DESIGN THINKING FOR NOVICES

Designing a Corporate Course to Embed Design Thinking in Organisations

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Msc. Strategic Product Design Graduation Project

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Design is too important to be left to designers.

Raymond Loewy

One of the most famous industrial designers during the 20th century

Preface

This report has been written as part of the graduation for the Master of Science program Strategic Product Design at Delft University of Technology. The activities and documentation have been executed by Joris Blok, in cooperation with Mindsweepers and client organisations Cost Engineering, Ynnovate and the Ministry of Uitvoeringsorganisatie Bedrijfsvoering Rijk. The project has been part of Mindsweepers' aim to empower organisations to thrive in the 21st century by using Design Thinking. In addition to that, the project has contributed to Mindsweepers' product portfolio, by developing a multi-day course that can embed Design Thinking in organisations successfully.

My motivation during this project has been my passion for Design Thinking and my mission to use Design Thinking to enrich the work of others. Another personal motivation during this project has been the to gain the ability to prove to teachers at the faculty of Industrial Design Engineering at Delft University of Technology that a course can indeed help organisations to embed Desing Thinking successfully (even though they often think that the opposite is true).

First of all, I would like to thank Arnout Tombrock, Aafje Jansen-Romijn and Christiaan des Bouvrie (Cost Engineering), as well as Fleur Pullen and Inge van Dijk (Ynnovate) for the opportunity to test the prototype of the course. Secondly, I would like to thank all the twenty participants for their intensive participation in the course, as well as their overwhelming enthusiasm and appreciation during the course itself. Thirdly, I would like to thank my good friend and co-founder of Mindsweepers, Johan van der Schaaf, for giving training during the validation of the prototype to one of the groups. Fourthly I would like to thank Leo Hörnig and Arjen de Lange (Ministerie van Uitvoeringsorganisatie Bedrijfsvoering Rijk), as well as Jesse van der Mijl and Daniek Bosch (Centre for Innovation) for the opportunity to observe their five-day course and to incorporate points for improvement into this course. Lastly, I would like to thank my chair Jan-Carel Diehl and mentor Willemijn Brouwer of Delft University of Technology for providing feedback and guidance, and for facilitating this graduation project.

Summary

In this project, executed by graduation student Joris Blok from Delft University of Technology, a multi-day course has been designed that allows Design Thinking to be embedded in organisations successfully. The course teaches the Design Thinking process, as well as a set of essential mindsets for Design Thinking novices. Furthermore, the course empowers participants to integrate Design Thinking into their context at work. This project taps into the quality of current courses on the market, which is insufficient for people to understand Design Thinking as well as to comprehend how Design Thinking can be applied in practice.

The project has taken on a design-led approach. After a quick benchmark of several existing courses, a literature study has been executed. Subsequently, an existing course has been observed, and different interviews have been conducted with eight people from the target group, two Design Thinking trainers and ten participants that have participated in a Design Thinking course. These observations and interviews have led to several insights for the new course. Furthermore, as a set of key mindsets for Design Thinking novices has been selected based on a co-creation session with three design students and four people from the target group. The results have been used to develop an operational framework for Design Thinking novices, which integrates the Design Thinking process and key mindsets. This framework, as well as constructive alignment, have led to the realisation of a prototype of the course.

The prototype has been validated with twenty participants, divided over two different settings (i.e. an in-company course in the private sector and an open course in the public sector). The validation of the prototype has proven that the course is projectable in both situations. Furthermore, the activities of the course enable participants to accomplish the learning objectives.

Follow-up interviews have shown that participants actively integrate the key mindsets after the course into their context at work. An additional insight from the interviews was that the course must contain an overview of all the design methods and tools with practical guidelines to enable the participants to apply the Design Thinking process after the course. Furthermore, the course must empower participants to convince others in their context of the added value of Design Thinking in projects.

Based on these results, the prototype has been iterated and refined, and a final product has been presented, which is assumed to allow Design Thinking to be embedded in organisations successfully.

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Introduction

The term Design Thinking is heard more and more. Leading companies such as Apple, Google and Coca Cola practice it, and leading universities such as Stanford, Harvard and MIT teach it. But what is Design Thinking? Design Thinking is a stakeholder-centred way of doing and thinking that can be used by organisations to solve novel and ill-defined problems in a complex real-world setting. Organisations can solve these problems by creating products and services while integrating the needs of all stakeholders, technological possibilities and the requirements for business success.

Design Thinking has proven itself for decades to give organisations a strategic advantage. Companies on the S&P500 list (i.e. a list with the most successful companies in the world) that practice Design Thinking surpass all other companies on that same list for more than ten years with 228% (Westcott et al., 2013). As one can expect, more and more organisations are interested to learn Design Thinking, both in the private sector as in the public sector (Sameer, 2019; Carke & Craft, 2018).

While a variety of companies offer different Design Thinking courses on the market, it unfortunately often occurs that people are still unable to apply Design Thinking at work (e.g. Burnett & Heiman, 2007; Dunne, 2018). Therefore, this graduation project has aimed to develop a corporate course that allows Design Thinking to be embedded in organisations successfully. This way, companies can tailor their products and services better to the needs of their customers as well as all other relevant stakeholders. The primary goal of this project has been to create a multi-day course, which will not only teach participants the appropriate design methods and tools of Design Thinking, but also the crucial mindsets. This way, participants can be sure that they can practice Design Thinking at work after the course.

The author has organized the study design of this project according to a design-led approach. This choice has first and foremost been made by the author to show the reader the diversity of the Design Thinking process. Secondly, the author has made this choice based on his background as an Industrial Designer.

The first phase of the process has aimed to understand the design challenge of this project. The phase consisted of three main activities. The first activity was a quick benchmark of an existing course that is currently on the market. The second activity was a literature study about why Design Thinking fails to be embedded in organisations and about how one can successfully design a course. The third activity of this phase was an orientation in the field to understand the context of the subject. This orientation consisted of an observation of an existing course as well as the conduction of several interviews with the target group and Design Thinking trainers.

The second phase of the process has aimed to frame the primary goal of this project into smaller and more practical design goals, which has given the project more focus. The third phase has aimed to develop an operational framework that integrates the Design Thinking process as well as the Design Thinking mindsets for novices. This framework, as well as the constructive alignment method for course design, have formed the foundation of the new course.

The fourth and the fifth phases have aimed to realise a prototype of the new course as well as to validate the prototype with two groups of participants. Moreover, the phases have aimed to refine the prototype to a final product.

The structure of the book is as follows. Chapter one (see p. 14) presents the starting point of this project, and chapter two (see p. 20) discusses the relevant literature. Chapter two also defines the three smaller design goals that support the primary goal. Subsequently, chapter three (see p. 46) describes the orientation in the field, and it introduces the operational framework. Consecutively, chapter four (see p. 82) explains the realization of the prototype as well as its validation with two groups of participants. Chapter five (see p. 148) shows the final product of the course, and chapter six (see p. 182) devotes itself to a discussion as well as a conclusion. Lastly, chapter seven (see p. 190) describes a brief reflection of the author.

STARTING POINT



The author's experiences

The primary design goal has been initiated based on the experiences of the author. The author has been enthused by Design Thinking during his study Industrial Design Engineering, which has formed the base of his education. The author has noticed during his study that Design Thinking can also be of added value to people that are not specifically designers. Therefore, the author has co-founded the company Mindsweepers during his study together with a friend.

Mindsweepers teaches essential knowledge and skills to organisations which will allow them to thrive in the 21st century. The company offers short Design Thinking workshops, which aim to excite people to use Design Thinking to enrich their jobs. Unfortunately, it has often occurred that the interest in Design Thinking by the participants has been diluted after the workshops, even though they were very enthused by it during the workshops. This diluted interest has led to great frustration amongst the trainers of the company.

An additional cause that has initiated this project is that the founders of Mindsweepers have recently facilitated two projects at the Indian Institute of Technology Bombay. Afterwards, the author has noticed that people started applying Design Thinking at work, when they have been working with it over a longer period of time.

These two experiences have motivated the author to look for a possibility that allows him to let people work with Design Thinking over a longer time frame, thus allowing them to start applying it at work.

A quick benchmark of existing courses on the market

The author has executed a quick benchmark based on his motivation mentioned earlier. During this benchmark, it has been analysed how current organisations enable people to practice Design Thinking at work. Based on the benchmark, it can be concluded that there are several companies offering Design Thinking courses via the internet to organisations both in the private and the public sector. The majority of these companies promise on their website that participants can directly start applying Design Thinking in practice after the course.

The length of an average Design Thinking course can be estimated at three full working days. Furthermore, companies offer training both as an open course (i.e. a course where the participants originate from different organisations) and as an in-company course (i.e. a course where participants originate from the same organization). Besides, the average course offers room for ten to twelve participants with a bachelor's degree or higher.

However, the author has also noticed during benchmark that a vast majority of teachers at his faculty of Industrial Design Engineering have a negative opinion on the Design Thinking courses that have been analysed.

The teachers have claimed that the quality of these courses is insufficient to embed Design Thinking in organisations successfully. Therefore, they do not see the added value of these Design Thinking courses for organisations.

The mentioned benchmark, as well as the two experiences from the previous paragraph, have motived the author, even more, to look for a possibility that will genuinely enable people to start applying Design Thinking at work.

Primary design goal

Based on the author's personal experiences and the benchmark, he has decided to define the following primary design goal:

Designing a Corporate Course to Embed Design Thinking in Organisations successfully

The course must educate people to become Design Thinking novices (i.e. people with a basic understanding of Design Thinking). Furthermore, it is essential that the course allows these people that they can actively apply Design Thinking in their context at work directly after the course. This primary design goal defines the starting point of this graduation project.



INSPIRATION IN THE LAB



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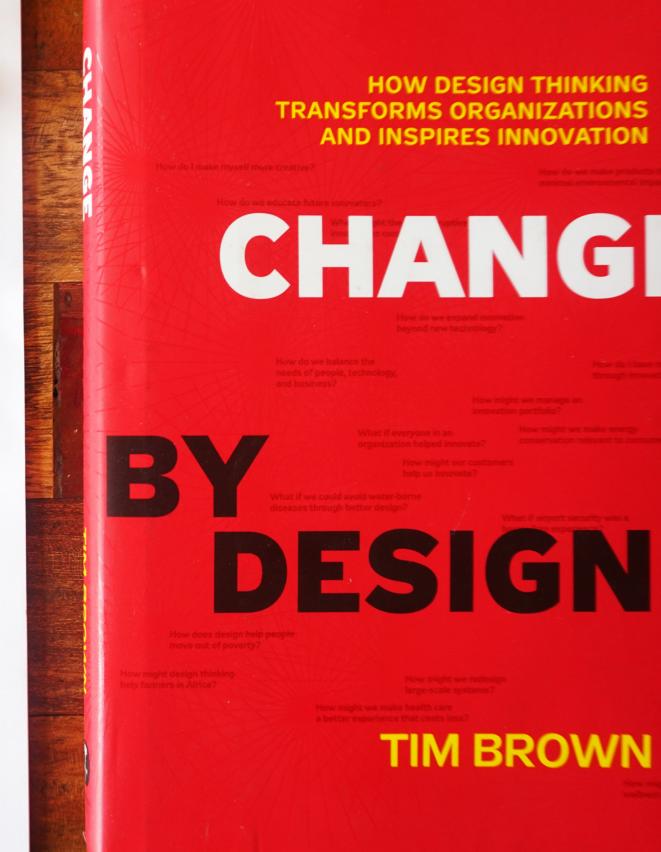
The Design Thinking Mindset: An Assessment of What We Know and What We See in Practice

BSTRACT

We review the design and management literature to identify and define key components of a design thinking mindset and report initial findings from fifteen and epth interviews with innovation managers, who reflect on their practices while implementing design thinking in their organizations. Our study confirms set of commonly understood and applied mindsets, but also reveals organizational constraints on translating cognition into behaviour. We argue that further that the property of design thinking mindsets and linking them to leadership theory provides suitable point of departure for the study of design thinking and its role for amovation.

KEYWORDS

design thinking leadership mindset innovation human-centred design





Theoretical background

To get a better understanding of how a corporate course can be designed that can embed Design Thinking into organisations successfully, a literature study has been done concerning what Design Thinking is, how it can be taught and how it often fails to be embedded in organisations. The results of this study have been integrated into a theoretical background that has guided all further choices in this project. The theoretical background has been divided into two sections. The first section (see p. 26) describes how Design Thinking is defined and characterized. The second section is about training and learning (see p. 35). This section describes how a course can be developed and how it can be executed effectively. Furthermore, this section describes how people learn, and it discusses some recent tips concerning learning and Design Thinking.

Design Thinking

Design Thinking has its roots in the 1960s, where efforts were made to discover how the design discipline fits in the field of rational sciences (Cross, 2001). Horst Rittel, a design theorist that is well-known for coining the term 'wicked problems' (i.e. problems that are ill-defined, complex and multidimensional), spoke and wrote extensively in the mid-1960s about how design methodologies can be used to tackle wicked problems (Rittel & Webber, 1973). In 1969, Herbert Simon was the first to see design as a way of thinking (i.e. Design Thinking) and found this way of thinking crucial for just the designers (Simon, 1969).

Later in 1991, the company IDEO saw the opportunity to commercialise and market Design Thinking for people that are not necessarily designers. They believed that designers master a set of skills that can be applied to a broader range of problems (Brown & Katz, 2011). To allow non-designers to quickly and easily become oriented with Design Thinking to solve their broad range of wicked problems, the company created its own customer-friendly terminology, steps and models. Design Thinking should replace the conventional converging and analytical way of thinking during problem-solving. In this conventional way of thinking, people tend to choose and execute only one idea out of a fixed set of existing ideas and to pull problems apart into separate parts to solve these parts individually (Brown, 2009).

There is little consensus about what Design Thinking is exactly, and currently, there are several definitions, models and processes that are being used to describe Design Thinking. For instance, by looking at the definition of Design Thinking, it is unclear whether it should be considered as a process, a way of thinking or both. Below are three different examples of definitions:

"Design Thinking is a human-centred innovation process that emphasizes observation, collaboration, fast learning, visualization of ideas, rapid concept prototyping and concurrent business analysis." (Lockwood, 2011) "Design Thinking is a style of thinking that combines empathy for the users and immersion in the context of a problem, creativity in the generation of insights and solutions and a data-based experimental approach to assessing the quality of solutions." (Liedtka & Ogilvie, 2011)

"Design thinking is a human-centred approach to innovation that draws from the designer's toolkit to integrate the needs of people, the possibilities of technology, and the requirements for business success." (Brown, 2009)

A new definition is proposed, while also integrating several elements of these definitions into one whole:

Design Thinking is a stakeholder-centred way of doing and thinking that can be used by organisations to solve novel and ill-defined problems in a complex real-world setting. Organisations can solve wicked problems by creating products and services while integrating the needs of all stakeholders, technological possibilities and the requirements for business success.

This definition considers Design Thinking as a process that allows people to navigate through different phases when solving a problem, and it defines Design Thinking as a supporting way of thinking (Schweitzer, 2016). Furthermore, the definition shares Brown's vision that designers should integrate the needs of people, technological possibilities and the requirements for business success.

Moreover, the definition is critical towards the term human-centred, which solely focusses on meeting the needs of people. By centring on the human-perspective, solutions are developed in isolation from the larger systems around us. This means that the inward-looking approach of human-centred design neglects the risks of broader impacts and possible collateral damage. Luckily, more and more people understand

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the need to break out of the human-centred bubble and to broaden the perspective to design for the future. Therefore, according to this new definition, Design Thinking should focus on meeting the needs of all stakeholders, in other words, those of all people and nature that are affected by an organisation or project or that can affect an organisation or project (Boutilitier, 2011). For instance, the country of Ecuador is now the first country in the world that recognizes the rights of nature in its constitution (Constitution of Ecuador, 2008).

Design Thinking as a process

Many different Design Thinking process models can be found in literature. The primary goal of these models is to define steps in the Design Thinking process. The models can be linear (e.g. IDEO or the d.School), circular (e.g. SAP or DEEPdt) or iterative (e.g. Interaction Design Foundation). Over the years, Design Thinking models have used a variety of terms, and they have differences and similarities in their stages. For instance, some models have chosen to cluster the stages of the process into only three stages (e.g. IDEO). In contrast, others have divided these stages into more and smaller ones, that can lead up to nine stages (e.g. Interaction Design Foundation).

Many Design Thinking processes can be found; however, there is not one that is necessarily the best (Brown, 2009; Jakovich et al., 2012). The process is always roughly the same, and an identical set of phases can be identified.

With an eye on the development of a course for Design Thinking novices, the Design Thinking course has been inspired by the model of Rozendaal and Schuffelers (see figure 1). The model of Rozendaal and Schuffelers is used to give students a jump-start with the study Industrial Design, where the focus lies on learning how to solve social problems (Rozendaal & Schuffelers, 2018). The design students have no prior knowledge regarding the subject relatively similar to the people that take part in Design Thinking courses. Therefore, this process has been an interesting choice to further integrate into the new course.

The model of Rozendaal and Schuffelers considers Design Thinking as a cyclical process, including four phases: framing, envisioning, realizing and validating. These phases encompass three domains: people, technology and business. The first phase of the process is framing, which is about understanding and framing a design problem. In this phase, the designer wants to get to the core of a problem, for example, by identifying all the different stakeholders and by taking on multiple perspectives. Moreover, the designer wants to narrow down the problem to achieve focus.

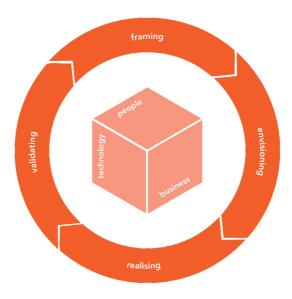


Figure 1: A model that is used to teach the Design Thinking process to design students in their first year. Adapted from "PO1 Studiehandleiding 2018-2019", by Rozendaal, M. & Schuffelers, P. (2018). Retrieved from https://www.studeersnel.nl/nl/document/technische-universiteit-delft/po1-introduction-io/verplichte-opgaven/po1-studiehandleiding-2018-2019/2978357/view

The second phase is about envisioning or searching for possible solutions that can solve a problem. In this phase, multiple creativity techniques are applied to generate countless ideas. Furthermore, most favourable ideas are selected in this phase based on a variety of criteria.

