

READER

# DESIGN THINKING

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## 1 DESIGN THINKING THEORY

Design Thinking is a human-centred approach to problem-solving and innovation that emphasises empathy, collaboration, and creative thinking. Design Thinking encourages interdisciplinary collaboration and a willingness to approach problems from multiple angles. It was initially developed in the field of design but has since been applied to a wide range of industries and disciplines. Here are some key aspects of the idea behind Design Thinking:

- **User-centred approach:** At the core of Design Thinking is the belief that solutions should be designed with a deep understanding of the people who will use them. By empathising with users and gaining insights into their experiences, challenges, and desires, designers can create solutions that are truly tailored to their needs.



- **Creativity and innovation:** Design Thinking encourages open exploration and creative brainstorming. It's about thinking beyond conventional solutions and embracing innovative ideas that might not have been considered otherwise. The focus on generating a wide variety of ideas helps break away from the limitations of established thinking patterns.
- **Iterative process:** Design Thinking is not a linear process; it's iterative. This means that designers continuously cycle through the phases of empathy, definition, ideation, prototyping, and testing. Each iteration builds upon the insights gained from previous rounds, allowing for gradual refinement and improvement of the solution.
- **Collaboration:** Design Thinking emphasises collaboration among multidisciplinary teams. Different perspectives and expertise contribute to a holistic understanding of the problem and diverse ideas for potential solutions. Collaborative work also enhances creativity and the ability to address complex challenges.
- **Fail forward:** Failure is seen as an opportunity for learning and improvement rather than a setback. By prototyping and testing ideas early in the process, designers can identify flaws and limitations before significant resources are invested. This "fail forward" mindset encourages taking risks and embracing mistakes as valuable sources of insight.

In summary, the idea behind Design Thinking is to shift the focus of problem-solving from the solution itself to the people who will use that solution.

Design Thinking methodology varies, depending on its origin. For example, in Germany, the phases of Design Thinking set a slightly stronger focus on identifying the problem, while in English resources, the focus lies on prototyping and implementing. Therefore, the following script describes the process of Design Thinking in a very general manner. Interested readers can find numerous well-written and freely available resources on design thinking on the internet, where they can choose the focus, they want to pursue. (cp. references)

## 1.1 Design Thinking team

Creating an effective Design Thinking team involves carefully considering various factors to ensure the team is well-equipped to collaborate, empathise, and innovate.

Design Thinking benefits from diverse perspectives. Therefore, team members should have various backgrounds, expertise, and skills. This diversity can lead to more creative solutions and well-rounded problem-solving.

Empathy is a cornerstone of Design Thinking and is essential for identifying user pain points and designing solutions that resonate. Therefore, choose team members who have strong empathy and an ability to understand the needs and perspectives of users. Additionally, seek team members open to exploring new ideas, taking calculated risks, and embracing the iterative nature of Design Thinking. An innovation mindset encourages thinking beyond the obvious solutions.

Design Thinking involves a lot of group discussions, brainstorming sessions, and feedback loops, so the ability to work well with others is essential. Strong communication skills are crucial for sharing ideas, collaborating, and presenting findings. Ensure team members can articulate their thoughts clearly and listen actively to others. Also, team members should be comfortable working in collaborative environments.

When building a Design Thinking Team, roles should be distributed among team members. Which roles are needed depends on the project's specific design challenge, setting, and scope. Typical roles are a facilitator, a time/ruleskeeper, or a project manager. The size of the team also depends on the context. In general, teams should not be too big but have enough people to cover all important perspectives and disciplines necessary for prototyping. Groups of 4-8 people are considered optimum.

## 1.2 Design Thinking environment

Provide the team with the necessary resources, tools, and materials. This could include access to design software, prototyping materials, research materials, and any other resources needed to support the process.

Commonly needed supplies are paper, pencils, markers, magnets, post-its, scissors, glue, flip-charts, whiteboards, pinboards, pins, and sticky tape. Depending on the detailedness of the prototype, other materials such as wood, fabric, plastics, LEGO®, cable ties or felt might be of use. In general, all materials that help foster creative advancement are very much welcome to be used.

