Labels, Error Prevention

Search

Good practice

- There is a search bar, in case of a large website. (Beginner)
- Search is available on every page, not just the homepage. (Beginner)
- Search box is wide enough, so that users can see what they've typed. (Beginner)

Methods for save and cancel

Give updates the database and cancel retrieves latest saved data. A solution can contain several saving patterns as long as it is clear how to execute it.

- After updating one or several values in a page.
- After updating values in a pop-up.
- After inline editing in a table.
- Autosave where all actions automatically saves the changes.

Good design makes a product useful

A product is brought to users if there is a need for it. Good design makes a product useful. Good design addresses the user needs of a product while engaging a willing user. (Beginner)

Interactive badge

1. Repetitive actions or frequent activities feel effortless. (Beginner)

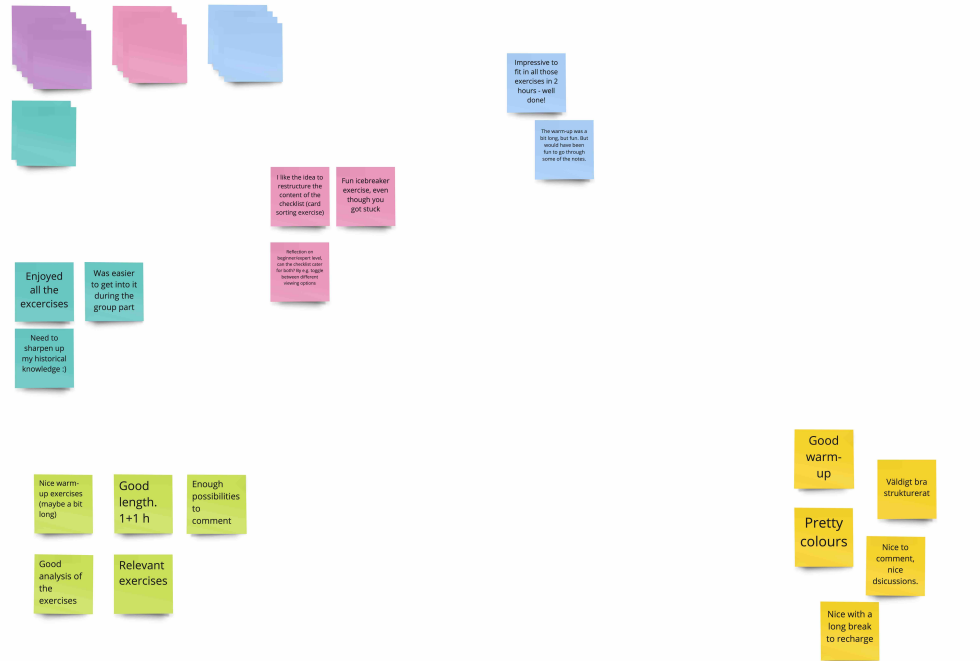
Why it matters: It makes repetitive actions for the user feel like nothing. They don't have to think about them. They are a breeze and they don't have to be afraid to be used. (Beginner)

How to use it: You need to be thinking of your product. Repeatable actions are repetitive. They are not one-time actions. (Beginner)

- If a page is used as a visual cue, does it match cultural conventions? (Beginner)
- Do the selected colors correspond to common expectations about color usage? (Beginner)
- When a process is a necessary action, are the words in the message consistent with that action? (Beginner)
- On one-entry systems, are labels enclosed in terminology familiar to users? (Beginner)
- For question and answer interfaces, are questions stated in clear, simple language? (Beginner)
- Are menus clear, readable, and navigational? (Beginner)
- Does the command language use jargon and avoid computer jargon? (Beginner)
- How the system has designed so that keys with similar names do not perform repeatable operations? (Beginner)
- Are function keys labeled clearly and distinctly, even if this means breaking consistency rules? (Beginner)
- Does the system automatically enter a dollar sign and decimal for necessary entries? (Beginner)
- Does the command language use jargon and avoid computer jargon? (Beginner)

