



# Encouraging Long-Term Use of Furniture by Promoting Strong User Attachment:

Exploring How Design Can Enable Longevity and Stewardship.

Master's Thesis in Industrial Design Engineering

GUSTAV DAGBERG  
LINUS HULTGREN

DEPARTMENT OF INDUSTRIAL AND MATERIALS SCIENCE



# Encouraging Long-Term Use of Furniture by Promoting Strong User Attachment:

Exploring How Design Can Enable Longevity and Stewardship.

GUSTAV DAGBERG

LINUS HULTGREN

Department of Industrial and Materials Science  
CHALMERS UNIVERSITY OF TECHNOLOGY

Göteborg, Sweden 2025

Encouraging Long-Term Use of Furniture by Promoting Strong User Attachment:  
Exploring How Design Can Enable Longevity and Stewardship

GUSTAV DAGBERG

LINUS HULTGREN

© Gustav Dagberg, 2025

© Linus Hultgren, 2025

Department of Industrial and Materials Science

Chalmers University of Technology

SE-412 96 Göteborg

Sweden

Telephone + 46 (0)31-772 1000

Acknowledgements, dedications, and similar personal statements in this thesis reflect the author's own views.

Cover:

Representations of two furniture concepts, described in chapter 7.

Left render, Linus Hultgren; Right photography, Gustav Dagberg.

Printed by Chalmers Repro Service

Göteborg, Sweden 2025

Encouraging Long-Term Use of Furniture by Promoting Strong User Attachment:  
Exploring How Design Can Enable Longevity and Stewardship

GUSTAV DAGBERG

LINUS HULTGREN

Department of Industrial and Materials Science

Chalmers University of Technology

## Abstract

In the context of rising environmental concerns and a fast-paced culture of consumption, the short lifespan of everyday objects, furniture included, has become both a design problem and a societal symptom. This thesis explores how design can be used as a tool to counteract disposability by promoting longer use time through the creation of strong mutual relationships between the user and furniture. Rather than focusing solely on durability in a technical sense, the project adopts a holistic approach that considers emotional attachment, material aging, functional adaptability, and the evolving role of furniture in everyday life.

The research is grounded in a multi-layered design process that combines literature studies, theoretical frameworks such as Patrick Jordan's "pleasures of design" and Jonathan Chapman's "emotional durability," as well as observational analysis and iterative prototyping. Insights from this process inform two design concepts: a modular shelving system that adapts to changing spatial and user needs, and a multifunctional stool that invites interaction, reinterpretation, and emotional connection. Both designs serve as speculative yet functional answers to the question: How might furniture be designed so that people not only use but also choose to keep?

By framing longevity as an ongoing relationship rather than a fixed attribute, this work proposes that design can extend the relevance and presence of furniture in people's lives. When objects are designed not just to serve, but to resonate, evolve, and stay meaningful over time, they become more than things: they become companions in daily life. In doing so, design takes on a stewardship role, encouraging care, retention, and a deeper sense of value. This thesis argues that meaningful relationships with furniture are not a sentimental ideal, but a future design strategy in the pursuit of sustainability.

Keywords: Longevity, Furniture, Emotional Design, Design for Attachment, Design for Care, Sustainable behaviour, Stewardship, Long-term use.

# Acknowledgement

We would like to express our sincere gratitude to our supervisor and examiner, Johan Heinerud, for his invaluable guidance, support, and insightful feedback throughout this project. His encouragement and perspective have been crucial in helping us shape and refine our work.

We would also like to thank designers Sami Kallio and Staffan Holm for generously sharing their time and thoughts with us. Their reflections on furniture design and long-term use have greatly enriched our understanding and inspired us.

Thank you all for your contributions.

# Table of Content

<b>1 Introduction</b>	<b>1</b>
1.1 Background	1
1.2 Purpose	2
1.3 Aim	2
1.4 Research Questions	2
1.5 Demarcations	2
1.6 A Distinct Design Project	3
<b>2 Process</b>	<b>4</b>
2.1 Literature Review	5
2.2 Interviews	5
2.3 Design as Exploration	6
2.4 Supervision from Professionals	6
<b>3 Frame of Reference</b>	<b>7</b>
3.1 Why Products are Replaced or Discarded	7
3.2 Material Longevity	8
3.3 Functional Longevity	8
3.4 Emotional Longevity	9
3.4.1 Emotional Design	9
3.4.2 Deciding Factors for Emotional Attachment	10
3.5 Interplay Between the Three Categories	11
<b>4 Review of Design Approaches for Longevity</b>	<b>13</b>
4.1 Graceful Aging - Materials That Maintain Interest	13
4.2 Care and Maintenance	14
4.3 Evolvability	15
4.4 Multifunctionality	15
4.5 Dependability	16
4.6 Trust	16
4.7 Interaction	17
4.8 IKEA Effect - A Sense of Accomplishment	17
4.9 Sensory and Tactile Design	18
4.10 Aesthetics	19
4.11 Animacy	20
4.12 Story	20
4.12.1 Narratives	20
4.12.2 Memories	21
<b>5 Ideation and Exploration</b>	<b>23</b>
5.1 Ideation	23
5.1.1 Memories, Marks, and Stories	24
5.1.2 Imperfections and Uniqueness	27
5.1.3 Joints and Constructions	29
5.1.4 Adaptability and Ever-Changing Conditions	30

5.1.5 Kinds of Furniture	32
5.2 Further Explorations	33
5.2.1 The System	33
5.2.2 The Dynamic	37
5.2.3 The Social	40
5.2.4 The Well Used	42
5.3 Formulating Two Visions	44
5.3.1 The System	44
5.3.2 The Dynamic	44
5.3.3 How the Visions Differ and Complement Each Other	45
<b>6 Development and Refinements of Concepts</b>	<b>47</b>
6.1 The System	47
6.1.1 System Overview	47
6.1.2 Vertical Legs	48
6.1.3 Horizontal Bars: Round and Square	49
6.1.4 Metal Corner Connectors	49
6.1.5 Hinges	53
6.1.6 Edge Brackets	54
6.1.7 Aesthetic Considerations	55
6.2 The Dynamic	56
6.2.1 Meeting the Vision	56
6.2.2 Defining and Deciding on Concept	60
6.2.3 Setting the Construction	62
6.2.4 Merging Ideas from the Two Constructions.	68
6.2.5 Design Decisions and Construction of the Final Concept.	69
<b>7 Final Concepts</b>	<b>75</b>
7.1 Händig - a System	75
7.2 Samtal - Your Everyday Companion	79
<b>8 Discussion</b>	<b>83</b>
8.1 Insights on the Three Pillars of Longevity	83
8.1.1 Functional Longevity	83
8.1.2 Material Longevity	84
8.1.3 Emotional Longevity	85
8.2 “Förvalta” - Steward	87
8.3 Further Research	87
<b>9 Conclusions</b>	<b>89</b>
<b>10 References</b>	<b>91</b>

# 1 Introduction

## 1.1 Background

Today, there is broad recognition that the current approach to consumption must change; a conversation that spans all industries, including furniture. Companies are actively working to rethink traditional practices, focusing on innovative and natural materials. For example, the company Papershell utilizes cellulose-based materials, while other companies explore the use of seaweed, industrial residues, and recycled materials.

However, the challenge extends beyond materials and production; it also involves significant behavioral factors. Addressing harmful consumption patterns requires a multifaceted approach to sustainability. Designers and engineers play a dual role in this effort, as suggested by Page (2014, p. 267). On one hand, they must innovate materials and production methods to minimize environmental impact. On the other hand, they must design products that encourage sustainable use behaviors. This latter aspect is crucial because even the most sustainable materials are ineffective if products are discarded prematurely. Furniture must be designed with longevity in mind to ensure it serves its full potential lifespan.

Designing for longevity in furniture can rely on three fundamental pillars: material, functional, and emotional durability. While material and functional aspects are frequently addressed, emotional durability is often overlooked. Yet this element plays a crucial role in promoting more sustainable consumption behaviors. Chapman confirms a similar view, suggesting that it can be met by “*increasing the resilience of relationships between consumer and product*” (2009). This is particularly relevant to the furniture industry, where the human-object relationship plays a crucial role.

This thesis will explore the concept of design for longevity in the furniture industry, with a specific focus on emotional durability as a key factor in achieving sustainable consumption patterns.

The concept of *Design for Longevity* can be defined in various ways. While the word *longevity* itself is described as “long continuance: permanence, durability” (Merriam-Webster, n.d.), the concept *Design for Longevity* focuses on matching a product’s lifetime with its actual period of use. In some cases, this may mean designing products with a shorter lifespan if it leads to more efficient resource use. As Carlsson et al. (2021) state:

*“Design for Longevity aims at designing products with an optimal lifetime, where optimal means taking the user, the business, and the resource efficiency perspectives into account when designing the life of a product.”*

However, this study specifically explores ways to extend the use time of furniture by identifying factors that influence user consumption and disposal behaviors. This approach assumes that most furniture is discarded before it is physically worn out. Relating to Carlsson et al. 's definition, the goal is to extend use time to match product lifetime, rather than shortening lifetime to fit the often unnecessarily short use period that is seen today. Hence, throughout this thesis, *design for longevity* is used to mean prolonging the time a product is retained and used.

## 1.2 Purpose

The purpose of this master's thesis is to explore how design can support the extended use of furniture by addressing emotional, material, and functional longevity, with particular emphasis on emotional longevity as a key factor in fostering lasting relationships between users and furniture. Through both theoretical research and practical exploration, the study examines how emotional connections between users and objects are formed, which materials and construction methods promote durability and adaptability, and how current design practices engage with these dimensions. The insights generated through this process will be applied and expressed through the design and construction of furniture pieces that embody principles of long-term use.

## 1.3 Aim

This thesis aims to construct a set of furniture pieces that utilize insights from both theory and an explorative design process to promote long-term use, with a particular focus on the relationship between users and their furniture. The designs seek to challenge prevailing patterns in how furniture is consumed, used, and discarded.

## 1.4 Research Questions

*What factors influence the long-term use and retention of furniture from a user perspective?*

*How can these aspects inform and shape design decisions to prolong the time a product is used?*

## 1.5 Demarcations

This work focuses on exploring how a design process can integrate and address the theme of longevity. While the primary objective is to influence consumption behavior to promote sustainability and reduce environmental impacts, this report does not aim to determine the extent to which such changes will result in an overall decrease in environmental impact.

This work focuses on the relationship between the user and the product. To gain meaningful insights, this work focuses on furniture, objects that users typically purchase with greater deliberation and with the intention to own for a longer period. Given the importance of personal connection in this context, this study primarily considers furniture designed for home environments. While the resulting ideas may have broader applicability, the consumption patterns and usage of public furniture differ significantly, making it challenging to address both aspects comprehensively. Consequently, focus has also not been on creating a commercially viable product.

This article's primary focus is on the emotional aspects of longevity. While material and functional longevity are also relevant, this work is limited to areas where these aspects intersect with emotional longevity. For instance, the concept of *graceful aging* aligns with both material and emotional longevity, whereas material durability and wear relate solely to material aspects and thus fall outside the scope of this study.

## 1.6 A Distinct Design Project

This master's thesis differs from the typical project format within the program *Industrial Design Engineering* at Chalmers University of Technology by taking a more explorative and speculative approach. Rather than following a traditional user-centered design process, the project utilizes design as a tool for inquiry and reflection. As such, it does not include direct user research or participatory methods.

Instead, the work builds partially on theoretical insights and partially on explorations, using ideation and prototyping as tools to explore how design might support prolonged use in furniture.

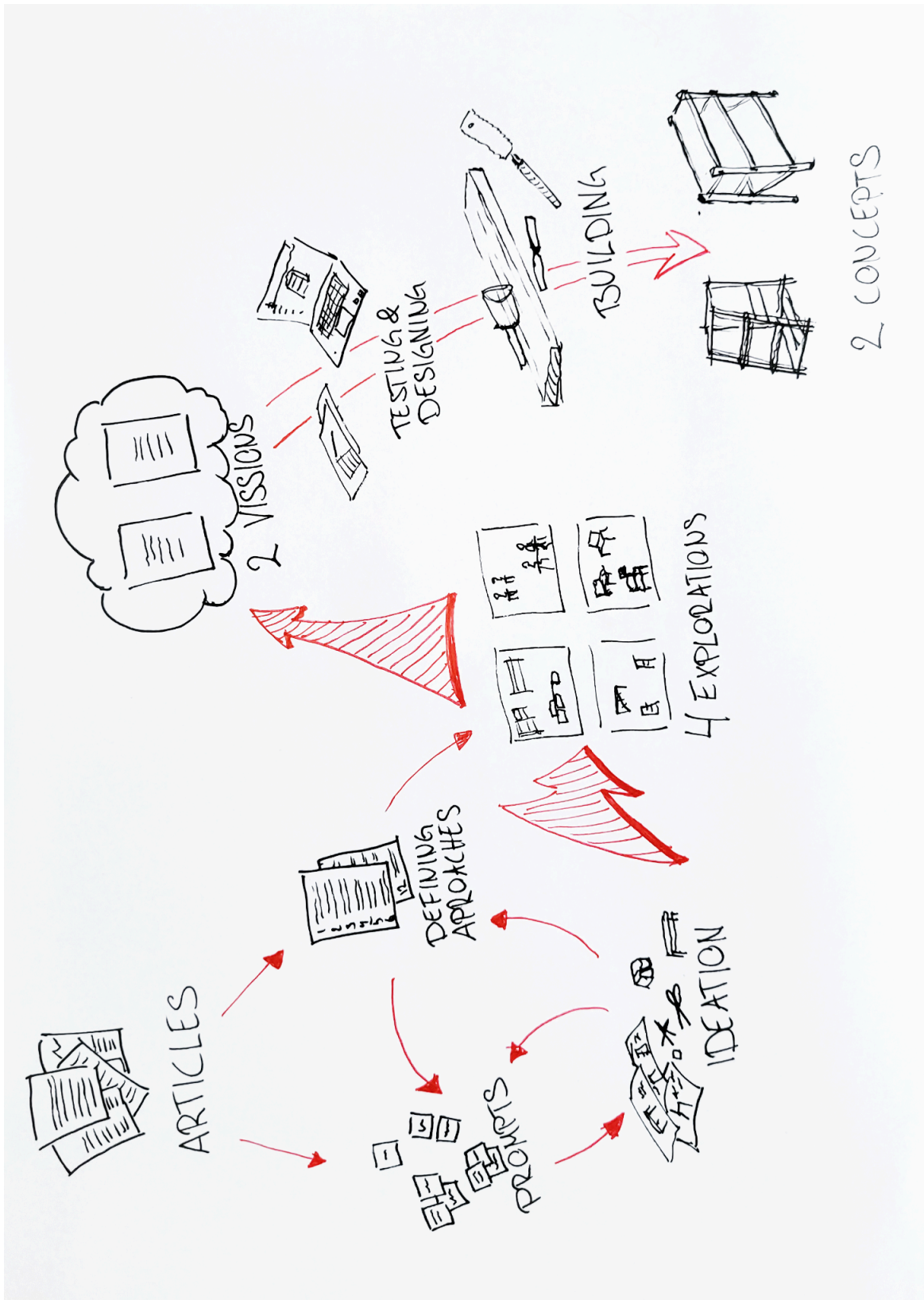


Figure 1. Visualization of the process.

## 2 Process

The process of this work contains two main elements: research and design work. These two processes have driven the project forward in tandem. The theory has inspired and shaped the design process, and in return, the design process has raised new questions that have refined and focused the theoretical work.

12 approaches were derived from the early iterations. These helped shape the concepts and design decisions in the second half of the project, which made sure theory and design worked hand in hand throughout the whole process.

### 2.1 Literature Review

The project began by forming a theoretical foundation, which included a literature review on emotional attachment theories, emotional durability, and longevity. Articles were found through Chalmers Library's search function, Google Scholar, and Research Rabbit. Additional articles were discovered via references in other studies. The book, *Emotional Design* by Don Norman, was also read.

Apart from setting the theoretical framework, the theory also informed the different approaches that have been evaluated and used through the design process.

### 2.2 Interviews

To deepen the understanding of the subject as well as learning about the industry and their thoughts, interviews were conducted. One interview was conducted with an expert on sustainable behaviours and circularity, and two interviews were conducted with Designers.

The expert on sustainable behaviours and circularity, Anneli Selvefors, was interviewed for two main reasons. First, to gain a deeper understanding of the role of longevity in relation to sustainable consumption and circular economy principles, a correlation that was found to be important in research. Second, to gain further insight into relevant design approaches. Selvefors has previously been part of creating a *Use2Use* toolkit. While that work focuses on a neighbouring area, several of the design strategies and tools overlap and are relevant within the context of this thesis.

The two designers were Sami Kallio and Staffan Holm, who run their separate studios in Gothenburg. The interviews started with an unstructured format with the goal of understanding their view on longevity, what is discussed in the furniture industry, and how they work in relation to the subject. The

interview then took on a more structured format, asking about specific approaches discussed in the literature.

## 2.3 Design as Exploration

The aim of the design process was to test and evaluate the relevance of various approaches and theories identified in the research. By using design tools such as ideation and prototyping in parallel with literature studies, the process generated insights not only into what could be done, but also how. These explorations could thereby help guide and focus the parallel theoretical study.

A secondary goal was to design and construct a set of furniture pieces. These designs should be able to, by themselves, promote a sustainable use through longevity and therefore act as precedent examples and inspiration for future projects. How this design process was performed is described in detail in chapters 5 and 6.

## 2.4 Supervision from Professionals

To include insights from professional practice, Sami Kallio and Staffan Holm were involved as external supervisors. They were visited at key points during the process to discuss everything from brief concepts to construction and materials.

## 3 Frame of Reference

This chapter presents insights into what longevity means and why it is important. Understanding the factors that influence whether products are retained or discarded is essential for ensuring that they remain in use for as long as possible, thereby reducing waste and promoting more sustainable consumption patterns. The theoretical framework is divided into three categories: **Material Longevity**, **Functional Longevity**, and **Emotional Longevity**. While all three forms of longevity are relevant to this work, particular emphasis is placed on emotional longevity, as it is central to the user perspective, fostering lasting relationships between people and their furniture.

### 3.1 Why Products are Replaced or Discarded

Product longevity refers to the duration for which a product remains functional, relevant, and valued by users, thereby delaying its replacement, disposal, and environmental impact. Several researchers have explored the reasons why products are discarded or replaced.

According to Schifferstein and Zwartsluis-Pelgrim (2008), there are four primary reasons why a product is no longer used:

1. Product degradation: The product loses its value due to wear and tear, either from a functional or aesthetic perspective.
2. Obsolescence due to changing user needs: The user may no longer find the product relevant, either because of lifestyle changes, evolving preferences, or new external requirements.
3. Shifts in user product interaction: shift in usage, different ownership
4. Change in context: The presence of better alternatives, technological advancements, or changes in trends may lead the user to abandon the product.

This model takes a broad perspective, viewing product longevity as an evolving relationship between the user and the product over time.

Mugge et al. (2005) have an overlapping but distinct model, identifying four main reasons for product replacement:

1. Functional loss: The product no longer works as intended.
2. Decreased usability: The product no longer meets the user's functional needs.
3. The availability of better alternatives: A superior product enters the market, making the current one less desirable.
4. Changing desires: The user seeks a new product due to aesthetic or emotional reasons.

While these models approach longevity from slightly different angles, they highlight the three overarching categories of product longevity: Material, Functional, and Emotional Longevity. These three factors together determine whether a product remains in use or is discarded. Material longevity ensures the physical durability and maintainability of a product, delaying its physical obsolescence. Functional longevity ensures continued usability and relevance over time. Emotional longevity addresses the user's attachment to the product, which can make them more likely to repair, repurpose, or continue using an item rather than replacing it. A deficiency in any of these areas increases the likelihood of early product disposal.

## 3.2 Material Longevity

This category concerns both material choice and construction methods. A product's material quality determines its durability and ability to maintain its physical integrity and aesthetic over time. If materials are robust and repairable, a product remains in use for longer.

**Reliability and Repairability:** A product that retains its material qualities without degrading is reliable and can be trusted to consistently perform well over time. If the product were to degrade in a way that negatively affects the experience of the user, the ability to repair or maintain can restore the product and, therefore, also the product-user relationship. A product that is easily repairable is perceived as more durable and more likely to be maintained rather than discarded. Haines-Gadd et al. (2018) suggest that the ability to repair a product fosters an emotional connection, as users see value in maintaining and preserving the product.

**Appearance and Aging:** The visual and material characteristics of a product influence both its functional and emotional longevity. High-quality materials that age gracefully can develop a patina, wear marks, or an aesthetic transformation over time, reinforcing a product's uniqueness and sentimental value (Haines-Gadd et al. 2018).

## 3.3 Functional Longevity

For a product to be kept and used over an extended period, it must remain useful and convenient for the user. While certain products are retained despite poor functionality, often due to sentimental value or strong aesthetic appeal, as is the case with some iconic designer pieces, this is difficult to rely on from a design perspective. Visual appreciation is subjective and unpredictable and should therefore not be the sole foundation of a product's longevity strategy. A more dependable approach is to ensure that the product is genuinely functional and enjoyable to use.

Usability and Adaptability: A product that remains easy to use and flexible to changing circumstances is more likely to stay in use. If a product becomes cumbersome or obsolete due to changes in the user's lifestyle, it is at risk of being replaced (Mugge et al., 2005).

Performance & Reliability: A product that continues to function as expected fosters trust and ensures long-term use. A poorly made product that breaks or malfunctions prematurely leads to frustration and early replacement, reducing longevity. Additionally, the ability to repair and maintain a product further supports its reliability and extends its lifespan (Haines-Gadd et al. 2018)

## 3.4 Emotional Longevity

The final, and arguably most relevant aspect, is **emotional longevity**, which plays a key role in determining how long a user chooses to retain a product. To enable a mutual relationship between the user and the furniture. A view confirmed by Jordan, who states that “pleasure with products accrues from the relationship between a person and a product” (p.11, 2000). When users form strong emotional attachments to a product, they are more likely to keep, repair, and continue using it, even when newer alternatives are available. This section first presents theory related to emotional design, followed by a discussion of factors that promote emotional attachment.

### 3.4.1 Emotional Design

Within the field of emotional design, it is often emphasized that a product must evoke interest and pleasure on multiple experiential levels. Two parallel frameworks illustrate this well. In Don Norman's theory of emotional design, he identifies three levels of experience: **visceral**, **behavioral**, and **reflective**. Norman draws connections between his model and another framework developed by Patrick W. Jordan, who outlines four types of pleasure: **physio-**, **psycho-**, **socio-**, and **ideo-pleasure**. Both models aim to offer a holistic perspective on how design can enhance the user's experience with objects. As Jordan explains in his book *Designing Pleasurable Products* (2000), this approach allows designers to consider “all of the potential benefits that a product can deliver” (p. 11).

While mapping similar subjects and having similar scales, these two frameworks differ in their focus, and their scales are not directly translatable. These theories will shortly be introduced to be discerned further.