In terms of the surroundings, the room/space should also foster creative advancement. Therefore, it should be spacious, have movable furniture to adjust the working situation, have many vertical surfaces to stick something on, and have a good climate, lighting, and acoustics. Also, it should not look too much like a conventional meeting room and should not be someone's familiar surroundings. Some groups might find it helpful to listen to music while working; others might enjoy the availability of refreshments and delights. No matter what concrete surroundings are chosen, those should match the individual needs of the Design Thinking group at hand.

## 1.3 Design Thinking method

Design Thinking is a process that encourages multidisciplinary teams to deeply understand users, redefine problems, and generate innovative ideas. It's important to note that Design Thinking is not a linear process, and the phases can be revisited and adapted as needed. The emphasis is on flexibility, creativity, and collaboration throughout the entire journey. The method is divided into several phases:

1. **Empathise:** In this initial phase, the focus is on gaining a deep understanding of the users and their needs. Designers engage in empathy-building activities such as interviews, observations, and immersing themselves in the user's experiences. The goal is to develop empathy for the users and gain insights into their challenges, emotions, and aspirations.

2. **Define:** Building on the insights from the empathy phase, the team defines the core problem to be solved. This involves synthesising the collected information, identifying patterns, and reframing the problem statement to align with the user's needs. A well-defined problem sets the foundation for generating innovative solutions. The problem definition is called the "design challenge".
3. **Ideate:** During the ideation phase, the team engages in brainstorming and generates a wide range of creative ideas. Quantity and variety are emphasised, and judgment is suspended to encourage unconventional thinking. The goal is to explore possibilities and generate as many potential solutions as possible.
4. **Prototype:** In this phase, selected ideas from the ideation phase are transformed into tangible prototypes or mock-ups. Prototypes can take various forms, from sketches and physical models to digital simulations. The purpose is to create quick, low-fidelity representations of the solutions to visualise and communicate ideas. For prototyping, it is best to have "embarrassing" and very sketchy versions of the final product/service. If the prototype is too perfect, the tester's feedback will be too short since they will provide superficial feedback.
5. **Test:** Prototypes are tested with actual users or stakeholders. Feedback is collected to understand how users interact with the prototypes, what works well, and what needs improvement. Testing helps refine the solutions and validate assumptions before investing significant resources.
6. **Implement:** Based on the feedback received during testing, the team goes through iterative cycles of refining and improving the solutions. This involves revisiting previous phases to make adjustments and enhancements. The iterative nature of Design Thinking allows for continuous improvement and innovation.