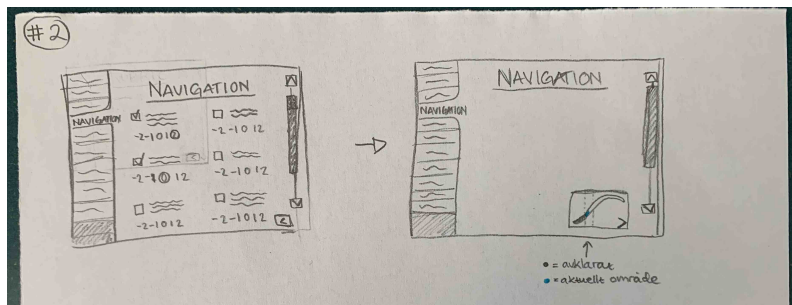
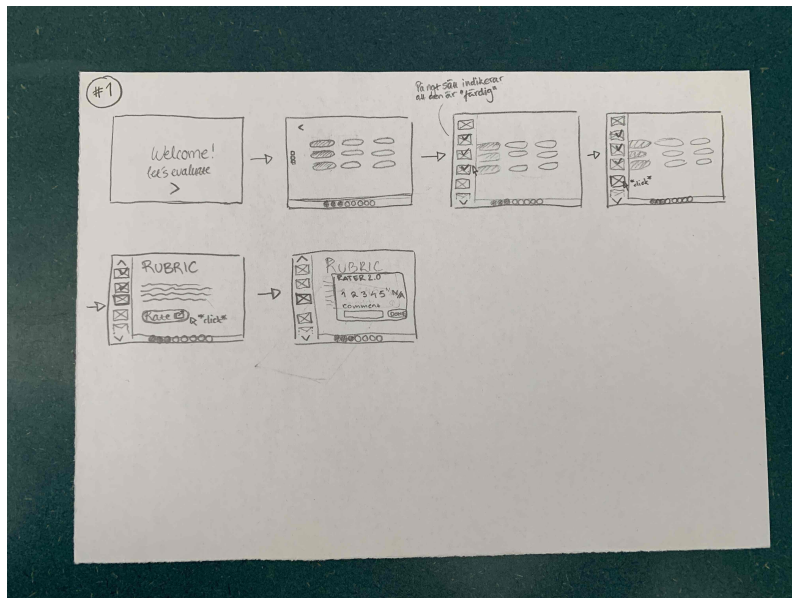
How was today's workshop? Thoughts, reflections, lessons learned.....

