

---

**Author** Bice Lee Herold

---

**Title of thesis** Problem Framing for Applied Research - Evaluating a new Designer's Approach to Problem Framing to Improve the Sustainability in Our Food Production Chain.

---

**Department** Department of Design

---

**Degree programme** Creative Sustainability

---

**Year** 2017**Number of pages** 93+55**Language** English

---

### **Abstract**

This project-driven thesis transposes problem framing in design onto scientific, applied research to enable more fruitful research projects. My initial motivation for this work comes from my alarm at the state of our environmentally unsustainable food system. Through collaboration with the research group for Sustainable Food Systems at the Research Institute of Sweden (RISE), this thesis investigates the role of design in applied research towards environmental sustainability. Specifically, it explores how design can help frame research projects onto environmentally-friendly food production and processing.

The design-led approach is employed to address the expressed concerns of the researchers at RISE about the ways in which they identify problems and also develop the concepts for new research projects. RISE focuses on changes in practice in the food production chain towards more sustainable performances. However, according to RISE researchers, their projects do not always reach the desired outcome, in part due to their current practices in executing projects. In addressing this challenge, I will explore how design-led ways of identifying problems and opportunities can be used at the pre-project phase of applied research projects.

The actual exploration took place in a one-day workshop which was attended by RISE researchers from different cities, and which was operationalised by a set of design-led framing activities. Grounded in design literature on framing (e.g., Dorst 2015; Lawson, 2005; Schön 1983), the activities were prepared to not require any pre-existing knowledge about design. The workshop utilised three actual research projects that the RISE researchers were about to develop. It was followed by a co-creation session to improve the tool that I had developed, and interviews about their experiences of using such an approach.

A framework of action research, a research method to conduct research through taking action, was employed to guide the implementation and evaluation of this new approach. I will point out the limitations of this study, reflect upon my learning outcomes and explain how I see the future of problem framing for non-design-led organizations.

---

**Keywords** design, problem framing, applied research, design transposition, action research, sustainability

---



# **PROBLEM FRAMING FOR APPLIED RESEARCH**

**Evaluating a New  
Designer's Approach  
to Problem Framing  
to Improve the  
Sustainability in Our  
Food Production Chain.**

**Bice Lee Herold 2017**  
**Creative Sustainability,**  
**Department of Design**  
**Aalto University, School of Arts,**  
**Design and Architecture**  
**Supervisor: Mikko Jalas**  
**Advisor: Seungho Lee**  
**Proof reading: Sylvie & Karen Herold,**  
**Thom Scott-Phillips, Sean Gilleran**  
**Layout assistance: Kathrin Grossenbacher**  
**Images: Bice Lee Herold**  
**Tables: Bice Lee Herold**

**“If I had an hour to solve a problem I’d spend 55 minutes thinking about the problem and 5 minutes thinking about solutions.”**

— Albert Einstein

# SHORTCUTS FOR BUSY READERS

<b>Abstract</b>	<b>VII</b>
<b>Summary of Frame Creation</b>	<b>36</b>
<b>Method Collection</b>	<b>37 and App. 2</b>
<b>Framing Teaser Prototype</b>	<b>50 and App. 3</b>
<b>Evaluation Workshop</b>	<b>69</b>
<b>Case Project Summary</b>	<b>69</b>
<b>Thesis Summary</b>	<b>73</b>
<b>Reflection and Learnings</b>	<b>74</b>
<b>Discussion and Outlook</b>	<b>76</b>

# TABLE OF CONTENT

Abstract	VII
Preface	VIII

1 Introduction	1
1.1 Context	1
1.2 Approach and Methods	2
1.3 Thesis Structure	3

## Part I

### Operationalising Literature on Framing in Design

2 Literature Review - Framing in Design	6
2.1 Literature Search	6
2.2 Research Situation	7
2.3 Terminology	8
2.4 Five Themes of Framing in Design	14
3 Collection of Methods	37

## Part II

### Transposing Framing in Design onto Applied Research

4 Action Research Method and Goals	41
4.1 Action Research	41
4.2 Goals	42
5 Project Case	44
5.1 Collaborative Partner: RISE	45
5.2 Planning	47
5.3 Intervening (Workshop in Gothenburg)	54
5.4 Reflecting	62
5.5 Re-Planning (Improvement)	64
5.6 Evaluating	69

## Part III

### Summary and Discussion

6 Summary	73
6.1 Reflection & Learning	74
7 Discussion and Outlook	76
Acknowledgement	81
References	82
Appendix	84





# ABSTRACT

This project-driven thesis transposes problem framing in design onto scientific, applied research to enable more fruitful research projects. The initial motivation for this work comes from an alarm at the state of our environmentally unsustainable food system. Through collaboration with the research group for Sustainable Food Systems at the Research Institute of Sweden (RISE), this thesis investigates the role of design in applied research towards environmental sustainability. Specifically, it explores how design can help frame research projects onto environmentally-friendly food production and processing.

The design-led approach is employed to address the expressed concerns of the researchers at RISE about the ways in which they identify problems and also develop the concepts for new research projects. RISE focuses on changing practices in the food production chain towards more sustainable behaviour. However, according to RISE researchers, their projects do not always reach the desired outcome, in part due to their current approaches in executing projects. In addressing this challenge, this thesis explores how design-led ways of identifying problems and opportunities can be used at the pre-project phase of applied research projects.

The practical exploration took place in a one-day workshop which was attended by RISE researchers from different cities, and consisted of a set of design-led framing activities. Grounded in design literature on framing (e.g., Dorst 2015; Lawson, 2005; Schön 1983), the activities were prepared to not require any pre-existing knowledge about design. The workshop utilised three research projects that the RISE researchers were about to develop. It was followed by a co-creation session to improve the developed tool, and interviews about their experiences of using such an approach.

A framework of action research, a research method of conducting research through action, was employed to guide the implementation and evaluation of this new approach. The last part integrates the limitations of this study and a reflection of key learning outcomes. It furthermore includes the future of problem framing for non-design-led organizations framed as research suggestions and potential for further implementation possibilities.

This thesis is written for motivated practitioners or prospective practitioners who want to apply or gain the competence for frame creation.

## KEYWORDS

design, problem framing, applied research, design transposition, action research, sustainability

# PREFACE

To describe how my personal motivation for this thesis came about, I need to discuss my very personal, deeply rooted interest in food. Food fascinates me because it is what keeps us all alive, unites us, shapes our culture and today forms one of the biggest economic sectors. In my years as student at Aalto University, I learned that today's food system is far from sustainable and is causing great environmental damage. I then started to investigate how I, as a designer, could help produce the necessary changes towards a more sustainable food system.

The investigation naturally began from my own role in the food system as a consumer. However, my interest quickly turned elsewhere. Through participation in courses at Aalto University and summer schools on the topic of sustainability, I started to see the whole food system, including the production and processing of food. I learned to see the myriad of forces that influence the system such as policies, international trading agreements and the production and implementation of new knowledge. I became profoundly interested in those indirect forces and how they shaped the food system.

Trained as a designer, as someone who creates user-friendly and desirable solutions, my focus was naturally based on a human level. From that perspective, it seemed obvious to me to approach the human behaviour that impinged on the food system and to look at the actions that were causing the environmental damage. I became convinced that if we wanted to change the food system, we would have to go back to one of the root causes of the problems: human behaviour (Standage 2010). There are countless approaches to do that, but with the tools I had access to, I immediately saw potential in design to change human behaviour.

Through my internship at ZHAW, the Zurich University of Applied Sciences, I first encountered applied research and its role in creating and implementing new knowledge. It influences the food system by connecting academic research to the needs of society and industry and by impacting the food system through knowledge production, transformation and application. I was the only designer amongst the group of scientists and I learned about a profoundly different way of working and approaching projects. I observed fundamental differences in thinking, acting and relating, and I was deeply dissatisfied that I could not get proper answers to the following questions that I considered naturally essential to starting a project:

- What problem is this project trying to solve?
- What is the underlying problem?
- Why is the problem a problem?
- And according to whom?
  
- Who are you doing this project for?
- Who are the key stakeholders and the potential users?
- What do they want and need?
  
- Could you think of another solution than the one you are currently working on?

**Those questions mostly concern the beginning of a project. The answers to those questions deeply shape the structure and characteristics of a whole project. I started to comprehend the importance of problem framing as a pre-project activity to understand, structure and interpret a problem in order to identify opportunities and develop concepts. However, the system of applied research is not designed to focus on the pre-project phase to frame and understand a problem. Usually, there is no time to dig into the problem field because the project application process happens in unpaid time that will only be recouped if the funding for a project is approved.**

**I started to wonder if there was a way to use the resources of applied research more efficiently to frame their problems better and create an even bigger change. I strongly believed that if design took on the role of guiding the problem framing process, research projects would become more successful and have greater impact.**



# 1 INTRODUCTION

## 1.1 CONTEXT

The origin of this thesis is based on my personal dissatisfaction with my observation of an absence of problem framing practices in applied research within the food system. This stimulated my motivation to research and create a new approach, derived from design, to understand, structure and frame problems. Problem framing as pre-project discipline is inevitable in design-led practice, as it defines the direction and aim of projects, as well as the potential opportunities to develop new solution approaches. The latter should be particularly important for applied research, as the field is involved in problem solving and innovation. We face challenges on various levels and in different directions in food production, as current approaches are not succeeding in fostering the needed change (FAO, 2014). Today we face serious global environmental problems and the food production system contributes greatly to environmental damage (Nesheim et al., 2015). Problematical parts of this system include agriculture, one of the greatest consumers of water (Strzepek & Boehlert, 2010); prioritisation of land for urban space or non-food crops (Valentine et al., 2012); food waste (Hall et al., 2009); deforestation (Malhi et al., 2008); globalisation of the food system and climate change (FAO, 2009). One possible area in which to start developing new and impactful approaches towards more sustainability is in applied research. This thesis aims to develop a new approach, derived from design and implemented in applied research, to make the food system more sustainable and environmentally friendly in the long term. The aim is to develop opportunities for new solutions by framing the research problem differently.

Applied research for sustainable systems connects science to practice by doing research for practical, problem-solving purposes. Based on collaboration with the research group for Sustainable Food Systems at RISE (The Research Institute of Sweden), this thesis will focus on their use of applied research as a means towards more sustainable food production. Their aim is to influence the food system through the creation of new knowledge about sustainable production practices and the transformation of this knowledge into impactful, practice-changing products. RISE's projects are intended to improve sustainable practices along the food production chain. However, they seemed to struggle with the fuzzy, front end of their projects, the pre-project activities, which lowered their potential impact on sustainable practices of their customers and users. They found themselves stuck in patterns of traditional methods, which did not seem to reward their desire for innovation. They saw that they were not tackling any underlying problems, were focussing on their academic knowledge and were not addressing all of the true needs of their customers. Therefore, the researchers were very interested in learning about other views and methods to overcome this gridlock. This thesis introduces

design as a way of enabling a more effective change in problem framing practices.

Design is an ever expanding discipline and it has been expanding its role in different directions. There have been successful forays into other, non-design-led fields, such as design for governmental services and policy-making (e.g. Helsinki Design Lab, Design Council, Mind Lab). Design to frame problems is a further approach, thoroughly researched by Dorst, which uses design practices to make complex problems approachable in design-led but also in potentially non-design-led fields. Framing includes interpreting, understanding and defining a problem in order to find new approaches and solutions. This has shown that framing of problems in design is an interesting practice that can be transferred into other disciplines. The importance of framing is underlined by its influence on the later, strategic path of a project (Boyer et al., 2013): The way a problem is framed defines, amongst other things, the early stages that will prepare for the implementation of other design approaches later on.

The researchers who participated in the projects studied for this thesis were struggling to frame their projects in a way that would lead to the desired impact. Problem framing has the potential to help them overcome their current challenges by approaching and managing the fuzzy front end of their projects and guiding them in a structured way through the pre-project phase of the identification of opportunities and the development of concepts. Design-led problem framing is transposed to applied research and the success of its implementation is investigated.

I consider the intersection of the fields of sustainable food systems, applied research, and design for problem framing as a promising one, as their synergy allows space for intervention. They are all strongly developing and transforming, and the dynamic of this transition can be used to drive change.

This thesis revolves around these questions: Which aspects of problem framing as design practice are potentially valuable as a way to increase the impact of projects in applied research for sustainable food production? How would such a practical approach be implemented to improve the applied researchers' practices of the pre-project phase of finding, structuring and framing a problem? The aim is to research if a change of practice can be achieved by transposing and implementing frame-creation in design to applied research.

## **1.2 APPROACH AND METHODS**

This thesis is a practical approach to the exploration of and reflection upon the role of design in applied research. This thesis contributes to research on the impact of design-led problem framing in applied research to enable more sustainable practices

along the food production chain. The scope of this thesis includes a focus on the first steps of an approach to transpose design-led problem framing to the non-design-led field of applied research and a test if this approach has the potential to lead to an improvement in research projects. The question of whether applied researchers could overcome current challenges in their research projects through designer-led problem framing is investigated, with the aim to enable more effective and human-centred projects. It is hoped to contribute to the change towards more long-term and environmentally sustainable client behaviour in the food chain.