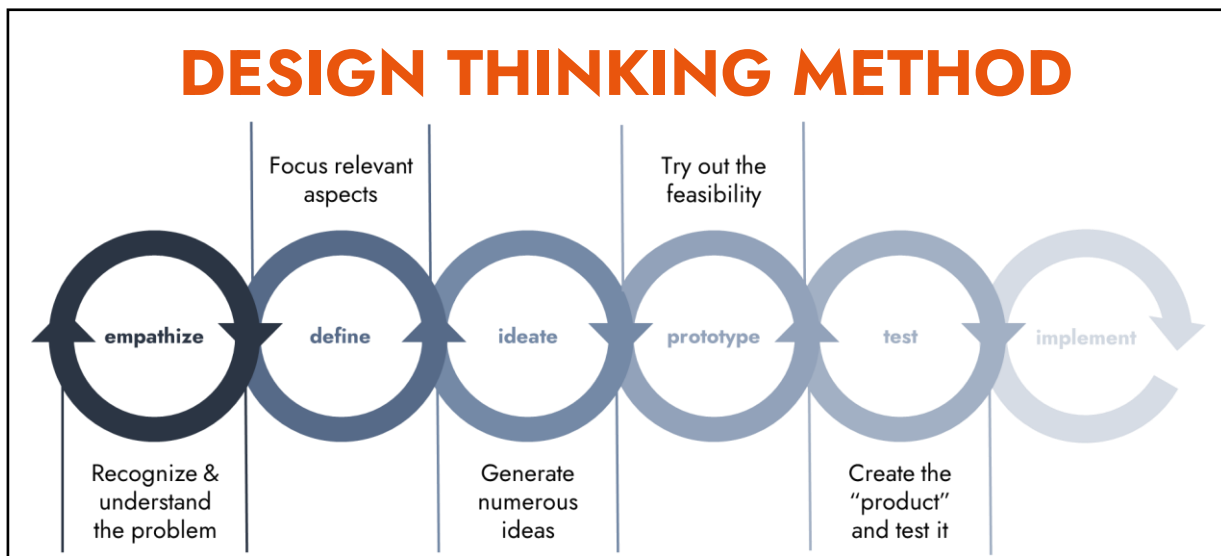


Figure 1: Design Thinking method - an iterative process.

## 2 DESIGN THINKING TOOLS

There are numerous tools to use in a Design Thinking workshop. Some of these tools fit a specific phase of the Design Thinking method; some might be useful all along the way. The following descriptions are an overview of possible tools to use but are not definite. (cp. references) They serve as instructions for the interactive Design Thinking workshop in the DIGIGEN programme.

### 2.1 Empathise

#### 360° Research

360° research is a thorough approach to gathering insights about a topic from all angles to achieve a comprehensive understanding. Collecting that many perspectives helps minimise bias and supports more informed decision-making based on a comprehensive understanding of the subject. The method involves collecting information from various sources, including direct data collection, existing literature, competitor analysis, market trends, customer feedback, internal stakeholders, external experts, online platforms, quantitative data, and self-testing. Some of these methods originate from a business context, others from social science research. However, every single method

is too much to be described within the scope of this material. Therefore, the interested reader is advised to look at the literature in the appendix.

### **Customer Journey Map** (*Board/Poster/...; Edding; Post-its*)

A customer journey map is a visual representation of the entire experience that a customer goes through when interacting with a product, service, or brand. It illustrates the various touchpoints, emotions, and interactions a customer has from the initial awareness stage through to the post-purchase/separation phase. Customer Journey Maps can be drawn/designed freely. Most frequently, they include a *timeline with stages* that customers go through, *touchpoints* as points of interaction between customer and organisation, *actions and emotions* at each touchpoint, *pain points* during the journey, and maybe *personas*. After creating the Journey Map, *opportunities for improvement* might be included in the illustration.

### **Stakeholder Journey Map** (*Board/Poster/...; Edding; Post-its*)

A Stakeholder Journey Map is a visual representation that outlines the experiences, interactions, and emotions of various stakeholders as they engage with an organisation. Unlike a Customer Journey map that focuses on the customer's perspective, a Stakeholder Journey Map encompasses a broader range of individuals and entities that are interested in or are affected by the organisation's activities. Stakeholders in this context can include employees, investors, partners, suppliers, regulators, community members, and more.

However, designing a Stakeholder Journey Map follows the same path as designing a Customer Journey Map. Different stakeholders might be condensed into only one Stakeholder Journey Map.

### **5-Why's** (*Board/Poster/...; Edding; Post-its*)

The "5 Whys" is a problem-solving technique that aims to uncover the root cause of a problem by repeatedly asking the question, "Why?" Each subsequent question delves deeper into the issue, revealing underlying factors that contribute to the problem. Start by asking, "Why did this problem

occur?" Ask "Why?" four more times and base the subsequent question on the answer from the previous question. Write that down or illustrate it some other way.