The third phase of the process is realising. In this phase, a solution is concretized by the designer into a prototype, which is a preliminary, cheap and simplified version of a possible solution. There are lots of different ways to create a prototype (e.g. mockups, models or role-play). The aim remains the same; you create only enough to be able to test your idea with stakeholders and to get feedback.

The fourth and last phase of the process is validating, or in other words, judging the potential of a solution based on quality. In this phase, the designer needs to take on a critical attitude towards a possible solution, by actually confronting stakeholders with the prototype and by conducting small experiments with it. The feedback from these experiments can be used to further iterate on the idea (i.e. improving the idea) or to decide to explore a completely different idea.

According to Rozendaal and Schuffelers (2018), there are many iterations necessary to get from a problem to a successful solution. Therefore, a designer continuously needs to navigate back and forth through the different phases. This way, the designers gain more insight into the problem and a fitting solution. Furthermore, a designer must actively integrate the needs of people, the technological feasibility and the goals of their organisation or client into the design process. Therefore, they always have to bear in mind crucial points as:

- How will the different stakeholders experience the problem or the solution?
- Can the solution be made with existing technology?
- What is the market potential of the solution?

The designers should use different design methods and Design Thinking tools during the whole process. These methods and tools (e.g. interviewing, persona's and rapid prototyping) are essential techniques that should be used in the different phases of the (Design Thinking) process allowing designers to understand the problems better as well as to find fitting solutions (Chasanidou et al., 2015; Gänshirt 2011).

Design Thinking as a way of thinking

The Design Thinking process, as described earlier, is guided by a way of thinking. This way of thinking consists of eleven Design Thinking mindsets (listed further down below). These mindsets are apparent during the whole process (Schweitzer et al., 2016). According to Schweitzer et al. (2016), there is a clear distinction between the Design Thinking mindsets and the traditional definition of mindsets in social-psychological literature, where mindsets should be categorized into thinking, doing and feeling. However, mindsets in Design Thinking consist of thinking as well as doing; both cannot be separated from each other (Kimbell, 2011).

Anyone can learn the different Design Thinking mindsets (Rauth et al., 2010; Lawson, 2005; Porcini, 2009). However, some mindsets require more experience from the designer (Schweitzer et al., 2016). According to David Kelley (2019):

"Experienced Design Thinkers possess and implement all mindsets while practising the process."

The Design Thinking mindsets can be distinguished into two categories:

(1) Mindsets that are apparent in Design Thinking novices (designers with no to little experience) as well as Design Thinking professionals (designers with relatively much experience).

Empathetic towards people's needs and context

The designer understands that empathy for all stakeholders is necessary to understand the social context of a problem.

Collaboratively geared and embracing diversity

The designer understands that cooperating and sharing knowledge are essential conditions to solve problems. Design Thinking professionals tend to work in multidisciplinary teams, because the multiple perspectives in these teams allow them to deal with contexts that are messy, complex and ambiguous (Jobst et al., 2011).

Inquisitive and open to new perspectives and learning

The designer is driven by curiosity and uses small experiments with stakeholders to catalyse the process.

Mindful of the process and thinking modes

Designers understand how and when they should navigate through the different phases of the Design Thinking process. Design Thinking professionals understand when and how they should use converging or diverging thinking modes as well as how to balance between analytical and intuitive thinking.

Experiential intelligence

Designers understand the power of working visually and they consider it as an essential form of communication. Designers use this way of working to prevent themselves and others from staying in the abstract.

Taking action deliberately and overtly

Designers understand that taking action allows them to catalyse the Design Thinking process.

Consciously creative

Designers understand that creativity is critical to explore less tangible and more subjective content as well as bringing the non-explored to live.

Accepting uncertainty and open to risk

Designers understand that there is little to no data in complex situations and that there is no direct pathway that leads to an innovative solution. Therefore, they dare to make decisions.

Critically questioning

Designers understand that they should always be critical towards what they think they know during the whole Design Thinking process.

(2) Mindsets that are only apparent in Design Thinking professionals and thus require more experience.

Modelling behaviour

Design Thinking professionals tend to influence the design team, by spreading optimism, guiding the team though the phases of the process and stimulating creative confidence.

Desire and determination to make a difference

Design Thinking professionals often want to be a catalyst for change and can convince others of problems and solutions with a high degree of confidence.

Why Design Thinking often fails to be embedded successfully

Design Thinking is becoming more and more popular among organisations in both the public and the private sector (Sameer, 2019; Carke & Craft, 2018). Designers respond to this demand by either supporting organisations in projects or by training companies in Design Thinking (Brown, 2009). Unfortunately, it often occurs that Design Thinking is embedded unsuccessfully. Two common bottlenecks are described below.

Practising Design Thinking as a process without the mindsets

The first reason why Design Thinking often fails to be embedded successfully is that it is often dumbed down in a course to just a process, without teaching the corresponding Design Thinking mindsets (Dunne, 2018). Companies that practice Design Thinking after a course without having the necessary mindsets will often treat Design Thinking like a linear, step-by-step efficiency process. They spend too little time gaining a deep understanding of the problem and tend to go too quickly towards the solution-space of the process (Koh et al., 2015; Nussbaum, 2011). The Design Thinking mindsets are the most crucial elements in the Design Thinking approach (Hassi and Laakso, 2011) and practising the Design Thinking process without the mindsets will be doomed to fail (Kimbell, 2012; Schweitzer et al., 2016; Sobel & Groegel, 2013b).

Not being able to remove the fear of critique and failure

The second reason why Design Thinking often fails to be embedded successfully in organisations is the lasting fear of critique and failure. People are, by nature, averse to critique and failure (Burnett & Heiman, 2007). However, a large part of Design Thinking focusses on gathering critique to obtain more knowledge about the problem and the solution. For instance, to gather critique and to iterate on it, designers make use of prototypes. Therefore, it is not a bad thing if a prototype fails, because a prototype is meant to be criticized. While this is taught to people in Design Thinking courses, they are often misunderstood when they return as designers to their organisations. Managers, colleagues and other stakeholders do not understand what a prototype in Design Thinking is and often see it as a highly detailed model that is

almost ready for production. Due to this significant difference in the definition of the word 'prototype', designers become afraid to show something that is not finished. This often leads to the temptation of the designers to wait too long with showing a prototype, allowing them to fall back into old patterns, where they wish to please the expectations of others. This way, the fear of critique and failure will remain.

Fear of critique and failure is most apparent in the public sector (Muente-Kunigami, 2018; Clarke & Craft, 2018). On the one hand, governments do not dare to invest in solutions that have a possibility of failing, resulting in lots of initiatives that are not being launched. On the other hand, when innovation projects are financially supported but seem to fail during the validation phase, governments are afraid to admit this kind of failure, because it means that public resources have been wasted. The result is that these projects fail endlessly due to a lack of necessary iteration cycles.

Training and learning

In this section, a theoretical foundation has been formed regarding training and learning. Page 35 describes how constructive alignment contributes to the development of a successful course. Next, page 37 describes how the effectiveness of teaching during a course is enhanced by taking on a specific role. Subsequently, page 38 describes how people learn according to the learning cycle of Kolb (Kolb, 1984). This helps to understand how participants can successfully obtain information in a course and how they can retain it afterwards. Lastly, page 39 highlights a few tips that can be used in the education of Design Thinking.

Constructive alignment

The design of a course consists of three main components: The intended learning objectives, teaching and learning activities and the assessment and feedback tasks. In a well-designed course, those three components should all be aligned with each other. This is called constructive alignment (Biggs & Tang, 1999). When all the components are aligned, the learner is enveloped in a supportive learning experience. The three course components must also consider the course context to achieve a coherent learning experience.

The course design triangle (see figure 2) supports constructive alignment. It is a model that simplifies and visualises the course design process, and it can be used to understand how the elements must be aligned (Shaw et al., 2016).

Assessment Course context Activities

Figure 2: Constructive alignment, supported by the course design triangle. Adapted from "The Course Design Triangle", by Shaw, A., Norman, M. & Davis, M. (2016). Retrieved from https://ctl.wiley.com/course-design-triangle/

When developing a course, it is best to apply the elements of the model in a specific order. The first step when developing a course is exploring the course context. In this step, one wants to get to know as much as possible about the context of the course. For example, by exploring the course context trainers can understand what the participants already know and what motivates them. This way, the learning objectives in the next step can be carefully tailored to the participants.

The second step is to determine the learning objectives. The learning objectives form the foundation of every course and describe what the participants should know as well as which skills and competencies they should have acquired at the end of a course. By being transparent towards the participants about the learning objectives beforehand, unnecessary tension and conflicts can be prevented later in the course. Furthermore, in this step knowledge should be prioritized, allowing only the necessary learning objectives to be implemented (Carnegie Mellon University, n.d.).

The third step when developing a course is to determine a variety of activities. These activities are the actions that will be performed by the trainers and participants to reach the learning objectives. Examples of activities that can be used during a course are presentations, discussions and group work (Shaw et al., 2016).

The fourth and final step when designing a course is determining the right form of assessment. The assessment consists of methods and tasks that a trainer uses to monitor

the progression of the participants regarding the learning objectives. Two forms of assessment that can be used in a Design Thinking course are performance assessment and self/peer-assessment. Performance assessment is a method that is commonly used during courses to measure complex competencies that the participants need in real life (Straetmans, 2017). During this assessment, participants have to show that they 'see and do things differently' as a result of the new knowledge that has been gained (Biggs, 2003).

A suiting format of performance assessment for a Design Thinking course is to let participants work on a project during the course, where all the activities are based on a real-life case. Noteworthy is that the participants can show how they have approached the problem, how they have used the data and resources, how they have applied the factual knowledge and how effective the solution will be (Biggs, 2003). Trainers should carefully manage that participants take on tasks that are outside their field of expertise when participants work in groups during projects. This way, learning can be optimised. However, a trainer must make clear during projects that learning is more important than the actual outcome of the case. Participants who understand this will take more risks in a course and tend to take on more significant challenges (Bransford, 1999).

A popular supplementary form of assessment that can speed up performance assessment is self/peer-assessment. In this kind of assessment, participants assess themselves or others during or at the end of a course. According to Biggs (2003), self/peer-assessment can lower the workload of a trainer by more than thirty per cent.

Taking on the role of a trainer

The quality of a course is also dependent on its execution. A vital ingredient of successful training demands from trainers that they consciously take on the role of a trainer. Taking on the role of a trainer requires several focal points (Condon, 2019). First of all, a course traditionally concerns the learning process, where a fixed set of learning objectives is created beforehand. Therefore, the main focus of the trainer should be on the participants accomplishing these objectives.

Secondly, a trainer needs to provide knowledge and competence into sperate chunks to the participants, for which he has to assume the role of the teacher and the participants that of students. Thirdly, a trainer should focus on achieving success in the long term. Therefore, they must emphasise during the course that concepts must be continually reinforced, practised and refined by the participants.

How people learn

It is crucial to know how people learn to understand how participants can obtain information during the course and retain it afterwards. Learning can be seen as the process whereby knowledge is created through the transformation of experience (Kolb, 1984). This kind of experiential learning can be seen considered as a cyclical process, in which someone goes chronologically through four stages (see figure 3) (Kolb, 1984). It is possible to enter the process at any stage and follow it through its logical sequence.

The first stage of the process is by coming across a remarkable event, also known as a concrete experience. This concrete experience is always the result of an action or an activity. To learn from this experience, one should enter the next stage where the concrete experience is analysed during reflective observation. The third stage of the learning process is that one should create an abstract conceptualization of the information, where the information is processed into different concepts that are then connected to existing knowledge. In the fourth stage of the process, one actively experiments (i.e. active experimentation) with these new concepts, until he/she comes across a new concrete experience and goes through the whole learning cycle again.

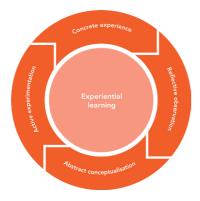


Figure 3: Experimental learning according to Kolb's learning cycle. Adapted from Experiential learning: Experience as the source of learning and development, by Kolb, D., 1984 (Vol. 1). Englewood Cliffs, NJ: Prentice-Hall.

By considering this theory, it can be assumed that trainers must allow the participants to go through the whole learning cycle. Therefore, the activities in the course should allow for (1) active experimentation, (2) concrete experiences, (3) reflective observation and (4) abstract conceptualisation.

Learning and Design Thinking

According to Mishra and Koehler (2003), the best way to teach participants Design Thinking is to let them practice it. Koh et al. (2015) add to this that participants should work on a specific case and that they should be able to create and validate a prototype. This way, they can learn how to quickly and easily apply simple iterative refinements on their ideas.

Moreover, trainers should create a creative and non-judgemental environment, which is critical in Design Thinking to stimulate creativity (Ulibarri et al., 2014). A way to create this kind of environment in a course is to let participants explore Design Thinking in a playful way and by bringing metaphors into the game (Gachago et al., 2017). Metaphors allow ideas to be communicated easily and effectively. Furthermore, they make it easier to exchange feedback, and they enable the inspiration of others (Mishra & Koehler, 2003).

Main takeaways

Based on the theoretical background, eight main takeaways have been identified. These main takeaways have actively been incorporated in the development of the new Design Thinking course. Furthermore, they have allowed the primary design goal to be divided and concretized into smaller design goals for this project (see p. 42).



Practising Design Thinking without the necessary mindsets will be doomed to fail. It is rather remarkable that trainers often do not include these mindsets in their course.



Eleven different mindsets can be learned to support the Design Thinking process, where some mindsets require more expertise than others.



Design Thinking courses often do not succeed in removing the fear of critique and failure, which leads to an unsuccessful implementation of Design Thinking in organisations.



The model that is used to give design students a jump start with Design Thinking can also be used to train Design Thinking novices.



Constructive alignment supports the development of a successful course.



Taking on the role of trainer is critical when executing a course.



One should have gone through the whole learning cycle of Kolb during a course, to obtain and retain the information that has been taught.



Design Thinking should be taught in a course by letting multidisciplinary teams work on a specific case in a creative and playful environment.

Three Design Goals

The eight main takeaways from the theoretical background have allowed the primary design goal from chapter one to be divided and concretized into three smaller design goals.

Identify a set of key mindsets for Design Thinking novices

The theoretical background shows that Design Thinking can only be embedded in organisations successfully when trainers have taught Design Thinking to participants both as a process and as a set of mindsets. However, it is unclear what this set of mindsets specifically looks like in a training. For instance, while the theoretical background differentiates between Design Thinking mindsets for novices and professionals, it is unclear which mindsets are critical to practice the Design Thinking process successfully. Therefore, a set of key mindsets for Design Thinking novices must be identified that should be integrated into the course.

Determine how the Design Thinking process and key mindsets should be taught in a course

It can be assumed that the model of Rozendaal and Schuffelers can be used to teach the Design Thinking process to novices. Furthermore, the theoretical background shows that constructive alignment can be used to create a course. However, it is still unclear how constructive alignment can incorporate the model of Rozendaal and Schuffelers into a successful course. Moreover, is it unclear how the set of key mindsets

should be integrated the course and which activities should be used to support both elements. Therefore, it must be determined how the Design Thinking process and key mindsets should be taught in a course.

Identify how the course can remove common barriers that prevent Design Thinking from being embedded in organisations successfully

The theoretical background shows that businesses and governments often fail to embed Design Thinking into their organisations successfully. The two leading causes are (1) practising Design Thinking as a process without the mindsets, (2) a remaining fear of critique and failure. To successfully develop a corporate course that allows Design Thinking to be embedded in organisations, it must be identified how a course can remove these barriers.*



^{*} This design goal has further been refined after the orientation in the field (see Ch. 3, p. 64).

In summary

In this chapter, a literature study has been done about Design Thinking and about training and learning. Eight main takeaways have been identified, which have allowed the primary design goal to be divided and concretized into three smaller design goals.

The first goal is to identify a set of key mindsets for Design Thinking novices. The second goal is to determine how the set of key mindsets and the Design Thinking process can be integrated and taught in a successful course. The third design goal is to identify how the course can remove common barriers that prevent Design Thinking from being embedded in organisations successfully.

The next chapter describes how these goals have been targeted by exploring the course context.

Progression



PROCESS

While a Design
Thinking
process has been
identified, it is still
unclear how the
process can be
implemented in a
course.

30%



MINDSETS

Eleven mindsets
have been identified.
It is unclear which
mindsets are
essential for Design
Thinking novices
and how these
mindsets can be
implemented in a
course.

20%



CONTEXT

Literature shows
common bottlenecks
that prevent
organisations
from embedding
Design Thinking
successfully.
However, it is still
unclear how the new
course can remove
these bottlenecks.

0%





Approach

The research in the lab has been followed by an orientation in the field. The goal of the orientation in the field has been to accomplish the design goals from chapter two as well as to learn more about the context of the new course. First of all, interviews have been conducted with the target group to discover how Design Thinking fits in the lives of the participants (see p. 50). Secondly, an existing course has been attended to understand how the process and mindsets can be implemented in the new course as well as to find out where existing courses on the market fall short (see p. 51). Finally, a co-creation workshop has been organised to discover which mindsets are vital for Design Thinking novices (see p. 54).

Activities

The approach consists of three types of activities: interviews with the target group, competitor observations with follow-up interviews and a co-creation workshop.

Interviews with the target group

To better understand the participants of the new course, semi-structured interviews (see Appendix A) have been carried out with eight people that have participated in the prototyped course, later in this project. This has helped to find out how Design Thinking can be applied in the context of Design Thinking novices.

First of all, the participants have been asked what kind of wicked problems they occasionally encounter at work and how they deal with these kinds of issues. Secondly, participants have been asked how they deal with innovative ideas at work and what causes these ideas to be carried out or to be neglected. Thirdly, because stakeholders play a central role in the Design Thinking process, participants have been asked three things:

- How do they currently interact with stakeholders?
- · How well do they think they know their stakeholders
- How are they connected with their stakeholders?