The chosen methods of researching problem framing and its transposition to applied research include a literature review, and the creation and testing of a new approach based on action research principles. The focus of the literature review is based around the centrepiece of Dorst's Frame Innovation and is complemented with further research. My methodological choice of literature is further explained in Section 2.1 "Literature Search" (p.6). The literature review includes the current research situation, important terminologies and five themes of problem framing. Guided by action research as a research methodology, the outcome of the literature review is operationalized so that it can be tested at RISE. I chose action research as a methodological framework to guide the implementation of problem framing practices in the form of a first iteration cycle of action research: observe and understand, plan, act, reflect. The practised steps of action research include interviews, discussions, a workshop and a co-design session at RISE. The research method has been chosen to guide the creation, application and evaluation of the tool, as well as the overall impact of the approach. The action research method will be explored more deeply in Chapter 4 "Action Research Method and Goals" (p. 41).

Based on a case example, this thesis hopefully contributes positively to the general research about the application of design in non-design-led fields for more sustainable practices, and more particularly for design-led problem framing practices in applied research. The requirements for a customized methodological design approach to lead to more design-led problem framing practices in applied research is examined. I will furthermore investigate to what degree such an approach can facilitate a change in practice, within the scope of a design master's thesis.

The expected outcome of this thesis is profound understanding about problem framing, an approach of operationalization of the theory, a tested implementation of the approach and lastly, a reflection upon the process and deliberation of the approach of design for applied research.

### **1.3 THESIS STRUCTURE**

The thesis comprises three research parts, followed by an evaluation, discussion and conclusion. Part I, "Framing in Design"

is the literature review, which includes an introduction to selected literature, the definition of the most important terms, and “The Five Themes of Framing in Design”. In those five themes, the first one discusses the basic organizational and human requirements to start framing. The second theme examines drivers and values. The third theme analyses the process of finding and choosing a problematic situation. The fourth theme describes how to investigate the chosen problematic situation and create understanding. The fifth theme explores the actual framing of the problem. Details of operationalization are summarized in the following “Method Collection” (3.0), a collection of design methods to implement problem framing.

Part II summarizes and analyses action research and its fundamental part in problem framing. After a short introduction into the methods of action research, the stages of action research that guided the implementation of the tool are examined, including “planning, acting and observing, reflecting and ... re-planning” (Kemmis et al. 2014).

Part III provides an evaluation and an outlook for the future.



# **PART I**

## **OPERATIONALISING LITERATURE ON FRAMING IN DESIGN**

## **2 LITERATURE REVIEW - FRAMING IN DESIGN**

The aim of this section is to create an overview of framing. Before introducing the literature review, selected research work, the current situation of the research and a clarification of the core terms of this thesis (design, problem and frame) is introduced.

### **2.1 LITERATURE SEARCH**

The literature review revolves around Dorst's life work *Frame Innovation* (Dorst 2015). This book was chosen as the centerpiece because it discusses problem framing as a design activity in a comprehensive and structured way. The book is used as a base from which to operationalize and implement his extensive research about problem framing in a real-life experiment. The book covers frame innovation in nine steps, including 19 case studies. This thesis focuses primarily on the first six steps of frame creation, as they address the actual framing of a problem. Dorst's subsequent three steps are concerned with futures, transformation and realization, which is not focus of this thesis. In the operationalization of Dorst's first six steps for testing with RISE, some of his approaches are expanded as they are not specific enough to be implemented. Therefore, other literature was considered in sections where he does not specify how to use his approach in practice. The chosen sources are referred to in the core literature sources of Dorst, Lawson or Cross (Dorst 2015; Lawson 2005; Cross 2011). Further research was conducted for the areas of: *Wicked Problems* (Rittel & Webber 1973); *Systems Thinking and Soft Systems Modelling* (Checkland 2000; Meadows & Wright 2008); *Meaning of Themes* (van Manen 1990); *Problem-Solving in Organizations* (Nickerson et al. 2007; Cyert & March 1963); *Creativity in Problem-Solving* (Basadur et al. 1982; Chand & Runco 1993); *Problem-Solution Relationship* (Maher & Poon 1996); *Structuring the Unknown* (Ancona 2012); and *Mindsets* (van Leeuwen et al. 2016).

Two other books about design thinking: *How Designers Think* (Lawson 2005) and *Design Thinking* (Cross 2011) invite further understanding about design practices. Furthermore, in order to understand the source and original purpose of framing Schön's work *The Reflective Practitioner* the seminal work about framing is considered, which Dorst also refers to (Schön 1983). Moreover, Schön's work links to the selected methodology of "action research" which is explored in the *Action Research Planner* by Kemmis et al (Kemmis et al. 2014). The intention is to conduct an intervention and then to evaluate the outcome and compare it to the initial stage before the intervention. The methodology and the "Action Research Planner" is introduced in Chapter 4 "Action Research Method and Goals" (p. 41).

In addition to the processes that were studied in the above mentioned literature, methods of concrete operationalization that would lead to the required outcome were researched. Collections of acknowledged design methods were consulted, including IDEO and d.school, Kimbell, Kumar, and online resources such as Mind Tools and Service Design Toolkit. However, as the purpose and background of those collected methods were only briefly described, the following authors were further researched to justify the method's appropriateness: De Bono (6 Thinking Hats, 1999), Dyer et al. (QuestionStorming, 2011), Kohfeldt et al. (5 Whys, 2012), Manzini et al. (Motivation Matrix, 2004), Meadows & Wright (System Mapping, 2008), Mintzberg (Shadowing, 1970), Spradley (Observation, 1980; and Interviews, 1979), Osborn (Brainstorming, 1957) and van Manen (Themes, 1990).

## **2.2 RESEARCH SITUATION**

Design has been an expanding discipline and much research has been done in new areas, for example on design thinking as a method for practices in non-design-led organizations (Brown, 2009; Kelley & Littman, 2004; Martin, 2009; Stickdorn et al., 2015). However, the very first, fundamental, step in design, which includes choosing and framing a problem, has been little discussed. A certain amount of important research has been done on framing (e.g. Dorst, Cross, Lawson, Schön); nevertheless, I agree with Paton and Dorst who criticize that “there is very little design research literature on how this ‘framing’ actually works” (Paton & Dorst 2011, 573). Therefore, the literature review is focused on the process of framing in order to analyse the requirements of each step of frame creation.

This thesis focuses on design-led ways of practicing. I assume that not only people who are educated in design can practice in a design-led way, but that other people from different backgrounds and who have the right combination of knowledge and skills can also do so. Therefore, I avoid referring to the term “designer”, but adapt the more neutral term of “practitioner”, as introduced by Schön, to refer to the person executing design-led practices (Schön 1983). A practitioner implies a high competence without requiring a particular background. This thesis is written for motivated practitioners or prospective practitioners who want to apply or gain the competence for frame creation.

The literature review focuses on the theory of problem framing, examining the required outcome and the processes involved with each framing step. The methods for generating the outcome and facilitating the processes are collected separately in the “Method Collection”. The method collection allows for a more dynamic way to explore the content compared with a linear literature review. It allows the practitioner the freedom to create a customized combination of methods. The reason for this choice is that the outline for frame creation should in no way become a “strait-jacket to the practitioner” (Dorst 2015, 99).

## **2.3 TERMINOLOGY**

It is anticipated that design will be a successful approach for problem framing. The following paragraphs explain this statement by analysing the meanings of “design”, “problem” and “framing”.

### **DESIGN**

Buchanan states that there is “no single definition of design ... [that] adequately covers the diversity of ideas and methods gathered together under the label.” (Buchanan 1992, 5). If there is no one definition of design, we cannot assume that “all design fields ... share common ground” (Lawson 2005, 9). Therefore, the particular definition of design that is referred to in this thesis needs to be explained. To understand the meaning of the word “design” in this thesis, a general definition is taken and is then shaped to form the desired meaning.

The specific definition of design in this thesis is started from the most general definition by Chris Jones: Design is the “initiation of change in man-made things” (Jones 1992, 6). This definition basically assumes that all man-made things are in some sense “design” (Jones, 1992). Buchanan adds the aspect of the “artificial” when stating that design is “the conception and planning of the artificial” (Buchanan 1992, 96). Compared with other disciplines, design is specialized in ‘what might be’ and this “act of producing proposals or conjectures, ... is central to designing” (Cross 2011).

Design includes a wide and rich field of professions and practices (Dorst 2015). Those practices range from everyday activities to professional occupations (Lawson 2005). Due to this diversity in practices, there is not one right process that can offer an appropriate “sequence of operations” (Lawson 2005, 124). The diversity of practices reflects the diversity in the motivation, role, drive, desired result or intuition of the designer (Dorst 2015). Since the designer as human is so important and influential within the process and the outcome of design, Lawson deduced that design is, besides a practice, a “distinctive mental activity” (Lawson 2005, 9). This mental activity includes dealing with problems and solutions. However, the designer is mostly admired for the solutions they produce and not for how they approach and handle problem situation, even if a good designer’s strength lies in their “ability to find the right problems” (Cross 2011). Therefore, with a focus on problems in this thesis, the definition of design is taken as substantially defined by problems and the processes of identifying and dealing with them. In the following paragraphs, the definition of the specific design for this thesis is explained..

Design is referred here as a process, not a product, whose aim is to investigate a design-led way of understanding a problem and of approaching a situation to affect a positive change (Schön 1983). Within the scope of this thesis, design is seen as a participatory

process to design another process (the working processes in applied research). Of notable mention is Dorst's term of the "new academic" design, which is distinguished from the "skill based" design in dealing with more complex problems. This allows the application of design in new fields, which relates very much to my situation (Dorst 2015).

The basic definition of design for this thesis is: "Design is a human activity, defined by a mindset and a set of practices, to approach a problem situation." This definition springs from the work of several authors: Jones, who defines design as man-made things, Cross, who emphasizes design as thinking process, and to Dorst, who assigns different practices to different designers, and defines design as "new model for problem solving" (Jones 1992; Cross 2011; Dorst 2015, 32). This definition can be split into four factors: the human, the mindset, the practices, and the problem. The purpose of design is in this specific case to help in the framing of problems. Therefore, the characteristics of those four factors of design that are important to formulate and frame a problem is examined.

The first component is the human factor. The design practitioner is understood as facilitator and collaborator and is included from the very beginning of a project. As I refer to participatory practices, the designer takes on the role of a facilitator. The practitioner is involved in formulating the problem and solution space and contributes to setting the overall direction (Dorst 2015; Paton & Dorst 2011). The practitioner is encouraged to personally interpret the problem and use intuition as acknowledged method (Lawson 2005).

The second component is the mindset. The practitioner is genuinely human-centred and considers the human factor at any time (Buchanan 1992). Thoughts and ideas are a common good and shared among participants: they are meant to be developed and built upon. Furthermore, the practitioner feels comfortable with uncertainty and ambiguity until late in the process: "The uncertainty of design is both the frustration and the joy that designers get from their activity" (Cross 2011). The uncertainty helps the practitioner to stay away from thinking in solution categories, and instead allows the practitioner to research the true characteristics of a solution product, including the consideration of any required "signs, things, actions and thought" (Buchanan 1992, 10)). Lastly, the practitioner has the mental flexibility to easily shift between "concrete representations and abstract thought" (Cross 2011). The practitioner is able to switch between the particular and the general in order to explore various problem levels (Lawson 2005). In summary, the practitioner's mindset is human centred, collaborative with thoughts, comfortable in uncertainty, focused on solution characteristics, and flexible enough to move between levels of detail and abstraction.

The third component is the practice. The choice of activities and the way they are executed is very particular to the kind of design required and genuinely participatory in this case. This means that the practitioner includes other stakeholders throughout the designing process. The first thing a practitioner has to consider is the expansion of the initial concept by searching for the problem behind the problem. Whilst creating a deep understanding of the problem, the practitioner starts the prescriptive activity of “what might be, could be and should be” (Lawson 2005, 125). The practitioner allows the problem and the solution to co-evolve together, instead of only focusing on the problem in the first step and then only focusing on the solution in the second step. The co-evolution involves a “constant iteration of analysis, synthesis, and evaluation passing back and forth between ... the problem space and the solution space” (Dorst & Cross 2001, 434). The contemplation between the two spaces also includes making sense of the known and the unknown and beginning to connect the gathered information into a coherent understanding. Sensemaking happens in iteration cycles, involving going over information and ideas, and modifying the synthesis (Lawson 2005, 38). Another distinct practice of the practitioner is diverging and converging. In order to create ideas, the practitioner defers judgement totally and becomes involved with a flow of output, defined as a diverging phase. Whatever is produced is not rejected, but instead used to inspire the other participants’ thoughts. Only in a second step is judgement allowed, when evaluating the produced output and taking decisions for further steps. Basadur suggests that one must think in diverging and converging phases at every step of a project (Basadur et al. 1982). The practitioner allows the ideas and solutions to emerge at any time of the project (Cross 2011). The practitioner does not pursue “a simple linear process”, but is flexible enough to adapt to surprises, such as unexpected idea flows (Buchanan 1992, 97). Practitioners may start with a clear plan but should “leave opportunity open to pursue interesting paths” (Cross 2011). Therefore, a practitioner has to balance the act of planning and delivering outcomes on one side and on the other side allow a free flow of possible new ideas. A further design practice is to work collaboratively and to involve others in the process. Lawson clearly states that it is important to “abandon the traditional idea that the individual designer is dominant in the process” (Lawson 2005, 30). Therefore, a practitioner knows how to collaborate and facilitate a “shared, social process” between stakeholders in order to include diverse perspectives and create common sense (Cross 2011).

The fourth and last component is the problem. This describes the kind of problems the practitioner tackles and the kind of problems design can create a solution for. The next section investigates design problems in depth. The most significant aspects to address are that a design practitioner is needed when an observed situation does not correlate to a desired situation and there is a “need for action” (Lawson 2005, 125), and that design problems are always ill-defined and “wicked” and therefore need a customized solution approach.