Take a post it and write down your thoughts :)

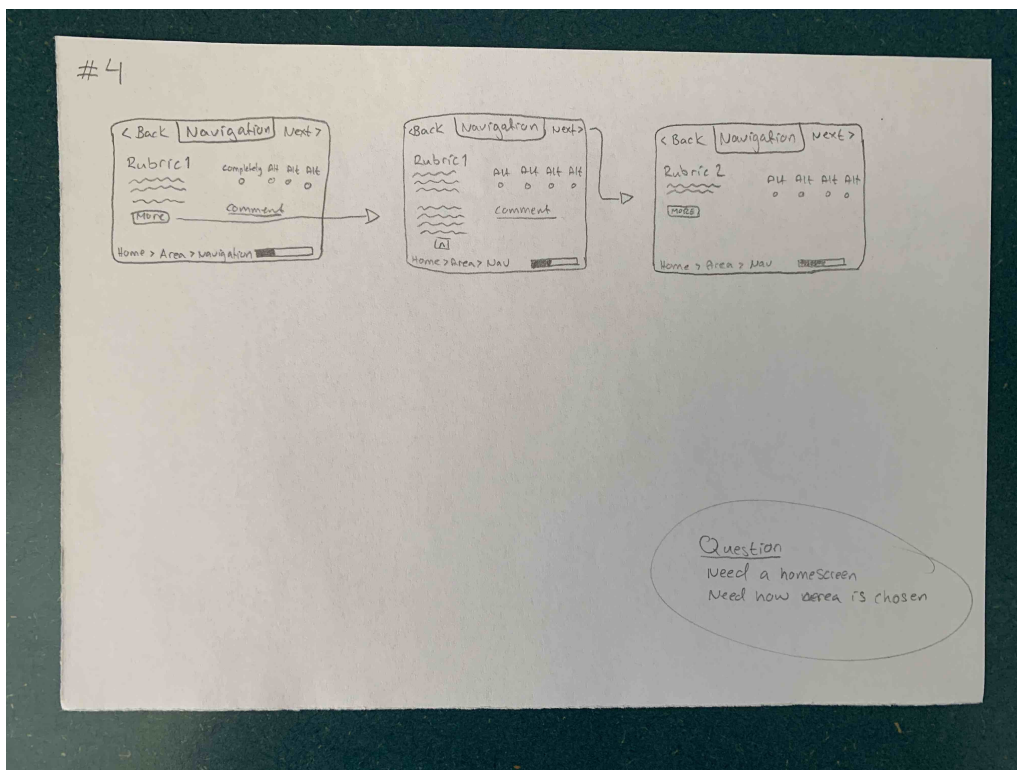
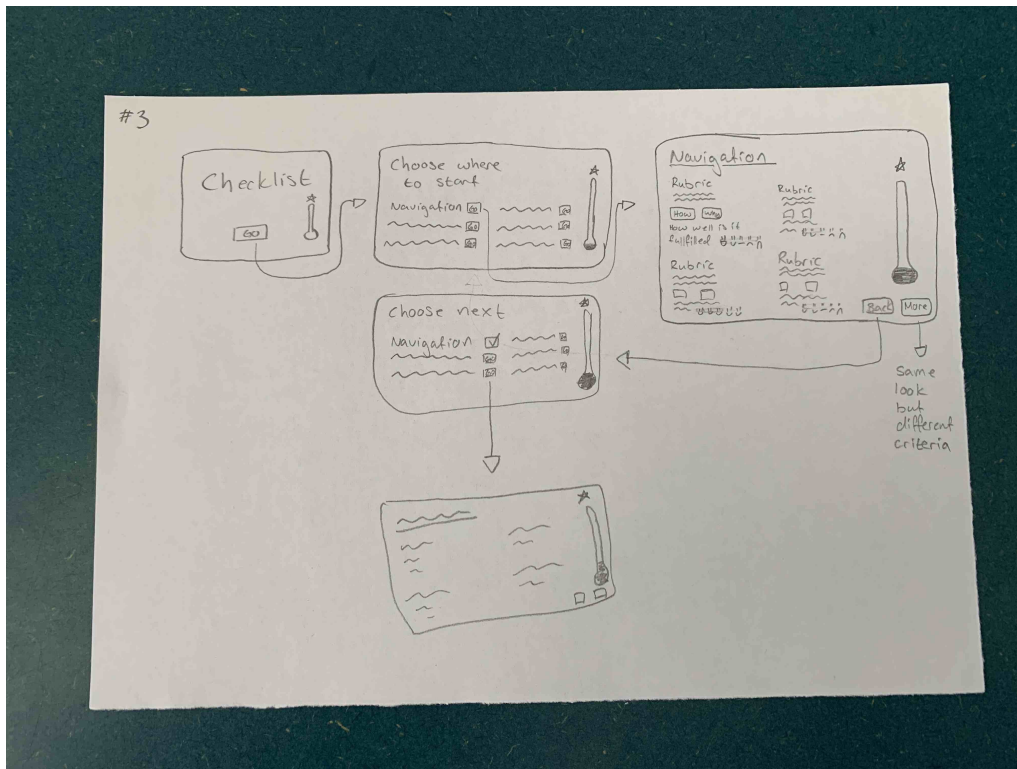