#### Don Norman's three levels of design

Don Norman highlights three levels of cognitive processing involved in interaction with products: visceral, behavioural, and reflective. The **visceral level** refers to the immediate, unconscious emotional reactions to a product's appearance, feel, or sound. The **behavioural level** relates to the

usability and functionality of the product; how well it supports actions and goals during use. Finally, the **reflective level** involves conscious thought, where one evaluates a product based on meaning and personal values. Together, these levels influence how one perceives and connects with designed objects. (Norman, 2004)

#### Jordan's four levels of pleasure

Jordan, on the other hand, has instead focused on dividing the types of pleasures that can be experienced. His four levels are called Psycho-pleasure, Physio-pleasure, Socio-pleasure, and Ideo-pleasure.

- **Psycho-pleasure** relates to “*Cognitive and emotional reactions*”. Designing for this level may consider ease of use, fun experiences, etc.
- **Physio-pleasures** are related to what is experienced with the senses. Designing the sensory experiences of touch, taste, and smell may include choices of texture, material, and more.
- **Socio-pleasures** process relationships with others. Designing for this level includes how the object defines the user in the eyes of others or the society as a whole. This may have to do with status, belonging, etc.
- Lastly, **Ideo-pleasure** relates to the values the object carries. It may be related to the aesthetics, the origin of the product, etc. (Jordan, 2000)

What both Norman and Jordan suggest for the design process, even if their categorizations differ, is the importance of addressing multiple levels. A piece of furniture may be visually appealing and functionally effective, but if the user cannot relate to its underlying idea, for instance, a narrative of sustainability, the overall experience is weakened. As Norman (2004, p. 58) emphasizes, a design “must strive for balance among the three levels of design.” Without this balance, a product risks falling short in the user’s perception, potentially leading to it being replaced by one that offers a more holistic appeal.

### 3.4.2 Deciding Factors for Emotional Attachment

The theories above highlight the importance of a holistic approach in achieving emotionally durable designs. Further, it is relevant to understand how this can be designed for. While there are multiple frameworks suggesting many concrete tools, Page (2014) is efficient in distilling the subject and suggests an outline of five key factors that contribute to emotional attachment:

1. **Memories:** Products gain sentimental value through personal experiences over time. This is the strongest factor in determining attachment. Additionally, some products carry inherited memories, such as heirlooms or items with historical significance.

2. Pleasure of use: Sensory elements such as texture, tactile feedback, and sound contribute to enjoyable interactions, making a product more cherished over time (Page, 2014).
3. Appearance and Aging: A product's material qualities, including how it wears and changes over time, impact its desirability. Haines-Gadd et al. (2018) note that marks from wear and tear can enhance attachment by reflecting the user's interactions, personalizing the object over time rather than reducing its value.
4. Usability and Relevance: The ability to use a product intuitively and conveniently reinforces attachment. A product that integrates well into a user's lifestyle and remains functional is less likely to be abandoned (Mugge et al., 2005).
5. Reliability and Repairability: A product that consistently performs well fosters trust, while repairability provides users with the satisfaction of maintaining and preserving their possessions (Haines-Gadd et al. 2018).

Further, Page (2014) finds that, of his categories, memories proved most prominent and frequently discussed in his interviews. This was followed by usability and pleasure. Lastly, though still significant, were reliability and appearance.

When comparing Page's five factors to the theories of Jordan and Norman, certain parallels can be identified, even though the frameworks differ structurally. For instance, the pleasure of use aligns well with both *physio-pleasures* in Jordan's model and the *visceral level* in Norman's framework. However, it is worth noting that Page's factors primarily emphasize inherent product qualities, which results in less focus on *socio-* and *ideo-pleasures* in Jordan's theory and the *reflective level* in Norman's.

### 3.5 Interplay Between the Three Categories

The Material, functional, and emotional focuses on longevity are each important, but also interdependent. A product's material quality and durability contribute to its ability to function over time, while a product that remains functional is more likely to maintain emotional significance for the user. Similarly, products with strong emotional connections are more often repaired and maintained, extending their functional and material lifetimes. If any of these elements fail, the product is more likely to be discarded, replaced, or left unused. Understanding and designing for these three aspects can contribute to longer-lasting products and a more sustainable approach to consumption.



## 4 Review of Design Approaches for Longevity

This research has explored a wide range of areas related to product longevity. Designing for longevity is a complex and multifaceted challenge with no singular solution. In this chapter, a set of factors derived from theoretical research is defined and discussed, evaluating their potential to promote extended product use.

By reviewing multiple studies and frameworks, a large number of aspects have emerged. For example, Haines-Gadd et al. (2018) identify 38 different strategies, and Norman (2004) dedicates an entire book to the topic. Faced with such a breadth of information, selecting which aspects to prioritize proved challenging. The selection process has therefore focused on factors more closely related to furniture design and the emotional relationship to furniture. Further, the aspects are merged and discussed on a more generalized level.

### 4.1 Graceful Aging - Materials That Maintain Interest

#### **Theory**

Selecting and designing with the right materials not only allows products to endure physically over time; it is also a key factor in maintaining emotional engagement. The term *graceful aging* effectively describes this phenomenon, as mentioned in Chapter 2.1. A primary reason products fall out of use is degradation. Particularly relevant here is aesthetic degradation; how wear, marks, and dirt alter the product's appearance. Haines-Gadd et al. talk about materials and coatings that mature, that instead of degrading in a negative way, they mature with use (2018).

#### **Reflection**

By making thoughtful material selections and smart design choices, this degradation can be minimized, or in more successful cases, the product's perceived value can even increase over time. Some materials are especially famous for their graceful aging properties, for example, leather that builds character with use. It can also depend on the product and how it is framed. For a copper roof, usually a patina is wanted, while other copper products might be polished to maintain a shine. Graceful aging of products could paradoxically be viewed as the product remaining novel, as it ages and changes, it becomes something new.

By making thoughtful material selections and smart design choices, the visual and functional effects of material degradation can be minimized. In some cases, the product's perceived value can even increase over time. Certain materials are known for their ability to age gracefully; for instance, leather often develops a richer character with use, while wood may gain warmth and depth through wear. The perception of aging depends both on the material itself and on how it is framed in the design. Signs of

wear and change can be seen as a natural evolution of the object, adding meaning and making it more valued over time, rather than less.

## 4.2 Care and Maintenance

### Theory

Ackerman et al. dig into this subject in their article. They find three triggers in designing for care. These are: **Sparks**, motivating the user to take action; **Facilitators**, making care and maintenance more available to the user; and lastly, **Signals**, reminding the user to take action (Ackerman et al., 2021).

Haines-Gadd et al. (2018) highlight in one of their strategies the value of designing for care, arguing for its ability to build a relationship of “mutual altruism”. In short, one could make conscious decisions on surfaces that could be refreshed and joints that can easily be tightened or repaired. This hands over the possibility and the responsibility of the care to the user.

### Reflection

No matter how well a product is designed and constructed, if it is loved, it will wear and get dirty. While graceful aging can maintain or even increase attractiveness over time, what happens when the function of the stool decreases? E.g., a stool could start to wobble, the fabric could wear, exposing the stuffing, etc. Its attractiveness sinks rapidly.

This area is, however, also complex to tackle. It seems many users don't want to care for and maintain their furniture. The reason behind this could be argued. It could be a cultural aspect, that consumption is the most conventional action, or that there just aren't as many examples and much discussion about the alternative to care for your things.

It could, however, also be argued to be a design flaw: that current designs shut down the opportunity for the user to take these actions. When a product is designed to invite maintenance through visual cues or accessible construction, it increases the likelihood that users will engage in care and repair, thereby extending both the product's functional and emotional lifetime. It could also foster an enhanced bond between the user and furniture through interaction and the feeling of accomplishment.

## 4.3 Evolvability

### Theory

Evolvability refers to the option to improve the product in the future (Van den Berge et al. 2021). This can be both in terms of replacing parts for newer versions as well as the possibility to adjust the product to changing needs. Van den Berge et al. further argue that upgradability can “breathe new life” into the product and make it novel again. It could also allow the user to adapt to social trends without buying a new product. They also mention the act of upgrading as a way for the user to express themselves through the product, creating a stronger emotional attachment. Ackerman et al. (2021) refer to this as *Appropriation* and also lift the creative act's ability to feel more attached to the object.

### Reflection

Functional obsolescence, changed conditions, and changed needs and desires pose a great risk for disposing of and replacing products. Designing furniture to fit changing life conditions is therefore key. One, however, needs to consider how far the modularity should go and be implemented in order to avoid too many compromises with the aesthetic design. Another key consideration is how user-friendly and accessible it is, if it is too much of a hassle to engage with, or if the user does not realize it can be done, the implementation has failed in its purpose.

## 4.4 Multifunctionality

### Theory

In chapter 3.1, it was concluded that one reason for replacing a product is that the user's needs have changed. For instance, one of the aspects highlighted by Mugge et al. (2005) is that a product may no longer meet the user's needs. While evolvability and upgradeability, as discussed earlier, can be effective strategies for preventing functional obsolescence, another approach is to design inherently adaptable furniture, even within a fixed shape. While these approaches have similarities, they differ in some areas. Multi-functional furniture may be dynamic and can change from one use to another without needing rebuilding. This means it can adapt not only to changing needs through life, but also through the day.

### Reflection

For instance, imagine a cupboard that no longer fits a space or no longer serves its purpose. It will be experienced as bulky, in the way, and is hence unlikely to be kept or repurposed. By enabling a single piece of furniture to serve multiple needs across different situations, its usefulness increases over time, reducing the likelihood that it will be discarded when the user's needs change.

## 4.5 Dependability

### **Theory**

A furniture that fulfills a specific and sometimes odd function or need is less likely to be exchanged. Selvefors uses an example of “that stool I always use while sewing on the sewing machine” and states that while it may not be the most valuable furniture, it may be hard to replace functionally (personal communication, February 12, 2025).

### **Reflection**

Furniture may be irreplaceable in aspects such as functionality or simply its size. A clearer example of furniture with a more specific function could be a stepping stool. If one is dependent on the climbability, it is harder to discard one's stepping stool and harder to find a replacement since it is not a very common piece of furniture. In contrast, a chair will always be easier to replace.

Regarding dimensions, furniture that fits perfectly in your home is harder to replace because of the pain of finding one that fits just as well. Imagine browsing for a new sofa because it starts to feel old and not as fresh. You soon realize that the sofa you have really maximizes the seat space and comfort for the spot you have it in, it is hard to find a good substitute, and you decide to clean it up or find new covers for the cushions.

The irreplaceability directly leads to a stronger will to care for and keep the object intact. While this may be hard to design for, considering that every home and every use situation is unique and that there will always be a chair to replace your chair, it is worth keeping in mind. Adding a unique function or detail may be what makes one hold on to an object.

## 4.6 Trust

### **Theory**

Another crucial factor in extending the lifespan of furniture is the sense of trust it conveys. Page (2014) argues, based on their study, that trust between the product and the user is fundamental for building a solid attachment. Norman also discusses trust (2004). He lifts different objects and concludes that simple mechanical objects are more easily trusted than, for example, electronic devices. He argues that with simpler objects, one knows what can be expected and it is often fulfilled; Thereby, trust can be built over time. With more complex products, the user may feel a lack of control, and disappointment is closer at hand.

### **Reflection**

If a piece of furniture feels unstable, fragile, or unreliable, users are less likely to rely on it, especially for demanding tasks like climbing or heavy use. Over time, this lack of trust can lead to the furniture

being sidelined or replaced, even if it remains physically intact. Designing for robustness and perceived sturdiness not only ensures safety but also builds long-term confidence, making it more likely that the piece stays in use for years to come.

## 4.7 Interaction

### **Theory**

When users interact with products, there is an opportunity for emotions to happen and bonds to form (Schifferstein & Hekkert, 2008). They argue that experience and interaction with a product are connected and influence and shape each other.

### **Reflection**

Promoting a bond between the user and the object is also a way of increasing the chance that the object will be kept. As with any relationship, more interactions build stronger bonds. This should imply that furniture that is more frequently interacted with is more likely to be loved and, in the next step, cared for. Some furniture is more interactive by its nature, the table that you eat at may be interacted with a couple of times every day, while the TV bench won't be touched after it is in place.

Further, an interaction can also be something beyond the primary function. The table may be extendable, it may have smart compartments or drawers, it may have a nice texture that has a pleasant feel and invites touch. All these are examples of additional interactions that could build a stronger attachment. To conclude, while some aspects of the interaction are already set, more interactions can always be added.

## 4.8 IKEA Effect - A Sense of Accomplishment

### **Theory**

Users tend to value products that they built or at least partially assembled higher. This phenomenon often goes by the name *The Ikea Effect*. In some cases, however, the value of products may even be exaggerated simply because of the effort one puts in (Norton et al., 2012).

Norman lifts an example of the *Heathkit Company*, which sold electronic kits (p.55, 2004). This example proves that it is the feeling of accomplishment that adds value. This is made evident since it was the inexperienced builders who valued their results highly. The experts on electronics did not feel the same pride. Designing furniture as a partially active process that induces a sense of accomplishment may therefore strengthen the emotional bond the user feels to the product and how it is valued, lessening the chances of replacement.

One does not, however, want to make the process too simple. Both Norman (p. 55, 2004) and Norton et al. (2012) refer to the example of the Betty Crocker cake mix, where early versions required minimal user involvement. By simply adding water, the experience felt artificial and unsatisfying to users. The inclusion of an egg in the revised mix reintroduced a sense of participation, making the process feel more authentic and increasing user satisfaction. This example illustrates the delicate balance between meaningful engagement and unnecessary effort.

Similarly, when designing for user involvement in furniture construction, it is worth considering how much complexity is appropriate. Extending beyond the IKEA-effect, Haines-Gadd et al. lift what they call “*create a feeling of mastery*” (2018). They argue that infusing a greater sense of ability in doing it yourself and feelings of accomplishment strengthens the individual's well-being. This leads to an increased emotional connection towards the objects that promote this effect. However, if the process becomes too demanding, it instead risks frustration, poorly executed results, and a diminished sense of mastery and pride in the finished product.

### **Reflection**

If taken to the extreme, one could reframe the approach when designing furniture to not only have the end product in focus but to design the experience of the assembly. Looking at the product more like a Lego set, where building the Lego model is, as much if not, the main reason for the purchase. One could even imagine a series of furniture where the different models are different difficulties, like puzzles.

## 4.9 Sensory and Tactile Design

### **Theory**

Sensory pleasure and user satisfaction can strengthen the connection between user and product, particularly in the early stages of ownership (Page, 2014). By creating satisfying, intuitive *interactions*, the furniture invites repeated use and exploration. When a product is enjoyable to use, whether through tactile qualities, smooth movement, or well-considered details, it encourages users to keep it around and care for it over time.

### **Reflection**

The sensory pleasure or interest a product can create cannot be too focused on the initial spark of curiosity but must take the longevity into mind to not become stale with time. An approach with few but well-designed subtle sensory details is probably a way to balance short and long-term impressions.

## 4.10 Aesthetics

### Theory

Page (2014) found that the visual qualities of objects, such as shape, material, finish, and color, play a significant role in forming strong emotional bonds between users and products. Further, they discuss that to promote longevity, designers should aim for simplistic and timeless designs. Haines-Gadd et al. (2018), on the other hand, describe imagination as a tool when designing, creating some magic, excitement, and room for discovery.

Kallio says that he thinks it's the details of a product that people fall in love with, both visually and function-wise (personal communication, February 26, 2025). For him, that is usually where a project starts, from some detail he finds interesting, although he does not make visual details just for the sake of it, it should serve some purpose.

### Reflection

When designing for long-term use, it often makes sense to go for a simpler aesthetic; something that doesn't feel tied to a specific trend or time. It's a safer choice if the goal is to make the product last. But the design can't be allowed to feel boring either. There still needs to be a touch of uniqueness; Some kind of magic that makes it interesting and worth keeping around. Even though aesthetics are personal and hard to define, they still play a big role in building lasting attachment.

A recurring comment during the process was, *"So you're looking to design a classic."* What makes a design a "classic" is often the result of a combination of strong visual qualities and a distinctiveness that was innovative or meaningful at the time of its creation. This might stem from a novel manufacturing technique, the use of a new material, or a bold conceptual approach. In some cases, a design also gains its classic status through association with a famous designer, where the reputation of the name contributes to the object's cultural significance and continued relevance. Another frequently heard observation was that *"people buy with their eyes,"* that many would prefer an uncomfortable but beautiful chair over the reverse. If a design relies on its aesthetic qualities to be relevant, long term, it is either at risk of falling out of fashion or must become a classic to stay relevant. While designing a classic is probably the wish of every designer, it is not something that one can realistically aim for. The alternative approach is to create something whose long-term value stems not only from how it looks, but from other qualities as well.

## 4.11 Animacy

### Theory

The sense that an object has a form of vitality or presence can also play a role in extending a product's lifespan. In his book, Norman digs into human tendencies to interpret and project emotional responses in any objects (p.135, 2004). This may lead to both positive and negative emotions towards an object.

Humans are more likely to form relationships with objects that respond to them or invite *interaction* in engaging ways. When furniture feels “alive” through its movement, adaptability, or subtle design cues, it can foster a stronger sense of connection. Perceived human-like traits may lead to unexpected moments of interaction, enriching the user's experience.

At the same time, these animate qualities can lead to certain expectations. Expectations that the object will behave in a predictable or “understood” way. When those expectations are met, the emotional bond may deepen. When they are not, users may assign blame. Norman (2004) raises the question of whether such moments could constitute a “violation of trust.” As discussed in Chapter 4.6, *trust* is a foundational element in building attachment between the user and the object.

### Reflection

The emotional engagement that can come from animate qualities can encourage users to keep and maintain the piece longer, reinforcing its role in daily life and seeing it as a trusted friend. However, one also puts higher emotional trust and expectations on the same objects, resulting in an increased risk of disappointment and blame in the mutual relationship between object and owner. This emotional fallout can result in the rejection or replacement of the product, regardless of its physical longevity.

## 4.12 Story

One subject that is much discussed is the focus on adding a story to the object. Relating to the socio-pleasures, it is inevitable that the objects that one surrounds oneself with tell something about you. The story an object conveys outward can add an extra value to the product. However, this perspective may also be questioned. It was found that there are different kinds of stories and that their effect on product attachment works very differently: There are stories that come with the object (*a narrative*) and there are stories that occur in the *interaction* with the object (*a memory*).

### 4.12.1 Narratives

#### Theory

Narratives are stories that come with the object solely. It could be an idea of why the furniture exists,

an image connected to the brand, using materials with a prior life and therefore a prior story (e.g., bags from Freitag), etc. These all work by resonating with the values and the story the user wants to tell outward. This mainly relates to the Ideo-pleasure levels.

### **Reflection**

While the story can help create an emotional bond and a meaning of the furniture, the concept could also be questioned. According to Staffan Holm (personal communication, February 18, 2025), when the furniture leaves the workshop, the designer no longer has control over the story. This means one can have an idea of what the object is but not expect to have control over the reaction the observer or user has. This will not in the least be individual for every potential user. Story, therefore, tells less about how long the furniture will be used and cherished.

Further, Staffan (personal communication, February 18, 2025) talked about that it is not the end users who are most interested in the story; it is the media. If that is true, it could be argued that these sorts of stories are a selling argument aiming to push new products onto users, a medium for increased consumption. Leading to it being counterproductive in this research search for prolonging the use of products. Since values and ideas shift, these stories are exchangeable. Hence, these stories that relate to ideo-pleasures should not be taken at face value.

## 4.12.2 Memories

### **Theory**

The more effective stories are instead those written between the object and the user; the furniture may carry a heritage from the user's family, the user may connect it to a cherished social context, or it may be a mark left on the object from how the owner has used it. Ackerman et al. (2021) partially talk about this, referring to it as reflecting. They describe how the will to keep and care for an object is increased by the memories and traces that are created through *interaction*. This could be argued to work within both the psycho-pleasures with emotional responses and with Socio-pleasures, as the common story may very well be visible to others.

### **Reflection**

These kinds of stories are not as easily exchangeable as the narratives and could be argued to effectively strengthen the bond between furniture and the user. However, they are also harder to design for. This can only be achieved by reinforcing other qualities related to longevity, such that it persists as an emotional interest over time. The creation of memories must be left to the mutual relationship between the specific user and the furniture.



# 5 Ideation and Exploration

This chapter describes the first part of the design work, from the first prompt to two separate visions. Selected stages of the design process will be described to show how the different aspects have been taken into consideration throughout the work.

## 5.1 Ideation

For the initial ideations, prompts and questions were worked out with input from the research articles that were read. These could include brainstorming on themes like:

- “*Our lives change*”, forcing ideas that could adapt to at least three different life scenarios;
- “*find materials with previous stories*”, ideating on how to implement materials that have already served a lifetime as something else;
- “*washability*”, focusing on details and constructions that allow for ease of *care* and cleaning.
- “*Surface treatment by using*”, where it was ideated on how furniture can be given a nicer finish by use over time.

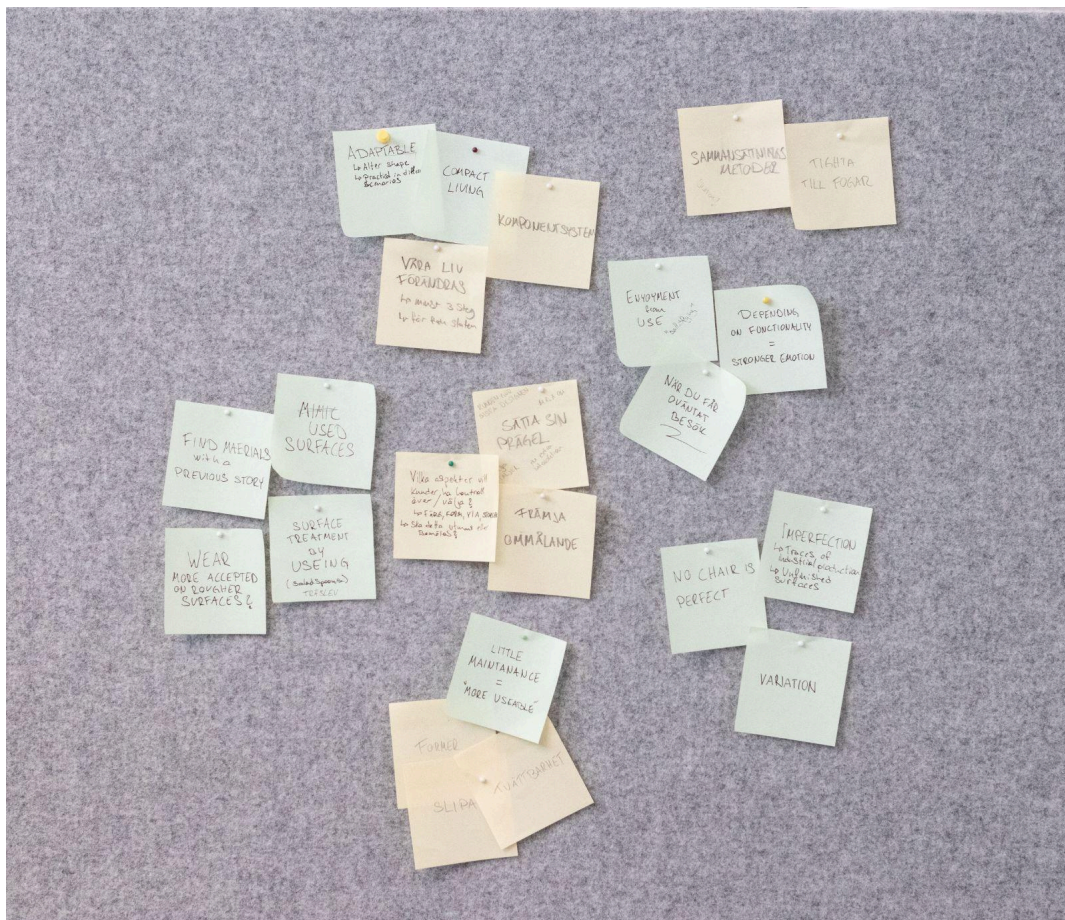


Figure 2. Overview of post-its with prompts used in the initial ideations.