## **DESIGN PROBLEMS**

**Design is a problem-solving process, but not all problem-solving processes rely on design. Design problems have particular characteristics, which are outlined in the following paragraphs. The characteristics of design problems and how they form a part of today's problem landscape are then explained.**

**In general, problems can be split into two categories: well-defined and ill-defined. Well-defined problems have clear, defined criteria and can be solved without extensive frame creation (Nickerson et al. 2007, 218). Simon published a list of properties of well-structured problems, including aspects of definite criteria, clear, stated goal and specific approaches for solving; these characteristics are rarely found in design problems (Simon, 1973). Dorst came to the conclusion that any well-defined problem, if followed some pre-set rules, can be solved by a "general problem solver" and is therefore not in need of a design approach (Dorst 2006, 6). However, an ill-defined problem has no clear definition of what an improved or better state might be. According to Buchanan, most of the ill-defined problems are "wicked problems" (Buchanan 1992, 16), a term that was strongly defined by Horst Rittel. Rittel's definition of "wicked problem" describes a "class of social system problems which are ill-formulated, where the information is confusing, where there are many clients and decision makers with conflicting values, and where the ramifications in the whole system are thoroughly confusing" (Churchman 1967, 141). In 1973 Rittel published an extensive list of the characteristics of wicked problems (Rittel & Webber 1973):**

- 1. There is no definitive formulation of a wicked problem.**
- 2. Wicked problems have no stopping rule.**
- 3. Solutions to wicked problems are not true-or-false, but good-or-bad.**
- 4. There is no immediate and no ultimate test of a solution to a wicked problem.**
- 5. Every solution to a wicked problem is a "one-shot operation"; because there is no opportunity to learn by trial-and-error, every attempt counts significantly.**
- 6. Wicked problems do not have an enumerable (or an exhaustively describable) set of potential solutions, nor is there a well-described set of permissible operations that may be incorporated into the plan.**
- 7. Every wicked problem is essentially unique.**
- 8. Every wicked problem can be considered to be a symptom of another problem.**
- 9. The existence of a discrepancy representing a wicked problem can be explained in numerous ways. The choice of explanation determines the nature of the problem's resolution.**
- 10. The planner has no right to be wrong. (Rittel & Webber 1973, 161- 166)**

**Buchanan moves on and claims that, based on Rittel's definition of a wicked problem, all design problems are inherently wicked, as there are "no definitive conditions or limits to design problems" - unless someone has taken the "wickedness" out (Buchanan 1992, 16). One of the core competences of designers is to "reformulate and give structure to ill-structured or wicked problems" (Lawson 2005, 292). Another characteristic of design problems is that the**

problem does not imply a professional field to create the solution. Design problems are “profession-neutral” and therefore challenge the practitioner in “not knowing too early which type of solution to apply” (Rittel & Webber 1973, 164). Lawson (Lawson 2005) made an extensive list of the characteristics of a design problem which can be summarized as follows. Firstly, a problem field is in such strong tension with the solution field, that the statement of the problem is always relative to the emerging solution proposals. Secondly, the interpretation of a design problem depends on the practitioner’s imagination for solutions. Thirdly, design problems have many levels on which they can be approached, depending on the practitioner’s power, time and available resources. These definitions draw attention to the parallels of design problems and wicked problems, requiring designers to give them structure. Design problems are therefore ill-defined, need reformulation, specification and a customized approach.

According to Dorst, today we face a new breed of problems, their main characteristic being “open, complex, dynamic and networked” (Dorst 2015, 1). Open means that the problem and the problem context merge and there is no clear boundary where the problem ends. Complex means that the problem has numerous connections to other elements, which for the sake of simplification, cannot be severed: this makes splitting into sub-problems very difficult and the problem has to be approached as a whole, in all its complexity. Dynamic means that it is not a static picture and instead changes over time by the adding of new elements or changing connections. Networked means that one problem situation influences another problem situation and what seems to be unrelated might have a big impact after all.

These problem characteristics show clear parallels to the characteristics of design problems. If today’s general problem landscape consists of these problems, it means that there are design problems to be solved outside the traditional design field. As designers have had success in dealing with design problems, which are distinctly similar to the new types of problems, it is most probable that designers will be able to take on this new breed of problems. Therefore, designers become important players in tackling the new problems, although these problems do not originally belong to the field of design in a traditional way.

Problems with the characteristics of design problems are found not only in traditional design fields, they also occur in unrelated fields. Therefore, there is a big potential for design approaches in seemingly unrelated fields.

## **FRAMING**

According to Lawson, a frame is, in a very literal sense, a “sort of window on the world”, which only allows a selective extract of a wider world (Lawson 2005, 276). Dorst’s definition is more focused



on a frame as “organizational principle” or a “coherent set of statements that are useful to think with” (Dorst 2015, 63). Minsky, a cognitive scientist Paton and Dorst referred to, describes a frame as a multi-levelled “network of nodes and relations” (Minsky 1975, 1). However, “frame” is, similar to “design”, in that it is not only a noun, it is also a verb. As this thesis is about framing activity, the origin and meaning of the verb is of importance too. The concept of framing is rooted in the ancient art of rhetoric but became influential in social science in the late nineteenth hundreds (Paton & Dorst 2011). In 1975, Minsky introduced the process to the field of artificial intelligence as a way to approach new situations by selecting a structure from memory and adapting it to the new one (Minsky 1975, 1). In 1983, Schön used the term framing as a practice of professionals when setting a problem in order to solve it. He defined it as a non-technical process to determine the context in which the practitioner will attend to the selected “things” about the problem (Schön 1983, 40). This means that the practitioner chooses the “phenomena” which he will relate to later in the process. Framing sets the definition of strategies as well as the direction of the project (Schön 1983). Dorst emphasizes in his definition the factor of possibility: “the act of proposing ... a hypothetical pattern of relationships” (Dorst 2015, 53).

Creating frames is a strategic move to approach wicked, ill-defined problems. It allows the practitioner structured thinking and to take on a particular perspective to handle complexity. Through a “clever mental process, some obstacle or conflict is simply removed by taking a particular view” (Lawson 2005, 275). This focus empowers the design to deal with the multifaceted nature and the unavoidable inconsistencies in design through structuring and “giving direction to thinking while simultaneously temporarily suspending some issues.” (Lawson 2005, 292). This corresponds to what Schön said, that framing is to convert a stuck, complex problem into a manageable one (Schön 1983, 63). The process of problem framing is fundamentally different to simplifying a complex situation. Frames narrow the problem, instead of simplifying, and therefore define a particular outcome space for solutions.

The quality of frames are later discussed, but there are a couple of factors worth discussing at this point. Dorst’s idea of a frame is to de-contextualize the problem by understanding and extracting the problem phenomena and putting it in a different context. His focus is to create a “very clear picture” of this new context, for example in form of a metaphor or analogy. The main purpose of such a picture is to inspire and captivate the practitioners and immediately develop further images (Dorst 2015, 64). From Schön’s perspective, a frame covers the design process more holistically. He claims that a frame is created to set “boundaries, select particular things and relations for attention, and impose on the situation a coherence that guides subsequent moves” (Schön 1983, 182).

**In summary, framing is an activity that can be applied to wicked or ill-structured problems (and therefore also design problems). It is a way to make a problem manageable by taking on a new perspective, observe the problem phenomena and create a new context for the phenomena. The aim is to inspire and to create new ideas about how to solve a problem.**

## **SYNOPSIS**

**After the definition of ‘design’, ‘design problems’ and ‘framing’, it can now be elaborated why design can be considered as a valuable approach for frame creation in non-design-led organizations that are working towards a more sustainable food system. Considering the previous definition of design – including the human factor, the mindset, the practices and especially the characteristics of design problems – it seems like a valuable approach to not only use design for design problems in the field of traditional design, but also as approach for design problems outside the field. Therefore, if a non-design-led organization faces design problems, design is a valid approach to tackle the problem.**

**Good designers are highly valued for their outcomes, and it is clear that the process of creating these outcomes has already been transposed to design-led fields such as design thinking. However, the less visible but equally important process of understanding and framing problems is underestimated (Lawson 2005). Therefore, this part of the process can be transposed. Framing helps to structure any wicked and ill-defined problems. Therefore, it is proposed to take on the transposition of the framing process into non-design-led fields. This would especially support non-design-led organizations to tackle their open, complex, dynamic and networked problems in a successful, design-led way.**

**Based on this use of design for problem framing in non-design-led organizations, I would like to pursue the issue of making the food system more sustainable. Many of the challenges in the food system are ill-defined problems. It is pertinent to consider design, especially problem framing, as a possible, successful way to overcome these challenges. This thesis focuses on applied research, but it can be applied to any other wicked or ill-defined problem.**

## **2.4 FIVE THEMES OF FRAMING IN DESIGN**

**This thesis focuses on design-led change in the practices of the research team at RISE, therefore the literature review is written from a perspective that facilitates a change of practice of a team in an organization of applied research. It is based on the fundamental questions I had when considering the application of frame creation at RISE: What is required from RISE (from an organizational and from a human perspective) to frame a problem? What drives the way that RISE frame problems? How could RISE**

**find and choose a good problem? How could RISE investigate and understand a problem? How does actual problem frame creation work? To answer these questions, six of Dorst's nine steps of frame creation were adapted and restructured, and complemented with further research.**

**The initial questions defined the topics of the five themes. The following outline is tailored to a project process in an organization, starting at the very beginning, before the selection of a problem. The first theme starts with an analysis of the pre-requirements of a team. The second theme uncovers values and drivers. The third theme explores the requirements that are needed to find and choose a problematic situation. The fourth theme documents the investigation of the chosen problem and its view from different perspectives. The fifth theme investigates the process of framing the problem and putting the problem phenomena into a new context. The last part concludes with a summary.**

**This literature review aims to create understanding of a designed change in problem framing practices at RISE. However, the outcome of the literature review is not exclusively relevant for RISE; it could easily be transferred to other organizations of applied research or other organizations in the food system that want to improve their practices through design. Some of the reviewed framing practices apply to organizations in general (including RISE), some are specifically important for organizations of applied research, and some are chosen especially for RISE. Overall, the compilation of researched outcomes and practices of problem framing provides a holistic approach that could potentially be implemented by the research team at RISE.**

#### **2.4.1 BASIC REQUIREMENTS**

**The following paragraphs explore the basic requirements of an organization and a team in order to conduct problem framing.**

##### **ON AN ORGANISATIONAL/STRUCTURAL LEVEL**

**Certain requirements have to be met in an organization in order to successfully start investing framing and reframing. Dorst and Nickerson et al. both mentioned a couple factors concerning the organization that could be considered (Dorst 2015; Nickerson et al. 2007).**

**Nickerson et al. showed that in order to make the problem finding process more efficient, an organization needs to be conscious of its existing structures and the policies that influence the problem selection (Nickerson et al. 2007). Certain profiles or characteristics of problems that need solving are more interesting and important for certain organization. Usually these organizational structures and policies, as well as the awareness of problem profiles and**

characteristics, already exist within an organization; however, most of the time they are not explicit, nor is the team fully aware of them.

Nickerson et al. furthermore points out that organizations should be aware of their limits and internal constraints. He suggests the organizations must know about their “ability to assemble knowledge sets to solve the problem” before making a final problem choice (Nickerson et al. 2007, 214). The purpose of knowing an organization’s limits should not primarily serve as a constraint, but rather as a safety precaution to avoid targeting unsolvable problems and hence waste time and resources.

Dorst claims that organizations’ profiles can be situated on a scale between radically open or totally goal-directed (Dorst 2015). In order to set the path towards innovation and radical exploration, it is important for innovators to be aware where on the scale the organization is situated. Most preferably, the organization would be in an open state, where participants are ready to “step out of their usual roles”(ibid, 38). In order to gain this awareness, Dorst suggests a dialogical approach between the interested parties for change, inside and outside the organization, where emerging assumptions and the usual ways of working are questioned and discussed (ibid). Most importantly, Dorst claims that the substantial factor that will determine successful frame innovation is the strong internal drive of all involved to maintain the motivation to work on those complex problems (ibid).

An organization can engage in frame creation on different levels, depending on how frame creation is embedded in the organizational practices. Dorst categorizes the different levels into “routine reaction”, “conventional practice”, “frame adoption”, “frame creation projects” and “frame creation as continuous process” (Dorst 2015). Routine reaction is about staying within the frame that is presented by someone else (the client for example) and is a very low-risk strategy. Conventional practice concerns using a frame that is already in the repertoire of the organization, where they again largely stay within their comfort zones. Frame adaptation promotes the hiring of an external party to bring in a new frame. This is a key renewal strategy for many organizations, because it leads to new experiences. Frame creation projects involve the process of creating a frame from scratch. Frame creation as continuous process is the holy grail of frame creation, as it is the process of creating frames that become an integral part of the organization’s everyday practices and therefore a core skill, required for knowing which level to target.

## **ON A HUMAN LEVEL**

As mentioned in the previous paragraph, the interest and drive that comes from the people involved counts as one of the most important factors for successful frame creation. Putting together a team of core project members who have strong interest and motivation is key. A practitioner is required to investigate the

possible team members and select them carefully. Van Leeuwen et al. described a fundamental factor concerning the group combination: He found out that the stakeholders with “a strong interest in existing solutions may have a tendency to block or frustrate the process” of a new frame creation (van Leeuwen et al. 2016, 360). Therefore, he suggests excluding those stakeholders until the new frames have been created (ibid, 360). Dorst explains that the team has to be able to let go of organizational practices, of ‘how things are usually done’ and cites Argyris when encouraging the staff of organizations to move away from “self-sealing” practices that keep them from even thinking about changes (Dorst 2015; Argyris 2000). The required urge to explore has to exist within the team. This internal drive usually results from a common sense for a “ripe problem”, where the issue at hand needs to be “felt to be a problem by key people in the organization” (Dorst 2015, 159). This can be a starting motivation but is, however, not a requirement. A later section will examine how to locate a problem. Overall, the organization, including its people, has to be ready to take on a new challenge of working with and on problems. They have to show motivation and openness and share a strong sense for change.