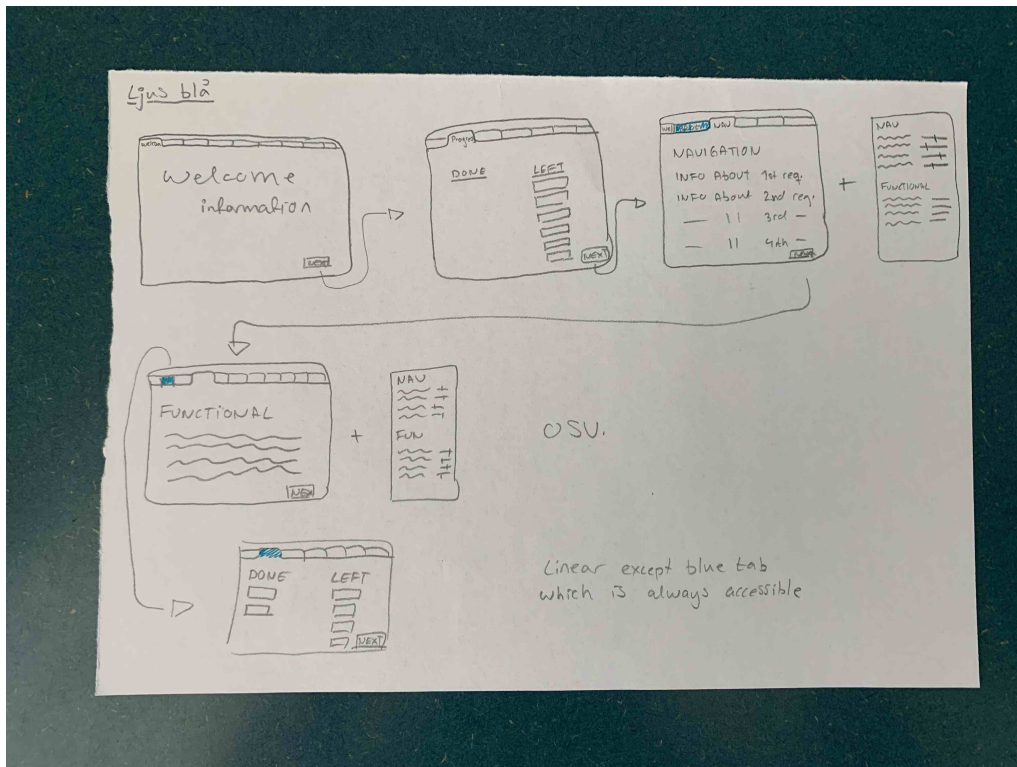
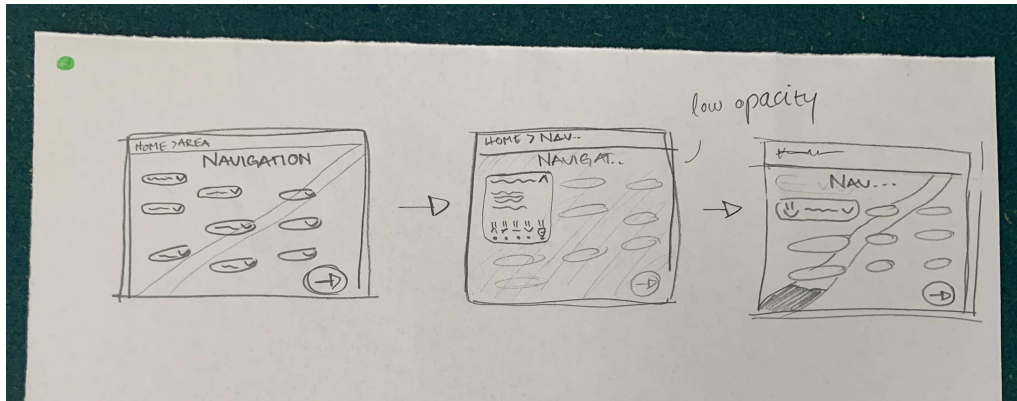
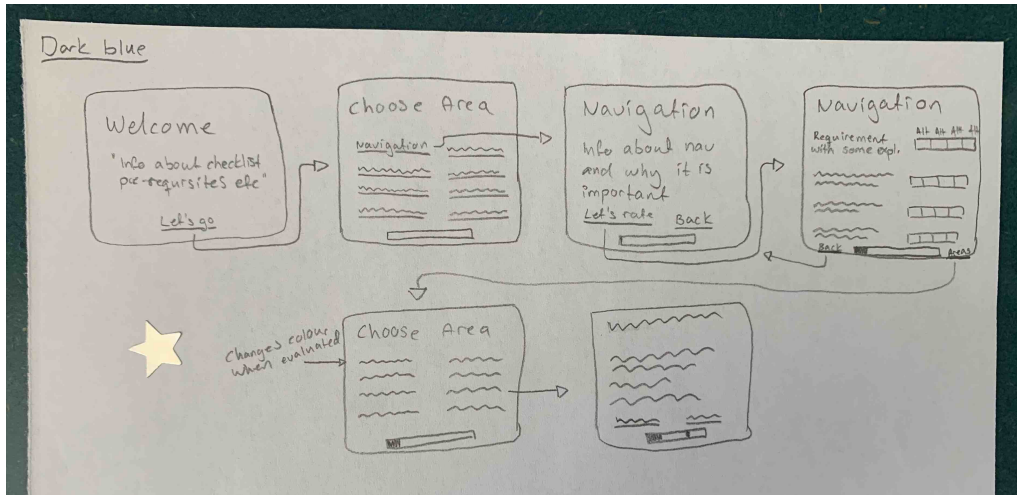
I