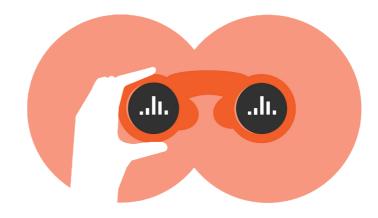
All the information has been captured via notes and audio.

The observation of an existing course, followed by follow-up interviews

To understand how the Design Thinking process and the mindsets can be incorporated into the course as well as to discover where current Design Thinking courses fall short, an existing five-day Design Thinking course has been attended. The course is developed within the ministry of Uitvoeringsorganisatie Bedrijfsvoering Rijk and organized for government officials who, despite their function, wanted to be able to innovate in a better and smarter way.

During the course, the participants and the trainers have extensively been examined. For example, the structure of the course, as well as the support of the trainers, have been analysed. Furthermore, it has been investigated whether the participants have encountered any problems during the course and how the participants have dealt with these kinds of problems. Moreover, the trainers have been asked for several tips during semi-structured interviews (see Appendix B).

All the information has been captured via notes and pictures.



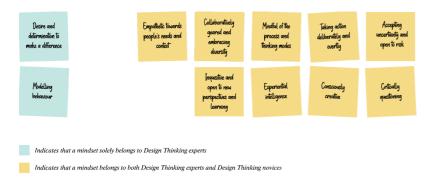


Co-creation workshop: A set of key mindsets for Design Thinking novices

To find out which mindsets are the most essential for Design Thinking novices and thus should be incorporated into the course, eleven Design Thinking mindsets from the theoretical background (see ch. 2, p. 31), have been converged. Below is described how three mindsets have been selected based on three steps; eliminating, clustering and practical co-creation sessions.

Step one: Eliminating

First of all, all the Design Thinking mindsets, which are not commonly possessed by Design Thinking novices, have been eliminated.



The theoretical background divides the eleven mindsets into two categories.

- Mindsets that are apparent in Design Thinking novices as well as Design Thinking professionals.
- Mindsets that are only apparent in Design Thinking professionals and thus require more experience.

Therefore, it can be concluded that the mindsets in the second category do not have a priority to be implemented into the course and thus can be excluded. The nine resulting mindsets have further been converged in the next step through clustering.

Step two: Clustering

The nine resulting mindsets from the previous step have been combined into different clusters based on their similarities. From the nine mindsets, five of them have been divided into two distinct clusters. The resulting mindsets have been considered as four clusters of one each. Moreover, to make the clusters more accessible to the participants, the clusters have been translated into new and simplified mindsets. Important to note is that the element of courage has been added to the majority of the clusters, based on the common fear of failure and critique that can occur in each of them (see H2, p. 33).



The first cluster, with the name 'Dare to go outside to explore the problem', consists of three mindsets:

- Critically questioning
- Taking on action deliberately and overtly
- Being empathetic towards people's needs and context

The core of the cluster revolves around the tendency of designers to visit the social context of a problem to understand it truly. The two mindsets 'being empathetic towards people's needs and context' and 'taking on action deliberately and overtly' share the similarity that designers understand that the inclusion of stakeholders in a project is critical to get a deep understanding of the problem. In turn, the two mindsets correspond to the mindset 'critically questioning', which states that designers are continuously critical towards what they think they know and that they want to validate their assumptions by visiting the context, as well as to talk with different stakeholders.

The second cluster, with the name 'Dare to confront important stakeholders with small experiments', consists of four mindsets:

- Accepting uncertainty and being open to risk
- Critically questioning
- Taking action deliberately and overtly
- Being inquisitive and open to new perspectives and learning

The core of this second cluster revolves around the fact that designers tend to involve stakeholders when developing and validating prototypes. They perform these actions to be able to create a solution that meets the needs of all stakeholders. The four mindsets have in common that prototypes are a critical part of Design Thinking. Solutions for wicked problems are not obvious beforehand, and thus designers should take the risk to bring possible solutions to the table and test them ('accepting uncertainty and being open to risk'). Possible solutions, however, are not accepted without validation. Designers are critical towards what they think they know ('critically questioning'). They make simple prototypes of their ideas and conduct small experiments with stakeholders ('taking action deliberately and overtly') to test the potential of their solution, as well as to gain new insights ('being inquisitive and open to new perspectives and learning').

The four remaining mindsets do not share significant similarities and are thus considered as four clusters of one each. The mindsets have been translated as follows:

- The mindset 'experiential intelligence' has been translated into 'dare to work visually, not only within your team but also with your stakeholders'.
- The mindset 'collaboratively geared and embracing diversity' has been translated into 'dare to embrace the diversity of your team members'.
- The mindset 'consciously creative' has been translated into 'dare to be creative and dare to make the unknown come to life'.
- The mindset 'mindful of the process and thinking modes' has been translated into 'be conscious of the Design Thinking process'.

Step 3: Co-creation sessions Finally, to converge the six remaining mindsets even further, two co-creation sessions have been organised in which design students and people from the target group have been instructed to select the most valuable mindsets for the course. The sessions have been conducted with two different groups: A group of four people from the target group with no prior knowledge of 5. Dur visuael te werker, niet alleer binner je team, maar Design Thinking. 1 Wees A group of three master students, all with a background in Industrial Design of belangryke stakeholders confronteres met kleine Engineering, but each with a different master's in Design. ook met belangrijke stakeholders lever The different groups have been chosen explicitly. The three master students have perimenta encountered Design Thinking at the start of their bachelor and Design Thinking # tangibles # communication # bring thought to life # crea has been the foundation of their studies ever since. By looking back at which mindsets have been essential at the beginning of their studies, it was easy for them to understand which mindsets would be indispensable for Design Thinking sk # taleing action # learning novices. Furthermore, by involving the target group and by looking through their perspectives, it could be identified which mindsets would be a valuable addition to I WONDER HOW their current way of working. EUERYTHING WORKS ?! The co-creation sessions were almost identical. For both groups, the six remaining mindsets have been divided over different individual pieces of A5 paper, each with a simple visual and a title. All the mindsets have been divided over the table in no particular order. Both workshops have started with a short introduction of Design Thinking and with a brief explanation of the mindsets. Furthermore, three post-it notes have been handed out to each participant of the session, along with the instruction to divide the post-it notes over three of the six mindsets. The workshop has been different in this aspect for both groups because the group of students have been asked to divide the post-it notes over three mindsets of which they thought these would be the most useful for Design Thinking novices. In contrast, the group of future participants have been asked to divide the post-it notes over the mindsets that would be an addition to their current way of working. Finally, both groups have been instructed to clarify the reason behind their choices. The information has been captured with notes, auto and pictures. The result of this co-creation session can be found on page 68. Durf naar buiten te gaan om het probleem te vorkenne 4 Wees bewust van het Design Thinking Proces diversiteit te ontarmen



Results

The interviews, the observation and the co-creation workshop, have led to the following results. First of all, based on the observation of an existing course, three critical areas of concern have been identified that must be taken into account in the development of the new course. Secondly, the observation has led to further refinement of one of the design goals. Thirdly, a set of three key mindsets for Design Thinking novices has been identified based on the co-creation session and the interviews with the target group.

Based on these results, combined with the information from the theoretical background, a new framework has been developed for Design Thinking novices. This framework integrates both the Design Thinking process as well as the three key mindsets. Moreover, the framework has been translated into nine learning objectives.







Three key mindsets for Design Thinking novices

Based on elimination, clustering and the co-creation sessions, three key mindsets have been identified for Design Thinking novices. During the co-creation sessions, it has appeared that, even though people had the option to choose from six different mindsets, almost all the participants chose for only three of these mindsets. Based on this result, a set of three key mindsets for Design Thinking novices has been determined. Therefore, one of the design goals has been accomplished, namely 'identifying key mindsets for Design Thinking novices'. Also, the three mindsets have not only been indicated as essential for Design Thinking novices by designers, but they have also been regarded to enrich the workplace by people who do not have any knowledge of Design Thinking. The three key mindsets are further explained below.

Mindset 1: Dare to go outside in order to explore the problem

The first mindset for Design Thinking novices is 'Dare to go outside to explore the problem'. This means that, when one solely analyses and interprets a wicked problem within his/her context, he/she will never fully understand it and be able to solve it. It has been mentioned multiple times by participants during the co-creation sessions and the interviews, that people are often tempted to explore problems solely at the office. This means that the problem, as well as the solution, are firmly based on assumptions. To prevent Design Thinking novices from building upon the wrong assumptions, they should continuously be critical towards what they think they know. They should also explore the context of the problem, for example, by engaging with different stakeholders. According to the design-students during the co-creation session:

"During small observations of the context of by conducting small interviews with stakeholders, you will learn essential information that you would have never retrieved when you would have analysed the problem solely from within your context."

Mindset 2: Dare to confront key stakeholders with small experiments

The second mindset for Design Thinking novices is 'Dare to confront important stakeholders with small experiments'. This means that one will never be able to find the best solution to a problem when he/she develops ideas solely from within his/her context without including relevant stakeholders. During the co-creation sessions, it has appeared multiple times that participants have stated that they were often tempted to put too much effort and detail into their ideas before they dared to show ideas to stakeholders. This was because they were usually afraid to make a fool of themselves, when an idea or a solution was not thought- or worked out far enough (this is supported by the theory in ch. 2, p. 33). Unfortunately, it often occurred that the solution in this case only partly met the needs of their stakeholders or not even at all, resulting in a waste of time and money. However, by confronting stakeholders in an earlier stage with solution development in the form of small experiments, Design Thinking novices can validate the potential of an idea with limited resources.



Mindset 3: Dare to work visually, not only within your team, but also with your stakeholders

The third and last mindset for Design Thinking novices is 'Dare to work visually, not only within your team but also with your stakeholders'. During interviews and the co-creation sessions participants have often stated that verbal communication at work often leads to miscommunication between colleagues or stakeholders. The participants have agreed that the ability to work visually is a skill that can enhance their work significantly. According to the design students during the co-creation session:

"The ability to work visually is an essential skill to bridge languageor cultural barriers and to work together with [stakeholders] during projects efficiently and effectively."

Besides that, they have claimed that the ability to work visually is crucial in Design Thinking to make ideas come to life.

"It doesn't make any sense to me to practice the Design Thinking process, without applying the mindsets. **Neglecting them** seems like such a waste of time."

Quote from one of the trainees during the validation of the prototype of the Design Thinking training (see Ch4, p. 137)



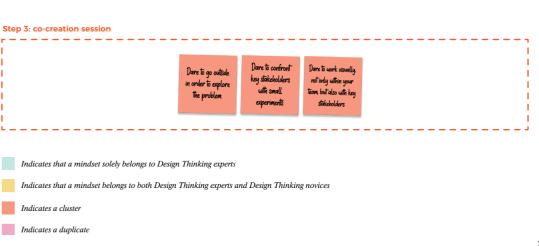


perspectives and learning intelligence

creative

questioning





An operational framework for Design Thinking novices

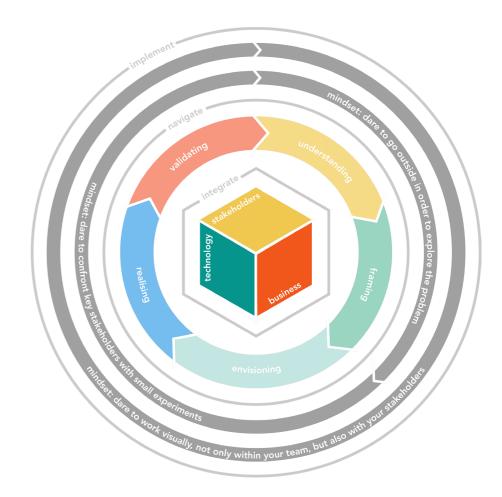
Because the three key mindsets for Design Thinking novices and the Design Thinking process both play an essential role in the design of the new course, an operational framework has been developed. The framework has allowed the two elements to be integrated into one whole (see figure 4).

The operational framework has formed the foundation of the new course and is able to demonstrate to novices how the Design Thinking process and mindsets should be integrated during Design Thinking projects.

When looking at the framework, it can be seen that the initial model from Rozendaal and Schuffelers (2018) (see ch. 2, p. 29) has formed the base of the framework, but that an additional phase has been added, namely 'understanding' the problem. By deliberately adding this phase to the framework, the importance can be stressed of spending sufficient time to understand the problem during the problem phase, before navigating towards the solution phase (i.e. this is a common problem in Design Thinking (see ch. 2, p. 33)). The understanding-phase focusses explicitly on understanding the problem, for example, by creating empathy for all the different stakeholders that are involved in the problem. The framing-phase of the framework now focusses mainly on narrowing down and reframing the problem to the perspectives of key stakeholders to achieve focus.

Furthermore, the framework stresses that one should integrate the needs of all stakeholders, which are those of people and nature. This is because, based on the newly proposed definition of Design Thinking (see ch. 2, p. 27), designers should break out of their human-centred bubble and take all stakeholders into account during the whole process.

Moreover, the framework indicates how the three key mindsets have been added and how they are connected to the five different phases.



- Analyse the problem. Understand who are involved and explore the problem from different perspectives.
- (Re)formulate the problem based on the different perspectives from stakeholders. Create focus.
- Think about how the problem can be solved. Brainstorm about as many ideas as possible.
- Think about how the solution can be made with little resources.
- Find out if your solution works. Finetune, iterate or look for new solutions.
- Think about how the solution can be beneficial for both internal- and external stakeholders
- Think about how the solution can create business value.
- Think about how the solution can be made with existing technology and available resources.

Figure 4: An operational framework for Design Thinking novices that integrates both the Design Thinking process and the three key mindsets

Mindsets

The framework shows how the three mindsets have been divided over the different phases of the Design Thinking process by using two circles.

The outer-circle represents the mindset 'dare to work visually, not only within your team but also with important stakeholders'. The mindset must occur in all phases of the Design Thinking process because communication between Design Thinking novices and stakeholders is apparent throughout the whole Design Thinking process. Therefore, by actively working visually during all phases, miscommunication between stakeholders can be decreased significantly. This does not only allow problems to be explored and understood more easily, but it also enables the right solution to be identified more quickly.

The two remaining mindsets, 'dare to go outside to explore the problem' and 'dare to confront important stakeholders with small experiments', have been divided over the inner-circle of the framework. The first mindset prevents that novices solely explore problems within their context during the 'understanding' and 'framing' phases of the Design Thinking process, and thus avoid that they build upon wrong assumptions. Participants should go outside, visit the social context of the problem and actively engage with different stakeholders. The second mindset makes sure that less time and money is spent on developing ideas that do not meet the needs of the end-user and other stakeholders. Novices must confront stakeholders with small experiments during the phases 'envisioning, realizing and validating'.

 π

Learning objectives

A set of nine learning objectives has been determined for the course, based on the operational framework as well as on the course context. These learning objectives describe exactly which knowledge and skills the participants should have acquired at the end of the course.

The learning objectives have been categorized into three groups:

- Process-related learning objectives (related to the Design Thinking process)
- 2. Conceptual learning objectives (related to the Design Thinking mindsets)
- 3. Personal learning objectives (related to the context of the participants)

Process-related learning objectives

LO1 - Understanding

At the end of the course, participants can use the key methods that are learned in the course to understand the problem, as well as its context and stakeholders.

Design Thinking phase: understanding

LO2 - Framing

At the end of the course, participants can use the key methods that are learned in the course to frame the problem from the perspectives of crucial stakeholders.

Design Thinking phase: Framing

LO3 - Envisioning

At the end of the course, participants can define a design challenge, and they can use the key methods that are learned in the course to create different ideas and to select the ones that are the most desirable, feasible and viable for this design challenge.

Design Thinking phase: Envisioning

LO4 - Realising

At the end of the course, participants can create different kinds of prototypes of their ideas, which they can test with stakeholders to collect feedback.

Design Thinking phase: Realising

LO5 - Validating

At the end of the course, participants can validate a prototype with stakeholders to collect feedback to improve on their idea.

esign Thinking phase: Validating

Conceptual learning objectives

LO6 - Exploring

At the end of the course, participants can discuss why a problem can only be fully understood when they have visited and explored its context.

Design Thinking mindset: Dare to go outside to explore the problem

LO7 - Confronting

At the end of the course, participants can discuss why it is essential to confront key stakeholders with small experiments.

Design Thinking mindset: Dare to confront important stakeholders with small experiments

LO8 - Visualising

At the end of the course, participants can discuss why visual communication is an essential addition to verbal communication

Design Thinking mindset: Dare to work visually, not only within your team but also with important stakeholders

Personal learning objectives

LO9 - Positioning

At the end of the course, participants can effect on how Design Thinking or parts of it

In summary

During the orientation in the field, more knowledge has been gathered about how the Design Thinking process and mindsets should be integrated into a Design Thinking course. For example, the co-creation sessions have allowed the identification of a set of three key mindsets. Furthermore, it has been discovered how the three mindsets can be integrated with the Design Thinking process into an operational framework for Design Thinking novices.

By observing an existing Design Thinking course, more knowledge has been gained regarding how a course can be structured. Moreover, the observation has shown where current Design Thinking courses fall short, resulting in three focal points. For instance, the majority of the participants does not know how to apply Design Thinking in his or her context. Based on this insight, one of the design goals has been further refined.

Based on the operational framework, different learning objectives have been created for the new Design Thinking course. To discover the right way to incorporate these learning objectives in the course as well as to find out if the participants are genuinely able to reach them, a prototype of the course has been created and tested with real participants in the next chapter.

Progression



PROCESS

While an operational framework has been created, it is yet unsure how it can teach the Design Thinking process in a course.

60%



MINDSETS

While three key mindsets for Design Thinking novices have been identified, it is unclear how the mindsets can be integrated into a course and if the mindsets truly complement the process.

60%



CONTEXT

No knowledge has been gained regarding how training can enable participants to apply Design Thinking in their context.

]%

PROTOTYPING & TESTING



Prototyping

Constructive alignment has allowed the operational framework, the focal points of the observed course, and the nine learning objectives to be integrated into a prototype of the course. Furthermore, constructive alignment has enabled the development of appropriate teaching and learning activities and a suitable assessment.