#### **2.4.2 SHARED DRIVERS**

In order to start practicing problem framing, an organization or team needs to know the factors that predefine the direction of the project, such as organizational values. The goal is to align the key stakeholders’ beliefs and to define a shared common ground of values. In order to ally forces, the key stakeholders have to create a common understanding about the external and internal drivers, the unique compilation of knowledge, the shared understanding of a problem definition, and a vision for a desired future. The following paragraphs outline those factors.

#### **EXTERNAL AND INTERNAL DRIVERS**

In order to start looking for a problem to tackle, the key stakeholders have to have shared understanding of the external and internal drivers that shape the practices. Clear knowledge about the external and internal drivers build the criteria for decision processes later on in the project. They create agreements about what to relate to and what to leave out (Dorst 2015).

The external drivers are the influences from outside the organizations that motivate and shape the action of a team. Lawson introduces the external influences as factors that shape what a practitioner can do to motivate action (Lawson 2005). They can be split into mandatory and voluntary drivers, including, for example, laws as mandatory, or customer’s needs as a voluntary driver. They are defined by various stakeholders, such as the practitioners themselves, the clients, the users or the legislators (Lawson 2005). Those drivers can originate from different

directions, including market, technology or customers' needs. A shared understanding about obligatory and freely-chosen external drivers determines which drivers to relate to in later steps.

Besides the external drivers, there is also a set of internal drivers that influence frame creation, such as the underlying values of an organization or a team. In design, the choice of a problem focus is, for example, highly dependent upon the designer's personal values. Designers are likely to select a problem based on a value judgement, which is an obscure process for outsiders (Lawson 2005). However, in a different context, when the choice of a problem focus has to be explained and justified to other parties, the internal drivers, as criteria for choice, have to become explicit factors. They have to unveil the underlying factors the practitioners base their decisions on.

A further internal driver, which particularly influences the process of problem choice, is the collective knowledge of a team. The availability of knowledge strongly shapes the process of problem finding and solution creation. Each person, with a personal set of knowledge, will frame the problem based on his/her skills and understanding (in various widths and depths), and "according to its expertise, its ideology, and its interests" (Schön 1983, 193). Therefore, for a smooth process of collective problem choice, revealing individual backgrounds and competences helps to create understanding and appreciation of each practitioner's behaviours and preferences. The disclosure of the collective knowledge furthermore shows strengths and potential gaps in competences, which can still be filled in at such early stage of a project. This aspect is particularly important for a new team where the members do not know each other yet.

## **SHARED VISION**

The last driver is the desired future a team is aiming for. The purpose of a shared vision is to create common goals. Several researchers have investigated the importance of having of some sort of clear idea about the desired future (Ancona 2012; Paton & Dorst 2011; Hekkert & van Dijk 2011; Dorst 2015). Paton and Dorst suggest creating a shared vision in the sense of a "mutually shared understanding" of what the project would be, "an approach, and a shared appreciation to value to be achieved" (Paton & Dorst 2011, 577). Ancona refers to a future vision by introducing "mapping" as a successful tool to navigate in unknown fields, such as the future. She describes it as a way of structuring the unknown and considering the multiple interpretations of different people (Ancona 2012, 6). Hekkert and van Dijk (2011) introduce the concept of the "future context", which is not only about creating a clear common vision but also about testing ideas in this future context to see how much it suits the envisioned future (Hekkert & van Dijk 2011). Overall, these voices strengthen the idea that every team should have a collectively created, explicit future vision as an internal driver.

## **SYNOPSIS**

Overall, the need for explicitly knowing and naming all of the drivers is to create a solid and explicit common ground. It reveals possible assumptions and creates a common ground. It brings all the stakeholders to the same page, aligns forces and creates a vivid vision to relate to at any time during the project. This is an extremely important step at the beginning of a project and can help avoid negative surprises later.

### **2.4.3 SEARCH AND CHOICE**

The importance of finding the right problem to solve has been stated by several researchers (e.g. Einstein 1938; Chand & Runco 1993; Lawson 2005; Dorst 2015). As early as in 1938 Einstein emphasized that “[t]he formulation of a problem is often more essential than its solution. ... To raise new questions, new possibilities, to regard old questions from a new angle, requires creative imagination and marks real advance in science” (Einstein & Infeld, 1938, 92). Design theorists point out that, particularly in the creative context, the process of finding the underlying problem is extremely important (Lawson 2005; Basadur et al. 1982; Dorst 2015; Nickerson et al. 2007). All those researchers agree about the importance of finding, structuring and framing the problem. While guidance on structuring and framing the problem is relatively well developed, it should be cautioned that the process of actually discovering and choosing the problem is insufficiently researched (Nickerson et al. 2007). Often, a project starts with a problem that has already been stated (at least to a certain degree) and is ready to be approached (e.g. Cyert & March 1963), but how that problem was chosen remains hidden. Common methods introduced into problem-solving processes, such as “nominal group technique” or “brainstorming”, are mostly focused on finding solutions, leaving aside the process of problem framing. Although there is little research about finding and choosing a problem, the following section offers a review of what does exist, the aim being to summarize the approaches for finding problematic situations.

### **PROBLEM DEFINITION AND UNDERSTANDING**

A problematic situation is a problem that is not clearly stated or interpreted yet and, after Schön, an uncertain, disorganized and indeterminate situation (Schön 1983). The qualities of a problematic situation are “puzzling, troubling, and uncertain” (Schön 1983, 40). It is a problem with an unclear shape. The following paragraphs are a discussion of the definition and understanding of a problematic situation, the methods for finding and the methods for choosing one.

In order to find a problematic situation, the practitioners have to know what to look for, what to relate to and what to be cautious about. Dorst did not address the definition of, or further examination of, what a problem is. In his thinking the problem

is already “apparent” (Dorst 2015). The definition of a problem, according to Rittel and Webber, is when an “observed condition” does not correspond with a “desired condition” (Rittel & Webber 1973, 159). This seems to be relatively easy and clear to understand when applied to a situation where the practitioner observes a condition and at the same time experiences the undesired condition. For example, imagine you observe a person A, who, upon finishing a bag of chips in the park, throws the empty bag into the lake where some ducks start nibbling on it. The observed condition is the littering; the desired condition would be the person putting the empty bag into a bin. The problematic situation is the gap between the careless littering and bringing the waste to the bin.

In an organization, however, the practitioner has to rely on the other player’s observations. In such a case, the practitioner would not see any of the above described scene. The practitioner would have to rely on person B’s observation about the littering person A. It might even be that person B only observes that person A is littering and a fourth person C defines the desired condition of putting the empty bag of chips into a bin. Thus, the practitioner has to rely on the other players to define the “observed condition” and the “desired condition”. A real-life example of applied research is global warming. The melting of the polar caps might not be a personal observation of the researchers; they would have to rely on other player’s observations. The practitioners have to refer and rely on the observations of other parties. Often in applied research, the role of the practitioner is to compare an observed and desired condition stated by others, detect a possible gap, and choose it as problematic situation to work with. Therefore, the practitioner has to be aware of the sources he/she relies upon to define the problem gap, as well as the reasons for the choice of this particular gap to verify the validity of the problem.

One way to justify the choice of the sources and gaps is based on the organizational values. The benefit of a value-based choice is that the sources and gaps that are revealed automatically relate to the organizational values and aims. That is why the previous step of naming the organizational values is so important. The approach of finding a problematic situation by looking for gaps between observed and desired conditions is, furthermore, a successful way to locate novel problems rather than just accepting existing ones. This process also facilitates the argument for why the chosen problematic situation is worth examining because it names the underlying values that reveal the gap.

## **PROBLEM SEARCH**

Sometimes one does not have to look far to find a problem. According to Dorst, a problem occurs when we do not know how to proceed or we get stuck in our normal practice (Dorst 2015): The “observed condition” is to be stuck, the “desired condition”



is to continue and proceed. In that case, the problematic situation almost appears on its own and forces the practitioner to stop, reflect (Schön 1983), and consider options (Dorst 2015).

However, this is not always the case. Nickerson et al. highlight, that the methods for searching for solutions are fundamentally different from the ones for searching for problems and sometimes a more active process is required to find a problem (Nickerson et al. 2007). Nickerson et al., for example, introduce two processes for identifying problems, which lead to two different types of problems. The first is the analytic process, which describes the actions of deconstructing current practices in order to find points at which to improve existing structures. This process leads to a well-structured problem definition. The other method is the synthetic process, which facilitates the finding of new problems, such as novel customer problems, entrepreneurial opportunities or radical innovations. These problems are usually ill-structured and comprise a wide range of alternative problems (Nickerson et al. 2007). Cyert and March say that an organization should have a balance of analytical and synthetic processes for finding problems, as this leads to a mixture of improvement (well-structured problems) and invention (ill-structured problems) within the company (Cyert & March, 1963). Depending on the practitioner's interest either analytic or synthetic analysis can be performed in order to find a good problematic situation.

Another approach to finding novel problems is through questioning. Many researchers who analyse problem-solving processes mention the importance of questions as a mean to explore either problems or solutions, where the question is often more important than the solution (e.g. Dyer et al. 2011; Drucker 1954; Csikszentmihalyi 1996). A well-formulated question can lead to inspiring and mind-opening thoughts, thus revealing a novel aspect of a problem. Dyer et al. take the example of the disruptive innovators who search for new challenges and who are excellent in continuously asking questions. But it is not just about the frequency and quantity of questions, it is also that they have the courage to ask the provocative questions in order to find a true problem. Sometimes the most fundamental questions that challenge the status quo are the most provoking ones. Disruptive innovators do not fear the two most common obstacles: they are not afraid to look stupid and they are willing to be viewed as uncooperative or disagreeable (Dyer et al. 74). Apart from questions about what currently is, what might be and what caused the situation, disruptive innovators like to ask the same question in various forms to provoke surprising ideas: "The key is constantly creating better questions to see that world through new eyes." (ibid, 83) Therefore, searching for problems through questions is a valuable approach to search for problems. If a problem is already chosen, the questions can help to split the problem into sub-problems.

## **PROBLEM CHOICE**

The process of problem framing works for a large variety of problems. Despite their diversity, they have to have one factor in common: they have to be undefined in the sense that they are profession-neutral and do not presuppose a specific competence to solve it. They should, furthermore, allow ideas to spark into very different directions. In order to find a problematic situation with such problem qualities, the practitioners must have an open mindset to be able to consider different kinds of problems. This helps to avoid the “category trap” which is a common pattern of behaviour to fall back into when trying to identify a problem based on existing categories of solutions (Lawson 2005, 221). An open mindset allows the practitioner to choose a problematic situation that is not solely in the practitioner’s field of specialization and hence puts focus on what would actually solve the problem. Therefore, the practitioners have to let go of their “specialisation strait-jacket” and allow themselves to go beyond their expertise (Lawson 2005, 11). Another benefit of an open mindset is the ability to produce wild and extreme ideas. As problem and solution emerge together (see Section 2.4.4 “Problem Investigation”, p.23) the problematic situation should inspire and spark ideas from the beginning. The ideas may be crazy and seem impossible at first, but, according to Buchanan, “impossible” is just a limitation of imagination (Buchanan 1992, 21).

## **SYNOPSIS**

In order to successfully choose a problem, the practitioners first need agreement upon what to look for. Secondly, they have to have consensus about who and what to relate to for the gap between the observed condition and the desired condition. Thirdly, they should consider questions as the means to find problems or break existing problems down into sub-problems. Lastly, they must have an open mindset to be able to facilitate the choice of an open, professionally neutral and inspiring problem.

### **2.4.4 PROBLEM INVESTIGATION**

Once a problem is chosen, the practitioners can start to investigate and work on the problematic situation. The following chapter investigates the means to understand and structure a problem.

## **CO-EVOLUTION OF PROBLEM AND SOLUTION**

Before exploring the investigation of the problematic situation, an important characteristic of creative problem framing should be noted. Even though the focus is strongly on the problem, especially in this thesis, a problem cannot be framed without considering solutions. Problem and solution are so closely tied together that Lawson even states that “problem and solution are inseparable”, and one does not exist without the other (Lawson 2005, 296). It is an interplay of triggering solution ideas and creating deeper problem understanding. This, however, happens

in an unpredictable manner. As David Radcliffe concludes in Nigel Cross' Design Thinking the creation of solutions "cannot be constrained to occur only during the prescribed time for this activity as dictated by notions of due process and proper sequence of phases in design." (Cross 2011). Therefore, ideas for solutions will also occur during the process of framing. The next paragraphs will elaborate on how an organization could manage the uncontrollable emergence of ideas.