Appendix: Morphological Matrix



I. Appendix: Morphological Matrix





J

Appendix: Pugh Matrix 1

First half of the first Pugh matrix. Cropped due to size.

Requirement	Reference	FigJam	Miro	Conceptboard	Microsoft Whiteboard	Explain Everything	Lucidspark	Excel
Wish - Adaptability	P	0	0	0	-	0	0	0
Necessary - Flexible amount of information	O	-	0	-	-	-	0	-
Necessary - Standardised evaluation	W	0	+	+	0	0	+	0
Wish - Main text	E	-	-	-	-	-	-	0
Wish - Provide overview	R	+	+	+	+	-	+	0
Necessary - Collaborative format	P	0	0	0	0	0	0	-
Wish - Stored in cloud	O	+	+	+	+	+	+	0
Wish - Flexible format	I	-	0	+	-	0	+	0
Wish - Minimize number of programs used	N	+	+	+	0	0	+	0
Wish - Familiar program	T	-	0	-	-	-	-	0
Wish - Possibility to comment	P	-	0	-	-	-	-	0
Wish - Possibility for non-linear navigation	R	+	+	+	+	0	+	+
Wish - Possibility to compare	E	0	0	0	0	0	0	0
Necessary - Clear tone of voice	N	-	0	-	-	-	-	0
Necessary - Include examples	T	0	+	+	0	0	0	-
Wish - Show progress	A	0	0	+	0	0	0	0
Wish - Consistent interface	T	+	+	+	+	+	+	+
Possibility to perform calculations	I	-	-	-	-	-	-	+
Integrated with Microsoft Teams	O	-	0	0	0	0	0	0
Possibility to add shapes	N	0	0	0	0	0	0	0
Possibility to add slides/frames/other content		-	+	+	-	-	+	0
Presentation notes		-	-	-	-	-	-	-
Possibility to download document		0	+	+	-	0	+	0
Presentation mode		-	-	-	-	-	-	-
Possibility to work offline		-	-	-	-	-	-	0
Easy to share		0	0	0	0	0	0	0
Σ +		5	9	11	4	2	9	3
Σ 0		9	12	6	9	13	9	18
Σ -		12	5	9	13	11	8	5
Netvalue	0	-7	4	2	-9	-9	1	-2
Ranking	6	13	1	4	15	14	5	7
Further development			Yes	Yes			Yes	

J. Appendix: Pugh Matrix 1

Second half of the first Pugh matrix.

Requirement	Figma	Google Slides	Pitch	Ludus	ClickUp	Trello	Adobe XD	Adobe InDesign	Mural
Wish - Adaptability	0	0	0	0	0	0	0	0	0
Necessary - Flexible amount of information	0	0	0	+	-	-	0	-	-
Necessary - Standardised evaluation	+	0	0	0	-	-	0	0	+
Wish - Main text	-	0	-	-	-	0	-	-	-
Wish - Provide overview	+	0	-	0	-	+	+	+	+
Necessary - Collaborative format	0	0	+	-	0	0	0	-	0
Wish - Stored in cloud	+	+	+	+	+	+	0	0	+
Wish - Flexible format	+	0	0	0	-	-	+	0	-
Wish - Minimize number of programs used	0	0	0	0	0	-	0	0	0
Wish - Familiar program	0	-	-	-	-	-	0	0	-
Wish - Possibility to comment	0	-	0	-	-	0	-	-	0
Wish - Possibility for non-linear navigation	+	0	0	0	+	0	+	+	+
Wish - Possibility to compare	0	0	0	0	0	0	0	0	0
Necessary - Clear tone of voice	+	0	0	0	-	-	+	0	-
Necessary - Include examples	0	0	0	+	-	-	0	-	+
Wish - Show progress	0	0	+	0	+	+	0	0	0
Wish - Consistent interface	+	0	0	0	0	+	0	+	+
Possibility to perform calculations	0	-	-	-	-	-	-	-	-
Integrated with Microsoft Teams	-	-	-	-	-	0	0	0	0
Possibility to add shapes	0	0	0	-	0	-	0	0	0
Possibility to add slides/frames/other content	+	0	0	0	-	0	+	0	-
Presentation notes	-	0	0	0	-	-	-	-	-
Possibility to download document	+	0	0	0	-	-	+	+	-
Presentation mode	-	0	0	0	-	-	-	-	-
Possibility to work offline	-	-	-	-	-	-	+	+	-
Easy to share	0	0	0	-	0	0	0	-	0
Σ +	9	1	3	3	3	4	7	5	6
Σ 0	12	20	17	14	7	9	14	12	9
Σ -	5	5	6	9	16	13	5	9	11
Netvalue	4	-4	-3	-6	-13	-9	2	-4	-5
Ranking	1	9	8	12	17	16	3	10	11
Further development	Yes						Yes		