At this point, the ideation mainly focused on finding interesting and new approaches to see what sparked interest and creative concepts. In this way, further research on the subject was informed and directed by the ideation. Less effort was put into defining the exact nature and form of the product. A concept could range from a system for building memorable and unique furniture from torn-down houses to a simple idea of implementing raw sawn edges. Below, some categories of prompts will be presented with examples of related generated ideas.

### 5.1.1 Memories, Marks, and Stories

This subject touches on several of the suggested approaches. Since it emphasizes the reuse of materials, *Graceful Ageing* naturally comes into play. Additionally, it connects to the idea of adding a *Story* through the production process. However, it is important to note that this aligns more closely with *narratives*, as previously defined, rather than *memories*. Given that narratives were argued to be less effective in fostering long-term attachment, the concepts explored here may have limited impact in achieving true longevity.

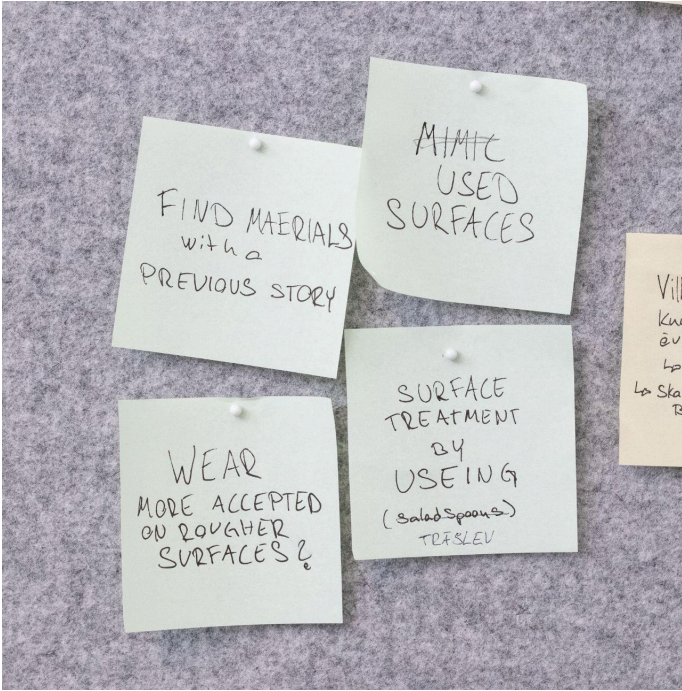


Figure 3. Prompts relating to materials and story.

One brand that works with used materials is the bag producer Freitag. They use tarps from trucks to create unique bags. What if one could create furniture with similar ideas? Either by using waste from something else or letting users create the last designs with the material they have at home. See figure 4.

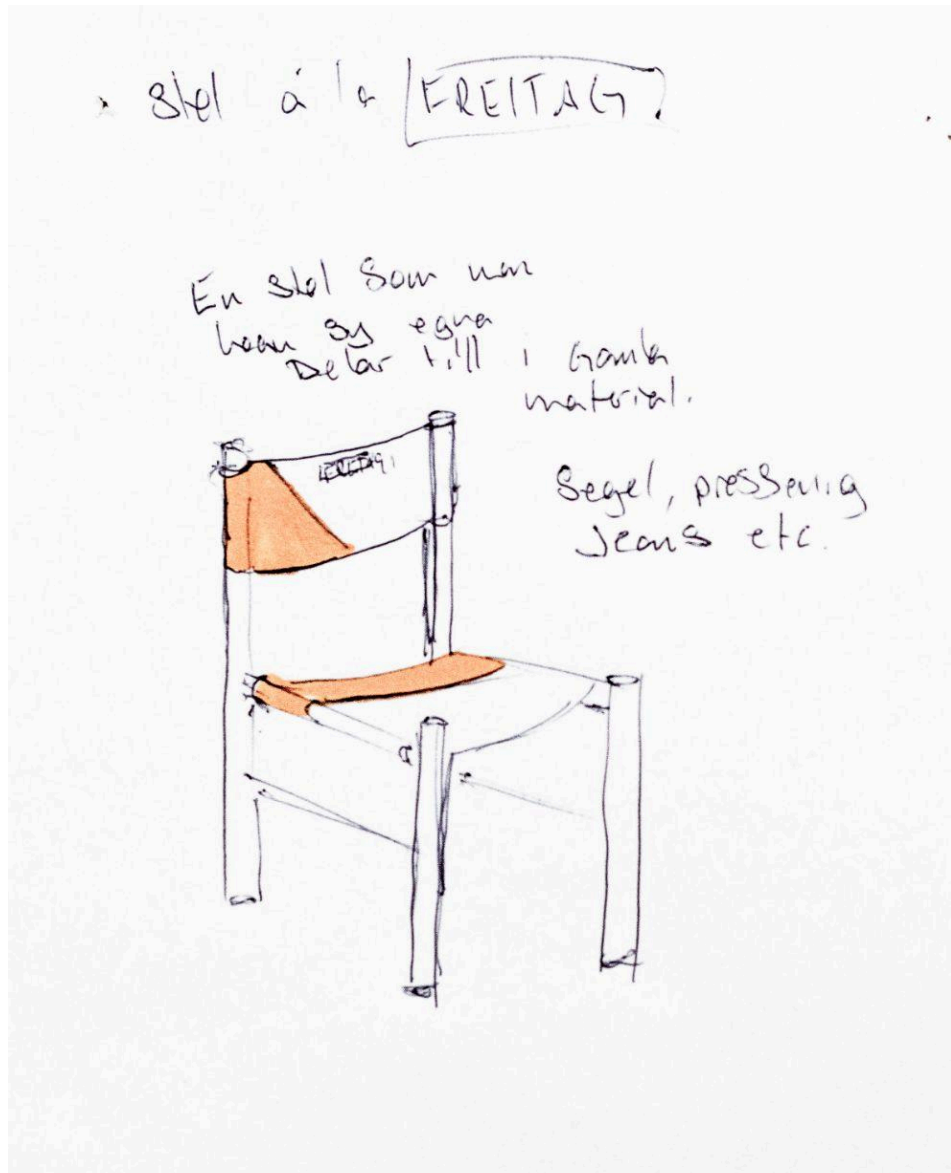


Figure 4. Concept making use of material with a previous story.

Other ideas of charging the final product with uniqueness were.

- To saw parts from the hull of boats, rendering each part unique. See figure 5.
- Collaborating with chefs who get a new surface to work on for a period of time. This leaves unique patterns from marks and stains. The surface is then incorporated into a final, unique piece. See figure 6.
- Create a process for turning torn down houses into simple pieces. It could, for example, be a great *memory* from a once loved house. See figure 7.

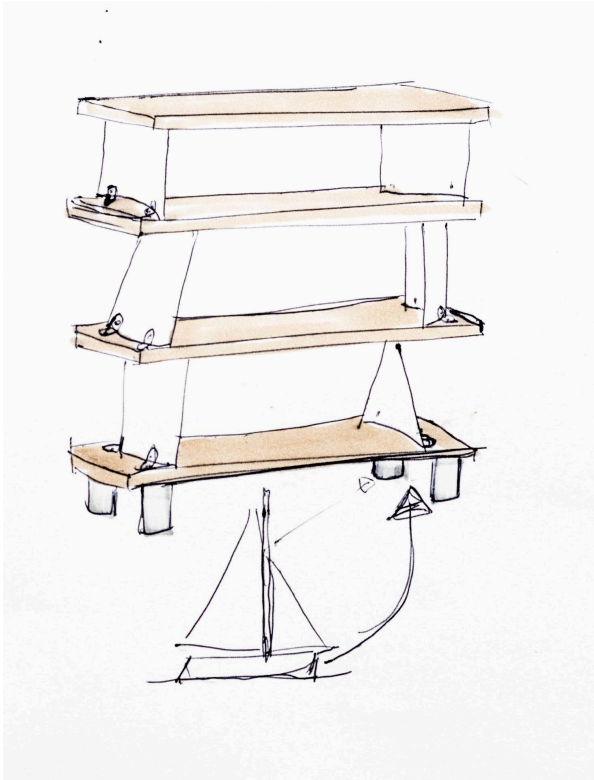


Figure 5. Unique shelves created from hulls.

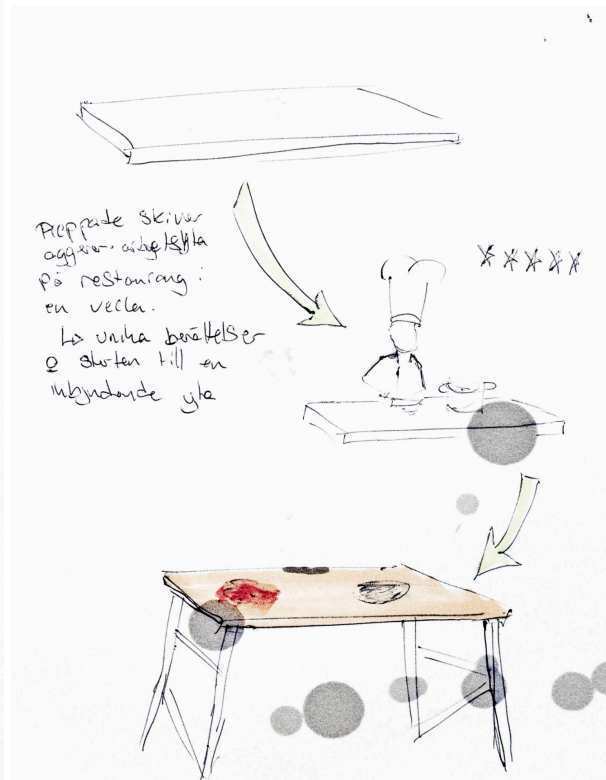


Figure 6. Create interesting surfaces by letting chefs work on them.

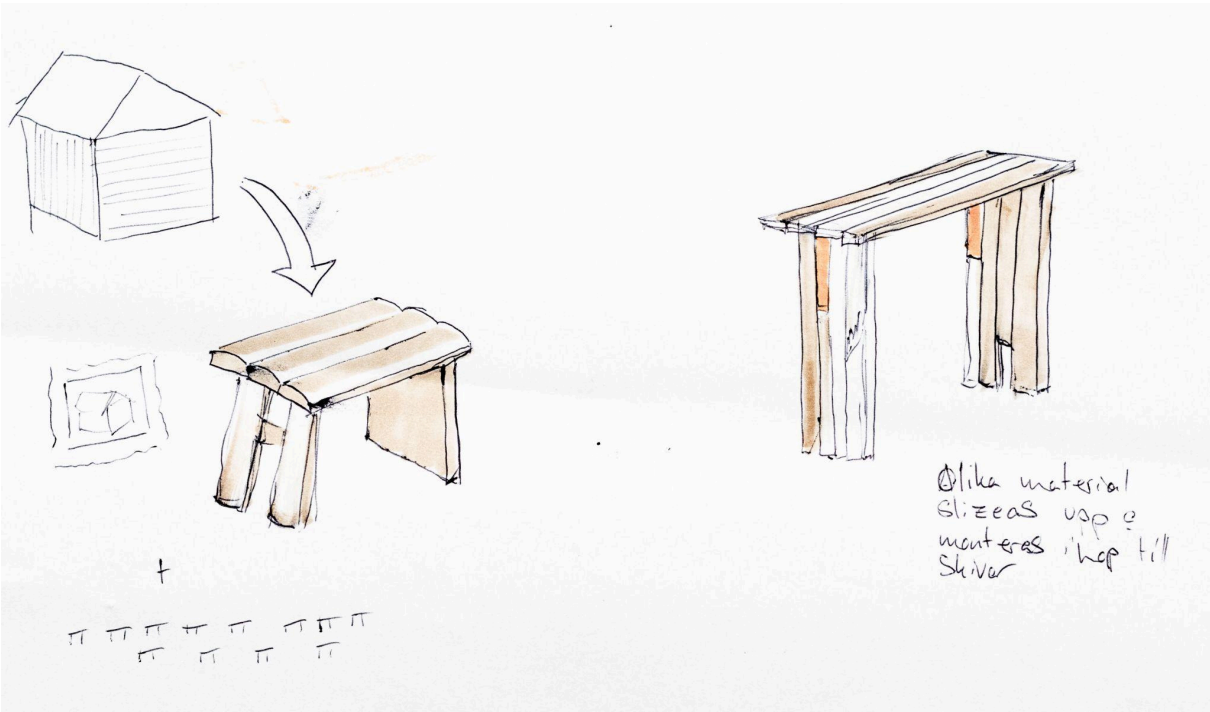


Figure 7. A systematic transformation from houses with strong emotional bonds to unique furniture

## 5.1.2 Imperfections and Uniqueness

In these ideations, variation and imperfection emerged as strategies for creating products that are not only valued for their uniqueness but also more inviting to use. A perfect, pristine surface can discourage *interaction*, as users may hesitate for fear of leaving visible marks or signs of wear. By contrast, an imperfect or varied surface signals tolerance for use. It becomes more welcoming to everyday *interactions*. Uniqueness was also believed to entail character in the object, an *animate* quality. Uniqueness could therefore promote creating a relationship with the concepts.

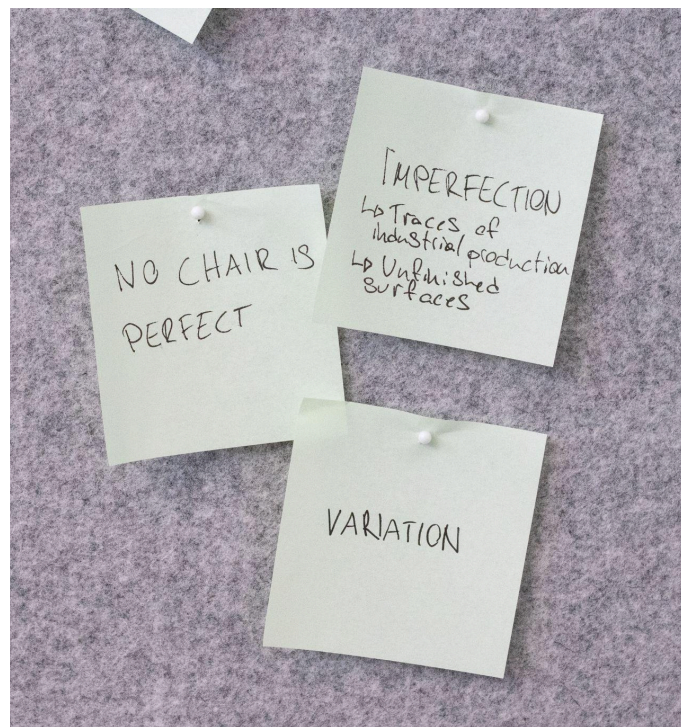


Figure 8. Prompts relating to uniqueness.

Some concepts involve introducing imperfection into the production process, while others aim to create surfaces that invite rather than discourage use. Examples from these ideations include:

- Developing a paint spray that unpredictably changes color, removing precision and control from production, and introducing randomness as a design feature. See figure 9.
- Constructing a chain of tables, where each table is built and painted directly on top of the previous one. This process results in surfaces that are already marked or “pre-worn,” helping to reduce user hesitation often associated with pristine furniture. See figure 10.
- Incorporating raw-sawn wood surfaces, which are not only visually expressive but also less sensitive to marks and wear, making them more forgiving in everyday use. See figure 11.
- Intentionally introducing randomness in form or color during production, breaking visual perfection, and encouraging acceptance of variation. See figure 12.



Figure 9. An uncontrollable painting process

Figure 10. Build the next table on the previous to break the perfection.



Figure 11. Use rough-sawn surfaces.

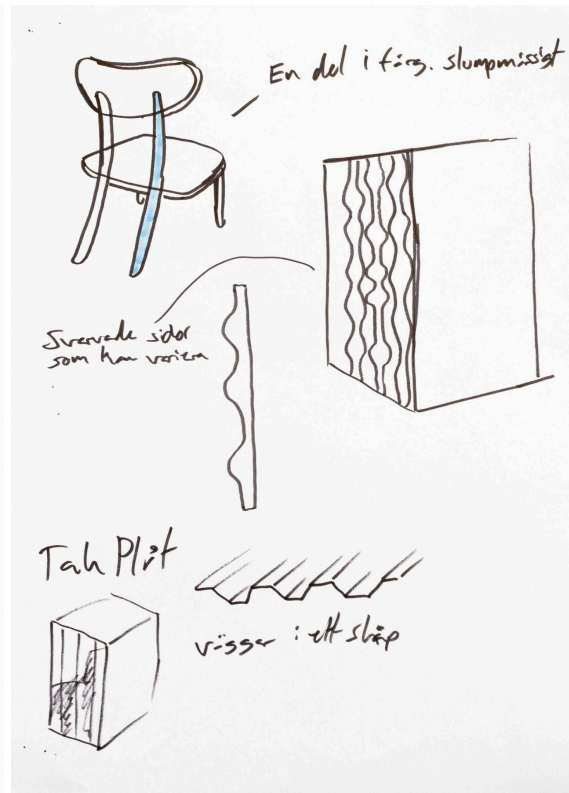


Figure 12. Introduce randomness.

### 5.1.3 Joints and Constructions

These ideations focused on technical solutions that could be interesting for different aspects. For instance, it could be on finding constructions and functions that allow for *Care and Maintenance* or for *Evolvability*.

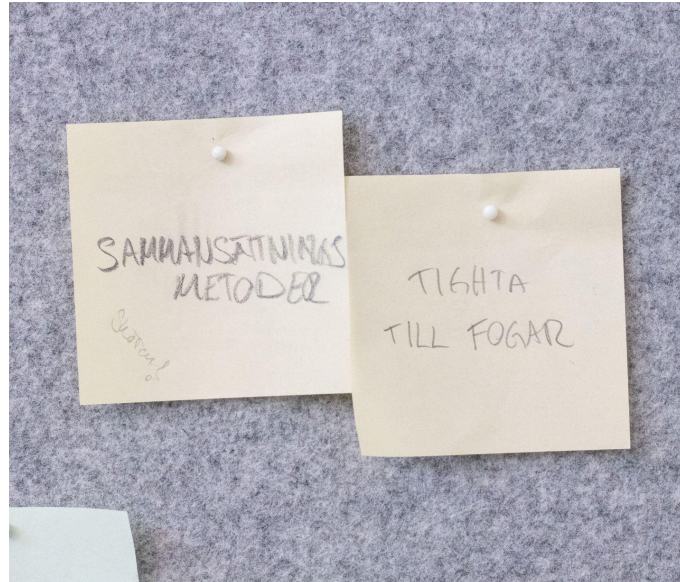
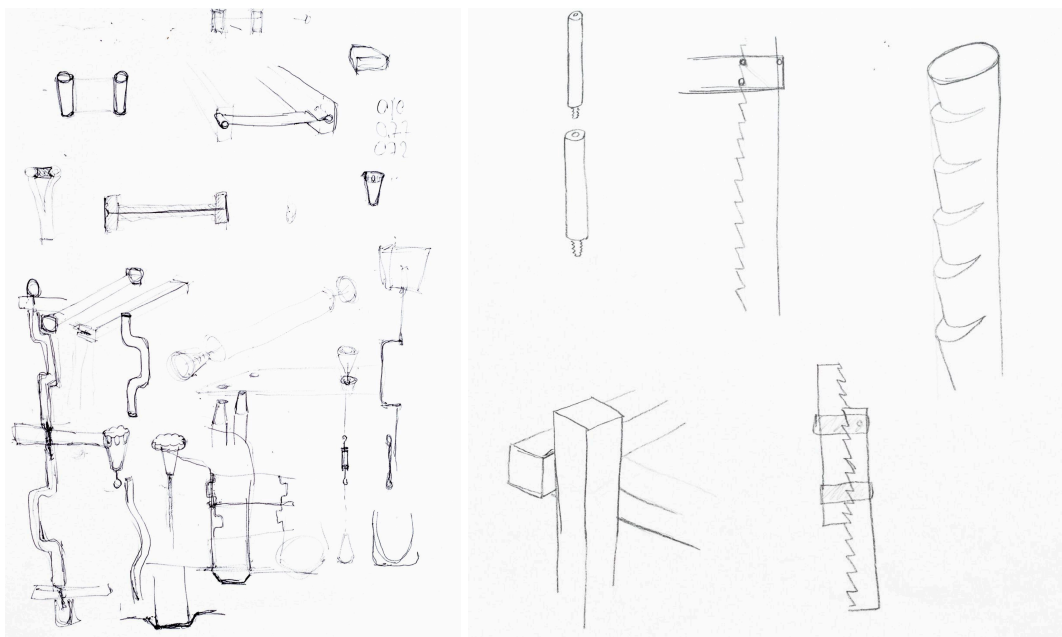


Figure 13. Ideation prompts relating to construction.

Beneath are some sketches representing:

- How tightening mechanisms can be incorporated in the form to enable the user to keep their furniture sturdy. See figure 14.
- Mechanisms that an *evolvable* system could build on. See figure 15.



Figures 14 & 15. See description above.

### 5.1.4 Adaptability and Ever-Changing Conditions

These ideations highlight the notion that the user's lives are in constant flux, and that a piece of furniture must adapt and remain relevant if it is to be kept over time. Solutions derived from these iterations can therefore draw upon the approaches of *Evolvability* and *Multifunctionality*. By designing furniture that can follow the user through different life stages and contexts, it will not only maintain its functional value but also, inevitably, become imbued with *Memories*.