This section describes the different activities that have been identified to support the participants to reach the nine learning objectives (see p. 66). Furthermore, this section describes the assessment that has been selected to allow trainers to monitor the progression of the participants towards the learning objectives (see p. 96). Lastly, this section describes how the teaching and learning activities and the assessment have been integrated into a prototype of a three-day course (see p. 98).

Teaching and learning activities

The teaching and learning activities are the day-to-day proceedings that help trainees to reach the learning objectives of the course.

The activities that have been integrated into the prototype can be divided into four categories:

- Presentations by the trainers
- Working visually
- Working on a case in multidisciplinary teams while using different design methods and tools
- Reflection on the learning objectives.

The different categories are further explained below.

Presentations by the trainers

Presentations have been incorporated into the course, which can be used by trainers for different purposes. The presentations are supported by using PowerPoint, allowing the trainers to integrate text, images and videos. Trainers use the presentation to provide participants with an overview of the course and the learning objectives.

Furthermore, trainers use the presentation to show the operational framework to participants continuously. For instance, the trainers show the framework while explaining the process and mindsets and how they are integrated. Another example when the trainers show the framework, is when they navigate between the different phases in the course.

Finally, the trainers use the presentation while explaining the different methods and tools that they teach in the course. The presentation supports the trainers to give various examples and to show the different tools and canvasses to the participants.

Working visually

LO8 - Visualising

Two different approaches are used in the course to teach participants how and why visual communication is an essential addition to verbal communication:

- Drawing
- LEGO®

Drawing is used in the course as a simple way to make thoughts more tangible. The main reason why this approach is used in the course is that it can be assumed that most participants have access to a pencil or marker in their context and work. By incorporating drawing into the course, participants are taught that little effort is required from them to work visually. Therefore, participants are instructed during the majority of methods to add simple visuals by drawing.

LEGO® is used in the course for a variety of reasons. First of all, LEGO® is an excellent way to create a playful environment, which allows the creativity of the participants to be increased (see ch. 2, p. 39). Secondly, LEGO® enables participants to create metaphors, which stimulate new associations and memories during the generation of ideas. Thirdly, LEGO® enhances the ability to share ideas with others (SERIOUS PLAY®, 2010). Fourthly, LEGO® can be used to turn concepts into prototypes (Sanders & Stappers, 2012). Therefore, LEGO is an excellent tool to incorporate into the course during brainstorming and prototyping.

A benefit of integrating both drawing and LEGO into the course is that participants are shown that a variety of surprising, yet simple approach that can be used to work visually.

Different warm-up exercises have been incorporated into the course to make the transition smaller for the participants to use these approaches. Furthermore, the participants are encouraged to actively reflect on how this way of communication differs from their current form of communication.

Working on a case in multidisciplinary groups while using different design methods and tools

According to the theoretical background (see ch. 2, p. 39), the best way to teach Design Thinking in a course is by instructing participants to work on a case in multidisciplinary teams. Therefore, whenever possible, participants divide themselves into multidisciplinary teams during the course. Furthermore, in the case of an open course, all participants should individually bring a case to the course beforehand. Each team must vote on a case that appeals the most to them at the beginning of the course, to be able to work on a single case.

In case of an in-company course, organisations can choose to select a single suitable case for all the teams beforehand. Therefore, in this scenario, participants do not have to bring a case to the course.

Participants execute the cases according to the Design Thinking process and the three Design Thinking mindsets.

Design methods and tools

Different design methods and tools have been selected for the prototype. These methods and tools support the Design Thinking process and mindsets, and thus eight of the nine learning objectives. The design methods and tools are further explained below.

LO1 - Understanding

The first method that participants learn during the course is stakeholder mapping. Stakeholder mapping allows the participants during the understanding-phase to identify all the relevant stakeholders that are involved in the problem. Furthermore, stakeholder mapping empowers participants to quickly and intuitively create a get a mental overview of those stakeholders. Moreover, a stakeholder map confronts the participants with the fact that wicked problems revolve around lots of different stakeholders and that Design Thinking demands that these people should be taken into account.

Other methods that participants learn during the understanding phase are the creation of a persona, journey mapping and the Five Whys. These methods allow participants to empathize with different stakeholders and to uncover their needs, wishes and pain points concerning the problem.

A persona enables participants to transform the needs, thoughts, frustrations and goals of stakeholders into typical fictional representations. By giving stakeholders an identity, they become more personal, which allows participants to bind themselves more to them and to get a better understanding of them.

Journey mapping allows participants to systematically create an entire overview of how stakeholders experience a problem from beginning to end by identifying different key moments. This overview enables them to find essential pain points, happy moments and emotions (Designkit, n.d.). The participants use a persona canvas (see figure 5) as well as a journey map canvas (see figure 6) to apply the methods.

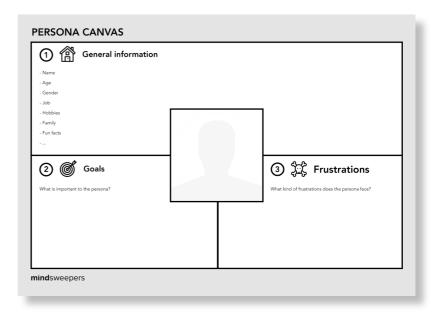


Figure 5: A persona canvas

1 Activities			
2 Visualisations			
Positive and negative experiences			
4 Emotions © © ©			

Figure 6: A customer journey canvas

The Five Whys-method empowers participants to approach stakeholders efficiently and effectively. The method is a simple, yet a powerful way to systematically trace the underlying motivations in a conversation, by asking 'why' five times in a row. This way, participants can get a clear understanding of their stakeholders while exploring the problem (e.g. during interviews).

LO2 - Framing

During the framing phase, participants learn how to crystallise the needs of stakeholders into a Point of View (POV) statement. A POV Statement allows participants during the process to solve their challenge in a goal-oriented manner (Dam & Teo, 2017). In addition to that, a POV statement avoids the incorporation of possible solutions into the statement (Distin & Kate, 2004). The participants make use of a POV Statement canvas (see figure 7) to apply the method.

looks for	a way to,
(persona)	(core of the problem)
because	
	(surprising insight)

Figure 7: A POV Statement canvas

LO3 - Envisioning

During the envisioning phase, participants learn how POV statements can be translated into one simple, short and practical question: The How-Might-We (HMW) question. Questions with the beginning "How might we ..." ensure a unified version of a design challenge. The approach aims to explore further aspects of a given problem, which can help to find a suitable solution.

In addition to defining a design challenge, participants learn during the envisioning phase how they can generate innovative ideas with the help of brainstorming. Brainstorming focusses on creating as many ideas as possible to maximize the number of possible solutions (Osborn, 1953). LEGO® has been selected as an approach for brainstorming during the course.

The final method that participants learn during the envisioning phase is post-it voting while incorporating desirability, feasibility and viability. This method enables participants to select the best ideas. The method does not only allow every member in a session to have an equal say in the selection process (Dam & Teo, 2019), but it also makes sure that the most important criteria are taken into account.

LO4 - Realising

In the realising phase, participants learn how they turn their ideas into prototypes, which can be used to collect feedback to improve on their idea. To do this, participants apply the method 'rapid prototyping', where they build only enough to test their idea and to get right back in there to improve it (Designkit, n.d.). LEGO® has been selected as a tool for rapid prototyping during the course.

LO5 – Validating (part one)

In the validation phase of the process, participants learn how they can test a prototype. During this method, participants use a validation canvas, that contains an overview of all the criteria that stakeholders most likely take into account when testing the prototype (see figure 8). The canvas forces the participants to think carefully beforehand about what needs to be tested. The canvas also makes sure that all the criteria are tested during the validation of the prototype.

1 To validate	2 User 1		③ User 2	
What do we want to validate?	What went well?	What went wrong?	What went well?	What went wrong?
What do we want to validate?	What went well?	What went wrong?	What went well?	What went wrong?
What do we want to validate?	What went well?	What went wrong?	What went well?	What went wrong?
What can we do to make our solution even better?	What can we improve?	<u> </u>	What can we improve?	

Figure 8: A validation canvas

LO7 - Confronting

The validation canvas also serves as a homework exercise. During this exercise, participants use the canvas in practice with relevant stakeholders. This way, trainers can show participants the value of confronting real stakeholders with small experiments.

LO5 – Validating (part two)

Participants also learn during the validation phase, how they can pitch an idea to stakeholders. Pitching is a valuable method that can excite or convince other stakeholders during the Design Thinking process (e.g. the client, managers or colleagues). Pitching can also help participants to attract funding for the development of their idea or a solution.

Participants learn how to craft an audience-centred pitch by using a pitch canvas. The canvas ensures participants that they have taken all the essential information into account before giving a pitch (see figure 9).

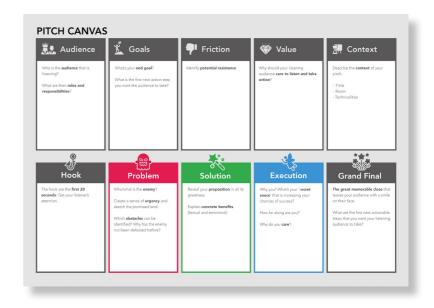


Figure 9: A pitch canvas. Adapted from Pitchblocks, by Pavlic, V. (n.d.). Retrieved from: https://www.pitchblocks.com

LO6 - Exploring

An assumption canvas has been made for the course (see figure 10) to teach participants the necessity of going outside when exploring a problem. This canvas is not used during the days of the course, but it is given to the participants as a homework exercise. The canvas stimulates the participants to recognize the assumptions that they make during the course. Furthermore, the canvas encourages participants to write down their most significant assumptions and to validate these assumptions in practice with stakeholders (e.g. by conducting interviews). This way, the participants experience the value of going outside and exploring the problem with real stakeholders, compared to making assumptions behind their desk at work.

0	assumption #1:
0	Conclusion(s):
0	assumption #2:

0	Conclusion(s):
0	assumption #3:
0	Conclusion(s):
mindsv	veepers

Figure 10: An assumption canvas

LO6 – Exploring & LO7 – Confronting

Another way to learn the necessity of engaging with real stakeholders is by applying the technique of role-playing.

"Role-play is a technique that allows students to explore realistic situations by interacting with other people in a managed way to develop experience and trial different strategies in a supported environment." (Glover, 2014)

Role-play is used by the participants while conducting interviews and during the validation of the prototype. This way, participants are confronted during the course by making assumptions, which should be validated outside of the course.

Since it is not practical to include real stakeholders in the course, role-play also serves as an excellent way to 'replace' real stakeholders.

Reflection on the learning objectives

LO9 - Positioning

According to the theoretical background (see ch. 2, p. 38), reflection is a critical element of experimental learning. Furthermore, a course should contain a sufficient amount of moments for reflection.

Therefore, the course provides different moments for reflection to the participants. First of all, these moments allow participants to learn the Design Thinking process and mindsets. Secondly, these moments empower participants to understand how Design Thinking can be applied in their context at work.

The moments of reflection vary from small, interim reflections to more extensive plenary reflections at the end of the day. The smaller moments of reflections are provided after each method or tool. During these smaller moments, participants reflect with their team on the learning objective that corresponds to the design method or tool. Furthermore, participants reflect on how the methods or tools can be applied in their context at work.

The plenary moments of reflections are provided after the end of each day. During these moments, participants reflect on the methods and tools with the whole group.

Course assessment

An assessment has been created to monitor the progression of the participants towards the learning objectives. Moreover, the assessment has given the possibility to find out where the prototype falls short (i.e. do the activities allow the learning objectives to be accomplished?). The main form of assessment that is being used during the course is performance assessment (see ch. 2, p. 36). An additional type of performance assessment that has been used is self-assessment.

Preassessment

The first part of the performance assessment is preassessment: a short plenary discussion at the beginning of the course, where participants share their fundamental knowledge of Design Thinking with the trainers. By identifying the prior understanding of Design Thinking of the participants, monitoring of the progression is made more reliable.

Active observation

The second part of the performance assessment focusses on actively observing the work from the participants after each method (e.g. by looking at the canvasses that have been filled in). This way, the trainers can check during the entire course, whether the participants have been able to carry out the methods and tools successfully. Furthermore, it allows the trainers to validate whether participants have achieved the process-related & conceptual learning objectives.

Homework

The third part of the performance assessment is the use of homework. First of all, by checking whether the participants have done their homework, trainers can validate whether the participants genuinely see the importance of two of the mindsets. Therefore, trainers can verify if the participants have achieved two of the conceptual learning objectives. For instance, when the participants do not see the importance of the two mindsets 'Dare to go outside to explore the problem' and 'Dare to confront important stakeholders with small experiments', it is most unlikely that they want to spend their time and energy to bother stakeholders with the assumption canvas

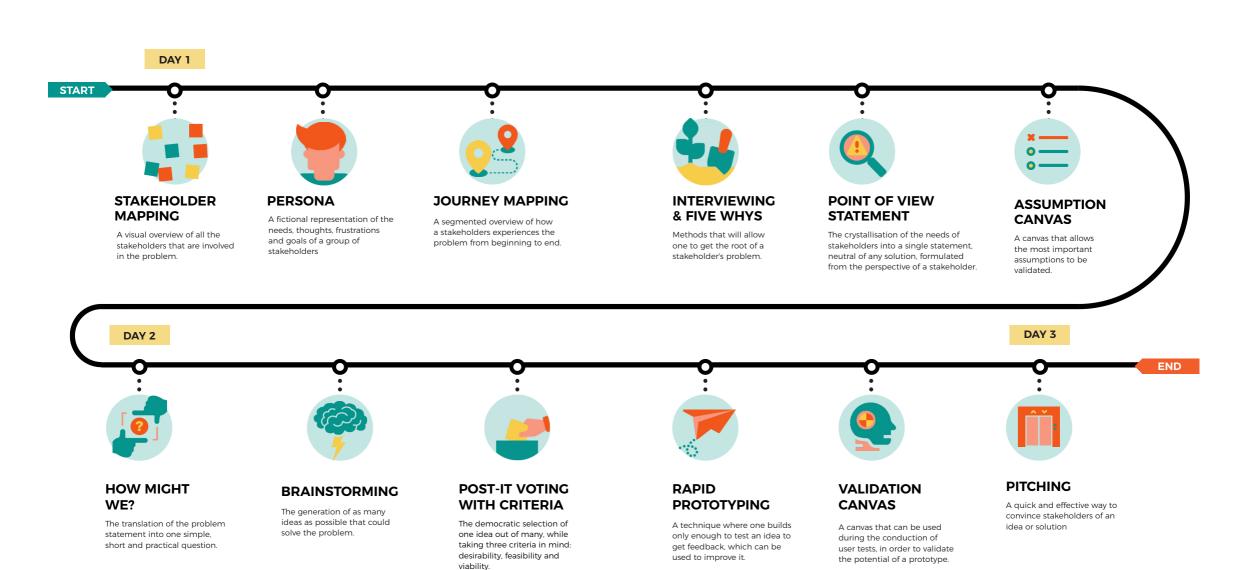
or prototype, or to put their reputation at risk. Secondly, by letting the participants discuss- and reflect on their results of the homework, as well as instructing them to state their current understanding of the methods during a plenary session, trainers can monitor the progression of the participants towards the conceptual learning objectives.

Plenary self-assessment

The final kind of assessment that is used during the course is self-assessment, where the participants measure their progression. To indicate whether the participants genuinely understand which elements of Design Thinking can be applied in their context at work (personal learning objectives), a plenary session is organised at the end of the course. During this session, participants discuss out loud what they have learned, and they share their understanding of Design Thinking (process-related & conceptual learning objectives) and of how different elements of Design Thinking can be incorporated into their current way of working. This way, the trainers can validate whether the participants have accomplished the learning objectives at the end of the course.

Prototype overview

Based on the quick benchmark in chapter one (see ch. 1, p. 18) and on the observation of an existing course (see ch. 3, p. 51) the methods and tools have been divided over three separate days. This is the average length of Design Thinking courses that are currently on the market. Therefore, it has been assumed that the course is neither too short for the teaching and learning activities nor too long. Below is shown how the different tools and methods have been distributed over the three days. A more detailed version of the prototype can be found on pages 112-116.





Day one

<u>Understanding & Framing</u> the problem.

The first day focusses on the first two phases of the Design Thinking framework (i.e. understanding & framing) and the two corresponding mindsets (i.e. 'Dare to go outside to understand the problem' & 'Dare to work visually, not only within your team but also with important stakeholders') (see figure 11).

The day starts with a short plenary pre-assessment, where the trainers ask the participants to share their initial knowledge of Design Thinking. After the assessment, the trainers give a theoretical introduction of Design Thinking via a presentation (see Appendix D). The different phases of the Design Thinking process are explained as well as their corresponding mindsets, with the help of the framework for Design Thinking novices. Furthermore, the trainers show the participants which phases of the process they go through during the first day. At the end of the presentation, Design Thinking is immediately put into practice. The practical part starts with a warmup exercise, where the participants are instructed to make several simple visualisations by using a piece of paper and a marker.

Next, all participants divide themselves into different multidisciplinary teams, in which they start immersing themselves in a case. The first step of the immersion is to quickly and intuitively create a visual overview of all the stakeholders that are involved in the problem of their case. The participants do this by creating a stakeholder map. The participants note every stakeholder on a post-it note with a simple corresponding visualization and put these post-it notes one by one on a whiteboard or flipchart.

Once all the stakeholders have been identified, participants learn how they can create empathy for one of the identified stakeholders. Since the course is limited by time, participants focus mainly on building empathy for the end-user. However, the trainers

make clear that the end-user is not the only one that should be taken into account and that problems should be explored from the perspectives of all the stakeholders when applying Design Thinking in practice. To create empathy, participants make a persona of the end-user with the help of a persona canvas, followed by a journey map.

Furthermore, to simulate how to get to the core of the end user's problem, participants role-play an interview with one of the team members, while integrating the Five Whysmethod. One member plays the persona of the end-user as well as possible. In contrast, the other team members ask as many questions about the problem as they possibly can and dive deeper to find underlying motivations. When each team has found the core of their problem, they reframe the initial issue of their case from the perspective of the end-user as a POV Statement.