In order to understand the relationship between problems and solutions, Dorst looked at them as two spaces in the same field; "problem space" and "solution space" (Dorst 2015, 25). He explains that the formulation of a problem and the ideas for a solution advance together (Dorst 2015, 434). In earlier research work, problem and solution were detached, for example as with Horst Rittel, who defined "wicked problems" and who distinguished them in two clearly separated parts, namely "problem definition" and "problem solution" (Rittel & Webber 1973). More recent work, however, shows that the process of problem framing and solution creation is a co-emerging process (Lawson 2005; Maher & Poon 1996; Dorst 2015). Lawson claims that this way of thinking of problem and solution as united entities is central to the modern thinking about design. Maher and Poon emphasize that design is not about fixing the problem first and then moving on to solutions but a co-evolution of both (Lawson 2005; Maher & Poon 1996). These research results suggest it is important to include solutions into problem framing because they are related in a dynamic way.

Researchers suggest different approaches that can be used to investigate the problem through solutions. Firstly, embracing ideas helps to evaluate the potential of the chosen path of framing. According to Dorst, the quantity of emerging solutions is a clear indicator of the fruitfulness of a possible "solution space" (Dorst 2015, 160). Secondly, not sticking to solutions but staying flexible and continuing to move between problem and solution is crucial to understanding both sides better. Therefore, a practitioner has to overcome the temptation to stick to an early, seemingly brilliant idea. In order to stay flexible, Maher and Poon suggest focusing on ideas as concepts, not on solutions as answers (Maher & Poon 1996, 195). By playing around with those ideas, designers "get more understanding about the problem rather than focus on just finding a solution" (ibid, 195). Thirdly, a solution can be used to explore a "whole range of acceptable solutions" (Lawson 2005, 112). Different solutions will be "more or less satisfactory in different ways and to different clients or users" (ibid, 122). Fourthly, if solutions appear to be about changing behaviour, Dorst recommends switching perspective to the potential user and exploring their abilities, as they open up a whole new "problem arena" to examine (Dorst 2015, 26). This opens up a solution field focused on existing strengths and leads to the understanding of the strengths included in a problem. Lastly, according to Lawson, "everything we design has the potential not only to

solve problems but also to create new ones” (Lawson 2005, 123). Therefore, considering possible problematic causes of a solution idea is another way to learn about the underlying problems, when pondering in the problem-solution field.

Lawson describes this “dynamic tension” between problem and solution field very well as factor in “what makes design as an activity not only so challenging and frustrating but also so satisfying and compulsive.” (Lawson 2005, 271). For now, the solution space is left aside and focus is returned on the problem side again.

## **SENSEMAKING**

Once a problematic system has been chosen, the next goal is to understand the problem through creating sense, particularly of the unknown. In his chapter about reasoning, Dorst talks about the unknowns as a main factor when designing. Ancona approaches the unknowns as factors of the map of knowledge (Ancona 2012). She mostly refers to the known unknowns as enumerable issues we do not know anything about (ibid). To create a better understanding of the problem, practitioners need to broaden their focus and do not only look at what they know, but also on what they do not know. As today’s problems are wicked problems, each practitioner faces a certain amount of unknown factors in each problem. One way to become more comfortable with the unknown is to reveal it, to make sense of it and to embed it into the network of knowledge. Karl Weick is the father of the term “sensemaking” and defined it simply as “the making of sense”, meaning to structure the unknown in order to facilitate enactment in it (Weick 1995, 4). Ancona operationalizes this thought and suggests the method of mapping as the most successful approach to becoming familiar with the unknown (Ancona 2012). The map is not intended to be right or wrong, but to be improved and iterated over time, complemented with new data and different points of view with a continual openness towards a wide variety of inputs (Ancona 2012). Such a map shows how much is understood about a problem and, furthermore, gives a team the confidence to overcome the fear of stepping into the unknown. Making sense of the known data together with the unknowns and assumptions is a key skill for a practitioner who wants to keep up with today’s complex, uncertain and continuously changing problems.

## **STRUCTURING IN SYSTEMS**

Frame creation is a way to embrace complexity by structuring the problem in such a way that it can be handled despite its complexity. Dorst’s approach is not to simplify the problem, but to distinguish between “different layers of context, which limits the number of elements and relationships that need to be kept in mind at any one time” (Dorst 2015, 103). Dorst mentions systems several times, e.g. when introducing open problems, however, he does not go into depth about how to investigate a problem as a system

(ibid, 9). One way to start understanding the problem as system is to structure the elements and relationships in a dynamic and multi-dimensional construct. Then, the problematic situation is no longer a static picture but a system that changes over time and is sensitive to change. It is influenced and affected by others and vice versa.

Before going deeper into the methods of creating such a system, it is worth mentioning at this point that systems thinking, especially Soft Systems Methodology (SSM), would have been a different, holistic approach to problem solving in itself. SSM presents an entirely different path towards framing problems that possibly would be just as suitable for innovation as the problem framing process. Both approaches address ill-defined, complex problem situations and propose practice-oriented guidance to first understand and then change the situation. However, in this context, because “Frame Innovation” has been chosen as a focus in the initial literature, only this one approach will be focused on, as it can be considered the most valuable one in this stage of problem framing and skip the majority of SSM. The “rich picture” and its analysis was introduced at this juncture, because its purpose is to lay out, name and clarify any known information about the problem situation. Furthermore, by splitting the analysis into three steps, it introduces the manner of thinking in layers, which is considered important at this point. This understanding of the problem is important in SSM in order to “organize thoughts and expression consciously in several layers” (Checkland & Poulter 2010, 28). In the following paragraphs the approach of a rich picture is reviewed and Checkland & Poulter’s work is complemented with additional research.

The main purpose of a rich picture is to graphically represent the problem situation in order to create better understanding. Therefore, the first emphasis lies in making the rich picture graphical in terms of drawing the many elements. The drawing is introduced as a necessary method, because it is an excellent medium in which to express relationships (Checkland & Poulter 2010). The importance of drawing corresponds with design theory about drawing and its importance as a method for designers. As Lawson figured out, the process of drawing is “part of the very thinking process itself” (Lawson 2005, 26), as it “appear[s] to reveal problems and enable the designer to see unsatisfactory situations” (Lawson 2005, 270). Cross also described drawing as a crucial act of designing, as it “provides some of the circumstances by which a designer puts him or herself into the design situation and engages with the exploration of both the problem and its solution” (Cross 2011).

The first step of drawing a rich picture is to collect a decent amount of different data to feed into the rich picture. This involves not only desk research, but every type of data possible. This means researching what has already been done in this problem

field and what has not, both successfully and unsuccessfully. Dorst calls this step “Archaeology”, where he investigates the problem in depth, as well as earlier attempts to solve it (Dorst 2015, 74). The most important element is to find out about the people, the stakeholders, of the system on a formal and informal level. This means firstly, naming all the possible stakeholders and, secondly, gathering information about them, formally and informally. Checkland & Poulter suggest engaging in “talking to people informally, reading a document, sitting in a meeting, conducting an interview” or “having a drink in the pub after work” (Checkland & Poulter, 216). In order to successfully proceed with frame creation later on, the practitioners have to start conducting empathic research now, because “one of the core processes in frame creation ... is largely based on empathy and the ability to understand the lived experience of the parties in the broader problem arena” (Dorst 2015, 142). In a more concrete sense, this means knowing the stakeholders’ roles, values, currencies, power and interests (Dorst 2015, 77). There are myriad ways of collecting this kind of data, for example through interviewing or observing (Spradley 1979; Spradley 1980), or researching lived-experience (van Manen 1990). The amount of collected data can be far from complete but should at least be enough to start creating some understanding.

Once some data is gathered, the practitioner can move on to the next step, which is to select the key features of the system. As Checkland and Poulter have not introduced a particular guidance on how to select those “key features” (Checkland & Poulter 2010), I other conducted research about selecting aspects of creating a system is considered. All the following approaches have the common view that the bits of knowledge about the problematic system will be split into different kinds of categories. Schön’s approach is to select the “things’ of the situation”, to name all the elements and processes, including people, places and structures (Schön 1983, 40). Lawson goes one step further and suggests that it is important to not only to name but also to develop the elements, like characters in a story, in order to understand how they “will react to events and behave as the story unfolds” (Lawson 2005, 292). Kumar, on the other hand, refers to entities, relations, attributes and flows (Kumar 2013). Meadows & Wright’s approach starts at a slightly different point, and suggests that one starts looking at the relations between the elements first and thereafter focus on the connections (Meadows & Wright 2008). They see the major drawback of starting with listing elements, as proposed by Schön, in beginning a never-ending process. Therefore, Meadows & Wright suggest starting by identifying interconnections, such as the “relationships that hold the elements together” (ibid, 13). This method facilitates the comprehension of the important and unimportant aspects of the problem. All of the proposed methods are valid approaches and it depends on context and the preference of the practitioner to choose the method by which to start a system.

Independent of the preferred method for guiding the drawing of the rich picture, all of these approaches draw the boundaries of the rich picture by selecting certain aspects to be included. However, it is worth referring to Dorst, who said that we often do not consider the “mental circle” that we subconsciously draw around a problem, deciding which aspects to consider and which not (Dorst 2015, 9). To clarify the situation, it can be concluded that it is important to not only focus on what to include, but also to take a moment to clarify what to leave out.

After the first version of the rich picture, the practitioners analyse and start improving it. The analysis is based on the rich picture and is organized in three steps: First, all the stakeholders are analysed in order to name the problem owner(s). Second, roles, norms and values are termed. Third, the distribution of power is analysed (Checkland & Poulter 2010). It is worth adding here one of Meadows & Wright’s approaches to analyse a system. They consider it important to take one step back from the details in order to understand and reveal the overall goal of the system, as well as to show how it is trying to achieve this (Meadows & Wright 2008, 14). The rich picture at this point has the potential to serve as a communication tool when talking to stakeholders and clients. At the same time, the rich picture can be improved and complemented with their feedback. The rich picture is, at this moment, probably far from complete, which is not a problem because it is a tool that is designed to be improved through iteration over time.

### **CENTRAL PARADOX**

The understanding of a problem situation in the form of a rich picture is a fundamental requirement to move on to pinpoint the central paradox. Dorst introduces the term “paradox” as “a real opposition of views, standpoints, or requirements” (Dorst 2015, 14). He explains the central paradox in his second step of problem framing to investigate the question: “What makes this problem so hard to solve?” (ibid, 74) The discovery of the central paradox is to understand the deadlock that keeps the problem owner from moving forward (ibid, 76). When investigating the central paradox, the practitioner searches for the fundamental, essential problem, and the factors that make the problem so hard to solve. This step includes figuring out why the problem is stuck. Dealing with paradoxes is one of the difficult but also deeply satisfying and inspiring actions of a designer. After investigating the central paradox, the practitioner has a clear definition of the core problem that should be tackled.

### **CONTEXT**

After the converging process of finding the central paradox, a diverging process of exploring the paradox’s context follows. Dorst found out that the solution of a problem lies not in the paradox

itself, but in the surrounding context of the paradox (Dorst 2015). Therefore, the diverging process of exploring and comprehending the particular circumstances of the problem is essential. Dorst also discovered that a central paradox is only fully contradictory in a specific, “predefined context” (Dorst 2015, 54). The practitioner has to find and name the factors that define this context in order to shift the context or create a new perspective from which to regard the paradox in a later step.

## **PROBLEM SETTING**

The converging process of creating a problem setting is to clarify the initial, vague problematic situation and turn it into a sharp problem setting. The term “problem setting” was introduced by Schön and is understood as “the decision to be made, the ends to be achieved” and “the means which may be chosen” (Schön 1983, 40). This follows on from the discussion that “[i]n real-world practice, problems do not present themselves ... as givens”, they have to be stated by someone first (Schön 1983, 40). At this point of the project, knowledge about and understanding of the problematic situation is already strong and therefore optimal to lead to decisions about which direction to take and which aspects to focus on. Furthermore, according to Dorst, this is the moment to defend frame creation as the right approach if the problem situation has the following qualities:

“(1) there are opposing views or conflicting aims, (2) no obvious solution is apparent, (3) the problem can be placed in an expanded context, (4) there is an open-minded champion within the “problem owner” organization that is seeking a solution, and (5) earlier solution attempts have not resulted in a satisfactory resolution, to the point where there is a willingness to take a different approach.” (Dorst 2015, 107)

Setting a problem is a delicate issue, because there is the danger of accidentally freezing the context (Dorst 2015, 13). Freezing the context means to describe the dynamic problem system as a static picture. This actually causes problems because it does not consider the continuous change of system over time (Dorst 2015, 13). It can lead to negative surprises in a later step when testing solutions in reality, when realizing that the system has developed in a way that does not support the solution anymore. Therefore, despite setting the problem, continuous change has to be considered. Dorst correctly states that in that case, the design problem is “not knowable at any specific point in the design process” (Dorst 2006 13), which, however, turns the process of defining the problem into a paradox itself. This aspect needs to be researched elsewhere. I conclude with the advice to be careful when setting a problem so as not to accidentally freeze the whole system.

Another difficulty to be considered in order to successfully proceed with frame creation is to stay “profession-neutral” when stating the problem. This has been mentioned before in the



context of selecting a problem. It means to not “presuppose a discipline to solve the issue” and to steer “away from making any assumptions on the nature or type of solution” (Dorst 2015, 134). This proposes a challenge for practitioners of design disciplines, who are used to being defined by “the nature of their outcomes” and not by the kind of problems they approach (Dorst 2015, 29). However, Buchanan has an approach to circumvent this challenge for designers by starting to think in “placements” and not in “categories”. Whereas “categories” predetermine the outcome and force solutions onto a situation, “placements” discover “specific possibilities in a new situation” and enable the designer to “discover new relationships among signs, things, actions, and thoughts” (Buchanan 1992, 13-14).