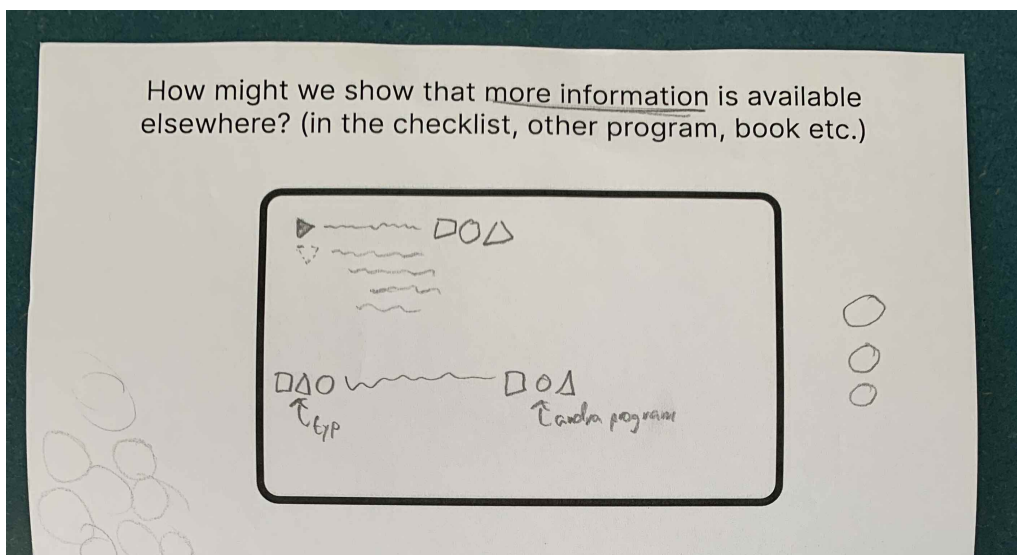
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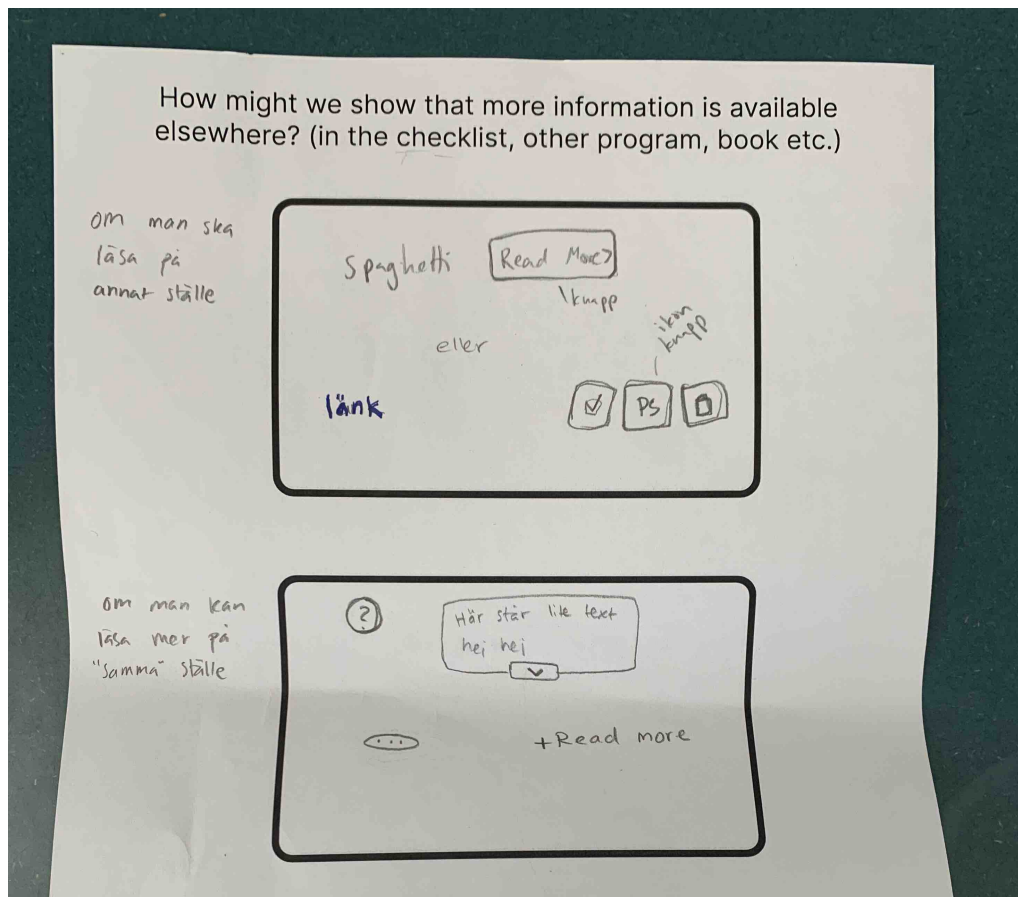
Appendix: Pugh Matrix 2