At the end of the day, the teams are instructed to write down all the assumptions that have been made by their team members during the day. Subsequently, each group makes a selection of the three most important assumptions, which they have to validate in practice with the assumption canvas by talking to one or two real end-users, before the start of day two.

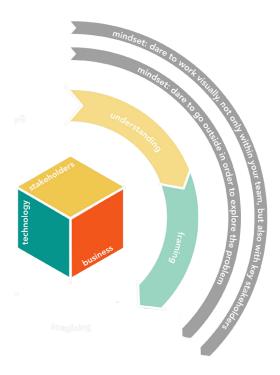


Figure 11: All the phases and mindsets of the operational framework that are implemented on the first day



Day two

Envisioning, Realising & Validating the solution.

The second day focusses on the last three phases of the Design Thinking framework (i.e. envisioning, realising & validating) and their two corresponding mindsets (i.e. 'Dare to confront important stakeholders with small experiments' & 'Dare to work visually, not only within your team but also with important stakeholders') (see figure 12).

The day starts once more with a small presentation (see Appendix E). This time, the presentation first looks back at day one. The trainers show an overview of all the phases that participants have gone through, as well as the corresponding mindsets, design methods and tools. Next, the trainers show an overview of the three phases that the participants will go through during day two. After the presentation, all teams discuss the homework that has been done, draw conclusions based on the results and decide whether their POV Statement should still be the same.

Next, Design Thinking is put into practice once more. Like day one, the program starts with a warmup exercise, which allows the participants to feel comfortable working visually during the day. This time, the participants use LEGO® to navigate through the remaining three phases. Therefore, as a warm-up exercise, they are instructed to individually build the highest tower as possible with the LEGO® that is provided that day.

Next, the participants translate their POV statement into an HMW question (i.e. a design challenge), from where they can easily search for different possible solutions. A brainstorm with LEGO® follows the HMW question. The brainstorm consists of two rounds. In the first round, the participants individually brainstorm to create as many ideas as possible for their design challenge. In the second round, participants brainstorm in teams. Out of all the ideas that are created, only one idea per team is selected. The participants do this by post-it voting, where they are handed out five post-it notes that

they must distribute over all the ideas that their team has created. Simultaneously, the participants keep three criteria in mind: desirability, feasibility and viability.

Next, the teams create a prototype of their idea by using LEGO®. As soon as every team has created their prototype, they each write down the three most important criteria that they want to validate by using the validation canvas. The validation of the prototypes is carried out by role-playing once more. This time, the persona of each team is played by several members from other teams, and each 'persona' is instructed to test a prototype. After the role-play, participants discuss how the feedback can be used to improve their idea.

At the end of the day, the teams are instructed to think about how they can translate their LEGO® prototype into a prototype of a different kind. They create this prototype as part of their homework and test it in practice with real end-users by using the validation canvas.

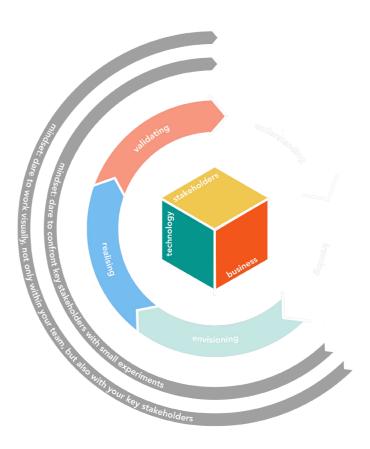


Figure 12: All the phases and mindsets of the operational framework that are implemented on the second day.



Day three

Show time, but most importantly: how does Design Thinking <u>fit in the</u> <u>lives of the participants?</u>

The third and last day focusses on all the phases of the Design Thinking framework, as well as on all three mindsets (see figure 13). This day mainly concentrates on reflecting on the process and mindsets by the participants, as well as on how these elements can be applied in their context at work.

The day starts with a short presentation (see Appendix F). The trainers use the presentation to review all of the phases, mindsets, methods and tools of day two. After the presentation, the participants internally discuss the homework that they have done. The participants look back at how they have realized their new prototype and discuss how they have validated this prototype in practice with real end-users. Next, the trainers organize a plenary session. During this session, all the teams give a short presentation of their prototypes and show which conclusions can be drawn based on the validation. Furthermore, the group reflects on the methods as well as the corresponding learning objectives.

After the presentation, the groups fill in the pitch canvas. When the pitch canvas is completed, the participants are given the time to prepare the actual pitch. The participants can use the time to practice their pitch, or they can gather materials that they can use to support it. Eventually, all the groups pitch their idea.

The trainers end the day by organising a plenary session for reflection and self-assessment. The trainers start the first part of the session by giving different examples of success stories of participants from previous Design Thinking courses. Next, the participants individually go through the entire Design Thinking process, mindsets,

methods and tools once more with the help of different images that have been distributed chronologically on the floor. Simultaneously, participants assess themselves and discuss which learning objectives have been completed.

The trainers start the second part of the session by handing out post-it notes to the participants. Furthermore, they instruct the participants to distribute the post-it notes over the mindsets, methods and tools that appeal the most to them. After the post-it notes have been distributed, the participants elaborate on their choices.

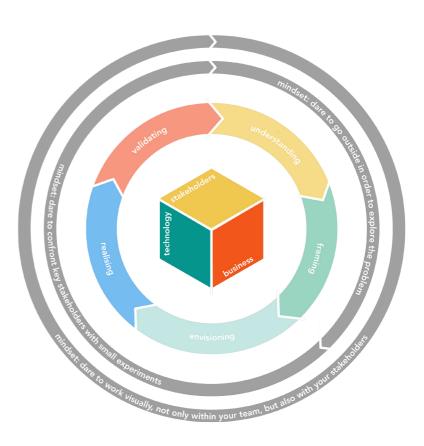


Figure 13: All the phases and mindsets of the operational framework that are implemented on the third day.

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Reflection in teams

Activities Learning objectives **Activities Learning objectives Interviewing & Five Whys Opening presentation** LO1 - Understanding Explanation with examples LO1 - Understanding Introduction to the trainers Pre-assessment LO2 - Framing Role-playing LO6 - Exploring LO9 - Positioning LO3 - Envisioning Reflection in teams Introduction of Design Thinking LO4 - Realising Introduction to the Design Thinking framework **POV** statement Overview of the course and the learning objectives LO5 - Validating Explanation with examples Overview of day one LO6 - Exploring LO2 - Framing LO7 - Confronting Participants create a POV statement LO9 - Positioning LO8 - Visualising Reflection in teams Warmup-exercise Top three assumptions LO8 - Visualising Drawing exercise in combination with an explanation of the Explanation LO6 - Exploring trainers LO9 - Positioning Participants write down their top three assumptions Reflection in teams **Case introduction** Participants form multidisciplinary teams **Closing presentation** Participants introduce their cases LO1 - Understanding Review of day one LO2 - Framing Short plenary reflection Stakeholder mapping LO6 - Exploring Overview of next week Explanation with examples LO1 - Understanding LO8 - Visualising Explanation of the homework exercise (i.e. the assumption canvas) Stakeholder mapping LO9 - Positioning LO9 - Positioning Reflection in teams Persona LO1 - Understanding Explanation with examples LO9 - Positioning Teams create a persona Reflection in teams **Journey Mapping** Explanation with examples LO1 - Understanding Journey mapping LO9 - Positioning

Reflection in teams

Activities Learning objectives **Activities Learning objectives Opening presentation Rapid Prototyping** Review of day one LO1 - Understanding Explanation with examples LO4 - Realising Overview of day two LO2 - Framing Rapid prototyping with LEGO® LO9 - Positioning LO3 - Envisioning Reflection in teams LO4 - Realising LO5 - Validating Validating LO6 - Exploring Explanation with examples LO4 - Realising LO7 - Confronting LO9 - Positioning Role-play LO8 - Visualising Reflection in teams **Homework discussion Closing presentation** Discussion in teams LO6 - Exploring Reflection in teams LO9 - Positioning Review of day two LO3 - Envisioning Short plenary reflection LO4 - Realising LO5 - Validating Overview of next week **How Might We** Explanation of the homework exercises (i.e. LO7 - Confronting Explanation with examples LO3 - Envisioning prototyping & validation canvas) LO8 - Visualising Teams create an HMW question LO9 - Positioning LO9 - Positioning Reflection in teams Warm-up exercise Tower challenge with LEGO® **Brainstorming** Explanation with examples LO3 - Envisioning Individual brainstorm LO9 - Positioning Brainstorming in teams Reflection in teams Post-it voting with criteria Explanation with examples LO3 - Envisioning Post-it voting LO9 - Positioning

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Activities

Learning objectives

Opening presentation

Review of day two LO3 - Envisioning

Overview of day three LO4 - Realising

LO5 - Validating

LO7 - Confronting

LO8 - Visualising

Homework discussion

Discussion in teams

LO5 - Validating

Reflection in teams

LO7 - Confronting

LO9 - Positioning

Pitching

Explanation with examples LO5 - Validating

Teams fill in the pitch canvas LO9 - Positioning

Reflection in teams

Pitch preparation

Pitching

Reflection in teams

Plenary self-assessment & reflection

Trainers tell success stories of earlier participants LO1 - Understanding

Plenary self-assessment LO2 - Framing

Plenary reflection LO3 - Envisioning

Post-it voting and discussion LO4 - Realising

LO5 - Validating

LO6 - Exploring

LO7 - Confronting

LO8 - Visualising

LO9 - Positioning



Validation

The prototype has been validated in two different settings.

The prototype has been validated to accomplish the two resulting design goals, namely:

- Identifying how the Design Thinking process and the mindsets can be taught in a course
- Understanding how the course can enable participants to apply Design Thinking in their context at work.

Furthermore, the validation has given the possibility to get a rough understanding of how much time is needed for the final course.

The prototype has been tested in two different settings. The choice for the settings is firmly based on the quick benchmark in chapter one. The benchmark has indicated that Design Thinking courses are usually offered both as an in-company course as well as an open course. Furthermore, the benchmark has shown that the average Design Thinking course can be projected in both the private sector as well as in the public sector.

Therefore, in the first setting, the prototype has been validated as an in-company course for participants in the private sector. In this setting, the group of participants originated from the same company.

In the second setting, the prototype has been validated as an open course for participants in the public sector. In this setting, a group of randomly selected participants has been invited to join the course, originating from different government institutions.

Another difference between the two settings was that the in-company course had an extra helping hand/trainer, while the open course-setting, unfortunately, had only one trainer. Both trainers are experienced in giving workshops and creative facilitation but have little experience with organising a full-scale course. Moreover, disregarding the two different settings, the two groups have allowed the course to be iterated.

While the two settings were different, the prototype itself has been the same for both groups. Furthermore, all the participants had a bachelor's degree or higher and no knowledge of Design Thinking.

The participants have been approached one month after the course with short follow-up interviews (see Appendix G). The follow-up interviews have allowed to (1) identify what has allowed the participants to understand the Design Thinking process and mindsets, and (2) to understand if participants have been able to apply Design Thinking in their context at work after the course.

The validation of the prototype has been captured by using notes, audio, pictures and videos.

Setting 1: An open course with Ynnovate

The open course has been made possible by Ynnovate, a training organisation that educates people in the public sector to become 'Ynnovators': government officials that actively work to realise an innovative public sector. The company has used her network to find twelve participants in the public sector, without prior knowledge of Design Thinking. The twelve participants have been randomly selected by Ynnovate and had different functions within the public sector (e.g. advisors, auditors, project leaders and process coordinators). Moreover, Ynnovate has provided her office in Utrecht to organize the course.

Setting 2: An in-company course with Cost Engineering

The in-company course has been made possible by the company Cost Engineering, an organization that supports leading companies in cost engineering with the help of software and consultancy. The company has provided eight of her 82 employees to test the prototype. The participants had different functions in the company (e.g. sales agents, consultants and developers) and have consciously been selected by the management to spread Design Thinking after the course in a multidisciplinary way. Furthermore, Cost Engineering has provided her office in Zwijndrecht to organize the course.

Extra attention

By testing the prototype with both participants from the private sector as well as participants from the public sector, is has been made possible to identify whether the prototype is projectable in both settings (see ch. 3, p. 66).

Therefore, the trainers have paid attention to the assumption that participants from the public sector indeed require extra attention. For instance, (in contrast to participants of the private sector) it has been assumed that more time should be spent on (1) teaching participants to identify different stakeholders of a problem (2), teaching participants to understand the end-user and (3) teaching participants how to deal with the risks that Design Thinking brings with it.





Results

The next pages highlight the results from the validation of the prototype. First of all, the pages 127-139 provide a detailed overview of the outcomes in both settings. Furthermore, the pages indicate the small interim iterations that have been carried out to accomplish the design goals. Secondly, the pages 140-143 describe how the validation has allowed the remaining design goals to be accomplished. Thirdly and finally, page 144 indicates the main takeaways from the validation, which must be considered for the final product in chapter five.

What has been learned after the test of day one with Cost Engineering:

Day one of the course has first been tested at Cost Engineering. Participants had little trouble to understand and apply the different methods and tools thanks to the simple examples that have been provided by the trainers. However, according to the participants, the workload of the prototype has been too high, and there has been little time for rest and reflection. This has prevented the participants from understanding how the different methods support the two phases of the process, as well as from reflecting on how the methods and tools can be applied in their context at work.

The two mindsets have been very much to the liking of the participants, not only during the course but also outside of it. For example, the mindset 'working visually' has not only made it easier for participants to communicate with other participants of the course, but it has also enhanced communication at work with their colleagues and external stakeholders. Moreover, the participants have realized that it is vital to dive deeper into a problem as well as to validate assumptions, before searching for possible solutions. During their homework, they have realised for instance that a simple phone call with an external stakeholder does not only enable one to gain valuable information within a short time frame but that it can also determine the entire direction of a problem as well as a solution. Furthermore, the participants have stated that they were consciously validating their assumptions outside of the course.



PROCESS

As a result of a limited reflection, participants have been unable to understand how the methods fit into the different phases.



MINDSETS

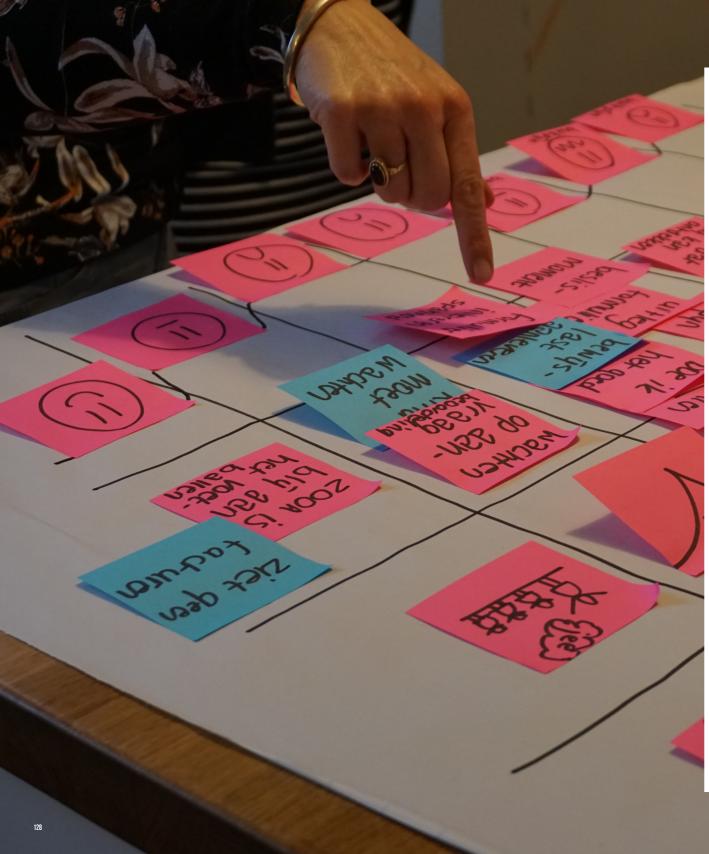
The mindsets have been considered by the participants as valuable assets and have even be applied outside of the course at work.



CONTEXT

Participants have not been able to understand how Design Thinking be applied at work.





What has been learned after the test of day one with Ynnovate:

The first day of the course at Cost Engineering and Ynnovate have been organised right after each other. Therefore, there has not been the possibility to iterate on day one. While the participants from Ynnovate have been able to go through the process without much trouble, there has been a clear difference between them and the participants from Cost Engineering. For instance, because only one trainer has been apparent, it became evident that the tools were not detailed enough to allow the groups to work autonomously. Moreover, this has resulted in a limited ability of personal counselling per group. Secondly, in this setting, the trainer had accidentally and unconsciously taken on the role of facilitator as well as the role of trainer. As a result, the trainer has guided the participants to focus more on the progression of their case than on the learning objectives.

Once again, the validation has shown that little time has been made available for rest and reflection. This has made it difficult for participants to consciously reflect on the way that the methods could be applied in their context at work.

Lastly, the validation has shown that both mindsets have also been to the liking of the participants of Ynnovate. For instance, multiple participants have pointed out that they have become more focused on the needs and wishes of the end-user. Furthermore, several participants have stated that the course has made them aware of the fact that there is an evident lack of personal engagement with external stakeholders in the private sector. For example, one of the participants has mentioned:

> "Talking with end-users... now that's something completely different than usual."

Moreover, one of the case holders has stated that the two mindsets have encouraged her to finally convince and enthuse her colleagues to join her project/case as well as to dive into the problem.



PROCESS

The tools were not detailed enough for participants to work autonomously. Furthermore, trainers need to guide participants to focus on the learning objectives instead of the progression of their case.



MINDSETS

The mindsets have been considered by the participants as valuable assets and have even be applied outside of the course at work.



CONTEXT

Participants have not been able to understand how Design Thinking be applied at work.