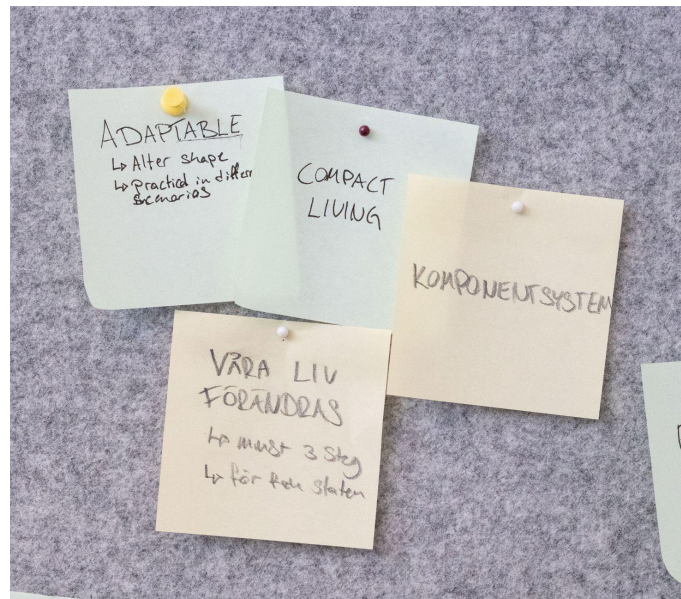


Figure 16. Ideation prompts relating to changing conditions.

A prompt here could therefore challenge by demanding at least two different uses of the same furniture or that it can be used in three different stages of life. Two short ideas were:

- A concept of furniture that *evolves* from a rocking horse for your childhood years but that then transforms into a rocking chair for when one grows old, with some unidentified step in between. See figure 17.
- A furniture shape that can be oriented differently and thereby shift function and character. This allows for changing needs. See figure 18.

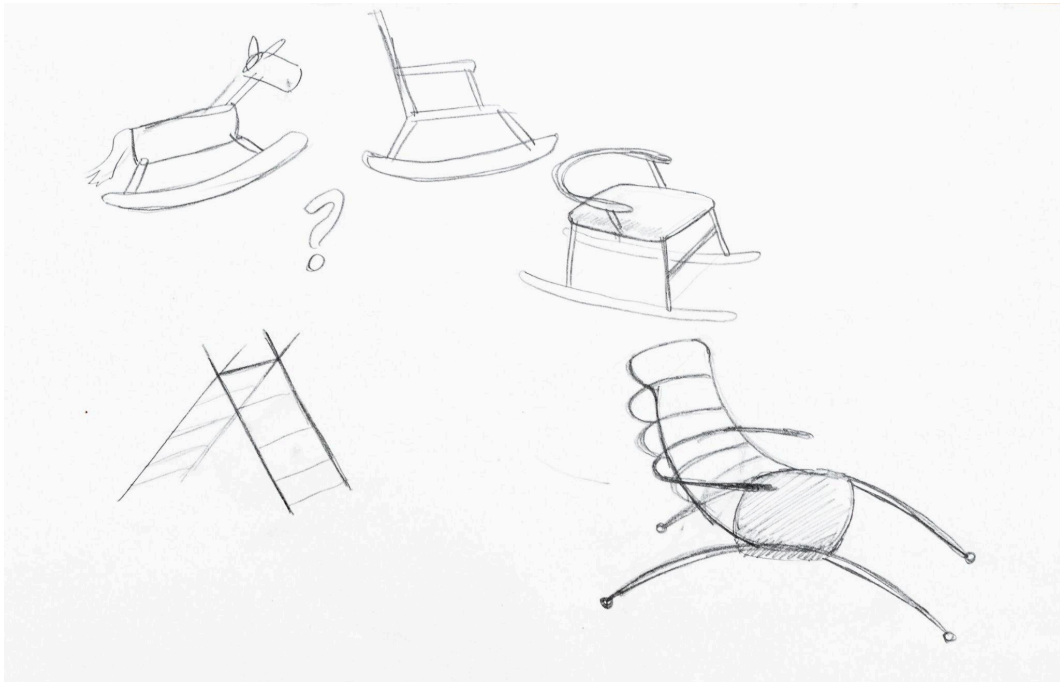


Figure 17. A furniture that transforms to fit different needs for the user at different ages.

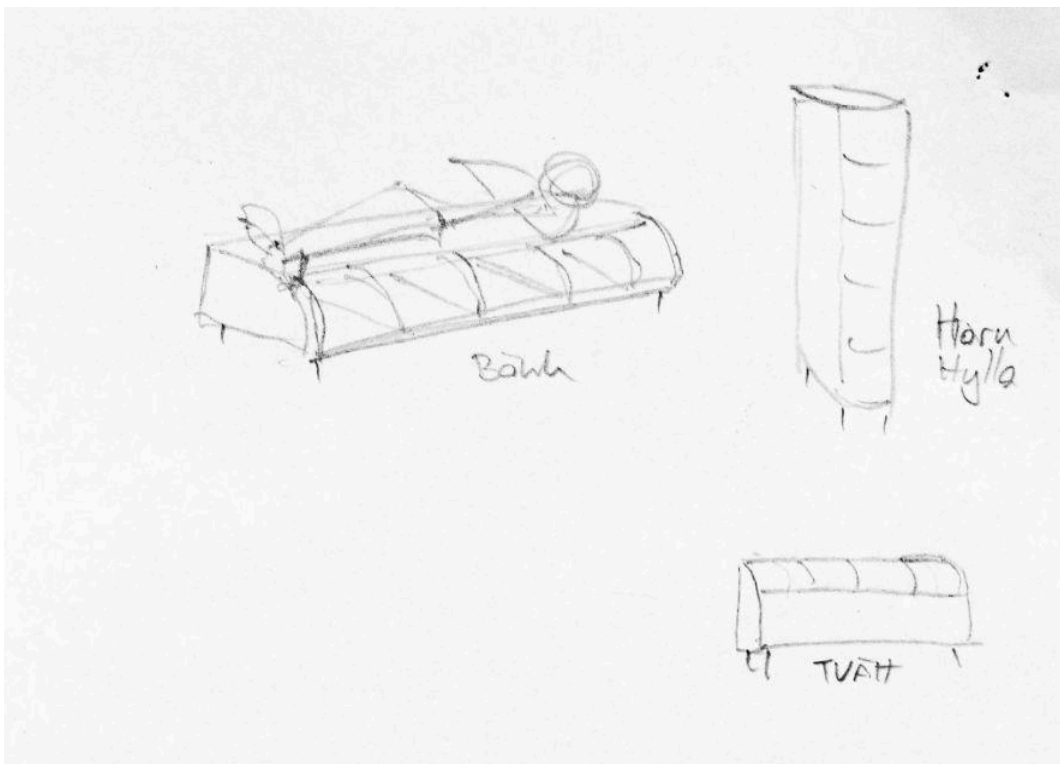


Figure 18. A static form that can be used differently depending on how it is furnished:  
a bench, a shelf, or furniture for sorting laundry.

## 5.1.5 Kinds of Furniture

After these first wide ideations, more aimed ideations for finding relevance and direction were worked out. One approach was to understand the inherent differences between different furniture and functions. The categories were evaluated with pros, cons, and relation to the subject. For example, the relevance of uniqueness in functionality, degree of flexibility, and how it is interacted with was discussed.

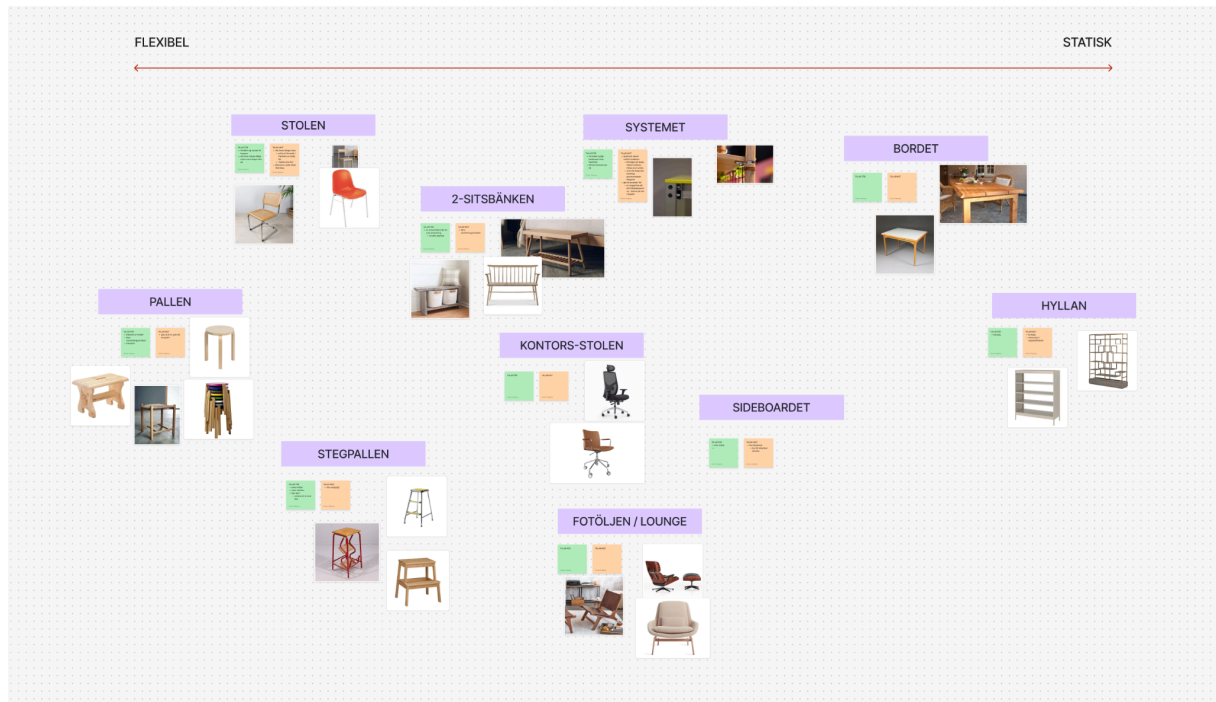


Figure 19. Categories of furniture with pros/cons and mapped on a scale of flexibility that they provide

All these are relevant for maintaining interest, and it is therefore relevant to understand what the challenges are with different furniture. E.g., it can be argued that the stool is one of the more flexible furniture categories, but because of its simplicity, making a stool that can not be switched out for any other stool is challenging. An armchair, on the other hand, can more easily be done with variation to fit different needs. There is also more interaction with the armchair than the stool. The challenge here is rather to add flexibility. For this work, it therefore seemed relevant to work with something in between; something that provided a flexibility in use with more interactions than a stool, but that still provided options to play and work with the concept. 2-seater benches or step stools stood out as good alternatives.

## 5.2 Further Explorations

The early concept ideations had a free and explorative approach to find a wide range of ideas, during this process, however, there evolved some commonalities between ideas that formed different areas. There was some overlap between the areas, with different concepts fitting into several of them. In this chapter, four summarizing categories are presented. These represent four main paths that were explored more thoroughly. The explored categories are: The system, The dynamic, The social, and the Well used.

The following stages of the ideation were performed with a heavier focus on building models. While a few sketches could start an idea, the ideation quickly moved into building the shape in 3D to understand proportions and functions. Some ideas demanded thorough examination in CAD, some demanded 3D-printing, and others could quickly be constructed using wire, toothpicks, and foam board.

### 5.2.1 The System

This area of ideas is based on a very modular system, which allows the user to build or assemble furniture based on their needs and preferences. This would allow new, second-hand, users to alter previously owned furniture to their needs. These concepts are strongly based on the approaches of *Evolvability and The IKEA effect*.

Concepts in this area can range in complexity from more defined pieces of furniture, which are limited in what can be done with them but are more user-friendly, to concepts that give more freedom to the user to modify and build what they want but are therefore a bit more complex and need more involvement.

#### Early system ideas

The overall concept of creating a modular system was considered early on, with a wide variety of constructions and joints explored. Three main areas of inquiry guided the development: ensuring the system is modular enough to offer users freedom and flexibility to create useful variations; making it easy and intuitive to modify and adapt; and achieving an appealing aesthetic that avoids looking overly technical.

Some early concepts explored the use of tension to achieve stability and strength. Tensioned wires were particularly interesting, as they can provide significant structural support with minimal material use, offering the potential for lightweight and minimalistic designs. These wires could be tightened using intuitive, tactile mechanisms. The idea of utilizing spring tension within more solid materials

like wood and metal was also explored. One early prototype featured a system for building shelves and benches using X-shaped legs that were compressed into channels at the top and bottom, creating a stable structure through mechanical pressure. See figures 20 & 21. This concept was not explored further since it was a bit limited to what could be done with it and the structural components would take up too much room both physically and visually.



*Figures 20 & 21. Concept of a system built on tension.*

Another, more straightforward approach was a system based on stacking components. One such concept, shown as a 3D-printed scale model in figures 22 - 24, consisted of interlocking boxes and planks that could be stacked in various configurations. While this allowed for flexibility, the concept proved somewhat limited in adaptability and felt overly defined in its aesthetic. A broader concern with this and similar ideas was that they risked feeling too temporary or sprawling, lacking the sense of permanence and identity that encourages users to form a long-term relationship with a piece of furniture.

This insight carried through into later concepts: while the design should be easily adaptable and open to modification, it was equally important that, once assembled, it felt like a unified, cohesive object rather than a collection of separate components.



Figure 22. A system built on three components. boxes, shelves, and fill-out pieces.



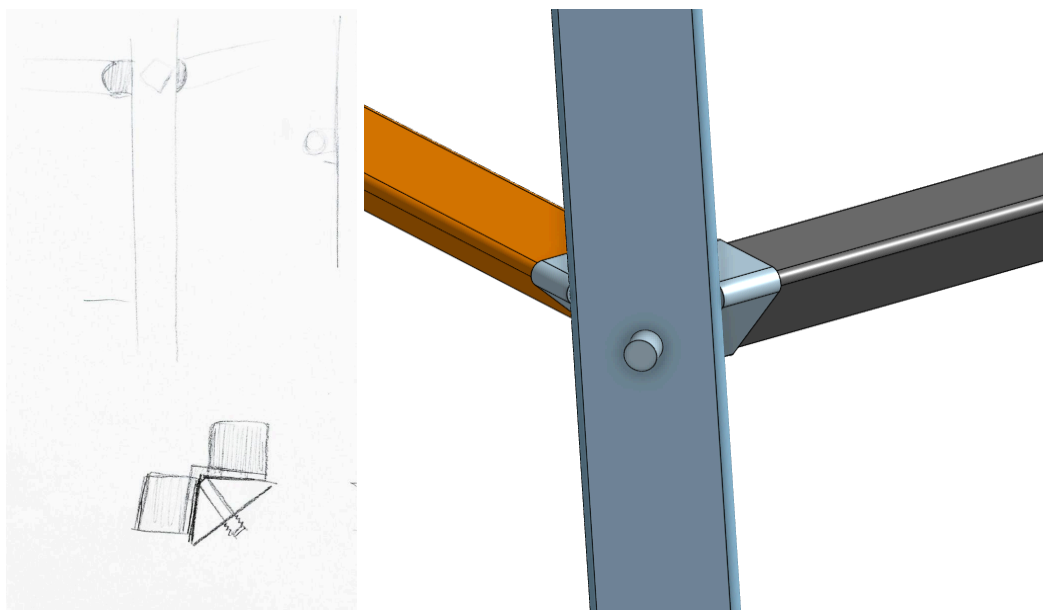
Figures 23 & 24. Two variations on how to build with the concept.

Another direction that was explored was how to join two or three perpendicular structural components, such as vertical legs and horizontal supports, which could open up the potential to build a wide variety of structures. With this approach, the user could design their furniture and cut pieces to length, themselves. One such concept was inspired by how a knot could be tied to secure perpendicular round bars. The natural shape a string would take was studied, then refined and translated into a permanent form made from steel wire. The bars could be slotted into corresponding holes within the wire structure, as seen in Figure 25. Although the idea was compelling, a key challenge was locking them in place in an elegant way, making it difficult to ensure a secure and rigid connection without compromising too much on the *aesthetic* appeal.



*Figure 25. A component for a system resembling tying rods together.*

This idea later evolved into approaches where tensioning became an integrated element of the design rather than an afterthought. One such solution involved a joint piece mounted diagonally through the corner, applying even pressure to both intersecting components and creating a stable and unified connection. See figures 26 & 27. Here, the metal corner bracket has a diagonal rod that is threaded at the end, where a decorative nut would tighten the construction.

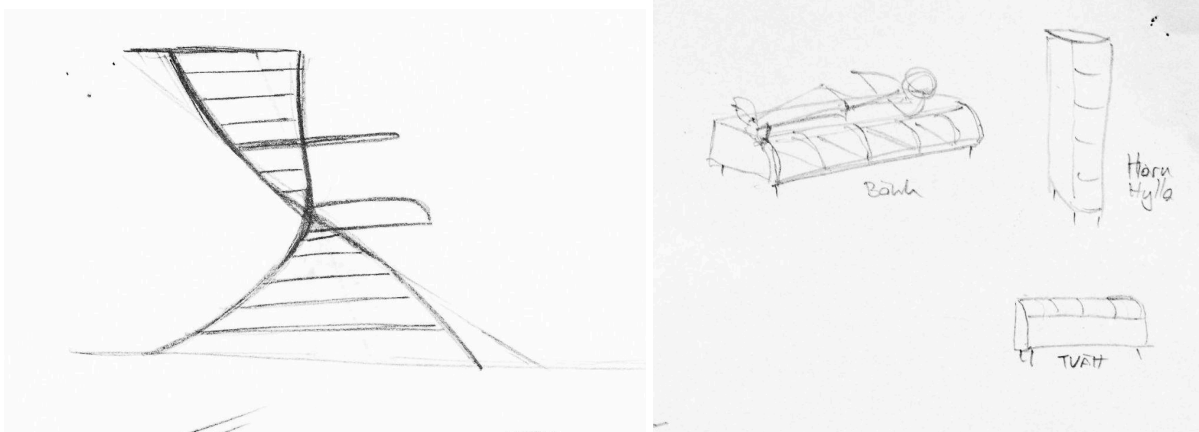


*Figures 26 & 27. A system built on tensioning through a diagonal corner post.*

## 5.2.2 The Dynamic

This area of exploration focuses on furniture designed to embody *Multifunctionality* and be a flexible tool within the home. By offering more than one use, such pieces are likely to be used more frequently than their single-purpose counterparts, potentially fostering a deeper and more personal connection with the user over time. Depending on how these functions are integrated, the furniture can also become an engaging design element that sparks curiosity and invites *interaction*. Concepts within this theme vary in complexity, from simple designs that can be flipped or rotated to reveal a new function, to more intricate systems composed of separate yet interrelated components.

Some early ideas were sparked by the theme of designing a piece of furniture that could accompany a person throughout their entire life, from childhood to old age. These concepts aimed to address changing needs over time and varied widely in form and function. Several explored the idea of a chair, considering how seating requirements evolve across life stages. While adjustable heights were an obvious improvement, more playful and symbolic ideas emerged, such as a chair designed for climbing and play in youth, with the same structure later offering support for standing up in old age. See figure 28. Other concepts envisioned furniture that could shift between entirely different roles, like a bench that becomes a shelf when stood upright, or a laundry holder in another orientation. See figure 29.



*Figure 28. A chair with adjustable heights, but that also adapts to different ages in other ways.*

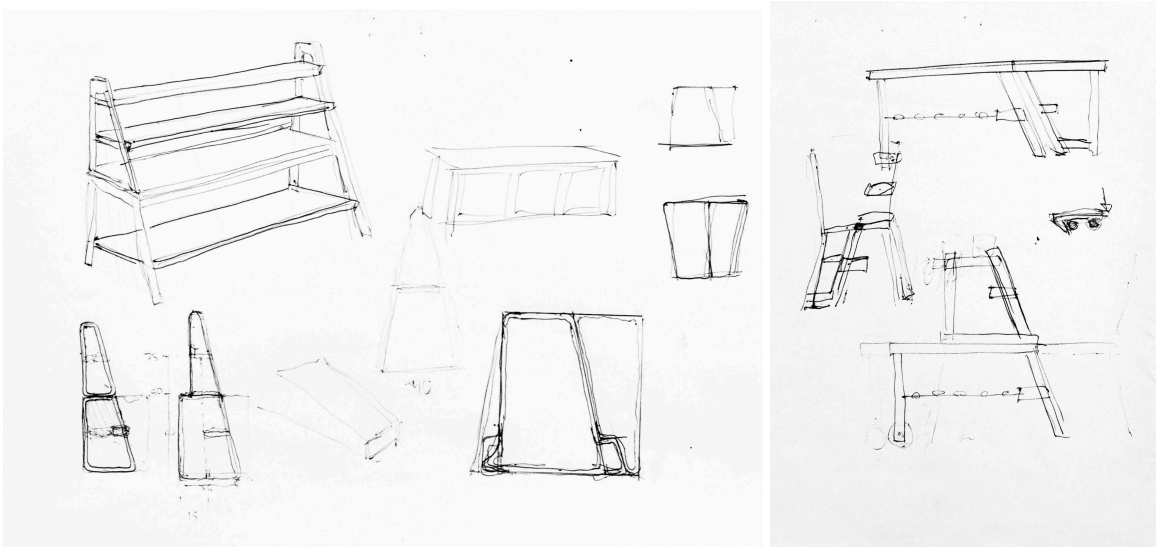
*Figure 29. A furniture that shifts roles-*

As the concept development progressed, the ideas gradually moved towards small, movable pieces of furniture that are brought into use when needed, rather than remaining fixed in place. Unlike larger, static furniture such as sofas or dining tables, these kinds of objects are used in a more situational way, almost as much a tool as furniture.

What stood out were concepts that included mechanisms to conceal or fold away certain features. Not only can that enhance functionality by reducing space usage when specific functions aren't needed, but also introduce a sense of curiosity and *interaction*, making the piece more engaging and playful.

Building on this direction, the ideation process focused on two key areas: first, identifying useful household functions that don't typically justify having a dedicated piece of furniture, and second, exploring clever and engaging ways to shift between these functions. The goal was to blend practicality with a sense of discovery, creating furniture that is not only useful in multiple roles but also invites *interaction* through its transformable design.

Several small models were created to explore different transformative approaches, resulting in several interesting concepts. See figures 30-37. Most of these ideas were inspired by step stools and maintained their core functionality but introduced alternative forms or mechanisms. Other ideas explored more novel functions as well.



*Figures 30 & 31. Sketches of stools and benches that transform into ladders or shelves.*



*Figures 32 & 33. A cubic stool that turns into climbable furniture with a simple fold.*



*Figures 34 & 35. A step stool that transforms into a bar stool with a backrest.*



*Figures 36 & 37. A step stool where the ladder smoothly folds away. The parallel movement creates a satisfying transformation.*

### 5.2.3 The Social

These concepts focus on the social use of furniture, mostly the simple stool, chair, or small bench that can be used as extra seating for when having company over and therefore can be associated with the positive emotions connected to other people. Charging it with the positive values from *Memories*. When not in use, this furniture can easily be stowed away in a corner or serve another simple purpose, for example, a surface to place things, clothes, magazines, or a potted plant. In the following examples are some concepts of benches, where the furniture is actively shared with someone. See figures 38 - 41. A simple stool or the model in figures 32 & 33 would be equally good representations.