## 2.2 Define

### **Empathy Map** (*Board/Poster/...; Edding; Post-its*)

An empathy map is a visual tool to help understand and gain insights into the experiences, thoughts, feelings, and needs of a particular user or customer segment. The content of such maps usually originated from the empathise phase of a Design Thinking workshop and its intensive research. The map typically consists of four quadrants, each focusing on a different aspect of the user's experience:

- **Says:** This quadrant captures what the user says aloud. It includes direct quotes, comments, and statements made by the user. These can provide insights into their expressed needs, desires, and preferences.
- **Thinks:** Here, you capture the internal thoughts and considerations of the user. This might include their concerns, worries, aspirations, and questions. It helps uncover the user's mindset and what they might think but not necessarily share.
- **Feels:** In this quadrant, you explore the user's emotions and feelings related to the problem or situation you're addressing. Understanding their emotional state helps you design solutions that cater to their emotional needs as well.
- **Does:** This quadrant covers the actions and behaviours of the user. What actions do they take in response to certain situations? Understanding their behaviours helps design solutions that align with their actions.

### **Personas** (*Board/Poster/...; Edding; Post-its*)

Personas are fictional characters representing different user groups or segments, helping humanise and understand users' needs, behaviours, and goals. Developing personas involves a structured



process of gathering information, analysing data, and creating fictional characters that represent your target user groups. Here's what should be considered when developing personas:

- Start by identifying user segments or groups interacting with the product or service.
- For each persona, give them a name and create a background story. Consider their demographics, job roles, hobbies, and relevant personal details.
- Outline the persona's goals, objectives, and tasks related to the product or service.
- Identify the persona's pain points, challenges, and obstacles.
- Include a photo or visual representation of each persona.

Finally, compile all the information into persona sheets that are easy to reference. Each persona sheet should provide a comprehensive overview of the persona's background, goals, behaviours, pain points, and quotes.

### **Creative Rephrasing** (*Board/Poster/...; Edding; Post-its*)

Creating a Design Challenge in one statement is a difficult task since every member of the team has their perspective on the topic. Therefore, it is helpful to invest some time to become clear about the actual problem by reformulating the sentence until everyone has the same understanding. Creative Rephrasing is a tool most useful at the end of the define phase.

To do so, the following steps are done:

- Write down the design challenge; best on a flip chart or whiteboard.
- Underline every keyword in the sentence.
- Brainstorm about every keyword and its meaning; discuss restrictions.
- Reformulate until the design challenge represents the actual problem.

### **Point of View (PoV)** (*Board/Poster/...; Edding; Post-its*)

The PoV (Point of View) method is a critical step in the design process that helps to distil the insights and observations gathered during the empathy phase into a clear and actionable problem

statement. The Point of View statement is framed as a concise and actionable problem statement that describes the user, their needs, and the insights gained from the research. It typically follows a structured format such as “User [user type] needs [user need] because [insight].”

## 2.3 Ideate

### **Brainstorming** (*Paper; Pencils; Board/Poster/...; Edding; Post-its*)

Brainstorming is a creative technique used to quickly generate many ideas, solutions, or possibilities. It's a collaborative process that encourages participants to think freely and without judgment, leading to innovative and unconventional ideas. The basic steps of brainstorming are:

1. Set a time limit (e.g., 10-15 minutes) for generating ideas.
2. Have participants individually write down as many ideas as possible related to the defined problem. They can use sticky notes, paper, or digital tools.
3. After the time limit, go around the room and have each participant share one idea at a time; record each idea on a visible surface, such as a whiteboard or a digital tool.
4. Cluster and organise ideas in visualisation on a whiteboard, flipchart, digitally, etc.
5. Initiate a discussion about the potential of each idea.

Brainstorming can be seen as a superordinate method to other ideate-phase methods, in which other methods can be integrated.

### **HMW-method (How might we...?)** (*Board/Poster/...; Edding; Post-its*)

The “How Might We” method is a powerful tool for shifting the focus from the problem itself to generating innovative solutions. It promotes a mindset of possibility and encourages participants to think beyond constraints. This technique is particularly effective when combined with other design thinking methods, such as brainstorming and prototyping, to develop and refine ideas that can lead to impactful solutions.