What has been learned after the test of day two with Ynnovate:

The first validation of day two has taken place at Ynnovate. Due to the lack of time for rest and reflection during day one, more time has been reserved to organize a plenary reflection at the end of the day. However, unfortunately, this moment has mainly been utilized by the participants to reflect on the progression of their cases. This was again caused by an unclear role of the trainer as well as a lack of interim moments of reflection where participants should have been instructed to reflect on the learning objectives of that day. Again, the participants from Ynnovate had little trouble to go through the phases of the Design Thinking process.

The two mindsets have been to the liking of the participants. For example, some participants enjoyed working visually so much that they have applied it during steps where it has not necessarily been asked from them. Furthermore, participants have been positive about the mindset 'Dare to confront key stakeholders with small experiments'. For example, the majority of the participants has discovered during the homework exercise that a quick confrontation of the end-user with a simple prototype leads to valuable insights and feedback in a short time frame. This is in contrast to endless speculation about the possible needs of the end-user regarding a solution, which they usually do.

Lastly, it was striking that the majority of the case holders has found it challenging to understand how the Design Thinking process can be applied in reality, while simultaneously taking the needs of a client into account. For example, it was unclear for the participants how the initial problem of a client can be solved, when Design Thinking revolves around finding and solving underlying or alternative issues.



PROCESS

Trainers need to guide participants to focus on the learning objectives instead of the progression of their case.



MINDSETS

The mindsets have been considered by the participants as valuable assets and have even be applied outside of the course at work.



CONTEXT

It has been unclear how the wishes of a client and the Design Thinking process go hand in hand.





What has been learned after the test of day two with Cost Engineering:

With the knowledge and experience that has been gained during day two at Ynnovate, more interim moments of reflection have been provided to the participants of Cost Engineering. After every step, a moment of reflection has been integrated. The participants have solely been allowed to reflect the learning objectives during these moments. Secondly, the role of trainer has consciously been taken on by both trainers, while simultaneously letting go off the role as facilitator. As a result, the participants have immediately been able to think about how Design Thinking could be applied at work, not only in their context but also in the context of their peers. Furthermore, it was noticeable that participants could now directly see possibilities to apply specific methods at work with some small adjustments to the tools. Moreover, the participants have actively thought about how Design Thinking can enrich their work outside the course.

The two provided mindsets have been considered by the participants of Cost Engineering as valuable assets that can enrich their work. The participants were convinced that the active involvement of stakeholders is essential for successful innovation. Furthermore, the participants have indicated that more opportunity must be created within their organisation to reach out to- and involve external stakeholders during projects. Moreover, the active development of the mindset 'Dare to go outside to explore the problem' has been apparent under the participants. This has resulted in a more significant motivation to go outside and to explore the problem further, before searching for a fitting solution in day two.

Lastly, some minor areas of concern have been identified. For instance, some participants have pointed out that they would have liked more software-specific examples during the brainstorm session.



PROCESS

Participants had no problem understanding the Design Thinking process.



MINDSETS

The mindsets have been considered by the participants as valuable assets and have even be applied outside of the course at work.



CONTEXT

Participants were able to understand how Design Thinking can be used at work by reflecting purely on the learning objectives.

What has been learned after the test of day three with Ynnovate:

The first validation of day three has taken place at Ynnovate. It was remarkable that all the teams have been able to work on the pitch canvas autonomously. This could have been due to the relative amount of detail that had been added to the tool. Therefore, it can be assumed that detailed tools lead to greater autonomy of the teams, thus allowing trainers to spend more time on personal counselling of individual participants.

It became noticeable during the plenary self-assessment that all of the participants have acquired a sufficient amount of understanding of Design Thinking. The majority of the group has indicated that the Design Thinking process gives a sense of freedom because one can navigate back and forth through the different phases. This has been very much to their liking. Furthermore, they have regarded the three mindsets as catalysts for their innovation projects: the mindsets provide quick, visual and reliable data. According to the participants, people in their context at work should spend more time on working visually, should pay more attention to the end-user and should contribute more to the involvement of external stakeholders during projects.

The participants have stated during the plenary reflection that they do not foresee any problems to incorporate the different Design Thinking mindsets into their work. In contrast, the participants have identified several bottlenecks regarding the application of the various tools and methods for the Design Thinking process itself. According to the participants, the first bottleneck was that the course did not provide them with an overview of all the methods and tools with practical guidelines to allow them to execute the Design Thinking process in practice. For example: how long does it take to organise a journey mapping workshop with colleagues or a quick brainstorm and how many colleagues do you invite during those kinds of workshops?



PROCESS

Participants have clearly understood that Design Thinking is not a rigid and linear process.



MINDSETS

Participants see the three key mindsets as catalysts for innovation projects



CONTEXT

Methods and tools need practical guidelines, and participants feel that they stand alone in the 'Design Thinking experiment'.





What has been learned after the test of day three with Cost Engineering:

After the third and final day at Cost Engineering, it became visible that the participants have accomplished the learning objectives. For example, several participants who did not have any prior knowledge of Design Thinking at the beginning of the course, have now been able to enthusiastically and effortlessly tell curious colleagues about Design Thinking and its different phases and mindsets. Moreover, it has become evident multiple times during the plenary reflection and self-assessment, that participants had gained sufficient knowledge of the Design Thinking process and mindsets. For example, numerous participants have stated that Design Thinking should not be regarded as a forced linear process, but that it allows people to navigate back and forth through the different phases of the process. Moreover, one of the participants has stated that:

"it doesn't make any sense to practice the Design Thinking process without applying the mindsets. Neglecting them seems like such a waste of time."

Striking was that the rest of the group has agreed to this statement and could thus see that the process and the set of three key mindsets are inseparable from each other.

Furthermore, it has appeared during the plenary reflection and self-assessment that participants clearly understood how some aspects of Design Thinking can easily be applied at work and that it would enrich not only their work but also those of their colleagues.

Lastly, the participants from Cost Engineering have not foreseen any significant bottlenecks regarding the application of Design Thinking in their daily work. They have stated that it would not be a big challenge to spread Design Thinking through the company or to involve colleagues in different methods and tools. For instance, the in-company course has provided them with seven other fellow enthusiasts with a basic knowledge of Design Thinking, who can be involved in workshops and spread the learnings of the course through the company. Furthermore, while the participants have also mentioned that the course could provide an overview of all the methods and tools with practical guidelines, this was not necessarily a necessity.



PROCESS

Participants could flawlessly explain Design Thinking and its phases to other colleagues.



MINDSETS

Participants were confident that the three mindsets are inseparable from the process.



CONTEXT

Every participant was able to understand how elements of Design Thinking can be integrated into their context at work keholders te conf perimenten.

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The achievement of the remaining design goals

The remaining design goals have been accomplished based on the validation of the prototype and based on the follow-up interviews. The results have been divided into categories that touch upon different topics related to the design goals and have been explained further below.

Determine how the Design Thinking process and the mindsets can be taught in a course

Based on the validation of the prototype and the follow-up interviews with participants, it has been concluded that the prototype can convey the Design Thinking process and the three key mindsets to the participants. Furthermore, although it has been expected otherwise (see p. 121), no clear differences have become apparent between participants from the private and public sector. Therefore, it has also been concluded that the prototype is projectible in both industries.

A variety of different factors have presumably positively contributed to the success of the prototype, such as the selection of design methods and tools, the choice to let participants work on a specific case in multidisciplinary groups or by creating a playful environment. However, three of the most noticeable elements have been highlighted below, which have been taken into account for the final product.

An operational framework that integrates both the process and key mindsets for Design Thinking novices

First of all, based on the validation, it can be concluded that the operational framework has enabled the process and mindsets to be translated into different essential learning objectives. Therefore, the framework has served as a successful foundation for the entire prototype.

Secondly, based on the follow-up interviews, where participants have been asked what enabled them to understand the process and the mindsets, it can be concluded that the framework also serves as a conceptual model during the training. Repeatedly showing the Design Thinking framework during the prototype has been a critical to allow participants to learn the Design Thinking process and mindsets. Furthermore, the framework has allowed participants to see how the three mindsets support the different phases of the process. Lastly, the follow-up interviews have shown that the framework has been simple enough for the majority of the participants to retrieve the information even after the course.

Constructive alignment

Constructive alignment has played an essential role in the development of the prototype. The validation of the prototype has shown that it has led to the selection of a successful set of learning objectives, activities and assessments, that can teach the Design Thinking process and mindsets in a course. For instance, the validation of the prototype has shown that the learning objectives allow participants to acquire a basic knowledge of Design Thinking and to understand how Design Thinking can be applied in their context at work. Furthermore, the validation has proven that the selected learning activities support the learning objectives and that the assessment allows trainers to validate whether the learning objectives have been accomplished.

Unfortunately, constructive alignment has not prepared the trainers enough to integrate a sufficient amount of moments of reflection on the learning objectives in the prototype. Below is explained how the moments of reflection play a critical role in the course.

Intermediate reflection on the learning objectives

During the validation of the prototype, it has become evident that interim reflections on the learning objectives must be integrated after each design method or tool in the course. These interim moments of reflection are critical for the participants to learn the Design Thinking process and mindsets. Furthermore, the validation has shown that these intermediate moments of reflection enable participants to understand how Design Thinking can be applied in their context at work.

It is essential that the trainers instruct the participants during these moments to reflect only on the learning objectives and not on the progression of their case. This insight became especially evident when the trainers let go off the role of facilitator and when they solely started focusing on conveying the learning objectives instead.

Understand how the course enables participants to apply Design Thinking in their context at work

Based on the validation of the prototype, as well as the follow-up interviews, it has been concluded that the interim moments of reflection have been indispensable for the participants to understand how the three Design Thinking mindsets can be applied in their context at work after the course. However, unfortunately, two bottlenecks have been identified that hinder the Design Thinking process from being used at work:

- Insufficient practical guidelines to apply the methods and tools
- the lack of colleagues, managers and external stakeholders that know Design Thinking.

Two elements that can remove these bottlenecks and thus enable participants to apply the Design Thinking process in their work are highlighted on the right.

An overview of all the design methods and tools with practical guidelines

The first element that is essential for the participants to apply the Design Thinking process at work after the course is by receiving an overview of all the methods and tools that have been provided during the course. Furthermore, this overview must contain practical guidelines per design method and tool, and it should add an extra layer of detail to the tools. Only with this overview participants can autonomously apply the design methods that contribute to the Design Thinking process. Moreover, the overview encourages them to involve colleagues and external stakeholders in these methods during workshops (e.g. how much time does it cost to execute a workshop, how many people should be included and when do you stop?).

Having others in the context of the participants that understand the value of Design Thinking

The second element that enables participants to apply the Design Thinking process at work after the course depends on the number of colleagues, managers and external stakeholders within their context that understand the value of Design Thinking. When these people can somehow actively be involved in the Design Thinking course and thus also understand the importance of Design Thinking, participants are catalysed to apply the Design Thinking process at work during projects.

Main takeaways

Based on the results, five main takeaways have been identified that have played a significant role in the development of the final product. The main takeaways are described below.



The operational framework for Design Thinking novices enables participants to understand the Design Thinking process and mindsets, as well as how they are integrated.



Constructive alignment has contributed positively to the selection of a set of learning objectives, activities and assessment, which allow the Design Thinking process and mindsets to be taught in a course.



Multiple interim reflections on the learning objectives empower participants to understand how Design Thinking can be applied in their context at work.



Participants need an overview of all the design methods and tools with practical guidelines to apply Design Thinking at work.

Moreover, the methods and tools require an extra layer of detail to enable the participants to work autonomously in the course.



More managers, colleagues or external stakeholders must see the value of Design Thinking before participants can and dare to apply the Design Thinking process at work during projects.

"All I could think about during yesterday's meeting was that Design Thinking would made it a hundred times more effective and efficient."

Quote from a participant during one of the Design Thinking training sessions.

In summary

The validation of the prototype has allowed the three design goals to be accomplished. First of all, the set of three mindsets that have been selected during the orientation in the field have proven to be a critical addition to the phases of the Design Thinking process for Design Thinking novices. Secondly, the validation of the prototype has shown that three elements have enabled the participants to learn the Design Thinking process and the mindsets during a three-day course:

- · Constructive alignment
- The operational framework
- Multiple interim moments of reflection

Thirdly, the validation of the prototype has shown that reflection on the learning objectives during the course is essential for the participants to understand how Design Thinking can be applied in their context at work.

Unfortunately, two bottlenecks have been identified that took away the possibility for the participants to apply the Design Thinking process at work after the course. Therefore, in the next chapter, a solution has been integrated into the final course, which tackles the two identified bottlenecks and could thus empower participants to apply the Design Thinking process at work successfully.

Progression



PROCESS

The operational framework, constructive alignment and the intermediate reflection on the learning objectives allow participants to learn the Design Thinking process.

100%



MINDSETS

There are three key mindsets for Design Thinking novices; they should dare to work visually, they should go outside to explore the problem, and they should confront key stakeholders with small experiments.

100%



CONTEXT

An overview of all the methods and tools with practical guides is critical to apply Design Thinking at work, as well as having colleagues, managers and external stakeholders that see the value of Design Thinking.

100%

THE FINAL **PRODUCT**



Final Deliverables

Two deliverables have been added to the course, based on the two bottlenecks of chapter four. These deliverables give the participants the ability and courage to apply the Design Thinking process at work. The first bottleneck concerns the fact that participants miss an overview of all the design methods and tools with practical guidelines. Therefore, for the first deliverable, a book has been designed (see p. 152). This book contains a complete overview of all the methods and tools that are taught in the course. The second bottleneck concerns the fact that participants don't have enough managers, colleagues and external stakeholders with a sufficient amount of knowledge of Design Thinking. Therefore, for the second deliverable, a voucher system has been designed (see p. 158). This system makes it easier and more attractive to involve managers, colleagues and external stakeholders in the course.

Deliverable one: Design Thinking for Novices

The most common reason why participants are unable to apply the Design Thinking process at work is due to the lack of an overview of all the design methods and tools. As a result, the participants lose sight of how the Design Thinking process should be applied, and they forget how the design methods support the different phases.

The second reason why participants are unable to utilise the Design Thinking process at work is that participants miss practical guidelines per design method and tool. As a result, they have a feeling that they do not have the ability and courage to apply the methods and tools at work. First of all, it is unclear how they can justify to others how much time it costs to use a particular method or tool and which/how much people should be involved. Secondly, it is unclear for participants when a design method or tool is completed, and which steps should come before and after the method to make it useful.

A book has been designed with a complete overview of all the necessary design methods and tools (see p. 150) to solve this bottleneck. The book, titled 'Design Thinking for Novices: how to start your own Design Thinking project' enables participants (as the name implies) to start a Design Thinking project after the course. It contains all the methods and tools from the course with practical guidelines and examples. This way, participants can experiment with the Design Thinking process and mindsets after the course in practice.

Furthermore, the book contains alternative conventional design methods as well as the necessary tools. As a result, the participants can apply more suitable design methods to their context at work when needed. This way, the book aims to make it easier for participants to use the Design Thinking process at work.

Lastly, the book provides the participants with the operational framework for Design Thinking novices. Therefore, the participants can retrieve the framework in the book, as soon as they have the feeling that they have forgotten it.

Every participant receives a copy of the book at the beginning of the course. The benefits of this action are twofold. First of all, it allows trainers to refer to alternative methods while explaining the design methods that are taught in the course. Secondly, it makes it easier for participants during the reflections, to understand which design methods are the most fitting in their context at work.

How the book is structured

The book presents the Design Thinking process in a chronological order, which is in line with the operational framework for Design Thinking novices. Furthermore, it encourages the reader to use the design methods and tools in chronological order at the start of a new project.

The book starts (just like the course) with the operational framework. The book briefly describes the process and the corresponding mindsets, as well as how they are integrated.

The book continues the framework by dividing the process into five chapters. It devotes each chapter to a single phase of the Design Thinking process, as well as its corresponding mindsets. Furthermore, it provides each phase with the design methods and tools in chronological order.

The methods are structured differently in the book, compared to how they are structured in the course. The reason for this is that the course is not suited to teach the methods in the standard order. For instance, the book encourages the reader to go outside and to approach external stakeholders with interviews and observations as soon he/she has created a stakeholder map. The reader should do this before he/she creates a persona or a journey map. However, because this approach is not suitable for a course, participants in the course must create a persona and a journey map based on their assumptions. In the course, the participants continue these methods with interviews, which they simulate by role-playing.

Because of this, trainers must emphasize during the course that the order that is taught to the participants does not mirror the conventional sequence in a Design Thinking

Design methods and tools

As mentioned earlier, the book provides the design methods and tools in a way to the user that is as practical as possible. First of all, the book gives a brief explanation per method (see p. 156). This explanation indicates what the method is and why it should be applied during the Design Thinking process. Secondly, the book advises per method how it can easily be used by organising short workshops with colleagues, managers or other relevant stakeholders. Subsequentially, the book informs the reader how much time is needed to execute a workshop, which/how many participants should be invited, and what kind of materials are necessary.

Thirdly, the book explains to the reader how the method can be executed step-by-step. This way, the reader is not thrown into the deep end, and he/she can be confident that the method is performed correctly. For instance, the first step of each method indicates the necessary preparations from the reader to execute the method successfully. Besides, the last step of each method ends with a 'what now'. This way, the book guides the reader in a specific direction, to make sure that he/she keeps following the Design Thinking process in the right way.

Fourthly, the book provides the methods, whenever necessary, with a canvas. These are the same canvasses that the participants use during the course. Important to note is that the canvasses from the final course (and thus those that are displayed in the book) now contain several hints, which allows people to use the canvasses more autonomously. Furthermore, the new canvasses have a more simplified graphical layout compared to those of the prototype. This layout makes it easier for the reader to quickly and easily replicate the canvas on a whiteboard or a flipchart and it will give him/her the feeling that not much is needed to apply the methods and tools at work.

Moreover, each canvas contains a QR code. When the reader scans the QR code with a mobile phone, the system will redirect him/her to an internet page that allows the canvas to be downloaded and to be printed. This way, this prevents the reader from writing on the canvasses in the book.

Fifthly and finally, the book provides every method with an example. This example gives the reader an idea of the desired result. The examples are identical to those that are provided in the course.