After all, good problem setting includes the goals and aims of tackling the problem, an argument for frame creation as methodological approach, a problem description that still leaves space for the problem to evolve and change, as well as openness to the kind of outcome. Besides the clarity of aim, such a problem setting also functions as a communication tool when explaining the conducted problem research to stakeholders.

## **SYNOPSIS**

This section has investigated different aspects of understanding and making sense of the problematic situation, including different types of research. It documented a diverging and converging process to explore the central paradox and the context of the problem. In the end the problematic situation is turned into a stated problem setting, including clear aims and aspects to relate to.

### **2.4.5 PROBLEM FRAMES**

To create a frame means, in a very rudimentary way, to define something to refer to during the problem-solving process. Cross defines it as “first principle”, Lawson calls it “primary generator”, and Dorst aims for “metaphors and analogies” (Cross 2011; Lawson 2005; Dorst 2015). They all have slightly different purposes. The “first principles” derive from product design and describe the physical, mechanical or material constraints and are therefore very product-specific references (Cross 2011). The “primary generator” is a model to direct the decision making process, by choosing a “few major dominating ideas” as evaluation criteria (Lawson 2005, 189). The idea of “metaphor and analogy” is to investigate the problem phenomena in a new context in order to create new ideas how to approach the central paradox. There are different processes to go through in order to reach metaphors and analogies, including stepping away from the problem and working with underlying principles, themes, and abstraction. The following section will discuss the different requirements to create metaphors and analogies.

## **CREATIVE FRAME CREATION**

The goal of frame creation in Dorst's sense is to see the problem's phenomena and pattern of relationships in a different context. However, usually the problem is too big and complex to transfer directly as a whole into a new context. Therefore, the essence of the problem has to be de-contextualized in a first step, and then transferred into a new context. For this reason, Dorst developed three steps of frame creation: abstraction, themes, and metaphors and analogies. The abstraction is to grasp the essential, underlying principles and patterns. The themes are to understand the essence of the human dimension that matters for the problem, and the metaphors and analogies are the bridge into a new context. The next section will analyse those three steps further.

## **ABSTRACTION**

The idea of abstraction is to detach the problem from its context in order to put the problem into a new context in a later step (Dorst 2015). Therefore, the problem has to be looked at from a more distant perspective in order to see the patterns within the problem (Ancona 2012). The abstraction of a problem furthermore helps to communicate with others without directly provoking solutions. The challenge of abstraction is to generalize while still retaining the essence of the problem, including factors such as core values or needs (Dorst 2015).

In the first step, before heading to abstraction, Dorst suggests investigating the principles and patterns of the problems. However, he does not exactly explain what a pattern is, nor do Ancona or Schön, who also talk about patterns. Therefore, the general definition of principles and patterns from the Cambridge Dictionary (Cambridge Dictionary) is considered: a pattern is "a particular way in which something usually happens or is done". The term "usually" implies to regularity, re-occurrence and predictability to some degree. A principle is "a basic idea or rule that explains or controls how something happens or works" (Cambridge Dictionary). Therefore, it is argued that the patterns are the examples that follow rules (principles). Patterns and principles can be identified simultaneously.

A great challenge during the naming of patterns and principles is to fall into stereotypes of labels and categories (Ancona 2012). Stereotypes should be avoided at any time, as frame creation is intended to be dedicated to a specific problem. The goal is to maintain the specificity of the particular problem and not to fall back on the perceptions of others. One way around this is to create new, project-specific categories and labels that do not represent any stereotypes. The overall goal is to have a rich collection of the essential and particular principles and patterns of the problem.

Once the principles and patterns are collected, the problem is ready to be abstracted. The aim is to take a further step back and

get “from the particular to a more general view of the problem situation” (Dorst 2015, 65). This means to make the patterns and principles context unspecific by, for example, exploring the super-categories, the category above the current one, of the aspects in the patterns and principles. The most important aspect to consider is to maintain the essence of the problem despite the abstraction.

## **THEMES**

Themes are the outcome when a problem situation is analysed on a very human level. In his chapter about themes, Dorst refers to van Manen, who describes a philosophic approach to qualitative research methodology by exploring the everyday lived experience. His goal is to reduce the lived experience to its essence (van Manen 1990). Although van Manen focuses on textual media, the designer’s interest lies in analysing and capturing problem situations (Dorst 2015). In order to reach the reduction, the practitioner has to focus on the “lived experiences” and create meaning through reflection (van Manen 1990). The following paragraphs examine the definition, process and challenge of theme finding.

Dorst defines themes as “set of significant experiences” which is hidden in needs, motivations and practices (Dorst 2015, 66). Van Manen further explains that, because they are so well hidden, once they are revealed, they give “shape to the shapeless” (van Manen 1990, 88). He furthermore explains that a theme is “the form of capturing the phenomenon one tries to understand” and it “describes an aspect of the structure of lived experience” (van Manen 1990, 87).

In order to find themes, the practitioners have to process the collected data, experiences, patterns “until a core insight is achieved” (Dorst 2015, 77). Dorst suggests focusing on episodic knowledge, which often leads to clues for themes (Dorst 2015). This overlaps with van Manen’s approach of focusing on lived experience. The method by which themes are found resembles the affinity diagram, where pieces of information are clustered in order to see unifying concepts. Van Manen additionally introduces two key questions in order to find comprehensive topics: “What is going on here?” and “What is this example an example of?” (van Manen 1990, 86). Those questions smoothly lead to overarching concepts, and because they are based on lived experience, reveal themes. Once a collection of themes is found, it is up to the practitioners to find and reflect “on the essential themes which characterize the phenomenon” and choose the core themes according to that (van Manen 1990, 30).

In case the found themes do not spark any ideas for metaphors and analogies, it is possible to take an in-between step to a “nomological network” (Dorst 2015). The method is introduced by Dorst and explains the process of putting a chosen theme in

the middle and “surround[ing] it with concepts that have been shown in earlier research to have a relationship with it.” (ibid, 164). This resembles a reversed affinity diagram, where the practitioners start with a superordinate and then search for minor terms. Once the theme and the concepts are spread out, a combination of the central theme and one of the surrounding concepts may reveal a particular underlying pattern and hence inspire metaphors and analogies.

## **METAPHORS AND ANALOGIES**

Creating metaphors and analogies is one of the key practices of frame creation (Dorst 2015). It presents a particular way of shifting the phenomena of the problem to a different context in order to explore new perspectives and possibilities. The following paragraphs explore the definition and the methods of creating metaphors and analogies.

Again, as there is no clear definition of “analogy” and “metaphor” in any of the core literature, I refer to the Oxford Dictionary’s definition: an analogy is “a comparison between one thing and another, typically for the purpose of explanation or clarification”, whereas a metaphor is “a figure of speech in which a word or phrase is applied to an object or action to which it is not literally applicable” (Oxford Dictionary). The idea of framing is to create such analogies and metaphors in order to generate and inspire new ideas. The first proposed way to find metaphors and analogies is to look at the problem phenomena, the patterns and principles, and the themes and find examples in real life where the same phenomena, patterns, principles and/or themes occur as well. A slightly different approach is introduced by Schön, who describes the process of creating generative metaphors as “seeing A as B where A and B are initially ... understood as very different things” (Schön 1983, 185). When the perception of both phenomena overlap, it is a “metaphor”, if not, it is a “mistake” (ibid, 185). It is important for either processes to go beyond likely analogies to find unlikely analogies. Unlikely analogies are key to many design processes as they might turn the problem around and describe it in a different way. Those analogies might take a long time to find, but finally it may be realized that they were very obvious (Lawson 2005).

The goal is to find more than one metaphor and analogy and to opt for a singular one or else a few strong ones to develop as frames. Dorst recommends only pursuing one in greater depth after a mental testing (Dorst 2015). Once a frame in the form of an analogy or metaphor is chosen, it has to be sharpened to the point where it becomes a clear, idea-provoking image for all stakeholders. The next section will evaluate that further.

## **SYNOPSIS**

All of the clarification and analysis of a problem leads to the last step of frame creation: first to de-contextualize the problem characteristics, and then transfer them into new context. The step of abstraction helps to generalize but retain the problem essence. It makes the problem's principles and patterns context unspecific. The themes' purpose is to include the very human essence of the problem, which are hidden in needs, motivations and practices. Lastly, the metaphors and analogies transfer the principles, patterns and themes into a new context, inspired by other, real life experience.

## **FRAME EVALUATION**

The quality of a good frame is dependent on different factors. Dorst emphasizes the strengths of the image and on its inspirational quality. He sets up five criteria to analyse the quality of a frame.

[1] Good frames ideally manage to create an image that spans and integrates a broad range of issues under consideration and might draw in even more issues from outside the original problem arena. [2] Good frames are coherent, and provide a stable (non-contradictory) basis for further thought. [3] Good frames are also robust, in the sense that the images they conjure up in the minds of the participants are sufficiently similar to provide a "common ground" for the discussion of the problem and possible solutions. [4] Of course, good frames need to be inspiring and original—perhaps not completely new to the world, but at least new to the problem setting. [5] And the best frames are very thought-provoking and lively, engaging people's imagination so their thoughts readily move along in the proposed direction. A frame has to be "fully embraced by all team members" in order to be a fruitful tool to harmonize thoughts. (Dorst 2015, 64)

Dorst strongly emphasizes the imagery of the frame in the form of a concrete concept. The metaphor has to be a figurative concept that bridges problem space with solution space (Dorst 2015). Furthermore, it has to be general enough to be understood and accepted by every team member. The quality of a frame can be measured by how inspirational it is and how much it provokes responses as well as by how well it guides the "mental structuring of the situation" (ibid, 64). Dorst gives a strong picture where successful, strong framing is like the film of a demolition shown backwards: "from a very messy cloud of dust arises a building where all the pieces fit together in a self-evident way" (ibid, 158).

Similar to Dorst, in Schön's view, a good frame is generative, which means it should generate new perceptions, a new view, as well as explanations and ideas for inventions (Schön 1983). Furthermore, he mentions that a strong frame reveals the necessary competences and roles that are needed to address the problem (ibid). As mentioned several times before, the aim of creating a frame is to stay profession-neutral as long as possible, in order to allow the inclusion of roles and professions you might not have thought of including, but who seem inevitable now. To sum

up, a good frame is a shared, clear, thought-provoking and thought-guiding concept.

### **DURABILITY/LONGEVITY OF A FRAME**

Another essential quality of a good frame is that it is non-transferrable because it is so context specific. Every frame has to be “reinvented by the receiving organization, and appropriated as its own idea” (Dorst 2015, 125). The seemingly extensive and time-intensive process of framing will become easier with practice. If frame creation becomes an integral part of organizational practices, the speed of problem framing will increase and the collection of frame ideas and unused frames will grow and create a base to work from. This “library” is fuelled by what practitioners see, experience and absorb. The richer this library is, the more points of reference there are for the practitioners with which to create new frames for problems and the easier future frame creation will be (Hertzberger 1991, 5).

### **2.4.6 SUMMARY**

Based on Dorst’s Frame Innovation and the complementary selected literature, this literature review leads to a coherent, holistic approach of problem framing that could be applied at RISE. In summary, this review covered the five themes of framing: basic requirements for framing, shared drivers, problem search, problem understanding, and framing. The process a practitioner might go through for problem framing could look as follows: Firstly, the practitioners need to create a common understanding about basic motivations and drivers, and explore the openness to change. Then they have to collectively define what the problem is, and why the problem is a problem in this context and referring to whom. Based on that, the practitioners choose a problematic situation to work with. The process is followed by the examination of the problem and the creation of common understanding. This includes investigating and researching the problem, and then collectively making sense and creating new understanding. Once the problem is profoundly understood and interpreted, the practitioners can move on to de-contextualizing the core phenomena and creating new contexts with metaphors and analogies.

Collecting, structuring and summarizing existing literature has brought problem framing one step closer to operationalization and implementation. Problem framing as a participative activity could now be practiced by RISE’s research team. The process is still at a theoretical level and the concrete implementation will depend strongly on the particular situation. However, this literature review has visualized one possible structured path of several steps that would lead up to frame creation. The end product, the new frame, does not need to be extraordinary by any means.