1. Use the design challenge statement and break it down into its essential components. Essential components are those that need to be addressed by the solution.

2. Transfer the design challenge statement into questions, each addressing one essential component starting with "How might we ...".
3. Use the "How Might We" questions as a prompt for, e.g., brainstorming.

### **6 Thinking Hats** (*Somethink representing the hats (Printed picture, coloured subjects, ...)*)

6 Thinking Hats is a creative problem-solving and decision-making technique that encourages individuals or groups to approach a problem or decision from different perspectives, represented by six metaphorical hats. Each hat represents a different thinking style, allowing participants to explore a variety of viewpoints. The technique aims to critical thinking and mitigate cognitive biases by systematically considering different angles. To do so, either assign each person one hat for the whole discussion or make hats metaphorically turn clockwise after, e.g., 5 min of discussion. The discussion can be in the setting of, e.g., brainstorming and other methods of the ideate phase.

- **White Hat (Facts and Information):** analyse what is known, identify gaps in knowledge, and gather relevant data to focus on objective facts, data, and information.
- **Red Hat (Emotions and Feelings):** express emotions, intuitions, and gut feelings without needing to provide rational explanations.
- **Black Hat (Critical Judgment):** identify potential risks, drawbacks, and problems from a cautious and critical perspective.
- **Yellow Hat (Positive Thinking):** focus on the benefits, opportunities, and potential advantages to look for the positive aspects of ideas.
- **Green Hat (Creativity and Innovation):** generate new ideas, explore alternatives, and think outside the box.
- **Blue Hat (Meta-Thinking):** represents process control of guiding the thinking process itself and managing the conversation.

### **6-3-5 method** (*Paper; Pencils*)

The 6-3-5 method collaboratively develops a large number of ideas for the specified problem. The focus is not on refining ideas but on the number of thought processes and involving the entire

group to open up diverse and creative pathways. A team of six individuals develops collectively: Each participant contributes three approaches initially, which are then expanded upon by the others in five iterations. The steps to do 6-3-5 are:

1. Take the design challenge statement.
2. Give each participant a sheet of paper with an empty table (3 columns with 6 rows).
3. In the first row, each participant thinks of three ideas for solving the problem.
4. After three minutes, the sheets are simultaneously passed clockwise.
5. In the next row, each participant endeavours to build upon and develop the ideas presented in the received sheet.
6. Steps 4 and 5 are repeated five times, filling all rows on the sheets.
7. Subsequently, the results are analysed, evaluated, and discussed with the entire group.

## 2.4 Prototype

Prototyping depends very much on the kind of product and service that should be developed. Building a visual prototype is less effective for services than doing a role-play and vice versa.

### **„Building it“** (*Various materials*)

„Building it“ can be on paper, with construction materials, digitally, or technically. The chosen method should match the idea that it represents. While building prototypes, it is important not to be too detailed and finalised. A prototype should offer points of weakness so they can be addressed appropriately.

### **Role Play** (*Notepad; Pencils; Eventually video recording device*)

Role-playing is the equivalent technique that supports the prototyping of primarily service prototypes. It helps teams visualise and test their ideas in a dynamic and interactive way. Role-playing involves participants taking on different roles or personas to simulate how users might interact with their prototype. For a role-play, set the specific scenario and aspects of the prototype that should be evaluated and assign roles (and eventually personas). After the role-play was conducted, note

down and discuss observations made during the play. Use the observations to reflect and iterate the prototype.

### **Storyboard** (*Paper; Coloured pencils; camera; digital tool*)

A storyboard is a visual tool to outline and communicate a user's journey, experience, or interaction with a product, service, or solution. It's a sequential series of images or sketches, accompanied by brief descriptions or captions, that illustrate the key steps, emotions, and touchpoints of the user's experience. When creating a storyboard, consider the following steps:

1. **Define the User's Story:** Which story should be told; *use the empathise and define phase.*
2. **Define the Users:** Who are the main characters in the story; *use personas.*
3. **Break down the Journey:** Identify the key steps/stages to be visualised.
4. **Create Visuals:** create 6-12 visuals (e.g., photos, sketches, etc.) that tell the story.
5. **Share and Discuss:** use the storyboard to tell the story and discuss the prototype.