How the book supports the fourteen learning objectives

Process-related learning objectives

The book supports the process-related learning objectives in the following three ways. First of all, the book allows the participants to read back the Design Thinking process and its corresponding phases, design methods and tools at leisure during the entire course. Therefore, the participants can adjust their progression towards the learning objectives in their own time, whenever necessary.

Secondly, the trainers can instruct the participants to read the book before day two and three. This instruction enables the participants to abstractly conceptualise the information first before they actively experiment with it during the course (see ch. 2, p. 38). As a result, experimental learning is enhanced.

Thirdly, the book allows participants to relearn the Design Thinking process, design methods and tools as soon as they have the feeling that their knowledge has been diluted.

Conceptual learning objectives

The book supports the conceptual learning objectives in the following two ways. First of all, the book emphasizes at the beginning of each chapter (and thus each phase) to apply the corresponding mindsets. This way, the participants do not only learn that they should not use the Design Thinking process without the mindsets during the course, but they also learn this when they read the book. Secondly, the book provides each mindset with a best-case practice, wherein it shows how the mindsets can be a significant enrichment of the Design Thinking process.

Personal learning objectives

The book supports the personal learning objectives in the following two ways. First of all, the book makes it easier for the participants to think about how Design Thinking can be applied at work during the course itself. After all, the book provides several alternatives for the design methods that are taught in the course. Therefore, the participants can use the book during moments of reflection in the course, to look for alternatives that are more fitting for their context at work. Secondly, the book allows participants to reflect on how Design Thinking fits in their context at work, even after the course.



Deliverable two: Vouchers

The lack of colleagues, managers and external stakeholders with a basic understanding of Design Thinking is an important reason why participants do not have the ability and courage to apply the Design Thinking process at work. As a result, these colleagues, managers and external stakeholders often do not see the added value of Design Thinking, which prevents them from being eager to apply the new design methods during projects. This way, much energy is demanded by the participants to convince others to execute projects according to the Design Thinking process.

Therefore, a voucher system has been thought out, which enables the participants to spread awareness about the importance of Design Thinking within their organization. The system makes it easier and more attractive for participants to involve people from their context in the course.

The voucher system works as follows. Every book contains three vouchers. The participants can use these vouchers by handing them over three other people in their context at work (e.g. colleagues, managers or external stakeholders). Each voucher offers a new member a hundred-euro discount on the registration fee of the course. In return, the original participant receives a hundred-euro cashback on his/her registration fee. An extra benefit of this system is that the participants actively advertise for the course, and thus provide the course with new participants.

An essential ingredient for the success of the voucher system is that the trainers must actively encourage the participants to use the vouchers. In addition to that, the trainers must explain the underlying reason for the system. This way, the participants can see the real value of the vouchers.

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Final Course

The course has been refined, based on the main takeaways from chapter four (see ch. 4, p. 144). The course is not much different from the prototype. For instance, the learning objectives, the operational framework and the key methods in the course have roughly remained the same.

However, the course has been refined based on three different areas:

- 1. Improved tools
- 2. The addition of a timetable
- 3. The integration of the book.

The three elements are further explained below. Moreover, the pages 166-177 provide a detailed overview of the final course and show how the three items have been integrated.

Improved tools

As mentioned earlier, the canvasses in the final course contain two improvements. First of all, the tools provide several hints, which allows people to use the canvasses more autonomously. By enabling the participants to work independently, the trainers acquire more time during the execution of the methods for individual counselling of the participants or groups whenever necessary.

Secondly, the canvasses have a more simplified graphical layout compared to those of the prototype. This layout makes it easier for the reader to quickly and easily replicate the canvas on a whiteboard or a flipchart and it will give him/her the feeling that not much is needed to apply the methods and tools at work.

An example of an improved canvas can be seen in figure 164. The figure shows an iterated version of the original pitch canvas in the prototype (see. p. 93, figure 9).

The addition of a timetable

A detailed timetable has been added to the final course, based on the validation of the prototype. First of all, the timetable shows that the course has been divided over three full working days. Secondly, the schedule indicates that there must be a minimum of one week and a maximum of two weeks between every day of the course. On the one hand, this time offers participants enough possibility to do their homework, while on the other hand, the time is not too long for the participants to make the course topical.

Thirdly, the timetable shows how much time the trainers should spend per activity, for example, on a presentation, on a specific method, or more importantly; for the crucial moments of reflection.

The course should contain two trainers to make sure that the trainers stick to the timetable. This way, one of the trainers can keep an eye on the time, while one of the trainers can focus on teaching. Another benefit of two trainers is the opportunity for more individual counselling, which allows individuals or groups to be counselled at the same time. However, it is essential to note that the trainers should spend the individual counselling solely on accomplishing the learning objectives.

The integration of the book

The book has actively been integrated into the course. First of all, every participant receives a copy of the book at the beginning of the course. Important is, the trainers must emphasize that the participants are obligated to bring the book to day two and three of the course to make sure that the participants make use of the book.

Secondly, the trainers can refer to alternative or additional methods in the book during the course. This way, participants understand that the number of design methods and tools in Design Thinking is much more substantial than what is taught in the course and that certain situations require alternative or additional design methods. Furthermore, the participants can use the book during the moments of reflection to look for alternative design methods, whenever they have the feeling that a method from the course does not fit in their context at work.

Thirdly, the book allows the trainers to explain to the participants that the design methods from the course are not structured in the way as one would apply them in practice. Therefore, it will be apparent to participants that, in practice, one should not build forward upon their assumptions, compared to what they do in the course. The trainers must explain that the book does follow the standard order which one should follow during an actual Design Thinking project.

Fourthly, the trainers should instruct the participants at the end of day one to read the entire book. This way, the participants can prepare themselves for the matter that will be taught during day two and day three. Furthermore, it allows them to adjust their progression towards the learning objectives in between the days of the course.

PITCH CANVAS



₩ Audience

Who are the specific people or audience segments that will be listening/reading to your pitch?

What are their roles and responsibilities? (not everyone is equally important, make sure you're addressing the right person!)



G Goals

Start with an end in mind: What's your **end goal** – what do you want your listening audience to do eventually?

Break the end goal down into the chain of smaller steps that are hard to say no to

What is the first next action step you want them to take? Think low threshold, low risk - something that is difficult to refuse,



Friction

Imagine that they had turned you down. What might be their reasons?

Identify their fears, worries, existing habits and believes that might lead to potential resistance against your call to action or against the idea

You might want to address those either in the pitch itself or prepare answers for potential follow-up of the pitch (Q&A).



Why should your listening audience care to listen and take action? How is your idea related to the way they measure success - what drives them?

Think gains and especially potential losses, both factual and emotional.



Describe the context of your pitch:

- Time (when, how much time do you have?)
- Room (where, how big...) and
- Technicalities (use of a projector, speakers, clicker, microphone...)



The hook are the first 20 seconds: Get your listener's attention, make tem go: "Wow, tell me more!"

Hook does not have to be it's own **chapter**! For example, you may simply want to start explaining the problem in an attention-grabbing



Problem

The enemy - paint a concrete, emotional picture of the thing that is getting in the way of your customer's happiness. Make it easy for your listening audience to relate.

Create a sence of urgency and sketch the promised land. Which obstacles can be identified? Why has the enemy not been defeated before?



Solution

Reveal your proposition in all its greatness. It could be a product, a service, a business case, a plan or any other type of idea. Whenever possible: show, don't tell!

Explain concrete benefits, both factual and emotional, that make it superior or at least unique compared to alternatives.

Prove your claims by providing tangible evidence



Execution

Why you? What key achievements and past experience indicate that you're the right team to make it happen? What's your 'secret sauce' that is increasing your chances of success?

How fare along are you? Highlight the key milestones that you've reached so far and the key steps you plan to take next.

What's your and why do you care?



Grand Final

(Optional) Give a summary of key points worth remembering

Call to action – what are the first next actionable steps that you want your listening audience to take? Make it difficult to refuse.

The great memorable close that leaves your audience on an emotional high, preferably with a smile on their face.



SUGGESTION: Print on A3 and capture the essence of each block on a sticky note. Iterate.

	Activities	Suggested Time	Learning objectives		Activities	Suggested Time	Learning objectives
	Introductory presentation	40 minutes			to get a good understanding of the case.		
	The trainers introduce themselves	5 minutes	LO1 - Understanding		Each group discusses what they currently	5 minutes	
	The participants introduce themselves (e.g.	10 minutes	LO2 - Framing		know about the case. The case holders have to keep a low profile in this discussion.		
	name, function and fun facts).	To Trimutes	LO3 - Envisioning				
	Pre-assessment: what do participants currently	5 minutes	LO4 - Realising				
	know about Design Thinking?	10 minutes	LO5 - Validating		Stakeholder Mapping	65 minutes	
	The trainers give an introduction to Design Thinking. They use the operational framework		LO6 - Exploring		The trainers explain what stakeholder mapping is, what the benefits are, and where the method can be found in the book. Next, the		LO1 - Understanding
	for Design Thinking Novices to explain the process and the mindsets. Furthermore, the trainers offer several real-life examples of Design Thinking projects.		LO7 - Confronting				LO9 - Positioning
			LO8 - Visualising		trainers give an example of a completed stakeholder map. Lastly, the trainers provide		
	The trainers give a brief overview of the outline of the course and explain the nine learning	5 minutes			alternatives for the method (e.g. stakeholder constellations) and refer to the book.		
	objectives. The trainers provide an introduction to the book and each participant receives a copy.	3 minutes			Each member grabs a marker and a bunch of post-it notes to create a singular stakeholder map on a whiteboard or flipchart together with their team members.	35 minutes	
	The trainers give an overview of day one. They 2 minutes show the participants the first two phases of the process they will go through during that	2 minutes			Each team adds post-it notes to the map with visual representations of the stakeholders.	10 minutes	
	day and which mindsets they will learn. Warm-up exercise	10 minutes		₩	Each participant reflects with their peers on how the method fits in their context at work. The participants can take a look in the book for an alternative approach whenever they have the feeling that the design method does not fit in their context.	15 minutes	
	Each participant receives a black marker and several sheets of A4 paper. The trainers give the participants several drawing exercises (e.g. by drawing lines, circles and stick figures). During	10 minutes	LO8 - Visualising		Persona	65 minutes	
	the exercises, the trainers provide a brief explanation of visual communication.				The trainers explain what a persona is, what	5 minutes	LO1 - Understanding
					the benefits are, and where the method can		LO9 - Positioning
	Case introduction	50 minutes			be found in the book. Next, the trainers give an example of a persona. Lastly, the trainers briefly provide alternatives for the method (e.g.		LOS - Fositioning
	The participants divide themselves into multidisciplinary teams of 3-5 people, depending on the size of the group.	5 minutes			empathy mapping) and refer to the book. Each team recreates the persona canvas on a	40 minutes	
	[Open course]: Each participant briefly explains his/her case to the team.	20 minutes			whiteboard or a flipchart. Each member grabs a marker and a bunch of	5 minutes	
	[Open course]: Each participant votes on a case of one of their team members.	5 minutes			post-it notes to fill in the canvas together with their team members. The participants create a persona of the end-user.		
	[Open course]: The team asks the case holder (i.e. the one in the team which case has been chosen) as many questions as they can to get a good understanding of the case.	15 minutes			Each participant reflects with their peers on how the method fits in their context at work. The participants can take a look in their book for an alternative approach whenever they have the feeling that the design method does	15 minutes	
	[In-company course]: Someone from the organisation introduces a single case via a short presentation	20 minutes			nave the reeling that the design method does not fit in their context.		
	[In-company course]: All the participants ask	20 minutes					

the case holder as many questions as they can

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Each team performs a role-play. One member

of each team plays the persona, while the other members ask the persona as much questions about his/her needs and pain points as possible. The participants write down their

insights on post-it notes.

10 minutes

how the method fits in their context at work.

Activities

Suggested Time

Learning objectives

Closing presentation

The trainers give a short overview of day one. They discuss the phases, the mindsets and the fundamental methods that have been taught.



The trainers organise a plenary reflection, where they instruct the participants to share and discuss what they have learned during day one.



The trainers explain the homework that must be made before day two. Each team is instructed to use the assumption canvas (which participants can find in the book) to validate their top three assumptions in practice with one or two external stakeholders. Secondly, each participant is instructed to read the entire book before day two.

The trainers give a brief overview of day two.

25 minutes

5 minutes LO1 - Understanding

LO2 - Framing

LO6 - Exploring

LO8 - Visualising LO9 - Positioning

5 minutes

5 minutes

10 minutes

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trainers briefly provide alternatives for the

	Activities	Suggested Time	Learning objectives	Activities	Suggested Time	Learning objectives
	Opening presentation	15 minutes		method (e.g. the 6-3-5 method) and refer to the book.		
	The trainers give a short presentation where they look back at day one. The trainers provide an overview of day two. They show the participants the last three phases of the process they will go through during that day and which mindsets they will learn.	10 minutes 5 minutes	LO1 - Understanding LO2 - Framing LO3 - Envisioning LO4 - Realising	The trainers show how ideas can be made tangible by using LEGO® and give some examples. Furthermore, the trainers share tips that can be used when the participants get stuck during a brainstorm session.	5 minutes	
	will leaff.		LO5 – Validating LO6 – Exploring LO7 – Confronting LO8 – Visualising	Each member brainstorms individually in silence and tries to create as many ideas as possible that can solve the HMW-question of their team. The participants share their ideas with	10 minutes	
	Homework discussion	40 minutes		their peers. All the participants are instructed to stand up and to switch seats with one of	0 minutes	
	Each participant has a discussion about the results of the assumption canvas with their peers. The teams adjust their POV statement whenever necessary.	25 minutes	LO6 - Exploring LO9 - Positioning	their team members. Each team performs a brainstorm with all the team members.	10 minutes	
R	Each participant reflects with their peers on how the method fits in their context at work.	15 minutes		Each team goes through all the ideas that are on the table one more time to make sure that they understand all the ideas that have been created.	10 minutes	
	How Might We? The trainers explain what the How Might We (HMW) method is, what the benefits are, and where the method can be found in the book. Furthermore, the trainers give an example of an HMW-question.	25 minutes 5 minutes	LO3 - Envisioning LO9 - Positioning	Each participant reflects with their peers on how the method fits in their context at work. The participants can take a look in their book for an alternative approach whenever they have the feeling that the design method does not fit in their context.	15 minutes	
R	Each team creates an HMW-question of their POV-statement. Each participant reflects with their peers on how the method fits in their context at work.	15 minutes		Post-it voting with criteria The trainers explain what post-it voting with criteria is, what the benefits are, and where the method can be found	50 minutes 5 minutes	LO3 – Envisioning LO9 - Positioning
	Warm-up exercise The trainers provide every group with a sufficient amount of LEGO®. Tower challenge: All the participants are	5 minutes 0 minutes 5 minutes		in the book. Next, the trainers explain the rules of brainstorming. Lastly, the trainers briefly provide alternatives for the method (e.g. the 'now, wow, how method') and refer to the book.		
	challenged to build the highest tower as they pos-sibly can with the bricks on their table. Everyone has two minutes, and every tower must stand on its own when the time is up.	5 minutes		Each team chooses three ideas that have the most potential. The teams have to take three essential criteria in mind while doing this: desirability, feasibility and viability.	15 minutes	
	Brainstorming The trainers explain what brainstorming is, what the benefits are, and where the method can be found in the book. Next. the trainers explain the rules of brainstorming. Lastly, the trainers height provide alternative for the provide altern	65 minutes 5 minutes	LO3 - Envisioning LO9 - Positioning	Each member divides five post-it notes over the three ideas that their team has selected. The idea that receives the most post-it notes is the winner and will be explored in the following method (i.e. rapid prototyping).	15 minutes	

	Activities	Suggested Time	Learning objectives		Activities	Suggested Time	Learning objectives
	Each participant reflects with their peers on how the method fits in their context	15 minutes			members: one member is an interviewer, and the others are observers.		
	at work. The participants can take a look in their book for an alternative approach whenever they have the feeling that the design method does not fit in their context.				Each team validates their prototype with the persona while filling in the left column of the validation canvas. Every member returns to their group at the end of the test.	30 minutes	
	Lunch break (12:45 - 13:30)				Each team exchanges a new team member with a member of another team. Again, they instruct this new member to play their persona as well as possible and divide different roles over their team members.	5 minutes	
	Rapid Prototyping The trainers explain what rapid prototyping in Design Thinking is, what the benefits are, and where the method can be found in the book. Next, the trainers give different examples of prototypes (e.g. mockups, models, storyboards, role-play, etc.) and refer to the book.	50 minutes			Each team validates their prototype with the persona while filling in the right column of the validation canvas. Every member returns to their group at the	30 minutes	
		5 minutes	LO4 - Realising LO9 - Positioning	Positioning end of the test. All the teams are given the possibility to use the feedback to iterate their prototype.	end of the test. All the teams are given the possibility to use the feedback to iterate their	10 minutes	
					15 minutes		
	Each team is instructed to think about what part of their idea they would like to test. Based on this decision, the teams	10 minutes			Closing presentation	25 minutes	
	choose what kind of prototype they want to create.				The trainers give a short overview of	5 minutes	LO3 - Envisioning
	Each team creates a prototype of their idea.	20 minutes			day two. They discuss the phases, the mindsets and the fundamental methods that have been taught.		LO4 - Realising
	Each participant reflects with their peers on how the method fits in their context at work. The participants can take a look in their book for an alternative approach whenever they have the feeling that the design method does not fit in their context.	15 minutes			The trainers organise a plenary reflection,	10 minutes	LO5 - Validating
R				A	where they instruct the participants to share and discuss what they have learned		LO7 - Confronting
A S					during day one.		LO8 - Visualising
					The trainers explain the homework that needs to be made by the teams before day three. First of all, each team	5 minutes	LO9 - Positioning
	Validating	120 minutes			is instructed to create another type of prototype that allows them to test their		
	The trainers explain how a prototype can 5 min be tested with stakeholders by using a validation canvas. Furthermore, they explain where the canvas can be found in the book.	5 minutes	LO4 - Realising		idea. Secondly, each team is advised to use the validation canvas (which		
			LO5 - Validating		participants can find in the book) to validate their new prototype in practice,		
			LO9 - Positioning		by confronting two external stakeholders with a small experiment.		
	Each team recreates the validation canvas on a whiteboard or a flipchart.	20 minutes			The trainers give a brief overview of day three.	5 minutes	
	Each team performs a role-play. First, the team exchange one team member with a member of another team. Secondly,	5 minutes					