Figure 38. Sketches of 2-seated benches.



Figure 39. A bench with some storage as an added value.



Figures 40 & 41. A bench that may also act as a ladder.

## 5.2.4 The Well Used

This area focuses on creating a space in the home where one naturally wants to spend a lot of time; the well-used and well-loved furniture that is missed when away from it. It could be an armchair, a bed, or the desk and chair where you work on your hobby, like painting or writing a novel. This area builds on the theory that frequent *interaction* with an object, combined with the creation of shared *memories*, strengthens the emotional connection to the furniture.

This area was found important but less explored in the initial ideations. Some attention was therefore put into developing proper concepts. The lounge stool was chosen as suitable furniture to work from. It is primarily an often-loved piece of furniture that one spends many hours in.

One concept is built on the idea of a lounge stool that could turn into a side table. Such a solution would, apart from being your favourite place to sit, also allow for multiple other uses and more flexibility. The Transformation would also become a satisfying interaction to enjoy or show off. See figures 42 - 45.

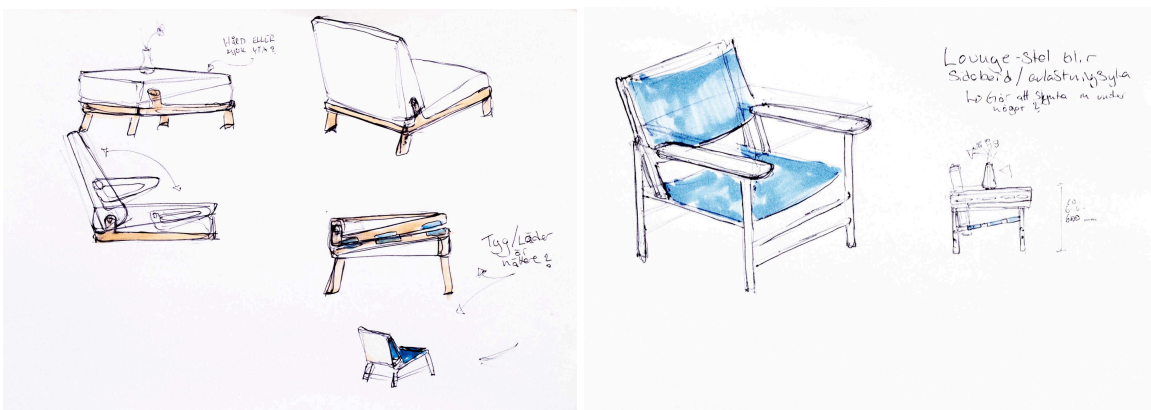


Figure 42 & 43. Sketches of armchairs that can transform into a table or an extra surface.



Figures 44 & 45. Model of an armchair that can transform into a table or extra surface.

A second concept explored was based on the idea of creating the ultimate reading corner based on an armchair with a built-in side table and lamp. This particular model, seen in figure 46, is meant to have the option to switch the table and lamp to the other side depending on the user's preferences.



Figure 46. An armchair for reading with adaptable qualities.

A last example of a concept is a lounge stool that builds on the theory of *care and repairability*. In this specific example, the idea is that with fewer and simpler parts, *Care and repairs* are made easier and more accessible to the user. E.g., one wide armrest can exchange multiple thinner supports on one side.



Figures 47 & 48. An armchair designed to promote and enable care.

## 5.3 Formulating Two Visions

At this stage of the process, many different directions had been explored, and a broad spectrum of concepts had been developed to varying levels of maturity. Moving forward, the goal was to refine these ideas into well-developed concepts that embody the project's core principles and can serve as a medium for discussion. Two visions were distilled from previous explorations, which will later translate into two final designs. They each represent the ideas and approaches explored, yet doing so in distinct ways with a focus on different approaches. This contrast between them creates a span of solutions, allowing the project to showcase possibilities for designing with the approaches rather than to present one final conclusion.

While the two visions spring from one of the earlier explorations each, ideas from all four explorations are incorporated. As will be seen, the vision for *the Dynamic* also describes both a *well-used* and a *social* furniture.

### 5.3.1 The System

A system that brings back the joy of crafting and creating to the customer. It should enable anyone to create their own furniture to fit their specific needs without the unease of doing something wrong or ending up unsatisfied.

It should also encourage the owner to make their mark. To paint, decorate, and shape it freely. In a later stage, the furniture could be sold or given to the next owner, who should feel equally inspired to make their mark. The components could also be used to create totally new pieces and would work well with a second-hand market. This brief is based strongly on two of the presented approaches, *Evolvability and the IKEA Effect*.

To be successful, the concept aims to meet four key questions:

- Does it feel bespoke?
- Does it encourage rebuilding or self-made adaptations?
- Does it feel unified, less like a modular system, and more like a coherent piece of furniture?
- Does it feel approachable and accessible to a wide range of users?

### 5.3.2 The Dynamic

A *dependable* companion in everyday life.

This is a piece of furniture designed to move with you. Flexible by nature, it adapts fluently to shifting needs, whether it's assisting with daily tasks, accommodating different users, or transitioning through life's many phases. It's always ready, always useful, like a quiet, reliable helper in the background.

Its ability to transform adds a satisfying and playful element. The furniture invites *interaction* and becomes something you enjoy not just for what it does, but for how it does it. You want to use it, show it, and even play with it.

Though small in size, it offers big support. This is the kind of object that earns its place by being there when you need it most, a companion piece that proves its value moment after moment. This Brief is instead based mainly on the three approaches: *Care and Maintenance*, *Adaptive Use* and *Multifunctionality*, and *Trust*.

To be successful, the concept aims to meet four key questions:

- Is it immediately clear, even to someone seeing it for the first time, that it's meant to be moved and transformed?
- Are its different functions easy to understand?
- Does it invite playfulness?
- Does it feel easy to *care* for and *maintain*?

### 5.3.3 How the Visions Differ and Complement Each Other

The two visions described above, each serve as a foundation for a distinct group of furniture concepts. While both are rooted in similar insights from research and ideation, they take consciously different approaches in execution. This section outlines key ways in which the visions both diverge and intersect.

#### Adaption

One of the strongest needs identified through research was adaptability: for a piece of furniture to remain relevant over time, it must be able to respond to changing conditions. In the **System** vision, *adaptability* is achieved through user involvement; each piece can be customized, rebuilt, or reimagined to meet evolving needs. The approach named *Evolvability*. This flexibility lies in its modularity and the user's ability to actively reshape the object over time. In contrast, the **Dynamic** vision emphasizes built-in *multifunctionality*. Here, adaptation is embedded in the furniture's form.

The object adjusts to different users or functions without needing to be rebuilt, folding, expanding, or reorienting itself to meet everyday needs as they arise.

### Stewardship

Both design visions engage with the concept of *stewardship*. An idea that ownership entails not just the right to use and dispose of an object, but also the responsibility to care for and extend its life. This perspective challenges prevailing patterns of furniture consumption and aligns with the aim of this thesis.

In the **System**, *stewardship* is encouraged by allowing users to leave their mark through painting, modifying, or reconstructing. The design invites a continuous dialogue between user and object, enabling a future owner to do the same. The emphasis is on longevity through active engagement and reinterpretation.

The **Dynamic** vision, on the other hand, builds more on the concept of creating furniture that builds a strong mutual *dependability* between the user and the furniture. A mutual relationship. It is a vision of furniture that will be used a lot and fulfill active needs in everyday life. Wearing and tearing this furniture is part of its nature. In return, this furniture expects to be loved and invite to be *cared for and maintained* to a pleasing and attractive condition.

# 6 Development and Refinements of Concepts

This chapter will cover the process of how the two visions were developed into two completed furniture. These processes were parallel but will be presented separately. From the earlier explorations, different areas had been explored to different extents. Therefore, the two processes described in this chapter take different starting points and do not follow the same structure.

## 6.1 The System

The overall concept and its intention were clear and were based on the construction method shown in Figures 24 and 25. The idea, which can be seen in Figure 49, is to make a system of components that the user can customize and configure to their liking. Further development focused on refining the concept and components to simplify construction and assembly, and to promote creativity.



*Figure 49: A rough model of the system concept.*

### 6.1.1 System Overview

The system is built around vertical legs that serve as the structural anchor. Metal connector pieces can be attached to these supports at various heights using pre-drilled holes. Each metal connector is

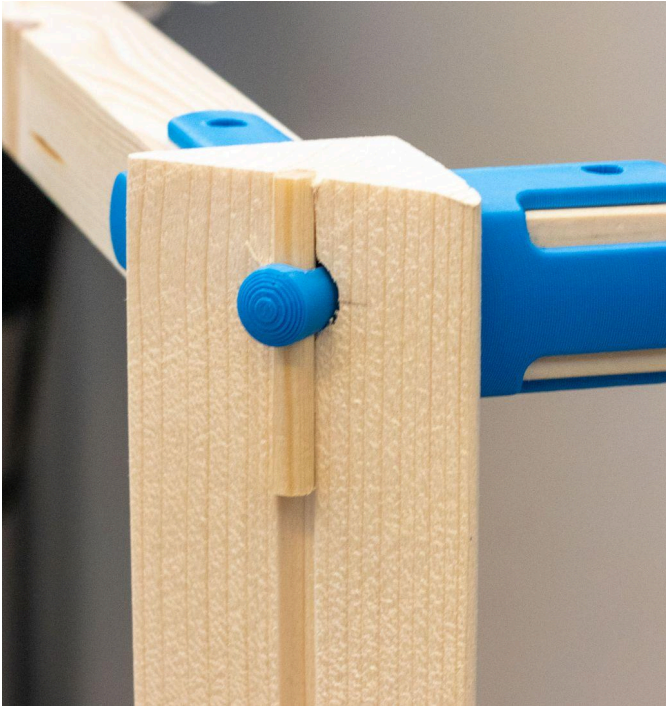
secured, locking it firmly in place. Horizontal wooden rods or beams are then inserted into the metal connectors to link together four vertical legs, forming a stable frame.

Between these horizontal members, users can mount planks to serve as shelves or walls, depending on orientation. Mounted horizontally, they function as surfaces for storage; mounted vertically, they add stability and help define or enclose the furniture's form.

A key idea behind the system is user involvement: all components can be purchased and cut to length by the user, allowing for fully custom dimensions and proportions. The system is designed so that most of the user-made cuts are hidden or discreet, helping preserve the overall clean and cohesive look of the finished piece.

### 6.1.2 Vertical Legs

The vertical legs are based on a triangular profile, with one edge forming a right-angled corner. See figure 50. Through this square corner, holes are drilled diagonally to accommodate the metal connecting pieces. These metal joints are inserted through the holes and rest flush against the inner surfaces. On the outer flat face, where the holes exit, there is a vertical groove designed to hold the wedge that locks the metal piece in place. This detail both secures the connection and adds a distinctive visual element to the construction.



*Figure 50. A mockup of the structure.*

### 6.1.3 Horizontal Bars: Round and Square

The system includes both round and square horizontal bars, offering users greater flexibility in designing and customizing their furniture. Each profile serves different functional and aesthetic purposes. Round bars enable components to rotate or pivot, allowing for adjustable angles; this allows for features like slanted shelves, fold-out surfaces, cabinet doors, or other interactive elements. The round profile can also be useful for future expansions of the system, such as adding backrests, seats, or other non-perpendicular elements.

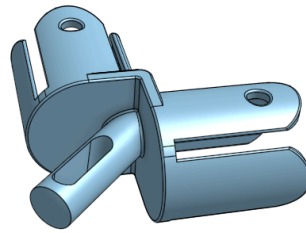
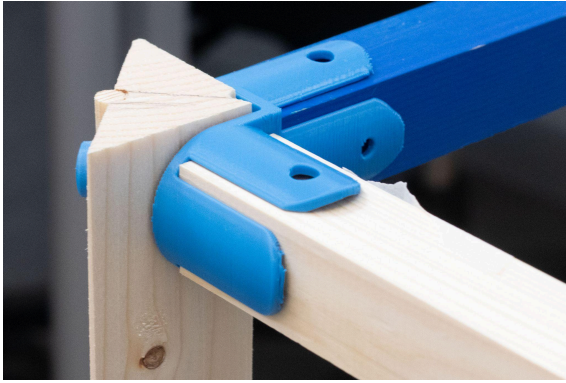
Square bars, on the other hand, provide a different visual character. Their flat surfaces can align more seamlessly with surrounding materials, helping to conceal cut edges or blend into the overall structure. Functionally, square bars are also practical for other types of custom, DIY modifications, for example, it's easier to screw into a flat surface than a round one.



*Figure 51. The two variations of bars.*

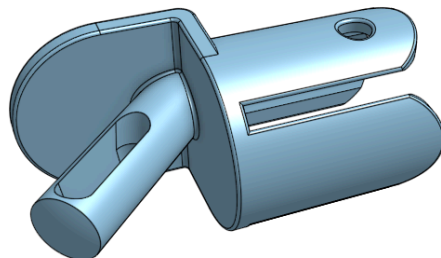
### 6.1.4 Metal Corner Connectors

The metal corner connector needs to be designed to fit both round and square bars. Several directions have been explored. One idea is to create a thinner, round profile with notched-out corners, making space for the square profile to fit, resulting in a connector with four “leaves”. See figure 53. Another possibility is a thicker connector that includes both a round and a square hole. A third option is a hybrid version that combines the two approaches, perhaps with one or two leaves removed to reduce material and increase versatility.



*Figures 52 & 53. The four-leaf variant that accommodates both round and square bars*

A separate design consideration is whether the connector should always allow building in two directions from the corner, or if it could also support only building in one direction. The benefit of allowing only one direction is that it opens up more flexible design opportunities. For example, it makes it possible to build shallow shelves that don't extend across the full depth of the furniture. It also enables the use of larger side or back panels that span more than one module, creating a more unified and enclosed appearance. Furthermore, this type of solution makes it easier to experiment with custom configurations, like angled shelves or other DIY ideas.



*Figure 54. A single-direction corner connector.*

The drawback, however, is that enabling single-direction connections may lead to a need for more parts or more complex designs.

One of the simplest solutions is to have two separate connector types: one that allows building in both directions and one that allows building in only one. See figures 53 & 54. The single-direction connector would need to be reversible so that the wedge mechanism works from either side. This feature might also be useful for the two-direction connector, adding further flexibility.



*Figure 55. A corner connector where you can mount one or two sockets.*



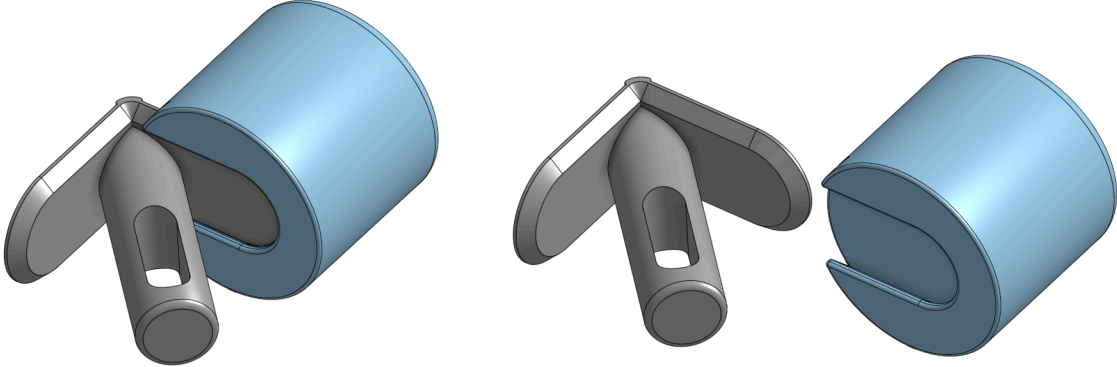
*Figures 56 & 57. A split corner connector.*

Another possibility is to design a connector where the user can choose to mount one or two bars, depending on their needs. See figure 55.

A third option is to create a split connector made of two interlocking pieces, which can be used individually or together to support one or two directions of construction, see figures 56 & 57.

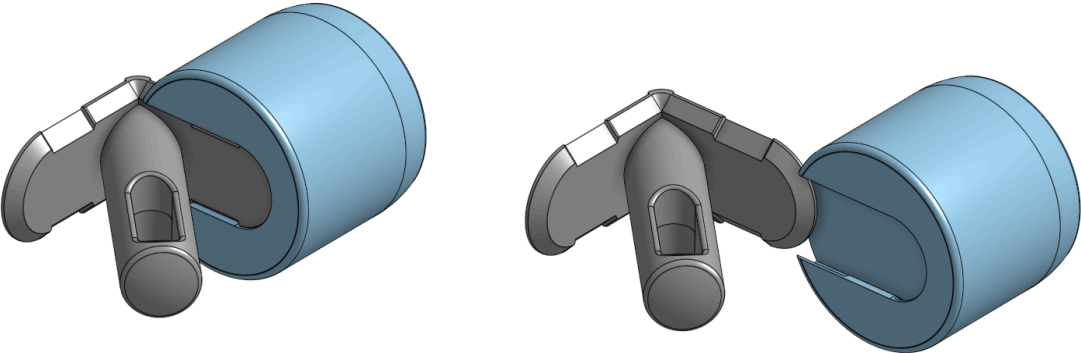
After extensive prototyping and testing of various ideas using 3D printing, the decision was made to use a corner-mounted solution that allows for the attachment of either one or two bar mounts. This made it possible to create separate mounts for square and round bars. By separating the two, the need to compromise between the geometries was eliminated, providing greater freedom in designing the

*aesthetic* qualities of each component. The concept was refined through several iterative design loops, improving both functionality and appearance. Eventually, the idea evolved into a version featuring a dovetail locking system as seen in figures 58 & 59.



*Figures 58 & 59. Corner connector with separate sockets using a dovetail.*

The system works by having the bar mounts extend slightly beyond the corner piece, so that when the unit is installed and the wedge is inserted, the resulting pressure is directed entirely onto the bar mounts, securing them firmly in place. However, there remained a risk that, under significant deliberate force, the bar mount could slide out. To further enhance security, a small internal bump was added to prevent removal entirely once the mount is installed, as seen in figures 60 & 61.



*Figure 60 & 61. A bump added to the dovetail.*

### 6.1.5 Hinges

Hinges have been another design consideration with different solutions that affect the design of the corner connecting piece. One way of doing hinges for cabinet doors is to use the round profiled bars as an axis for the hinge to rotate around; this could make for an interesting detail where the hinge is a part of the construction. As the corner connecting piece was originally designed, the round bars are always mounted horizontally, which means cabinet doors that swing out from horizontal hinges. Horizontal cabinet doors might be desired in certain cases, but the more traditional vertical hinged door is often more practical.

Another option was to have the possibility to install some small rods that could act as the hinge. That could be accomplished in several ways for the bar mounts, one way was to have the rod go through the bar mount and be secured with a screw from the inside (see figure 62).

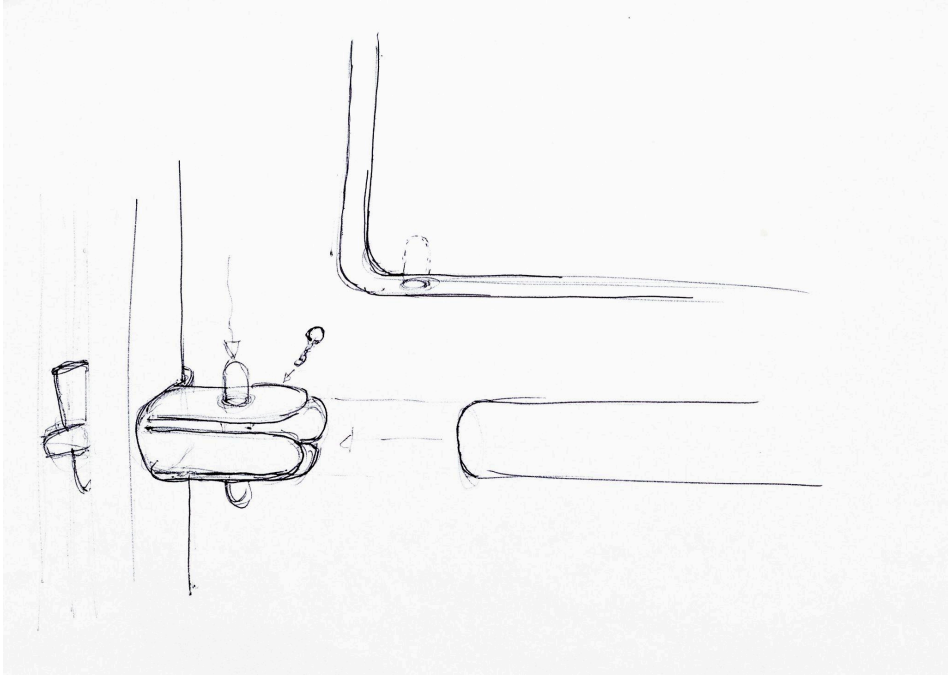


Figure 62. Sketch of possible implementation of a “hinge” functionality.

### 6.1.6 Edge Brackets

To install shelves and walls, edge brackets are used, which the user can attach to the bars and then screw onto the shelves or wall panels. Initially, there were ideas to design a single bracket that could work on both round and square bars to reduce the number of different components. This can be seen in the middle of Figure 63. However, this proved challenging to achieve in a visually pleasing way, as it created visible gaps when used on either bar type. As a result, the decision was made to develop two separate brackets for the different bar profiles. This choice also aligned with the earlier decision to separate the bar mounts for the round and square bars.



Figure 63. Early variations of edge brackets.

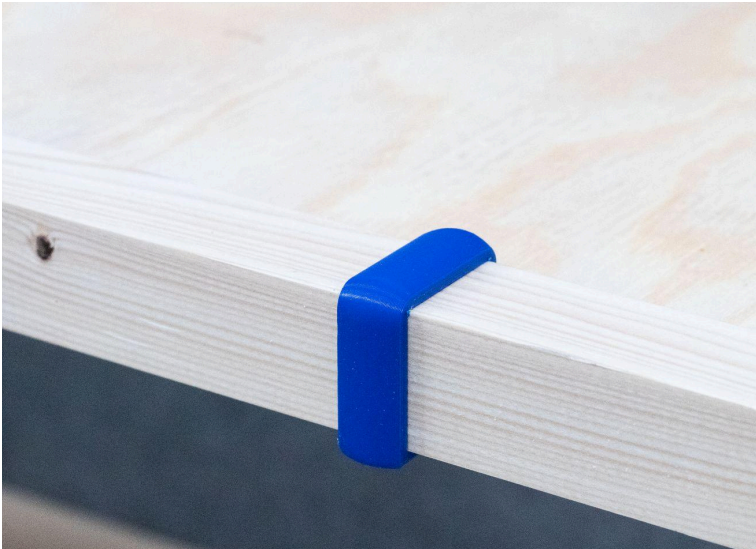


Figure 64. Square variation of edge bracket.