Requirement	Reference	Conceptboard	Miro	Lucidspark	Powerpoint	Adobe XD
Wish - Adaptability	F	0	0	0	-	0
Necessary - Flexible amount of information	I	0	+	0	+	0
Necessary - Standardised evaluation	G	-	-	-	-	-
Wish - Main text	M	0	0	0	+	0
Wish - Provide overview	A	+	+	+	-	0
Necessary - Collaborative format		0	0	0	0	-
Wish - Stored in cloud		0	0	0	-	0
Wish - Flexible format		-	-	-	0	0
Wish - Minimize number of programs used		0	0	0	-	0
Wish - Familiar program		-	0	-	0	0
Wish - Possibility to comment		-	0	-	0	-
Wish - Possibility for non-linear navigation		0	0	0	-	0
Wish - Possibility to compare		-	-	0	-	-
Necessary - Clear tone of voice		-	0	-	0	0
Necessary - Include examples		+	+	+	+	0
Wish - Show progress		-	-	-	-	-
Wish - Consistent interface		0	0	0	-	-
Possibility to perform calculations		0	0	0	+	0
Integrated with Microsoft Teams		+	+	+	+	+
Possibility to add shapes		-	-	-	0	0
Possibility to add slides/frames/other content		-	0	0	+	0
Presentation notes		-	-	-	+	-
Possibility to download document		-	0	0	-	+
Presentation mode		-	-	-	+	-
Possibility to work offline		0	0	0	+	+
Easy to share		0	0	-	-	0
$\Sigma +$	0	3	4	3	9	3
$\Sigma 0$		11	15	13	6	15
$\Sigma -$		12	7	10	11	8
Netvalue	0	-9	-3	-7	-2	-5
Ranking	1	6	3	5	2	4
Further development	YES					

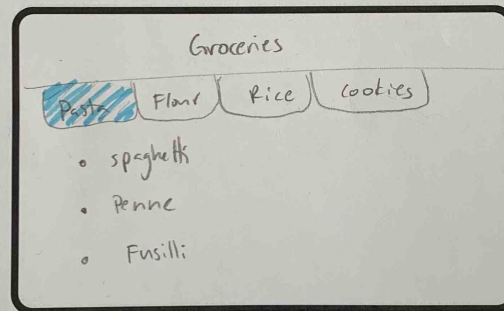
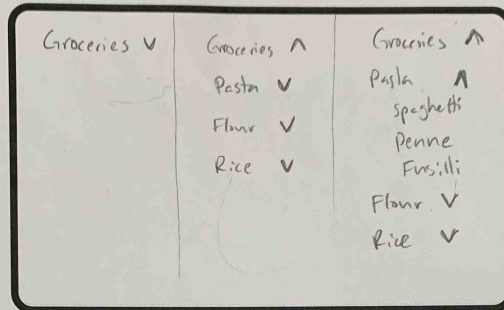
L

Appendix: Co-creation about Structure and Presentation

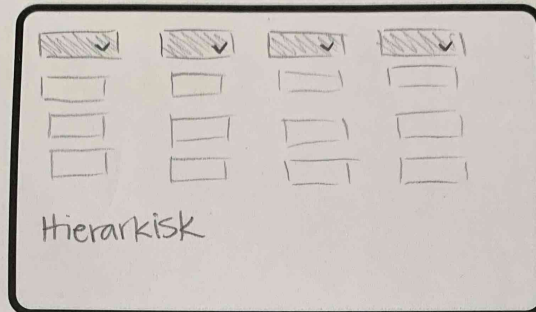




How might we build a structure with different levels?