174

175

they instruct this new member to play their persona as well as possible. Thirdly, they divide different roles over their team

Each participant reflects with their peers on

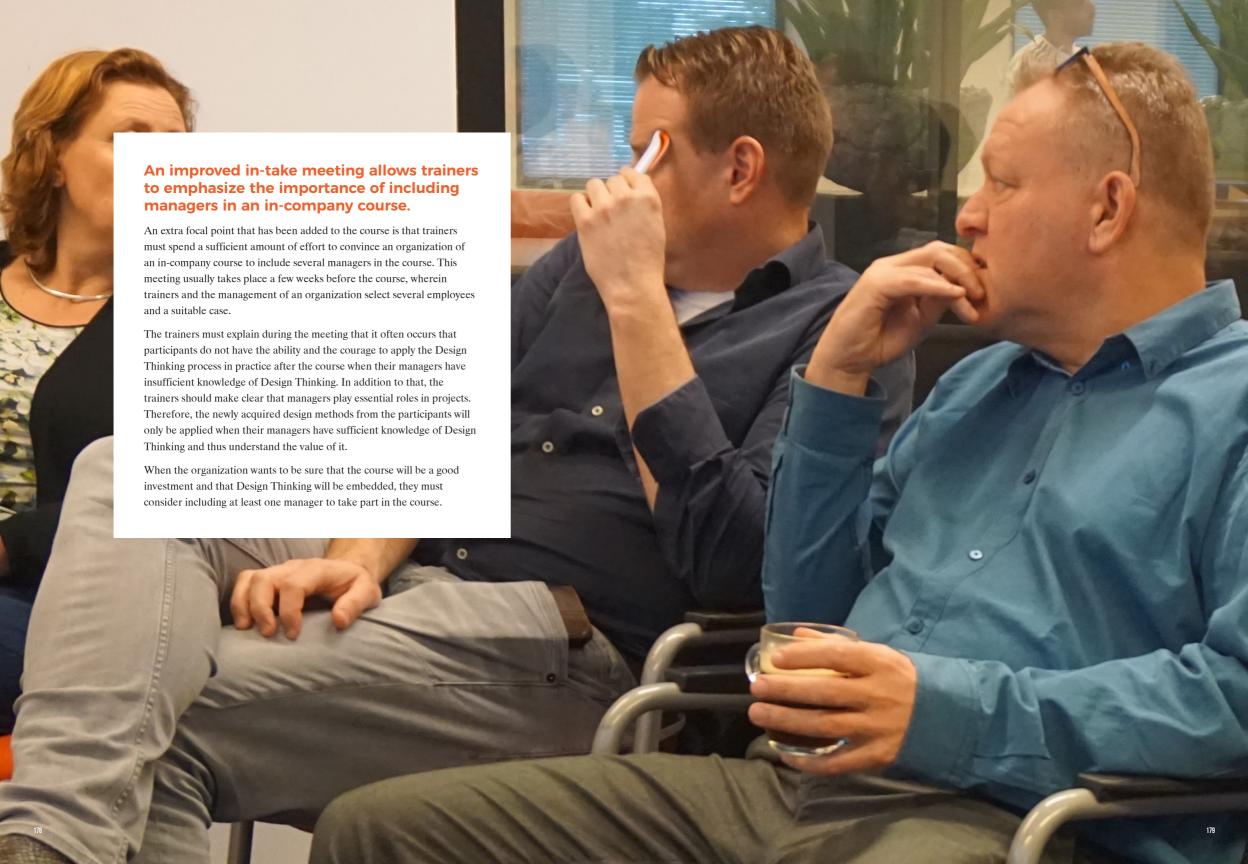
how the tool fits in their context at work. Each team has time to prepare their pitch.

Moreover, the trainers advise the teams to choose someone with little pitchingexperience to give the pitch.

15 minutes

70 minutes

	Activities	Suggested Time	Learning objectives		Activities	Suggested Time	Learning objectives
	Opening presentation	15 minutes					
	The trainers give a short presentation where they look back at day two.	10 minutes	LO3 - Envisioning				
	The trainers provide an overview of day three. They explain that day three will focus on pitching as well as on how Design Thinking fits in the context of the participants after the course.	5 minutes	LO4 - Realising		Lunch break (12:45 - 13:30)		
		3 minutes	LO5 - Validating				
			LO7 - Confronting				
			LO8 - Visualising		Each team is instructed to give a pitch.	60 minutes	
	Homework discussion	35 minutes			Each participant reflects with their peers on how the method fits in their context at work.	15 minutes	
	Each participant has a discussion about	20 minutes	LO5 - Validating		de work.		
	the results of the new prototype and the validation canvas with their team members		LO7 - Confronting		D	175	
	(e.g. what happened and which conclusions can be drawn?).		LO9 - Positioning		Plenary self-assessment & reflection	135 minutes	
	Each participant reflects with their peers on how the methods fit in their context at work.	15 minutes			The trainers place several images on the	5 minutes	LO1 - Understanding
ZiN					floor that represent the different phases, key mindsets, methods and tools that		LO2 - Framing
	Pitch canvas	175 minutes			have been taught in the course.		LO3 - Envisioning
	The trainers explain what pitching is, what the benefits are, and where the method can be found in the book. The trainers give different examples of pitches by showing short videos	5 minutes			The trainers guide the participants through the entire course one more time	25 minutes	LO4 - Realising
			LO5 - Validating	by explaining the different images.		LO5 - Validating	
			LO9 - Positioning		The trainers give various examples of success stories of prior participants that apply Design Thinking in their context at work.	30 minutes	LO6 - Exploring
							LO7 - Confronting
	The trainers explain to the participants how	5 minutes					LO8 - Visualising
	they can draft an audience-centred pitch by us-ing a pitch canvas and they show the participants where they can find the canvas in their book.	5de5		A	The trainers organise a plenary self- assessment and reflection. Furthermore, the participants share and discuss what they have learned during the entire course and how they will apply Design Thinking in their context at work after the course.	60 minutes	LO9 - Positioning
	Each team recreates the pitch canvas on a whiteboard or a flipchart.	5 minutes					
	Each member grabs a marker and a bunch of post-it notes and fills in the top row of the canvas.	30 minutes			The whole group discusses the importance of the three mindsets	10 minutes	
	Each team fills in the bottom row of the canvas	30 minutes		€100	The trainers explain the voucher system as well as its importance.	15 minutes	



In summary

A detailed end product and two deliverables have been presented in this chapter. The two deliverables provide a solution to the two bottlenecks of the prototype, which have been identified in the previous chapter. The first deliverable is a book with an overview of all the design methods and tools of the course with practical guidelines. Furthermore, the book provides additional and alternative design methods and tools, which the participants can use at work after the course. The second deliverable is a voucher system, which makes it easier and more attractive for participants to include colleagues, managers and external stakeholders in the course. As a result, participants can show the value of Design Thinking to more people in their context. By adding the two deliverables to the course, it is assumed that participants can now apply the Design Thinking process at work after the course, alongside the Design Thinking mindsets.

In addition to the two deliverables, the prototype has been refined in three different areas. First of all, a detailed timetable has been added, which contains all the steps of the course with a specific time indication. Secondly, the tools of the course have been improved, by aquiring more detail and a simplified graphical layout. Thirdly and finally, the book has extensively been integrated into the course.

The next chapter discusses how the final product has contributed to the primary design goal by providing a conclusion and a discussion.

Solutions



PROCESS

The operational framework, constructive alignment, intermediate reflection on the learning objectives, and the book have formed the foundation for the course to teach the Design Thinking process.



MINDSETS

The operational framework, constructive alignment, intermediate reflection on the learning objectives and the book have formed the foundation for the course to teach the Design Thinking mindsets.



CONTEXT

Intermediate reflection on the learning objectives *enable* participants to reflect on how Design Thinking can be applied in their context at work. Furthermore. it has been assumed that the book, the voucher system and the improved intake meetings during in-company courses are necessary for participants to apply the Design Thinking process at work.



Conclusion

This graduation project has aimed to design a course that can embed Design Thinking in organisations successfully. To be able to reach this primary goal, three smaller design goals have been formulated:

- 1. The course must contain a set of essential mindsets for Design Thinking novices
- 2. The course must be able to teach the process and mindsets to participants
- The course must enable participants to apply Design Thinking in their context at work.

To be able to incorporate a set of essential mindsets in the course, it has been investigated which mindsets are vital for Design Thinking novices to execute the Design Thinking process successfully. Based on the theory and several co-creation sessions, three mindsets have been selected out of nine mindsets for Design Thinking novices.

- Dare to go outside to explore the problem
- Dare to work visually, not only within your team but also with your stakeholders
- Dare to confront key stakeholders with small experiments

To be able to teach the three mindsets and the Design Thinking process in a course, an operational framework has been developed. Both the process and the mindsets have integrated in the framework in a way they can support each other. The operational framework and constructive alignment have led to the development of a prototype of a three-day Design Thinking course.

The prototype consists of a variety of activities, different forms of assessment and nine learning objectives that are mentioned below:

LO1 - Understanding: At the end of the course, participants can use the key
methods that are learned in the course to understand the problem, as well as its
context and stakeholders.

Design Thinking phase: understanding

LO2 - Framing: At the end of the course, participants can use the key methods
that are learned in the course to frame the problem from the perspectives of
crucial stakeholders.

Design Thinking phase: Framing

LO3 - Envisioning: At the end of the course, participants can define a design challenge, and they can use the key methods that are learned in the course to create different ideas and to select the ones that are the most desirable, feasible and viable for this design challenge.

Design Thinking phase: Envisioning

 LO4 - Realising: At the end of the course, participants can create different kinds of prototypes of their ideas, which they can test with stakeholders to collect feedback.

Design Thinking phase: Realising

 LO5 - Validating: At the end of the course, participants can validate a prototype with stakeholders to collect feedback to improve on their idea.

Design Thinking phase: Validating

LO6 - Exploring: At the end of the course, participants can discuss why a
problem can only be fully understood when they have visited and explored its
context.

Design Thinking mindset: Dare to go outside to explore the problem

- LO7 Confronting: At the end of the course, participants can discuss why it is
 essential to confront key stakeholders with small experiments.

 Design Thinking mindset: Dare to confront important stakeholders with small
 experiments
- LO8 Visualising: At the end of the course, participants can discuss why visual communication is an essential addition to verbal communication.

Design Thinking mindset: Dare to work visually, not only within your team but also with important stakeholders

LO9 - Positioning: At the end of the course, participants can reflect on how Design Thinking or parts of it can be applied in their context at work.

The prototype has been validated in two different scenarios. In the first scenario, the prototype has been tested as an open course with participants from the public sector. In the second scenario, the prototype has been tested as an in-company course, with participants from the private sector. This way, it has been validated whether or not the prototype is easily projectable in a variety of situations. Three main results have surfaced during the validation, which have been highlighted below.

First of all, the validation of the prototype has shown that there are no significant differences between both groups. While the opposite has been expected, the validation has demonstrated that no specific focal points are required when participants originate from the public sector. Therefore, one can conclude that the course is projectable in both the private sector and the public sector.

Secondly, the operational framework has proven to be a valuable addition to the prototype. The validation has shown that the operational framework has not only been useful to design the prototype but that it has also served as a conceptual model during the course itself. By actively showing the framework during the course, it becomes easier for participants to understand the different phases of the Design Thinking process and which mindsets support them. Because of this, it can be concluded that the framework plays an essential role to teach the Design Thinking process and mindsets during a course.

Thirdly, it has surfaced during the validation that the selected learning objectives, activities and assessment have contributed sufficiently to the education of the Design Thinking process and the three mindsets. Unfortunately, constructive alignment has not prepared the trainers enough to integrate a sufficient amount of moments of reflection on the learning objectives in the prototype beforehand. These moments of reflection have been incorporated in the prototype halfway during the validation. The validation has shown that these moments are essential for participants to learn Design Thinking and to understand how Design Thinking can be applied at work.

The participants have been approached with follow-up interviews after the validation. The follow-up interviews have shown that the prototype indeed enabled participants to apply the Design Thinking mindsets in their context at work after the course. Unfortunately, the interviews have also shown that the prototype has not been able to provide participants with the ability and courage to apply the Design Thinking process at work, due to two bottlenecks. First of all, the prototype has not provided the participants with an overview of all the necessary design methods and tools with practical guidelines. Secondly, the prototype has not been able to support participants in showing their colleagues, managers and other relevant stakeholders the added value of the Design Thinking process during projects.

The prototype has been refined to a final product, and several deliverables have been added to remove the mentioned bottlenecks. First of all, a book has been designed with an overview of all the design methods and tools with practical guidelines. Secondly, a voucher system has been developed, which makes it easier and more attractive for participants to involve people within their context in the Design Thinking course. Thirdly and finally, an improved intake meeting for in-company courses has been added to the final course. During these improved intake meetings, trainers encourage organisations to let managers take part in the course.

Based on the mentioned results, it can be assumed that the primary goal has been accomplished and that a course has been developed that can embed Design Thinking in organisations successfully. However, the final product must be tested to be sure that participants are genuinely empowered to apply the Design Thinking process in their context at work after the course.

Discussion

Even though it can be assumed that the primary design goal has been accomplished, and a course has been developed that might embed Design Thinking in organisations successfully, five points should be brought up for discussion.

The observation of an existing Design Thinking course has shown that participants were unable to understand the Design Thinking process after the course, as well as how they can apply Design Thinking in their context at work. Furthermore, that same observation has shown that the trainers do not teach any mindsets for Design Thinking novices to the participants in the course. However, it is debatable whether this one observation is reliable enough to generalise the quality of the Design Thinking courses that are currently on the market. Therefore, more existing courses need to be observed in the future. These observations could even allow new bottlenecks or focal points to surface, which can be integrated into the course.

Three mindsets for Design Thinking novices have been selected based on eliminating, clustering and a co-creation session. Furthermore, the validation of the prototype has shown that participants of the course believe that the mindsets are essential when executing the Design Thinking process. However, it can be questioned whether the appropriate mindsets have been selected. For instance, the author has based the clustering-process heavily on his intuition and his experience as a designer. Furthermore, it is debatable whether the number of participants during the co-creation session is significant to conclude that the three mindsets are essential for Design

Thinking novices. Therefore, including more (and perhaps also more experienced) people in the process of eliminating, clustering, and the co-creation session will increase the reliability of the set of key mindsets for Design Thinking novices.

The validation of the prototype has shown that both groups of participants have accomplished the learning objectives. However, it can be questioned whether the number of groups that have participated in the course is sufficient to conclude the quality of the prototype. For instance, imagine if the prototype would have been tested with three or four groups instead of two; would all of the groups still be able to accomplish the learning objectives?

The validation of the prototype has also shown that the course is projectable on the private and the public sector and that it can be executed both as an open course as well as an in-company course. However, it is debatable whether the prototype has been validated correctly. For instance, it would have been better if the prototype was tested as an in-company course with a group of participants from the public sector and a group of participants from the private sector. The same principle applies to a validation of the open course. Therefore, in the future, the course should be validated with more groups, while simultaneously having fewer variables.

The most critical point that should be brought up for discussion is the reliability of the quality of the final product. Two deliverables (i.e. a book and a voucher system) have been added to the course, based on the validation of the prototype and the followup interviews. Furthermore, the intake meeting at an in-company course has been adjusted in a way that trainers try to involve managers in the course. Unfortunately, the final product has not been tested, and therefore, one can doubt its quality. First of all, it can be questioned whether the book is the right medium to create an overview of all the design methods and tools. Furthermore, it is unclear whether the book has been integrated into the course correctly. Perhaps the book may distract participants from the course itself when trainers actively use it. Secondly, it is debatable whether participants will use the voucher system after the course. Besides, it is unclear whether the system will indeed be able to convince colleagues, managers and external stakeholders to take part in the course. Thirdly and lastly, one can doubt the quality of the improved intake meeting at in-company courses. For instance, it is still unclear whether trainers can convince organisations during these kinds of meetings to instruct managers to take part in the course.

Therefore, to validate that the final product has genuinely accomplished the primary design goal, one should test the final course and final deliverables in practice.

PERSONAL REFLECTION

Personal reflection

During this graduation project, I have been able to use a vast amount of knowledge and experience that I have gained during my studies, and specifically in the field of Design Thinking. Furthermore, I have been able to require and add new knowledge to my portfolio. For instance, I have gained more knowledge and experience in designing a course and giving training. The two most significant learning experiences concerning this topic have briefly been highlighted below.

The first learning experience during this graduation project occurred while convincing organisations to take part in the validation of the prototype. The organisations had to be convinced to take part in a course that had not yet been realised and proven itself to be a valuable investment. As a result, organisations found it difficult to take the risk to provide their employees to take part in a three-day course. This problem has been solved by 'selling' the course as a finished product and by telling the organisations that I had more than enough knowledge and experience concerning Design Thinking. This action has eventually convinced two organisations to take part in the validation of the prototype. What I have learned from this is that a brand-new course can thus be validated and iterated efficiently and effectively, when it is sold as a final product to organisations or individuals.

The second learning experience occurred due to my insecurity as an unexperienced trainer that I had to overcome during the course. Participants regarded me as the expert and demanded that I could answer all of their questions. Unfortunately, due to my lack of work experience, I was unable to provide all of the answers to these questions. As a result, I noticed that the participants started doubting the quality of the course itself. I have dealt with this problem by advising my graduation coaches inbetween the days of the course and using their expertise and experience to find answers. This way, I was still able to provide the right answers to the remaining questions of the participants before the end of the course. What I have learned from this is that the quality of the trainer is as important as the course itself. Therefore, to improve the course, I must gain more experience, both in the area of giving training as well as in the field of Design Thinking. The only way to do this is by simply getting to work after receiving my master's degree, continue the execution of this course and to extend my knowledge of Design Thinking.

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