## 2.5 Test

### **Testing Grid** (*Paper/Computer program*)

A testing grid is a structured framework used in usability testing to plan and organise the testing process. Therefore, it serves as a superordinate method for all testing efforts. The testing grid provides a clear and systematic approach to ensure that all relevant usability aspects are evaluated during the testing phase. A testing grid typically includes the following components in an individually chosen form of documentation: scenarios or tasks, user demographics, testing methods, testing environment, success metrics, moderation/facilitation, schedule and timeline, analysis and reporting, and action items/improvements.

### **A/B Method**

The A/B Method is a standardised comparison of two similar but different prototypes. The prototypes of interest are evaluated based on the same method/testing grid and then compared according to their scores. The prototype with better results/scores during the testing should be pursued.

**Walkthrough** (*Notepad; Pencils*)

A walkthrough is often done with experts in the field of the prototype. The prototype is shown and walked through with the expert while they offer their feedback for each step of the walkthrough. Before the walkthrough, experts are provided with any relevant materials or documentation. This might include designs, specifications, prototypes, or project plans. During the walkthrough session, the Design Thinking team/facilitator guides the expert through the material, explaining the prototype. The expert actively engages in discussions, asks questions, and provides feedback based on their expertise. A record of the walkthrough is often documented, capturing the discussed points, feedback, and improvement suggestions.

**Observation** (*Notepad; Pencils*)

Observation functions similarly to a walkthrough, but instead of experts pondering about the prototype, end-users are asked to work with the prototype. The testing end-user is allowed to use the prototype in every way possible. At the same time, an observing member of the Design Thinking team takes notes on the behaviour, struggles, and actions of the testing person. Observations are shared and discussed after the testing.

## 2.6 Implement

**Create a Pitch** (*Poster/Presentation/Flipchart*)

A pitch is a concise and persuasive presentation to convey an idea (product or service) to an audience, typically in a limited amount of time. The goal of a pitch is to capture the audience's attention, clearly communicate the key points, and generate interest from the listeners. Pitches can vary in length, from a quick 30-second elevator pitch to a more in-depth presentation lasting several minutes. Elements that should be included in a pitch are: the problem statement (design challenge), the solution (product or service) with its value and benefits, proof of success validation and a call to action. Overall, it should be delivered with enthusiasm and confidence.

### Implementation Roadmap (Software/Board/Poster/...)

An implementation roadmap is a strategic visual tool that outlines the step-by-step process and timeline for successfully implementing a Design Thinking project. It thereby serves as a guide for project teams, stakeholders, and decision-makers and helps ensure alignment, transparency, and effective coordination throughout the implementation process.

Key components of an implementation roadmap typically include:

- **Goals and Objectives:** provides a clear sense of purpose and direction.
- **Milestones:** represents critical phases or accomplishments that mark progress.
- **Timeline:** provides a visual representation of the project's duration.
- **Tasks and Activities:** breaks down the implementation process tasks and activities.
- **Responsibilities:** assigns responsibilities/accountabilities for each task or activity.
- **Dependencies:** indicates which tasks must be completed before others can start.
- **Resources:** human resources, equipment, budget, and technology
- **Risks and Mitigation:** recognises potential risks and mitigation plans to address these.
- **Communication Plan:** outlines the communication plan and audience.
- **Evaluation and Monitoring:** measures of the effectiveness of the implementation.

### Lessons Learned (Various materials)

Discussing and documenting lessons learned is an ongoing practice that contributes to personal and organisational growth and life-long learning. It involves reflecting on past experiences of the Design Thinking workshop to identify insights, improvements, and valuable takeaways. There is no standardised way to elaborate on lessons learned, so every suitable process is practical.

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