**Its purpose is to be functional and inspirational, which can also happen with a very simple, even “obvious” frame (Lawson 2005, 277). The quality of frame creation does not necessarily lie in the frame itself, but in the preliminary process of creating insight and understanding about a problem that leads up to the frame. Without the procedural gaining of understanding, the “obvious” frame could not have been created (Lawson 2005). A frame is therefore just the tip of the iceberg, where the deep understanding and knowledge that has been created remains unseen.**

# SUMMARY TABLE

Literature Themes	Required Outcomes and Processes	Summary	References
Basic Requirement	Organizational Limits and Abilities	Know the limits and abilities to estimate potential problem situations	<i>Nickerson et al. 2007</i>
	Organizational Openness	Know how ready the organization is for radical openness and how goal-oriented it is	<i>Dorst 2015</i>
	Driving Core Team	Have motivated and open group of people who are ready to change practices and take on new challenges	<i>Van Leeuwen et al. 2016; Dorst 2015</i>
Shared Drivers	Know Internal and External Drivers	Know mandatory and voluntary drivers, as well as underlying values of the organization and the group.	<i>Lawson 2005</i>
	Collective Knowledge	Know the collective knowledge that the team brings to the table, which influences the choice and investigation of the problem.	<i>Schön 1983</i>
	Shared Vision	Have a collectively created desired future as a long-term goal and as vision to work for.	<i>Ancona 2012; Paton &amp; Dorst 2011; Hekkert &amp; van Dijk 2011; Dorst 2015</i>
Search and Choice	Problem Definition and Understanding	Find a discrepancy between an “observed condition” and a “desired condition” as starting point for a problem.	<i>Rittel &amp; Webber 1973; Nickerson et al. 2007</i>
	Problem Search	Undergo synthetic process to find new, ill-defined problems. Use questions as guides.	<i>Dyer et al. 2011</i>
	Problem Choice	Choose a problematic situation that is inspiring, undefined and profession neutral.	<i>Dorst 2015; Schön 1983</i>
Problem Investigation	Co-evolution of Problem and Solution	Problems and solutions develop together and nurture each other. Choose a process where they can co-evolve together.	<i>Lawson 2005; Cross 2011; Dorst 2015</i>
	Shared Understanding	Make sense of the unknown by understanding, looking at the relation between knowns, unknowns and assumptions.	<i>Weick 1995; Ancona 2012</i>
	Key Stakeholders	Know the people who influence and who are influenced by the problem most, and who are needed to solve the problem.	<i>Dorst 2015</i>
	System/Rich Picture	Understand the problem from a systems perspective, including the dynamics and relations of the different elements and features.	<i>Dorst 2015; Checkland &amp; Poulter 2010; Lawson 2005; Kumar 2013; Meadows &amp; Wright 2008</i>
	Central Paradox	Know why the problem is so hard to solve and know where the gridlock is.	<i>Dorst 2015</i>
	Paradox Context	Understand the surrounding of the central paradox to know it in context.	<i>Dorst 2015</i>
	Problem Setting	Define the problem, what to relate to, what to consider and what not.	<i>Schön 1983; Dorst 2015</i>
Problem Frame	Principles and Patterns	Understand the principles and patterns of the problem and how they work.	<i>Dorst 2015; Ancona 2012</i>
	Problem Abstraction	De-contextualize the essence of principles and patterns from the specific problem.	<i>Dorst 2015; Ancona 2012</i>
	Themes	Understand the essence of the human dimension that matters for the problem.	<i>Dorst 2015; van Manen 1990</i>
	Nomological Network	This additional process is a “reversed affinity diagram” to inspire metaphors and analogies.	<i>Dorst 2015</i>
	Metaphors and Analogies	Bridge the principles and patterns and themes into a new context, found in real life examples.	<i>Dorst 2015; Schön 1983; Lawson 2005</i>
	Frame Evaluation	Evaluation of the quality of the frame to ensure successful potential work.	<i>Dorst 2015</i>

**Table 1**



### **3 COLLECTION OF METHODS**

The content gathered through the literature review is further developed, into two outcomes, the “Method Collection” and a prototype of the “Framing Teaser”. Both are enclosed as appendix. This section will explain the purpose and background of the “Method Collection”.

The “Method Collection” is, as the name implies, a collection of methods. Whereas the literature review focuses solely on theory and on required outcomes and processes to do frame creation, the “Method Collection” is a collection of possible methods that would lead to the required outcome and processes. The collection is the first step in operationalization of frame creation and at this point not a complete, concluded version. It is a rough overview of possibilities, including the most important methods that could lead to valuable contributions. It is structured in the same way as the literature review and can be read parallel. Each section in the literature refers to a section in the “Method Collection”, providing the background to and a manual for the methods. It can be used to further operationalize my literature review.

The “Method Collection” is a step in between the literature review and the “Framing Teaser” prototype and has helped to produce the foundation of the “Framing Teaser”. It provides an overview of all the methods in order to help to select a smaller collection for the “Framing Teaser”. It helps to see the possibilities and qualities of each method, as well as the relationships between methods, which then guided the choice of a combination of the methods.

# TABLE OF METHODS

Literature Themes	Required Outcomes and Processes	References	Methods	Reference
Basic Requirement	Organizational Limits and Abilities	<i>Nickerson et al. 2007</i>		
	Organizational Openness	<i>Dorst 2015</i>	<b>Dialogical Approach</b>	<i>Dorst 2015</i>
	Driving Core Team	<i>Van Leeuwen et al. 2016; Dorst 2015</i>	<b>Sharing Session, Trend Matrix</b>	<i>Kimbell 2014; Kumar 2013</i>
Shared Drivers	Know Internal and External Drivers	<i>Lawson 2005</i>	<b>5 Whys</b>	<i>Kohfeldt &amp; Langhout 2012</i>
	Collective Knowledge	<i>Schön 1983</i>		
	Shared Vision	<i>Ancona 2012; Paton &amp; Dorst 2011; Hekkert &amp; van Dijk 2011; Dorst 2015</i>	<b>Brainstorm for Shared Vision</b>	<i>Osborn 1957</i>
Search and Choice	Problem Definition and Understanding	<i>Rittel &amp; Webber 1973; Nickerson et al. 2007</i>	<b>Analysis: Six Sigma, Statistical Process Control, Total Quality, Lean Management, Quality Function Deployment</b>	<i>Nickerson et al. 2007</i>
	Problem Search	<i>Dyer et al. 2011</i>	<b>Reflection</b>	<i>Dorst 2015; Schön 1983</i>
	Problem Choice	<i>Dorst 2015; Schön 1983</i>	<b>Question Storming</b>	<i>Dyer et al. 2011</i>
Problem Investigation	Co-evolution of Problem and Solution	<i>Lawson 2005; Cross 2011; Dorst 2015</i>	<b>Brainstorming</b>	<i>Osborn 1957</i>
	Shared Understanding	<i>Weick 1995; Ancona 2012</i>	<b>Investigation of Problem Through Solutions</b>	<i>Dorst 2015; Maher &amp; Poon 1996; Lawson 2005</i>
	Key Stakeholders	<i>Dorst 2015</i>	<b>Mapping the Knowns, Unknowns and Assumptions</b>	<i>Ancona 2012</i>
System/Rich Picture		<i>Dorst 2015; Checkland &amp; Poulter 2010; Lawson 2005; Kumar 2013; Meadows &amp; Wright 2008</i>	<b>Brainstorming for Key Stakeholders</b>	
			<b>Empathy Research (ER): Empathy Interview</b>	<i>Spradley 1979; IDEO 2009; Kumar 2013</i>
			<b>ER: Observation</b>	<i>IDEO 2009; d.school 2011; Kumar 2013; Mintzberg 1970; Spradley 1980</i>
			<b>ER: Peer Observation</b>	<i>IDEO 2009</i>
			<b>ER: 6 Hats</b>	<i>De Bono 1999</i>
			<b>Insights: Affinity Diagram</b>	<i>d.school 2011; Scupin 1997</i>
			<b>Persona</b>	<i>Cooper 2004; Service Design Toolkit 2014; Kumar 2013</i>
			<b>POV Insights</b>	<i>d.school 2011</i>

			<b>Stakeholder Motivation Matrix</b>	<i>Manzini et al. 2004</i>
			<b>Rich Picture</b>	<i>Checkland &amp; Poulter 2010</i>
	<b>Central Paradox</b>	<i>Dorst 2015</i>	<b>Question-based Discussion for Central Paradox</b>	<i>Dorst 2015</i>
	<b>Paradox Context</b>	<i>Dorst 2015</i>	<b>Restructuring (previous findings), Paradox Context Creation</b>	<i>Dorst 2015</i>
	<b>Problem Setting</b>	<i>Schön 1983; Dorst 2015</i>	<b>Discussion and Report</b>	<i>Schön 1983</i>
<b>Problem Frame</b>	<b>Principles and Patterns</b>	<i>Dorst 2015; Ancona 2012</i>	<b>Brainstorming for Abstraction</b>	<i>Osborn 1957</i>
	<b>Problem Abstraction</b>	<i>Dorst 2015; Ancona 2012</i>		
	<b>Themes</b>	<i>Dorst 2015; van Manen 1990</i>	<b>Affinity Diagram, Filtering Themes</b>	
	<b>Nomological Network</b>	<i>Dorst 2015</i>	<b>Nomological Network</b>	<i>Dorst 2015</i>
	<b>Metaphors and Analogies</b>	<i>Dorst 2015; Schön 1983; Lawson 2005</i>	<b>Brainstorming for Metaphors and Analogies</b>	<i>Osborn 1957</i>
	<b>Frame Evaluation</b>	<i>Dorst 2015</i>	<b>Frame Analysis</b>	<i>Dorst 2015</i>

**Table 2**

# **PART II**

## **TRANSPOSING FRAMING IN DESIGN ONTO APPLIED RESEARCH**

# 4 ACTION RESEARCH METHOD AND GOALS

## 4.1 ACTION RESEARCH

The choice of action research as a method assures a structured way of researching and testing, provides evaluation criteria and a way of measuring my impact. Most of the literature about action research connects it closely to educational practice, which incites doubt to its applicability to this thesis. However, the book *The Action Research Planner* by Kemmis et al. clearly states that action research can be conducted in various fields, where “each professional field has its own distinctive practices ... to be enhanced through critical action research” (Kemmis et al. 2014, 113). Compared with other literature about action research (e.g. McNiff 2013), *The Action Research Planner* is not solely focused on changing educational practices, but opens up the approach to be applied to other disciplines. Furthermore, the structure of the book provides a clearly understandable framework for real-life application, which was of benefit within the scope of the thesis. It provides a guide through the steps of reflecting on personal practices, helps one to locate shared concerns, to plan a way to change and to implement that change, and helps with reflection and analysis. The project case was based on the first iteration cycle of action research, which includes: planning a change, acting and observing the process and consequences of the change, reflecting on these processes and consequences, and re-planning of a change (Kemmis et al. 2014). The iteration cycles can repeat infinitely.

Apart from the promising research structure, the authors of *The Action Research Planner* are well aware of the approach’s weaknesses. For example, they mention that the outcome of the research initiative might be unexpected and unpredictable. Even if the practitioner is the decision maker of the research project, they cannot be fully accountable for the consequences (Kemmis et al. 2014). Furthermore, the authors address the limits of the approach, in the sense that not all needed changes can be accomplished immediately, but at least the authors see the advantage in challenging the problem situation’s “character and boundaries” (ibid, 100). The method might not lead to immediate success, but it is a tool for strategic decision making for finding leverage points from which to start the change.

The choice for action research as guiding principle is based on its aim to be a “practice changing practice” and conduct research through action, which accommodated the overall goal of this thesis (Kemmis et al. 2014, 4). It is a qualitative, context-specific research method that differs from other research approaches by formulating the research question from within a group of participants. The procedure of action research is iterative and includes reflection on the current situation, intervention to change the situation, and reflection on the intervention. After that, the

whole process is iterated. Unlike other research methods, action research is conducted from within the group of participants, based on a shared concern and an unforced consensus about what to do (ibid). Action research aims to create knowledge through practice and therefore needs great motivation to create a change in practice (ibid).

In the scope of this thesis, only a small-scale research project was able to be conducted. However, because it is based on the iterative nature of action research, it could easily lead to another, larger research project. This approach to action research can be considered as a kick-off for a greater change. Through several iterative cycles, the researchers of RISE would actually be able to create change in their practice. For the purposes of this thesis, a first, very small cycle that leads to the starting point of a next research cycle has been conducted.

The Action Research Planner also had a further purpose. Through the search for a shared concern and a structured way of observing existing practices, it guided the creation and customization of the prototype of the intervention tool “Framing Teaser”. It furthermore inspired a new documentation method to be tried. Based on the Action Research Planner’s advice to make others collect evidence for you (Kemmis et al. 2014), the “Inside Observer” was developed. It is a note-book in which the participants are encouraged to document their perspective and experience of the intervention. This led to interesting insights from an insider’s perspective, which would not have gained otherwise.

## 4.2 GOALS

The goals of the research project were set in consideration of the possible scope of action research. A timespan of one and a half months was taken to understand the situation, create an intervention tool and conduct the intervention in one day. This significantly limited the possibilities; normally, action research is conducted over a much longer and more extensive time frame.

The overarching goal set for this research was to adapt the designed practices of problem framing through several iterative cycles of action research. This would eventually lead to a change in their practice and would enable them to create more impactful projects that, in turn, would lead to more sustainable practices in the food production chain. This goal is outside the scope of this thesis, but it provided the direction and perspective for the actions and embedded the approach into a bigger picture.

The strategic objective that is considered viable in the scope of this thesis can be split into two categories: the goals deduced from the Action Research Planner that I consider useful for my case, and the additional, case-specific goals.

## **ACTION RESEARCH PLANNER GOALS**

### **1. CONDUCT A FULL, FIRST-ACTION RESEARCH ITERATION CYCLE:**

The aim was to initiate change by guiding the client through participating and experiencing a first full iteration cycle of action research. The steps were: to find a shared concern, to intervene by participating and experiencing design-led problem framing with the “Framing Teaser”, to reflect upon the experience and to consider what future changes it should have, and to re-plan the “Framing Teaser” to better adapt it to their needs. It was aimed to end at a new starting point for a new iteration in order to implement a new, adapted version of the “Framing Teaser”.

### **2. UNDERSTAND THE INTERVENTION AS PART OF A BIGGER GOAL**

The aim was to inspire the researchers and to motivate them to further engage with design in a gradual, step-wise manner. This approach makes implementing design appear feasible, and allows them to take small steps over a longer period of time.

### **3. STRONG SENSE OF DEVELOPMENT AND EVOLUTION**

One of the core goals of action research is to give the participants a strong and authentic sense of development and evolution in the participants' practices.” (Kemmis et al. 2014). This is considered much more important than to actually achieve a change of practice after the first iteration. In this case, this meant giving them an experience, a window on or an idea of what design is and make them interested in taking more steps in a later process.

### **4. INITIATION OF A CHANGE OF PRACTICE**

In the best-case scenario, it would already have enabled a change of practice during the first iteration cycle.