### 6.1.7 Aesthetic Considerations

Since the visual qualities of products are so important to customers, several iterations were made to refine the parts. The components needed to appear well-designed to avoid associations with construction hardware, while also remaining neutral enough to allow users to customize the look and feel of the furniture according to their preferences. Throughout the concept development, different shapes and visual elements were explored alongside the functional aspects, of which a few select pieces can be seen in Figure 65. It would have been easy to add decorative details to distance the design from a rough, utilitarian aesthetic, but such details also risked dominating the overall expression of the finished furniture.

Therefore, the chosen approach was to aim for simple yet carefully considered forms, parts that don't immediately draw attention, but upon closer inspection feel deliberate and well designed. They should feel "right." Another important aspect was creating a sense of cohesion between the shapes of the different components. In Figure 66, some iterations of the refining process can be seen.

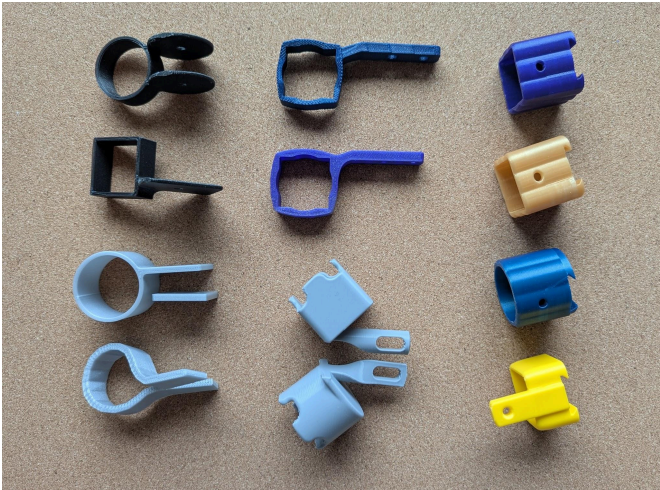


Figure 65. A selection of shape explorations from the concept development.



Figure 66. A selection of shape explorations from the refining process.

## 6.2 The Dynamic

This chapter outlines the development process from the second conceptual vision to the final design, highlighting how theoretical insights informed key design decisions along the way.

### 6.2.1 Meeting the Vision

The initial vision broadly outlined how *interaction* with the furniture should feel, focusing on the emotional and experiential qualities. However, it left open what specific types of *interaction* or functionality the furniture should actually fulfill. Among countless sketches, a wide array of concepts explored different modes of interaction. It became crucial to select a direction that not only integrated multiple functionalities but also offered interactions that were both engaging and rewarding over time.

A stepping stool emerged as a strong starting point. While its primary function is clear and specific, it is frequently used in diverse and improvised ways. It moves fluidly through the home, serving not only as a ladder or a seat, but just as often as a convenient "catch-all" surface for miscellaneous items.

It was explored how this versatile piece of furniture could be designed to transform for different scenarios. For example, how a single step stool could convert into a small bench, a dining chair, a child's seat, and more. While all these *interactions* and transformations aligned with the overall vision, developing the concepts further revealed valuable insights into what was feasible and what presented significant challenges. At this stage, the concepts were also reviewed and discussed with Holm. Here are briefs of a few Step stool ideas.

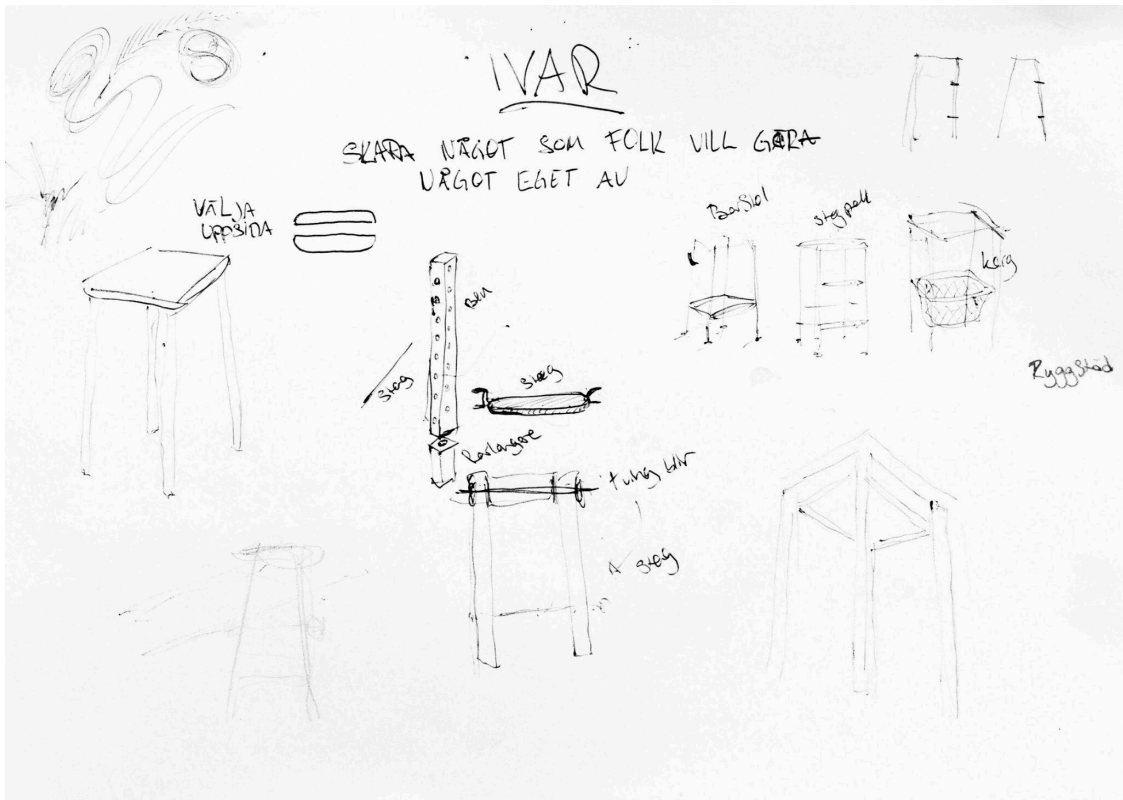


Figure 67. Design the stool for your needs.

Above is a stool whose purpose can be designed by the user. With choosing a few parts, it could be either a bar stool, a step stool, or why not a side table. See figure 67.

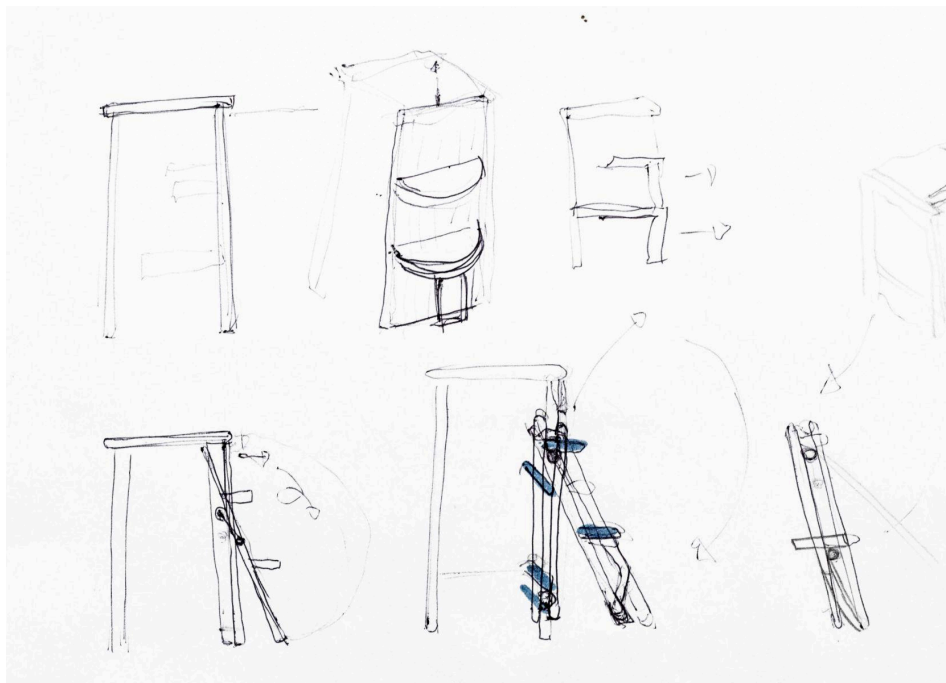


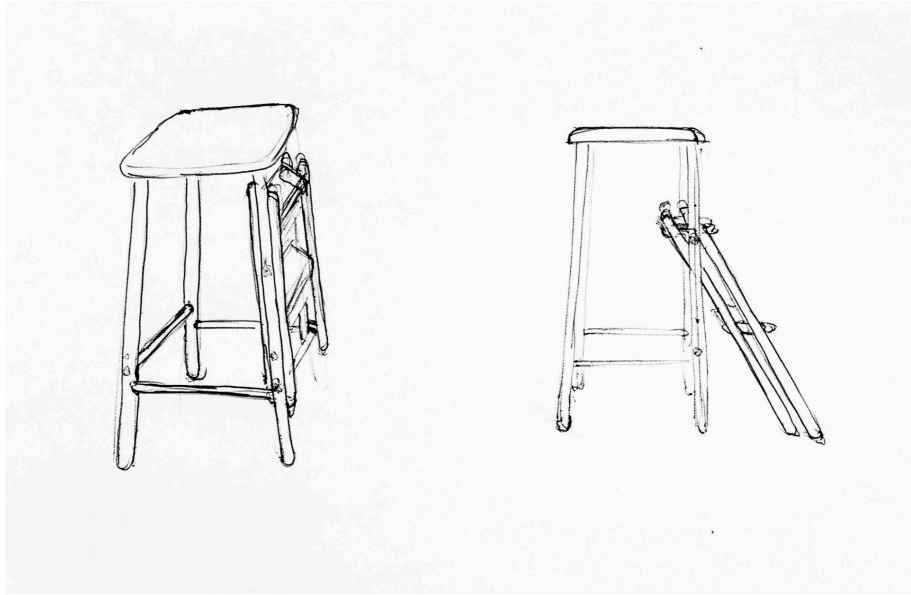
Figure 68. A stool that converts into a child's seat.

A step stool that can be altered into a child's seat. The part marked in blue acts as two steps normally, but when fastened on top, it acts as an armrest and a secure seat for the baby. See figure 68.



Figures 69, 70 & 71. Three examples of step stools that may also act as dining chairs.





*Figures 72 & 73. Step stools with a focus on satisfying interactions.*

Lastly, as an alternative path, it was discussed how the step stool could be designed to promote an excellent experience without adding excessive functionalities. A satisfying transformation could be an alternative way of adding value to the product. See figures 72 & 73 for one concept.

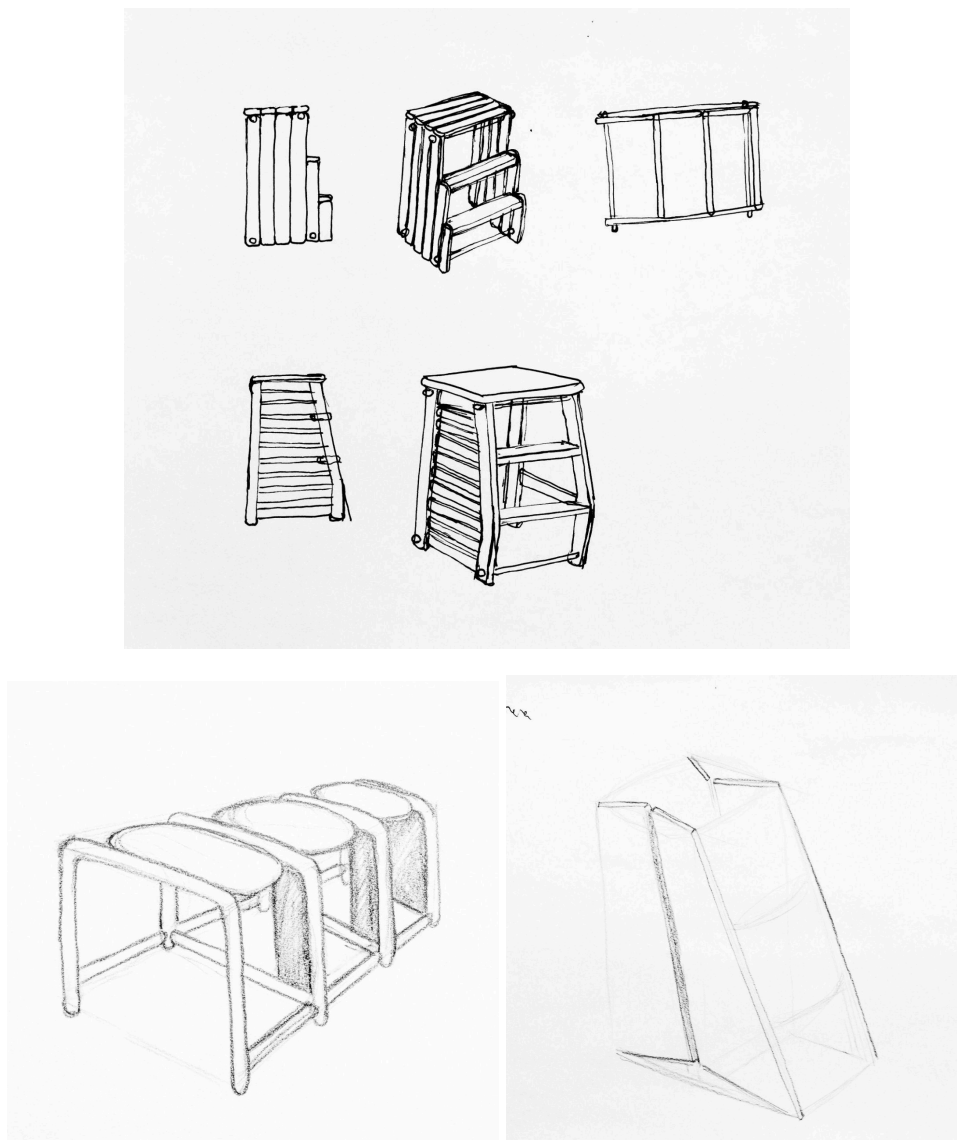
Many concepts involved proper transformations with moving parts. While this enables very interesting and satisfying transformations, it was also important to find solutions that were not too complex. Ideally, the transformation should be fluid and intuitive, preferably achieved through a single, seamless motion. Designs that required repositioning multiple parts, unscrewing components, or folding in several steps risked creating a mental barrier that could discourage users from fully engaging with the functionality.

It was further concluded that solutions involving separate, detachable parts were less appealing, as these components could easily become misplaced over time. This not only added unnecessary complexity but also risked making the furniture less engaging and, ultimately, less functional.

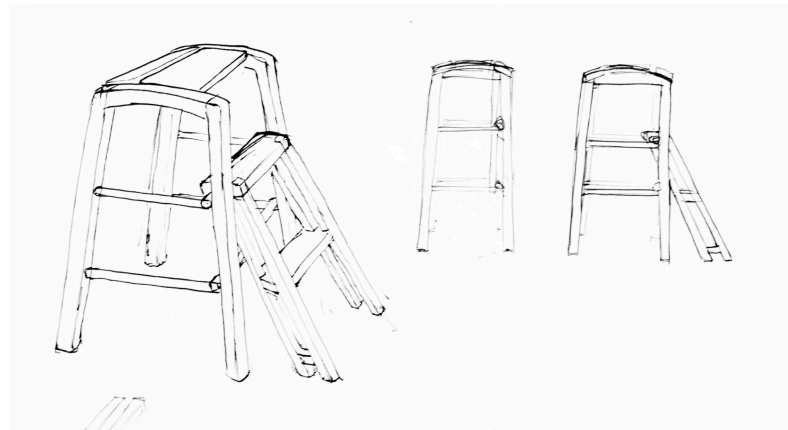
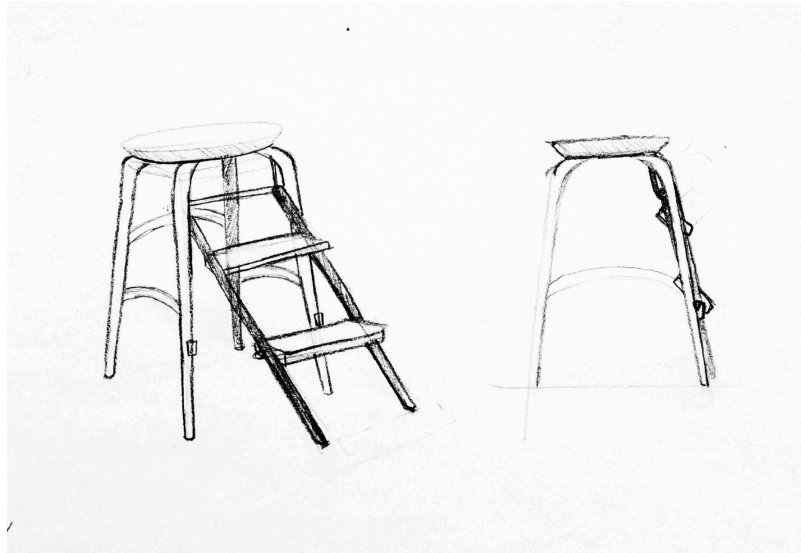
Finally, for a stepping stool, users must *trust* its stability and rigidity. Without this trust, the stool would likely go unused, and people tend to discard furniture that doesn't meet their practical needs. This was a challenge in many of the concepts explored. While certain design and construction choices could help mitigate this uncertainty, they would require extensive testing. A more rigid, consistent shape seemed to align better with the overall vision, ensuring both stability and the user's confidence in the product.

## 6.2.2 Defining and Deciding on Concept

Based on these conclusions and extensive ideation, two concepts were selected for further evaluation. The first concept was a tall stepping stool that could be rotated onto its side to transform into a “bench” with a standard seat height, providing extra seating when guests are over, see figures 74 - 76. The second concept was a compact, highly portable stepping stool designed to occupy minimal space. The ladder could be unfolded as needed, offering an ergonomically favorable climbing angle without being bulky or obstructive in other situations, see figures 77 & 78.



*Figure 74, 75 & 76. Step stool and bench in combination.*



*Figures 77 & 78. A compact step stool.*

A small survey was conducted in which sketches of multiple designs for both concepts were shown to six participants. The participants were first asked how they imagined using the two pieces of furniture in their homes. They then engaged in open discussions about the potential experience of living with these pieces, sharing what features they would most value.

Before the survey, a key concern with the turnable concept was that it might become too bulky, potentially leading to a more static piece. However, the feedback revealed that this concept was favored. Participants were drawn to its additional functionality as extra seating and its potential to serve as a catch-all surface, making it more appealing. Rather than seeing it as bulky, most interviewees imagined it fitting seamlessly into specific areas of their homes. While this is a positive outcome, it's important to note that if the furniture becomes primarily associated with storage, it risks being limited to a single function, something that other pieces of furniture could perform more effectively. This would ultimately reduce its value for the user.



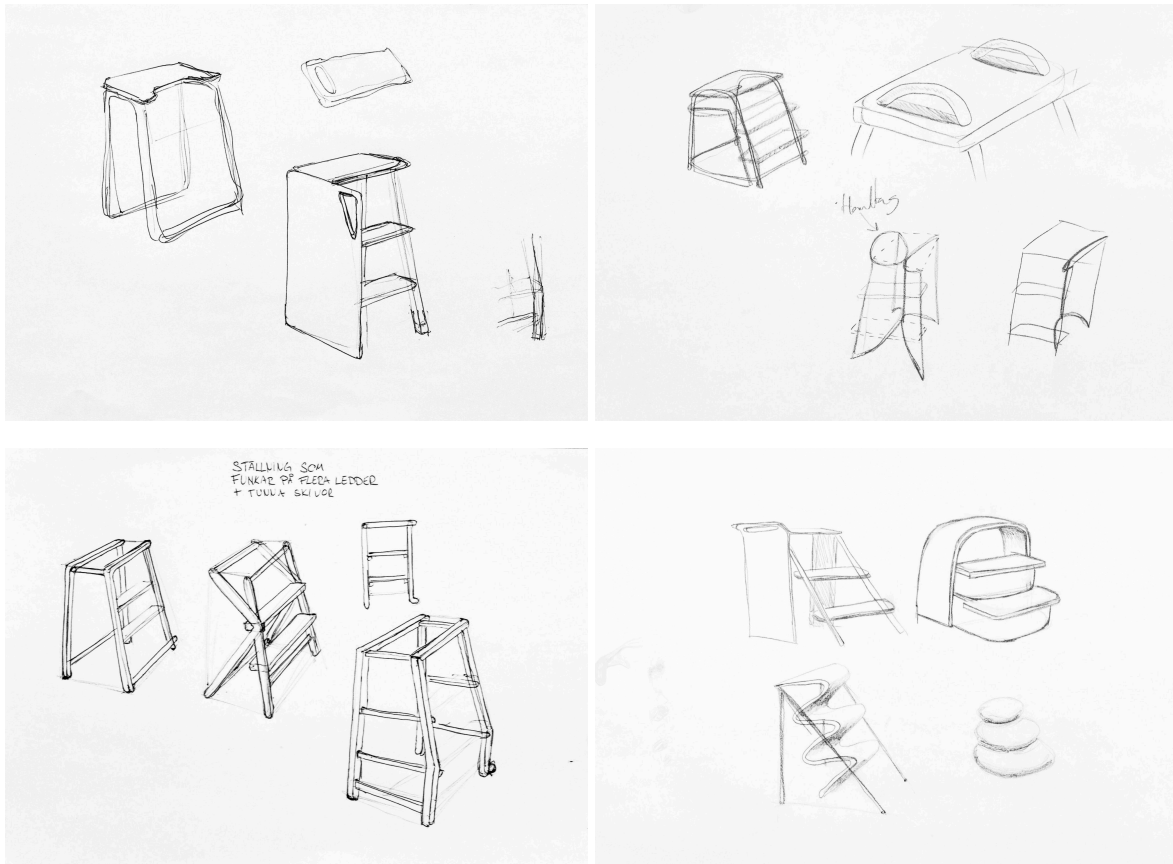
*Figure 79. Mockups of the concept. First, a functional mockup in wood, followed by a cardboard mockup to examine how small it could be designed.*

In parallel, mockups were created to explore the potential sizes and dimensions of the different concepts. The goal of the mockups was to get a feel for and work with the scale to minimize bulkiness and conclude that it would be possible to combine this trustworthy yet flexible furniture in one form.

After reviewing insights from ideation, concept development, the survey, the mockups, and discussing the concepts with Holm, a well-informed decision was made. The step stool/bench concept was selected to move forward. It aligned well with the vision, offering both the necessary rigidity for stability and an interactive, dynamic appeal. Additionally, it held potential for further design and refinement in form and details, for enhancing the expression of interactivity and versatility.

### 6.2.3 Setting the Construction

Once the concept was decided, the next step was to determine the construction approach. Initially, a broad range of options was explored, including designs using large sheets, slatted constructions, and structures with significant bends, among others.