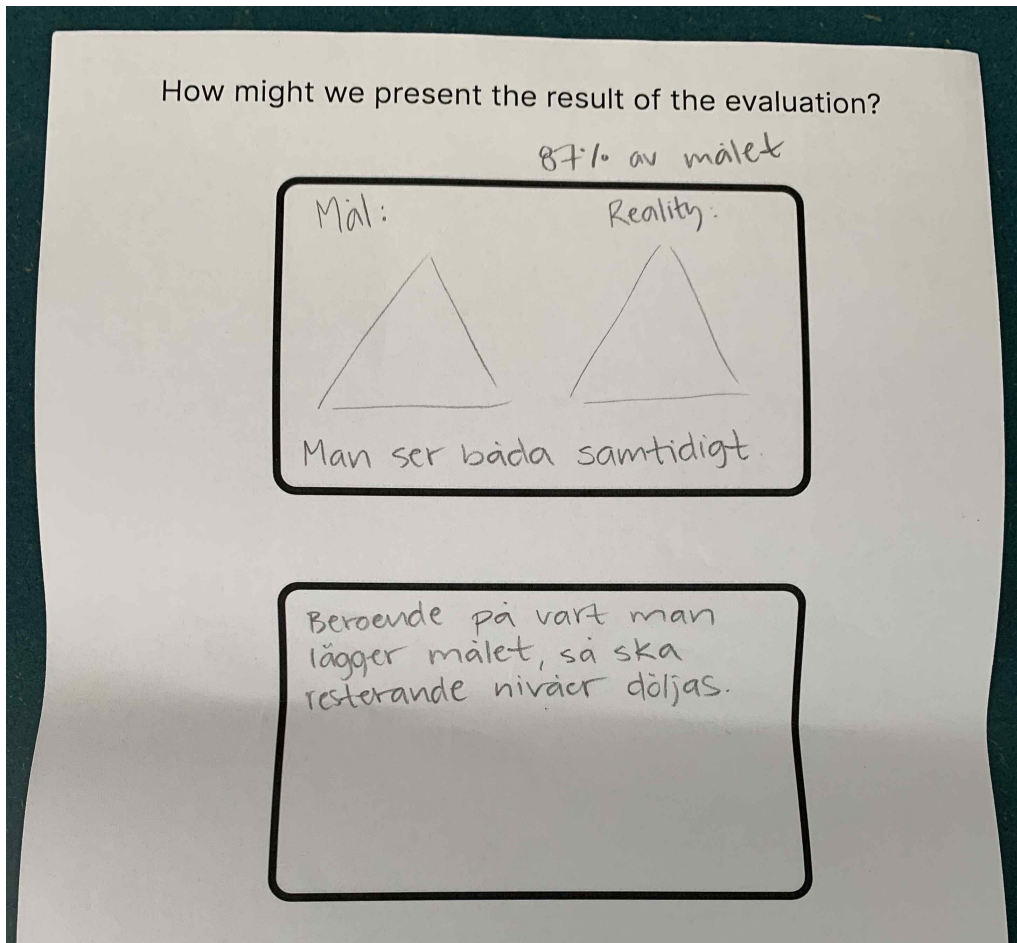
How might we build a structure with different levels?



Hur ser strukturen ut?

Skapa mening genom visuella
medel.

Relationen mellan de olika
delarna är viktig.



How might we present the result of the evaluation?

Siffror
Mätbart

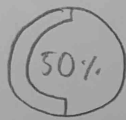
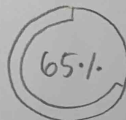
kategorier som idag
med siffror-rating
tex UI style 8/10
användbarhet 3/10



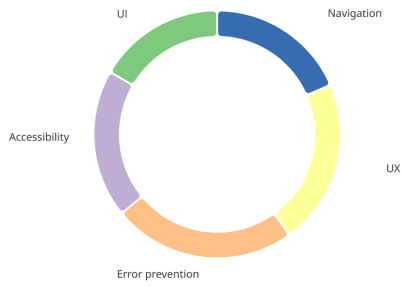
Reached

Not reached

1. ratea enligt skalan som finns idag.
2. kategorierna måste nå upp till ett visst värde för att ses som "bra"
3. presentera om kategorierna når till godkänd nivå eller ej



Content of Evaluation



quick review

Detailed review

Navigation

Information about category, what it is and why it is important.

Maybe in the case of navigation it can say that there are different kinds of menus such as horizontal and vertical.

Maybe add pictures as well and show for example.



 Navigation -> Methods and components

Horizontal menus are only used for a limited number of pages. **1**

How **Why**

20P	15P	10P	5P	-5P	0P
Same throughout	Mostly the same	Partially the same	Barely the same	Not the same	N/A
Add a comment here using the comment-function					

Vertical menus are used when there are many pages. **1**

How **Why**

20P	15P	10P	5P	-5P	0P
Same throughout	Mostly the same	Partially the same	Barely the same	Not the same	N/A
Add a comment here using the comment-function					

Mega menus are used for overview of complex solution structures. **1**

How **Why**

20P	15P	10P	5P	-5P	0P
Same throughout	Mostly the same	Partially the same	Barely the same	Not the same	N/A
Add a comment here using the comment-function					

Card menus are used for presenting information of the menu options. **1**

How **Why**

20P	15P	10P	5P	-5P	0P
Same throughout	Mostly the same	Partially the same	Barely the same	Not the same	N/A
Add a comment here using the comment-function					

Hamburger menus are by default hidden. **1**

How **Why**

I should only be used for limited space on e.g. mobile devices.

20P	15P	10P	5P	-5P	0P
Same throughout	Mostly the same	Partially the same	Barely the same	Not the same	N/A
Add a comment here using the comment-function					

SUM: _____
 20-16p → final score 20p, 15-11p → final score 15p, 10-6p → final score 10p, 5-0p → final score 5p

N

Appendix: Sorting of Statements