Figures 80 - 83. Sketches of ideas for the general construction of a step stool.

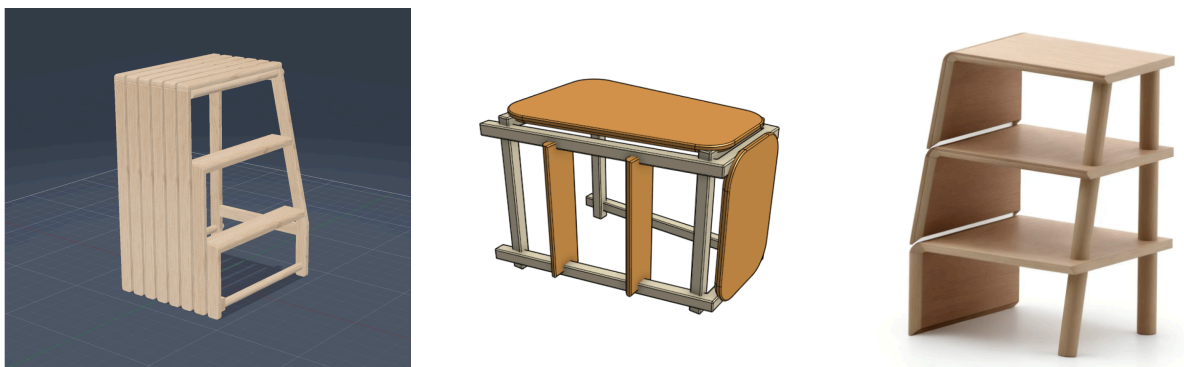


Figure 84, 85 & 86. CAD models for further investigations of constructions. The third image was created by taking a screenshot from CAD and rendering it through an AI image generator.

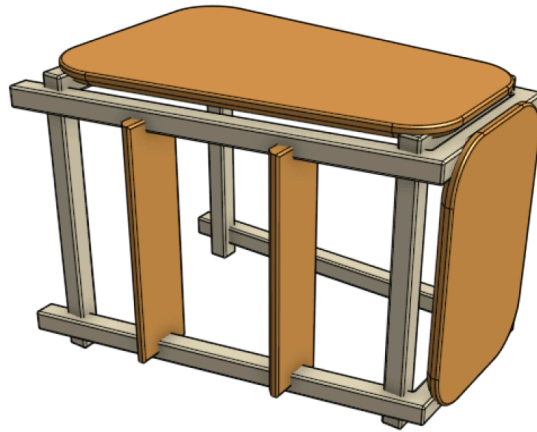
The following demands were considered in the construction process:

- Promote *care* and cleaning: Fewer and simpler parts make maintenance easier. Complex shapes are harder to replace, and features like slatted constructions have more corners that tend to collect dirt.
- Disassemblability for *care*: It was essential that the furniture could be partially disassembled for cleaning and maintenance. This also implied the need for the structure to be adjustable over time, allowing for tightening as needed.
- Express dynamic qualities: Early sketches and mockups leaned towards a very boxy aesthetic. While this could suggest a turnable functionality, it also gave the piece a more static appearance. The goal was to incorporate design elements that conveyed movement and flexibility.
- Encourage *interaction*: To spark interest and encourage dynamic use, the design needed to include details and elements that hinted at its interactive nature. For example, the top corner between surfaces should feature some form of handle, signaling and facilitating the intended interaction.
- Feel logical in both orientations: The furniture should not appear as if it is "lying on its side" when flipped. A design that feels awkward in either orientation could make the user experience less pleasant.
- Have dedicated feet: A challenge with this concept was the potential for surfaces that occasionally come into contact with the floor to become visible. If these areas became worn or dirty, it could detract from the overall *aesthetic*. It was important to design these surfaces carefully, ensuring they were not too large or intrusive, to maintain a clean and functional appearance.

Two constructions that met these requirements were selected: the intertwined arches and the frames. While the general concepts were clear, further definition of the construction and assembly, as well as refinement of the dimensions, was necessary. To achieve this, mockups were built.

## The Intertwined Arches

This concept was based on the idea of emphasizing the two orientations by creating a distinct set of legs for each surface, which intertwined with one another. In both orientations, the piece would have four legs, with the horizontal legs serving as a structural element to enhance stability.



*Figure 87. The intertwined arches.*

After building and reviewing the mockup, it was concluded that the airy feel and the minimal, clear construction were appreciated. It also successfully appeared functional and logical in both orientations. However, in the horizontal position, it looked somewhat odd, as it resembled a complete piece of furniture on its own, which disrupted the intended dual-purpose expression.



*Figure 88. Prototype of Intertwined Arches*

It was identified that the proportions and spacing between elements needed further refinement to make the design feel more cohesive and less sprawling. Additionally, further development was required to ensure the structure's rigidity and to define a practical assembly method. The concept was further developed and explored in CAD to explore these aspects more freely.

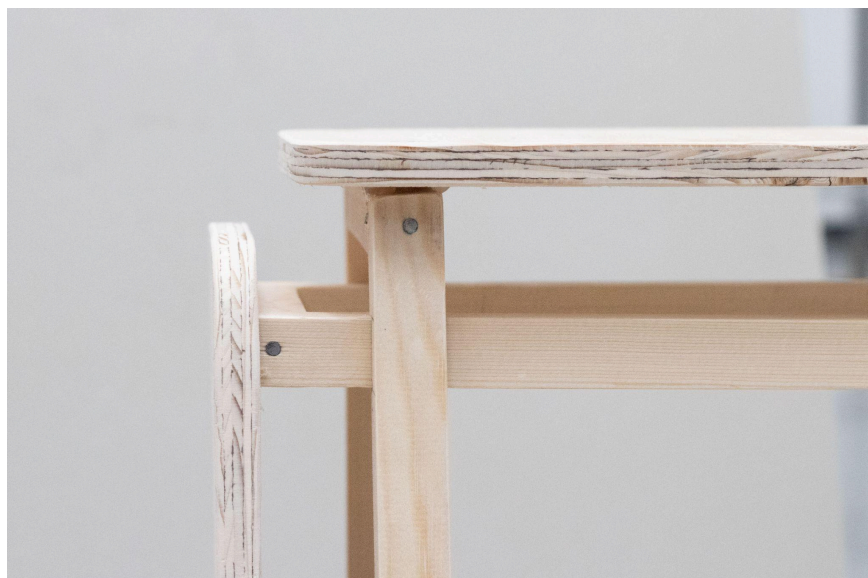
**Strengths:**

- An airy feel is created by lifting the frames above the main construction
- Minimalistic and clear construction
- Makes sense visually and looks like furniture in both orientations

**Aspects to refine:**

- Fine-tune the spacing between elements to create a more cohesive, less sprawling look
- Define precise assembly methods to prevent looseness or wobble over time
- Explore the shaping of the surfaces, for example, by working with arched forms

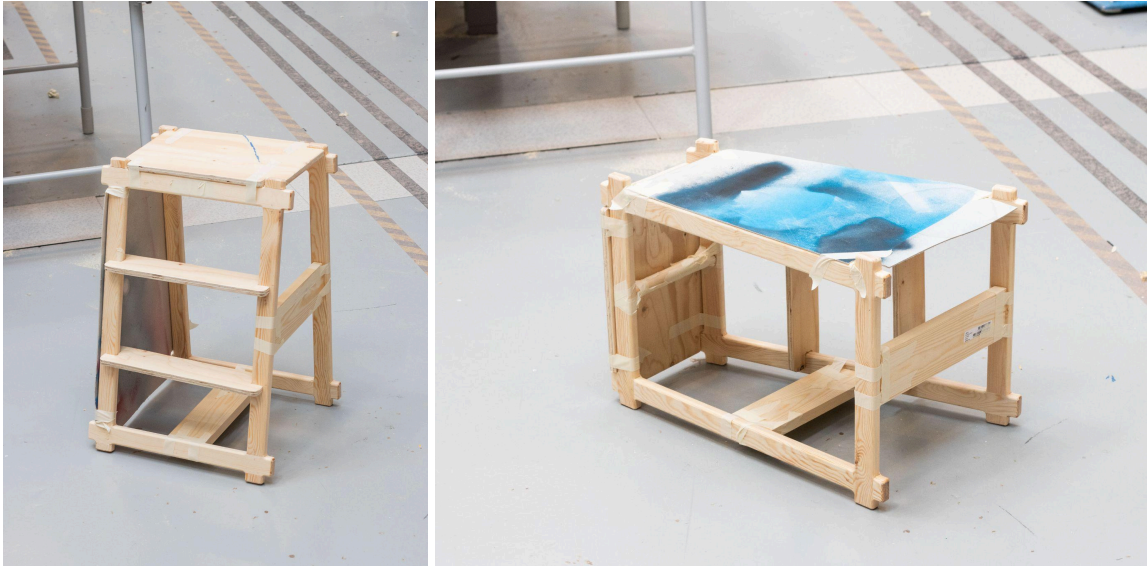
As dimensions and spacing were experimented with, it became clear that achieving a more compact construction while maintaining two distinct orientations was challenging. In the mock-up, this distance was quite large, as seen in Figure 89. The most difficult part was resolving the intersection of elements in the top corner, particularly when trying to integrate a handle into the form.



*Figure 89. Top corner of mockup.*

## The Frames

This concept was based on the idea of achieving symmetry from all directions, minimizing the asymmetry of the original concept, and ensuring the furniture looked the same in both orientations. The hope is that this would encourage users to turn and flip it more naturally.



*Figures 90 & 91. Mockup in two orientations.*

Building the mockup, it was found that the symmetrical and rotatable characteristics worked well. It also created a unique and interesting graphical element with the crosses. This concept tended to appear more boxy, but potential was seen to soften that boxiness by refining details, for example, by avoiding supports in the bottom left corner. As seen in Figures 90 & 91, the supports are instead placed halfway up on both sides. Further work was needed to fine-tune the frame dimensions and decide how much the crosses should protrude. By moving the research into CAD and using parametric modeling, these aspects, along with many others, were explored and tested in parallel.

A key part of the further development of this concept is to evaluate the amount of structural support needed and how it should be fastened. For example, the surfaces themselves could contribute significant stability if they are integrated into the construction. However, having a fully stable frame that the surfaces attach to would offer more flexibility in shaping and sizing the surfaces. Additionally, it would be beneficial to design a joint that helps pull the frames tightly together, rather than relying solely on screws for stability.

**Appreciated aspects:**

- The symmetry of the design
- The graphical element that naturally emerges from the flipping function

**Potential to develop:**

- A fastening mechanism that preserves the design character while allowing the construction to be tightened when needed
- An investigation into how much the side panels can contribute to the overall structural support
- Adjustments to make the surfaces more symmetrical

### 6.2.4 Merging Ideas from the Two Constructions.

Having investigated both construction concepts, it was found that both had their strong aspects. Moving forward, *the frames* were seen to have the most potential to create an integrated and interesting furniture that expressed and invited *interaction*.

Taking inspiration from *the intertwined arches*, the construction could borrow more even dimensions, which would lead to a more uniform look from all angles, and the use of distance and space between parts could lead to a less boxy look.



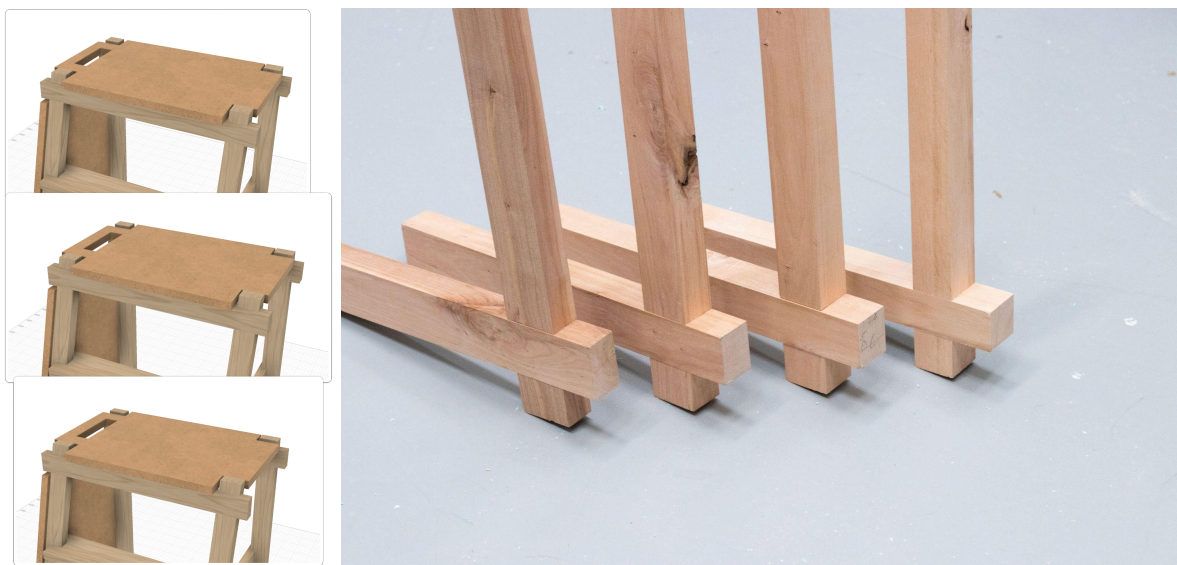
*Figures 92 & 93. Screenshots of the frame's general shape and construction.*

## 6.2.5 Design Decisions and Construction of the Final Concept.

In this chapter, several key design considerations will be outlined.

### Dimensions of Frames

An important design decision was to figure out the dimensions of the main frames. From the mockup, it was learned that the cross-section dimensions felt off. They were too evidently separate frames. The dimensions were tested with parametric modeling to quickly get a feeling for the effect of changing the dimensions. Four dimensions were then tested in the workshop, ranging from a square of 30x30 to 22x40. The decision landed on the dimension 26x35. (2nd from left in figure 95.)



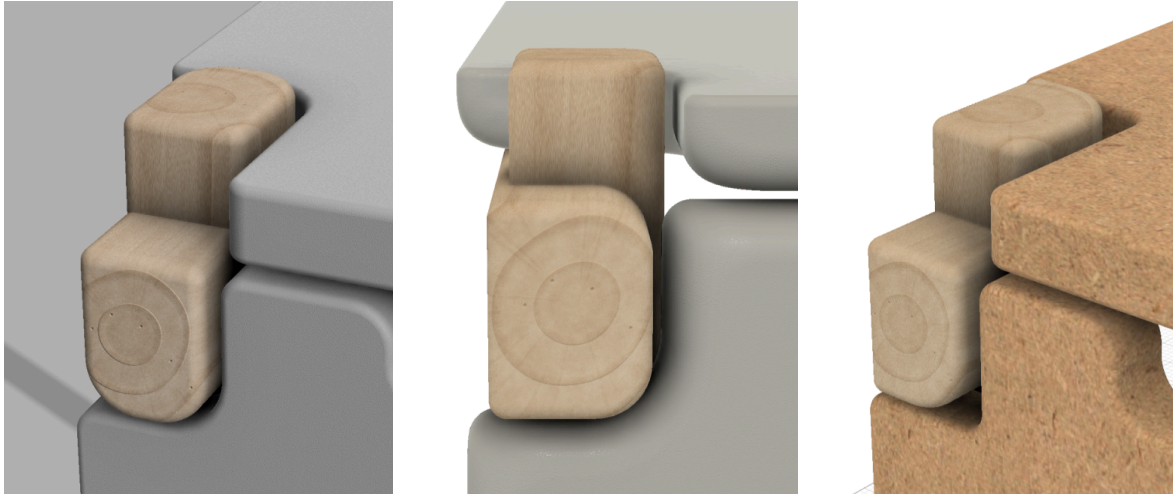
*Figures 94 & 95. Tests of dimensions in CAD respectively wood.*

A further decision has revolved around how deep the half lap joints should be; if they should be flat or stepped, meaning they have an offset. Opting for a stepped version would add more life and form to the construction, rendering it more distinct. It would also allow for more play in adding rounds and form. However, it was also found that the offset creates asymmetry and complicates designing logical meetings between other parts. In Figure 97, it can be seen that the surfaces do not align. Opting for a flat construction would therefore make a clearer and cleaner look while risking looking flatter.

Also, the length of the ends of the crosses was experimented with. Concluding that the frames should match the top surface, resulting in a distance of 20 mm.

## Forms and Rounding of Base

An important aspect of the expression of the frames was playing with the roundings. As a starting point, it was believed that rounds were an important part in producing a design that could withstand use and wear.



*Figure 96, 97 & 98. Variations on how many edges to round.*

Further, the goal is to find a balance between giving a unique and inviting soft look that larger rounds could contribute to, compared to refining and keeping the shape evident. A more expressive form that sticks out could be more easily fancied initially, but in the long run, easier to grow tired of. Making this decision relevant for emotional durability. Above are a few screenshots of different rounding and how the different parts relate to each other.

## The Relationship of the Two Surfaces and Types of Handles

In designing this interactive furniture, an important aspect was designing the experience and semantics of the “flip”. Adding a handle played a role here. This handle should logically be in the corner between the two surfaces. A corner where a lot happens visually. Some complex solutions with moving or soft parts were discussed. Proper handles in wood were also investigated. In the end, it was decided to keep it relatively simple. Solutions designing the handle as a hole, where it was evident the hand should go, would make the interaction understandable while not compromising on the overall shape and construction.



*Figure 99. Screenshots of tests of handles and the relationship between the two surfaces.*

### Constructions and Fastening Mechanisms

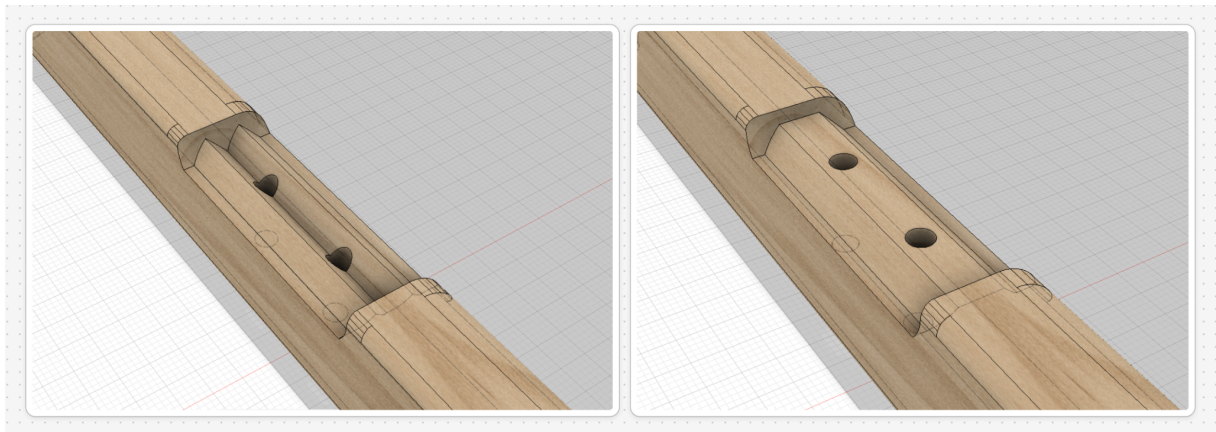
In designing for *care*, the disassemblable construction enables the user to separate parts to more easily touch up the surface treatment or repair. These joints must, at the same time, allow the user to easily tighten them if they start to jiggle, as well as understand that they can tighten them. Keeping the joints tight will prolong the lifetime of the furniture.

A few different solutions were discussed using wedges and screws in creative ways. It was discussed how visible these should be. A more visible cue would remind the user of his/her ability to tighten it. It could, however, also affect the overall visual impression, e.g., resulting in a cheaper or less well-refined look. The decision landed on a construction using screws with a large arched, slotted head. That would clamp the parts together.

To ensure the joints would maintain their shape and remain tightenable over time, their internal geometry was also refined. The primary goal was to enable the construction to absorb most of the pressure and rotational forces caused by movement. Ensuring that the screws alone would not bear loads in directions they're not designed for. The decision landed on a geometry similar to Figure 101. The final joint can be seen in Figure 124.



*Figure 100. Test of screw heads. A slotted version similar to this was decided on.*



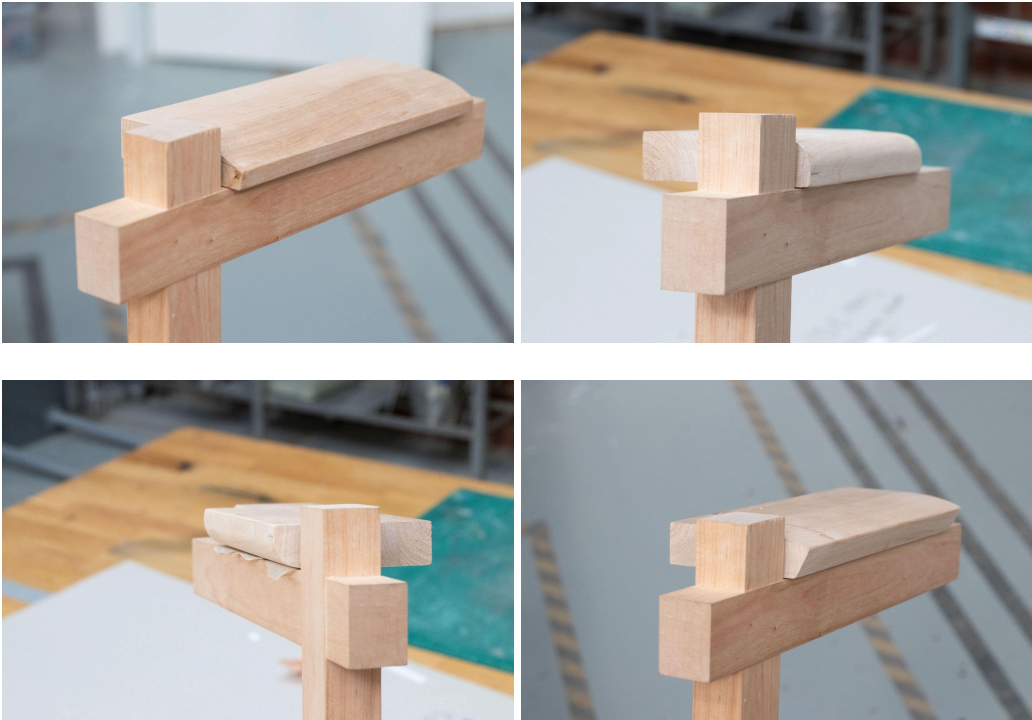
*Figure 101. Variations of interior geometries in CAD.*



*Figures 102 and 103. Prototypes of interior geometries to take the load of the screws.*

Shape of Surfaces and Detailing

The design of the two surfaces included many challenges. Apart from finding a logical shape relating to the base, much thought has also been put into the details. How they should differ from each other or not, the form of the edges, how textures could help define and make the *interaction* more interesting, etc. Below are some tests of how the edges of the surfaces could look to create different expressions.



Figures 104 - 107. Tests of surface edges.

Here are two examples showcasing the complexity in making all parts meet logically. To the left, it can be seen that the offset in the cross creates an offset between the surfaces, resulting in the edges not aligning. To the right is a test of how to simplify the shape of the surfaces. With this test, it was learned that it was more logical not to intersect the crosses. As seen to the right in Figure 108.

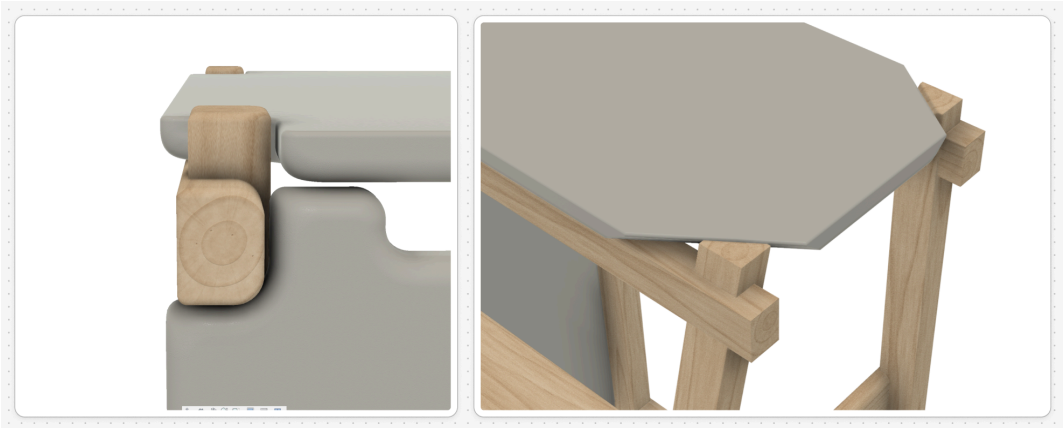


Figure 108. Two examples showcase the complexity in making all parts meet logically.



## 7 Final Concepts

In this chapter, the two final concepts from the design process will be presented: the thoughts behind the concept and details, and how they promote prolonged use.

### 7.1 Händig - a System

The ordinary person's trust in their own ability to create, design, and take a tool in their hands has long been limited. Today, consumption has become a norm and an alternative too accessible, rendering the need for your own handiness useless. Today, consumption behaviours are being questioned, and this furniture aims to be part of that shift.

Many people dream of building their own furniture, custom-fit and with a personal touch. *Händig* is a furniture system designed to make this process both accessible and enjoyable. It is sold as ready-made wooden profiles that can be cut to the desired length. Each profile is fitted with a socket at both ends, which are then secured to the corner posts using a corner piece and a wedge.



*Figure 109. Two unique builds with Händig that show variability and playful use of material.*



*Figure 110. Two builds with Händig that show how to build for specific needs.*



*Figure 111. A larger shelving system built with Händig.*

By offering a high degree of freedom in design choices, users are able to shape furniture based on their own needs and preferences. At the same time, the system defines key proportions and refined details, ensuring a coherent and considered result. Through these constraints, the system helps guide the user toward a unified and *aesthetically* balanced outcome that one can be proud of. This hands-on involvement fosters a sense of ownership, encouraging users to care for and maintain the furniture over time. By enabling users to engage with the design process, the system aims to strengthen the emotional bond between the user and the object, ultimately helping to extend its lifespan.

With its few but interchangeable components, the system offers a wide range of configurations, from conventional setups with horizontal shelving to more unconventional, exploratory designs. Users can choose between square or round profiles, each offering distinct advantages. The round profile allows for new angles and even the possibility of incorporating rotating elements, while the square profile excels at securing and stabilizing the structure. Alternatively, mixing both profiles offers exciting opportunities to explore the system's full potential.



Figure 112-115. The different components.

Building and designing your own furniture taps into the *IKEA effect*, strengthening the bond between the user and the object. The goal is to further enhance this connection by helping the user build confidence in their abilities. Additionally, this furniture allows for personal expression, whether by embracing the natural beauty of wood or experimenting with vibrant colors and new materials. The simple shapes and modular construction not only enable but also encourage this creative freedom.

Most importantly, the modular structure and interchangeable components allow users to easily modify the furniture by adjusting the configuration, swapping parts, or adding new elements. This flexibility enables the furniture to *evolve* with changing needs and preferences, helping to extend its lifespan and ensuring it remains relevant and loved over time.



*Figures 116 & 117. A shelf built with Händig. Showing versatile constructions with 3 variations on how to place a shelf and with a back piece.*

## 7.2 Samtal - Your Everyday Companion

*Samtal* is Swedish for conversation. This piece is designed to invite conversation on how ownership of furniture is viewed. It also offers a physical space for two friends to sit together and share a conversation. But most of all, it seeks to open an ongoing dialogue between itself and its owner. For these reasons, it truly earns its name.

This *interactive* and *multifunctional* piece of furniture is designed to promote mutual relationships between users and objects, a *Stewardship*. In its nature, it is designed to fulfill your needs in different scenarios throughout your home, your day, and your life. In return, it expects to be cared for and loved. If you no longer cherish it or have use for it, its only wish is to respectfully be passed on to the next carer.

Based on the functional, but also limited, concept of a step stool, this furniture offers more uses in its two modes. On its end, it is actively both a high stool and a ladder. Lying down, it becomes the extra seat, or even two seats, that you always miss when having company over. Further, it is designed to be equally functional when passive, fitting smoothly up against a wall, acting as the temporary catch-all surface for either your sweaters or the extra pot in the kitchen.

Its design and construction are intended to invite *interaction*. The symmetric frames and the similarities between top and side offer an interesting and new look that sparks an initial interest in understanding more and interacting with it. Further visual cues, such as the handle and “feets” encourage you to flip the furniture.



Figure 118 & 119. The Step-Stool *Samtal*, in its two orientations, offers multiple functionalities.



*Figures 120 - 123. Samtal used in four different ways throughout the home.*

The dual orientation feels logical thanks to the similarities, as well as some other smart design choices. It proved important to avoid the look of a flipped-over furniture. The placement of the supports between the frames is a good example. Putting these in the center instead of near the bottom corner enables them to resemble a stretcher, as well as avoiding a boxy look.

This furniture invites you to care for it. The simple and disassemblable construction is designed to build confidence in the user's ability to care for it. Cues on how it is assembled and that it is easily assemblable again are intentionally made visual, yet elegant, to reduce uncertainties. This also reminds and invites the user to tighten the joints. Which will be key to also improving the physical and material lifetime.

If the user wishes to touch up the finish after a few years, this is made accessible even for the inexperienced. Using smooth surfaces and relatively large rounding makes it easier to sand without risking changing the impression. Fewer corners and bends do the same.

The many *interactions*, using it, sharing social occasions with it, and taking the time and effort to care for it, are all part of building a strong bond between you and your furniture. Resulting in a joyful and sustainable long-term use. Or should it be called “*Stewardship*”?



Figures 124 & 125. The two types of joints make Händig disassemblable and careable.



# 8 Discussion

At the start of the project, the three pillars of longevity, material, functional, and emotional, were all investigated. Emotional longevity became the main focus, as it was considered the least defined and explored. With that said, the categories overlap in several ways, and both material and functional aspects were always kept in mind, especially when they were believed to influence emotional attachment.

## 8.1 Insights on the Three Pillars of Longevity

Through this chapter, each pillar will be discussed with regard to how they were experienced to work with, how they were found important, and how they were considered in the final designs. The emotional pillar will be discussed more in depth and sectioned further since it has been the main focus of the thesis.

### 8.1.1 Functional Longevity

One such quality is its functional relevance, an object that continues to be useful and valuable regardless of changing trends. For this reason, exploring functionality also became a crucial part of the process, not with the goal of forecasting future needs, but through the lens of identifying functions that users value and that could contribute meaningfully to long-term emotional attachment.

The tasks these concepts serve are nothing extravagant, but they are meaningful in daily life. Their value lies in doing something simple exceptionally well. By working consistently and feeling intuitively right to use, they earn their place in the user's life, not just as useful tools, but as *dependable* companions. While both concepts are grounded in basic functions, each employs a different approach to flexibility to keep those functions accessible over time.

**Händig** is designed with long-term adaptability in mind. Its modular construction allows it to be reconfigured, resized, and repurposed to meet changing circumstances and needs. This ongoing flexibility helps it remain relevant as the user's life changes, and it therefore has a higher likelihood of being kept long term, as compared to a more static piece of furniture.

While a lot of thought and work has been put into the design of the components to make sure they function well and are easy to use, they have not been tested in metal, as is intended for the actual production version. Using the 3D printed prototypes, it is possible to get an indication of how the experience of putting it together will be and how sturdy it will be, but further refinement would benefit from being iterated with metal.

**Samtal**, on the other hand, is flexible in a more immediate, everyday sense. Its strength lies in its ability to shift roles throughout daily life, serving as a step, a seat, or a small table, whenever and wherever it's needed. Its usefulness comes not from being customizable over time, but from always being close at hand, ready to help. This regular *interaction* and *trustability* are factors that will contribute to building attachment and enable long-term use.

### 8.1.2 Material Longevity

Material longevity may mean many things. This work has not focused on evaluating physical qualities such as durability, how much wear and tear a material can withstand, or researching new innovative materials. Instead, the focus has been on qualities that relate to the user and can influence their emotional connection to an object.

Rather than focusing solely on durability in a technical sense, material longevity was approached through the lens of how the object and its materials age over time. Design choices were evaluated based not only on how they might slow down or accelerate signs of wear, but also on how visible signs of use would be perceived. A key insight from the research was that aging can be seen as either deterioration or character development, depending on how it is framed in the design.

Another important aspect was designing the objects in a way that encourages users to care for them. By making the product feel both easy and worthwhile to maintain, its lifespan can be extended in practice. A well-maintained piece often retains a higher perceived value and is less likely to be replaced. Just as importantly, the act of caring for an object was found to strengthen the user's emotional bond with it. When users invest time and effort into maintaining something, they become more attached and less willing to let it go.

**Händig** is all about giving the user agency to make their furniture their own, which also includes taking care of and repairing as needed. Its modular nature, where parts can easily be removed, simplifies thorough cleaning, sanding, treating the surface, or replacing and repairing. Giving this power to the user makes sure that the product won't need to be completely replaced due to material degradation.

**Samtal** is a more defined piece of furniture. Therefore, it was of importance to design the structure and joints to allow for and enable *care and repairs* in other ways. While some joints are glued to ensure the rigidity and *trust* of the stool, other joints are made tightenable. This approach makes it easier to replace or repair parts and reduces the number of narrow corners that would complicate surface maintenance. The ability to retighten the construction as it loosens over time or with seasonal humidity changes also helps extend the material's lifespan, as loose joints tend to wear down more

quickly. While glued joints are more rigid as a rule, they are also less approachable to repair and tighten whenever they do get loose.

### 8.1.3 Emotional Longevity

From the literature review, it was evident that an important aspect in designing emotionally durable products that users want to keep and maintain was to design for all sorts of experiences. This has been key throughout the design process. The conclusions drawn will be broken down into Jordan's pleasure levels.

#### Psycho-Pleasure

To design for this level has been very prominent in the process. A lot of effort was put into defining and designing the uses and functionalities. Both designs carry a strong intention for the experience and how it may lead to stronger product attachment.

This project has had the freedom to define and add functions, which led to two relatively specific furniture concepts. However, not all furniture can or should be this intricate. For a more predefined design process, say a commission to design a stool, a more fine-tuned approach may be considered. The recommendations in this work are therefore not necessarily about adding new or interesting functionalities. Instead, the focus could be on ensuring that the product performs exceptionally well for its intended use and that it remains pleasurable to interact with. In the case of a simple stool, it is, for instance, more important that it can be relied on.

#### Physio-Pleasure

Designing for the physio-pleasures has been a continuous focus throughout the process. From early concept development, where tactile qualities were explored in separate ideation sessions, to later discussions about how individual components should feel during the assembly process, physical interaction has remained central. For **Händig**, *tactile* feedback and the sense of *trust* in the physical construction have been key considerations. For **Samtal**, the emphasis lies in creating an engaging and satisfying *interaction* as well as creating *trust*. In both cases, materiality plays a crucial role.

Due to limited time and restricted access to a workshop, however, this area could not be explored to its full potential. While the ideas and intentions are in place, properly designing for *tactile* experiences requires extensive prototyping, testing, and iteration. These qualities cannot be fully predicted or planned; they must be built, tested, and refined through hands-on experimentation.

## Socio-Pleasure

Designing for socio-pleasures is highly relevant. A fundamental part of being human is expressing who you are. Not only through personality and lifestyle choices, but also through the objects one chooses to surround oneself with. Furniture, like any designed object, carries and communicates a *story*. Whether bold or subtle, this narrative contributes to how one is perceived and how one sees oneself.

A compelling background or concept can therefore enhance a furniture's perceived value. If the *story* a piece tells is unrelatable or unconvincing, it risks becoming irrelevant or overlooked. Designers cannot control who ends up owning the piece or why. With this in mind, the focus has been on creating designs that are both interesting and accessible, striking a balance that invites personal meaning while remaining broadly relatable.

The hope is that the owner of a **Händig** appreciates the freedom it offers, the satisfaction of building it, and the opportunity to shape it further. This tells a *story* of being capable and hands-on, and the choices made afterwards continue that narrative, turning the piece into a personal expression. Something to proudly show off.

**Samtal**, on the other hand, carries several potential stories for the user to claim as their own. Whether it reflects a flexible and practical lifestyle, a commitment to caring for one's belongings, or simply a fondness for its social nature as an extra seat, it becomes a piece of furniture that aligns with the values of its owner.

## Ideo-Pleasure

In the case of the designs developed in this thesis, there was no deliberate attempt to target this level. As established in the research, this layer is inherently difficult to control, given that the preferences involved are highly personal and subjective. Regardless of what the product's concept is or how clearly it communicates its concept or values, each user will relate to it differently, shaped by their own experiences, beliefs, and needs.

However, both concepts embody a strong underlying idea that has the potential to resonate with users. It is hoped that this will be perceived as meaningful and engaging. For the right user, this alignment may foster a deeper emotional attachment. **Händigs'** emphasis on self-assembly and personalization, **Samtals'** focus on *care* and *stewardship*, and the shared theme of sustainable consumption and prolonged use all aim to contribute to a sense of value to lasting connection.

## 8.2 “Förvalta” - Steward

What would change if we *steward* our furniture instead of own it?

This question was frequently returned to throughout this work. First lifted in chapter 5.3.3 as a reflection of the visions and later embodied in the core of the final concepts. An idea that summarizes the insights into what the consumption and use of furniture must strive to become. The concept is to change the way furniture is valued, not as something that one has the right to use and discard, but instead as something that one is responsible for *caring* for until it is passed on to someone else. With this, it is still allowed to make the furniture one's own while being the *steward* of it.

It is relatively simple to own furniture. Why is that? Dragging the questioning of ownership further, one can compare owning furniture with how other objects are owned. Why is owning a house or having a Pet considered harder? This is because there are expectations of *care and maintenance*. But people still own houses because they get something in return, it's a mutual relationship between the house and the owners. Can design help create a similar experience between furniture and its owners?

## 8.3 Further Research

It may not be realistic to expect individuals to develop an equally strong personal connection, sense of responsibility, or *stewardship* toward every object they own. This raises the question of whether a more holistic perspective is needed, one that considers the full range of everyday objects to better understand how to counteract throwaway culture and promote long-term use on a broader scale. Perhaps some strategies are more universally applicable across product categories, or perhaps the solution lies in a combination of targeted approaches tailored to different types of items and their specific roles in users' lives.

In the broader context, the concept of a circular economy becomes highly relevant. Solutions such as leasing or co-ownership can contribute to more sustainable consumption patterns. For future research, it would be valuable to explore how this thesis's approach to steward furniture could coexist with circular economy principles and form a more holistic model in which certain objects are better suited for personal care and long-term attachment, while others may be more appropriate for sharing or circulation.

In this larger picture, the subject of circular economy is close at hand. Solutions such as leasing or co-owning can be part of achieving sustainable consumption. For further research, it would be of interest to investigate how this thesis approach to stewarding furniture can co-exist alongside a circular

economy to achieve a more holistic approach where some objects are more relevant to tend to more closely and some are more relevant to share.

The resulting concepts are theoretical design proposals grounded in research and the conclusions drawn from it. Their effectiveness in prolonging use time could have been further supported through user testing during the design process. However, since the aim is to explore long-term relationships with furniture, evaluating their success would require a longitudinal study stretching over years. Such a study would add valuable insights and perspectives to the effects of this work's approaches, contributing to a deeper understanding of how long-term relationships with furniture develop over time.

This thesis focuses on furniture for the home, a context where the idea of personal and emotional attachment is most applicable. From a broader perspective, it would be valuable to explore which approaches and factors are relevant in the context of shared or public furniture. What other considerations rise in importance? And how can emotional qualities be leveraged to promote longevity when personal attachment is not a primary driver?

## 9 Conclusions

From the beginning, this project set out to understand how design can support lasting relationships between users and their furniture. Ultimately, promoting more sustainable consumption. By exploring a wide range of Approaches affecting how objects are viewed and valued, key insights were identified around emotional, functional, and material longevity: three pillars that together shape how and why objects stay relevant over time.

Throughout the process, it became clear that longevity is not a single outcome, but a layered and relational quality. **Emotional** attachment, for instance, often emerges through use, *memory*, or personal investment; factors that can be encouraged through design but never guaranteed.

**Functionality** plays a role not just in how something works, but in how it adapts over time. And choices for **material** longevity do not only include durability or how an object ages and wears, but also how it invites *care and maintenance*.

Rather than seeking one perfect solution, two distinct furniture concepts were designed that together demonstrate a wider path toward longevity. *Händig* invites its owner to become the creator; to build, adapt, and leave a personal mark. In doing so, a stronger bond is formed; the more you shape it, the more it reflects your current needs and identity. *The Dynamic* is designed to invite *interaction*, touch, and *care*. It forms a mutual relationship with its owner, becoming more than just a functional object, but a *trusted* companion in everyday life.

These designs are not meant to be definitive answers. They are means for fostering critical discussion and examples of how design processes can create the conditions for long-term use of furniture. They show how design, when rooted in an understanding of human experience, can invite *care, stewardship, and attachment*.

The method, which combined theory, conceptual exploration, and iterative prototyping, proved effective in identifying and translating abstract ideas such as attachment or *care* into tangible design decisions. However, its limits are also acknowledged. Longevity is deeply personal. People's relationships with objects are complex, emotionally charged, and culturally shaped. Attachment cannot be forced, and design cannot account for every variable in use. There is also a risk in over defining, in trying to engineer attachment too precisely, because what makes some objects special is often their unpredictability, their surprise, and their capacity to be interpreted freely.

Perhaps it is less about controlling the outcome and more about designing with generosity, leaving space for the user to participate, reinterpret, and claim ownership. Because in the end, longevity is not

only about durability or functionality. It's about whether something is worth holding on to. And that, ultimately, is up to the user.

Looking forward, there is a need for further research into how emotional durability with furniture can be supported across different cultural and social contexts. Exploring furniture longevity in shared or public settings could also offer new insights. The public sector is arguably of great importance to research, as these contexts account for a significant portion of overall furniture consumption. However, the lack of personal connection in such settings may limit the impact of emotional factors in promoting long-term use.

Ultimately, *attachment* and *care* can and should be valued as important design elements. Designers play a key role not only in shaping what objects are but also in how they are used, *cared* for, and remembered. By addressing these aspects in the design process, there is potential to foster longer-lasting relationships between people and their furniture. Contributing not only to more sustainable consumption but also enriching the users' lives with meaningful experiences.

# 10 References

- Ackerman, L., Tuimaka, M., Pohlmeier, A. E., & Mugge, R. (2021). Design for Product Care—Development of Design Strategies and a Toolkit for Sustainable Consumer Behaviour. *Journal of Sustainability Research*, 3(2). <https://doi.org/10.20900/jsr20210013>
- Carlsson, S., Mallalieu, A., Almefelt, L., & Malmqvist, J. (2021). DESIGN FOR LONGEVITY - A FRAMEWORK TO SUPPORT THE DESIGNING OF A PRODUCT'S OPTIMAL LIFETIME. *Proceedings of the Design Society*, 1, 1003–1012. <https://doi.org/10.1017/pds.2021.100>
- Chapman, J. (2009). Design for (Emotional) Durability. *Design Issues*, 25(4), 29–35. <https://doi.org/10.1162/desi.2009.25.4.29>
- Haines-Gadd, M., Chapman, J., Lloyd, P., Mason, J., & Aliakseyeu, D. (2018). Emotional Durability Design Nine—A Tool for Product Longevity. *Sustainability*, 10(6), 1948. <https://doi.org/10.3390/su10061948>
- Jordan, P. W. (2000). *Designing pleasurable products: An introduction to the new human factors*. Taylor & Francis [u.a.].
- Merriam-Webster. (n.d.). Longevity. In Merriam-Webster.com dictionary. Retrieved February 13, 2025, from <https://www.merriam-webster.com/dictionary/longevity>
- Mugge, R., Schoormans, J. P. L., & Schifferstein, H. N. J. (2005). Design Strategies to Postpone Consumers' Product Replacement: The Value of a Strong Person-Product Relationship. *The Design Journal*, 8(2), 38–48. <https://doi.org/10.2752/146069205789331637>
- Norman, D. A. (2004). *Emotional design: Why we love (or hate) everyday things* (Paperback ed.). Basic Books.
- Norton, M. I., Mochon, D., & Ariely, D. (2012). The IKEA effect: When labor leads to love. *Journal of Consumer Psychology*, 22(3), 453–460. <https://doi.org/10.1016/j.jcps.2011.08.002>
- Page, T. (2014). Product attachment and replacement: Implications for sustainable design. *International Journal of Sustainable Design*, 2(3), 265. <https://doi.org/10.1504/IJSDES.2014.065057>
- Schifferstein, H. N. J., & Zwartkruis-Pelgrim, E. P. H. (2008). Consumer-product attachment: Measurement and design implications. *International Journal of Design*, 2(3), 1–14. <https://www.ijdesign.org/index.php/IJDesign/article/view/325/0>
- Schifferstein, H. N. J., & Hekkert, P. (Eds.). (2008). *Product experience*. Elsevier Science.
- Van den Berge, R., Magnier, L., & Mugge, R. (2021). Too good to go? Consumers' replacement behaviour and potential strategies for stimulating product retention. *Current Opinion in Psychology*, 39, 66–71. <https://doi.org/10.1016/j.copsyc.2020.07.014>

DEPARTMENT OF INDUSTRIAL AND  
MATERIALS SCIENCE  
CHALMERS UNIVERSITY OF TECHNOLOGY

Gothenburg, Sweden 2025  
[www.chalmers.se](http://www.chalmers.se)



**CHALMERS**  
UNIVERSITY OF TECHNOLOGY