## **ADDITIONAL GOALS**

### **5. UNLOCK THE ACUTE PROBLEMS OF THE CASE**

As the researchers were offering their time and resources to participate in this experiment, they should get something useful and tangible out of it for themselves. Therefore, this goal was to help them overcome the challenges of the cases.

### **6. CREATE LEARNING THROUGH EXPERIENCE**

As the goal was to change practice, which is an activity, it made sense to initiate their learning about a new practice through practicing it. In the future they can relate to it as a real-life experience, which might increase the chance of repetition.

## **7. BE ABLE TO REPLICATE PARTS OF THE INTERVENTION**

Closely related to the previous goal: because of the experience and the understanding of the approach, they will be able to replicate (at least parts) of the intervention.

Overall, the aim of the action research is to find out if the “Framing Teaser” prototype as a small, customized design approach, executed in a one-day timespan, can kick-off a change of practice in an organization with no understanding about design but with an open, motivated mindset.

# **5. PROJECT CASE**

## **PROJECT BACKGROUND**

Through the literature review, the necessary knowledge needed to understand problem framing from scratch was gained. To further research the approach of problem framing in non-design-led organizations, a test on real projects was conducted. The aim was to research if a change of practice can be achieved by transposing and implementing frame creation to applied research. The approach was tested with RISE on their real cases, guided by the principles of the Action Research Planner (Kemmis et al. 2014). The collaboration and the methodology are further explained in this chapter.

## **SCOPE AND DATA**

The scope of the collaboration with RISE was small but intensive. After an online meeting and some correspondence back and forth with Karin Östergren, it was agreed to meet in person in January 2017 to discuss the extent of a possible collaboration. This meeting, with presentations and discussions, served to understand their way of working. After the meeting, a one-day workshop was coordinated in February to implement and test the “Framing Teaser” prototype on their running projects, with a follow-up day for interviews. The possible time frame for the workshop was short, because of thesis timeline constraints and to fit the timing of the beginning of a project in order for problem framing to make sense. Between the two meetings, during the creation of the “Framing Teaser” prototype, close contact was maintained to verify assumptions about their way of working, as the first meeting was only barely sufficient to understand their way of working. The workshop day was a dense, six-hour-long testing phase. The following day, a two-hour long co-design session was conducted, followed by personal interviews with the core participants. The collected data from the entire collaboration contained: hand-written notes of the first meeting; several email conversations; one day of audio transcript from the workshop,



photos, personal notes and notes from the insider observer (a book where they documented themselves) in addition there were more than two hours of interview transcripts that happened before and after the workshop, on site and online; and two hours of documentation and transcript of the co-design session.

### **5.1 COLLABORATIVE PARTNER: RISE**

The Research Institute of Sweden (RISE hereafter) is owned by the Swedish government through the Ministry of Enterprise and Innovation, and funded by public (National and EU) and private partners. RISE's mission is to be a successful innovator and to support sustainable growth and development in Sweden. Since 2014, the research company has merged several, scattered research institutes under one umbrella organization to become stronger and more impactful. The research institute consists of six divisions (Bio-economy, ICT, Bioscience and Materials, Safety and Transport, Built Environment, and Certification), which are subdivided into smaller research units. It is interesting to note that not only are they divided into units, they also have thematic divisions that go across units and unify disciplines (Mobility; Energy and Bio-based economy; Life science; Digitalisation; and Sustainable Cities and Communities).

The collaboration for this thesis project is with the researchers from the research group Sustainable Food Systems under the unit of Agrifood and Bioscience, being a part of the division of Bioscience and Materials. The unit covers projects all along the food chain, from agriculture to consumption, and manages to tackle more holistic challenges within the food system. Their specific research areas include Sustainable Food Production and Production Chains, Seafood and Marine Biotechnology, Sustainable Food Consumption, Bio-economy, and GreenLean Supply Chain Management. This research group Sustainable Food Systems is currently working on improving the environmental performance of food supply chains, using Life Cycle Assessments (LCA) as a tool to analyse and identify improvement potential and possibilities. An overarching goal of the research group is it to encourage new ways of thinking and acting along the food production chain. Especially in the GreenLean research group, the aim is to implement tools and new ways of thinking to get to a green, waste-free management system.

The group works closely together with the public sector and with food industry partners in order to improve product and process development, quality, product safety, production efficiency and environmental matters. What distinguishes them from universities is that their research is based on needs from the industry and actors in the food sector, and aims to promote development and innovation. While results from publically funded research projects are open, result form more industry driven research projects in the private sector remain private and are not publicly accessible, for example the calculation of a carbon footprint for a specific product. This latter kind of work is more like consultant work.

All participants that took part in the collaboration work as researchers at RISE, most with an engineering and technological background. They all have strong personal values as regards a sustainable world and they dedicate their daily work to make the food production chain more environmental friendly. The group also has a very strong inner driver to enable others (their customers or future users of their products) to consider their practices and make them more sustainable. Their aim is to stop piling up new knowledge and instead to create an impact with it. They believe that the availability of information and knowledge is the first step necessary to create change. They would like their knowledge to transfer to the public sector, private sector and consumers in order to reduce the environmental impact of current consumption patterns.

Their research projects can be categorized into two types: conventional and consulting research project. A simplified version of a conventional research project includes identifying a gap in knowledge, conducting research to fill the gap, and publishing the results. In the more recently developed consulting research project, the aim of the research is not only to create new knowledge, but also to transform it into an impactful form in order to affect real-life cases. Therefore, in recent years, the focus of the researchers' task has shifted from solely producing knowledge, to also creating an impact with the generated knowledge. This shift challenges the researchers' practices with the requirement of a new set of skills. The researchers have realized they lack skills to transform the knowledge into an impactful form and they are looking for ways to gain those skills. At the moment, for example, they struggle with engaging people along the production chain and lack the means to address their needs. As result, they are frustrated with the small impact their products are having on the change of behaviour towards sustainable practices. They see potential in design to lead to a bigger impact. Karin, the main driver for including design methods in research and my primary contact person, first came across design thinking as a buzz word in discussion with other researchers from other fields. Without knowing too much about it, she felt that she was already touching upon it with some of her regular practices in "LEAN thinking" (a way of creating production chains with no waste). She thus became motivated to engage with and learn about design thinking. The entire research group sees design as an opportunity for developing their research, overcoming their current challenges and gaining the skills they lack. Better problem framing would help them to better understand the basic problems they want to tackle in a project, and it would give them various perspectives on the problem situation, including from the perspective of potential users. This would lead to better understanding of the stakeholder's needs, improve their engagement and thereby create a potentially bigger impact.

## **PROJECT CASES**

The three project cases worked on during the collaboration were all in different project stages, had different aims and revolved around different problems.

The first project was at the stage right after the confirmation of the funding and planning the next step of developing the concrete outline of the project. The aim was to combine two sets of existing data, one concerning nutrition and health, and one about the environment, in order to create a decision support tool for authorities to promote healthier and more environmentally friendly meals. The challenge at the moment was to find and frame one particular problem to start with.

The second project was in a very late stage and almost finished, but the interest in choosing this project was to learn approaches for another project to include the potential user to a higher degree and to better respond to their needs. There was a possibility that the core problem of the project would be reframed.

The last project was in a very early stage, almost only a vague idea about creating a tool for designing food production processes in a more sustainable way. The interest in problem framing for this project was to formulate the vague idea into a stated problem.

## **5.2 PLANNING**

Nov 16 – Jan 17

This section is the first step of action research. Planning includes profound understanding through observation of the situation and finding the shared concerns. The following step is to plan the intervention to approach the shared concerns and foster change.

### **5.2.1 UNDERSTAND**

The understanding of the initial state is based on the basic requirements of understanding the practices and the shared concerns (Kemmis et al. 2014). Those components structure the consistent focus of the research.

### **OBSERVED PRACTICES**

In order to understand the current situation, the practices of RISE were observed. The observation of practices gives a structured insight about “the way we do things around here” (Kemmis et al. 2014, 20). Practices are composed of sayings, doings and relating and are shaped by a practice architecture (ibid). As it was clear from the beginning that this thesis would have no impact on the practice architecture, this factor was left out. However, it is needed to add “thinking”, as it appears to be significant in this case. Based on the observation from the interaction with RISE, an extensive list of sayings, doings, relating and thoughts was created,

which can be found in the appendix (see App. 1, p. 84). For this section the most significant or interesting findings are discussed.

It was observed that the RISE participants' way of talking and sharing thoughts happens in a careful and considerate way. They spoke with a lot of respect for each other and the statements and opinions of others were rarely questioned. They evaluated their thoughts carefully before articulating and sharing them. The language they used was fairly complex and they had the tendency to express themselves in an intricate way.

Apart from the known processes of applied research, such as applying for funding, executing research processes and publishing findings, the observation revealed a couple interesting insights about their particular way of doing things. The RISE participants showed a strong affection for technical solutions and therefore tended to jump to technical solutions. With their focus on solutions they preferred to tweak the solution instead of questioning the initial problems.

Each participant worked as much as possible alone, as they considered this the most productive way of working. They tried to save time by working efficiently and avoiding any iterative processes. Their busy work style encouraged them to work in routinized ways, avoiding the exploration of new ways of working.

Before starting a project, they usually do an “unstructured background check” (Emma & Jennifer), focussing on the obvious findings and with no real reflection behind. They are not used to investigating causes and relationships between those research findings. They missed to see the bigger picture and therefore stated their problems in a general, inexplicit way.

They related to fields within science and had a strong bent for technological approaches. They focused on relating to their own knowledge and competence when starting a new project.

They had a very strong social cohesion, showing a group culture of inclusion and respect. One of the group members described their group culture in a nice way: they very much care for each other and respect each other no matter what gender, age or background. However, he also mentioned that this kind of culture might be a bit too polite and focused on consensus (Ulf).

They related strongly to their sense and drive for sustainability and change. This led to approaching their stakeholders from their own values and perspectives. They assumed a natural interest and motivation for sustainability in others as a conclusion of their own motivation. They also had a strong consensus about what to do, including aspect such as “LCA is the right approach” or “we have to work together with the industry” (Ulf).

**They had an efficient and economical way of thinking and used as few resources as possible. This mindset was driven by the aim of achieving excellent project results in order to receive new project proposals and with that more funding. They economized wherever possible, for example inviting as few people as possible to a meeting to save costly, human resources. For meetings or discussions, they did usually not gather more than 2-3 people. They perceived that their highest efficiency occurred when working alone at a desk, applying analytical methods and producing output. Their prioritisation lay in making ends meet, and therefore, they hesitated to try out new approaches, caused by the uncertainty of success.**

**They related strongly to the funders' instructions and directives. Their actions were influenced by the funders' interests.**

**On the one hand, they tended to think in a very abstract way when it came to the use and understanding of terms. For example, they all agreed that the food production system had to become more sustainable, without having consensus what "sustainability" meant in the specific context of a project. On the other hand, they liked to rush onto the concrete level of a problem and stick to it.**

**They liked to think about a problem from one perspective and tended to stay close to the initial research question.**

**When discussing problems, they liked to get lost on side tracks. During discussions, each mind followed a different side track, which made reaching an agreement difficult. Another fact that supports the observation of their scattered thoughts is that they have many projects and tasks going on simultaneously, which exacerbates the difficulty of focusing on one single thing. They had trouble switching off what was going on at the back of their minds.**

### **SHARED CONCERN**

**The shared concern builds the starting point for action research. A shared common sense of an undesired situation is needed to define the desired change. Based on the discussion with RISE, I compiled the aspects where I sensed a shared concern.**

**It was deducted from the observations during the interactions that the aim of creating an impact with the newly generated knowledge put the team under pressure and caused frustration when they did not achieve their desired impact. They struggled with engaging the client and making the project attractive to them. Furthermore, they left out the potential user, ignoring their needs and interests. Hence, the potential user of a newly developed research product the was not integrated in the research process, nor properly understood, and the impact and satisfaction remained small. They lacked the knowledge to create impactful solutions and instead had a tendency to try to tweak existing solutions. Therefore, their**

shared concern revolved around their lack of skills with which to consider the problem and to engage with the users, clients and stakeholders.

Furthermore, they felt restricted when using the investor's money, because they felt that they had to play by the old rules. As a result, they became worried about becoming too innovative.

## **SUMMARY**

The team understood their work as more than just creating new knowledge; they wanted to make a difference. Their overall concern was that they were not achieving the impact they would have liked with their projects. They wanted to make products and create solutions that others want to use, in order to make users' practices more sustainable. They were trying to find the overlap between the needs and challenges of society and how the team's competences could meet those needs. However, they were stuck with focusing on their own competences, without having a proper preceding problem formulation or an understanding of what they needed to effect the change they wanted.

Based on observations it could be deduced that they wanted to learn how to become more efficient and more human centred. They were interested in learning basic design skills, starting with framing and reframing the core problems of the projects within the existing structures.

They showed a strong motivation to improve their own way of working, and therefore the focus needed to be solely on the improvement of the practices of this particular research group. All participants were highly motivated, open-minded people and the research group was genuinely interested in new approaches.

### **5.2.2 INTERVENTION TOOL: "FRAMING TEASER" PROTOTYPE**

The "Framing Teaser" prototype is the core piece of the intervention part and a possible framing guide to introduce the practitioner to a first experience of framing. It is based on an understanding and knowledge about framing. The prototype tool was made to be implemented and tested for the first time within the scope of this thesis in real life, during the intervention phase of action research cycle. It was developed based on action research principles, and took into account the observed practices and the shared concerns of the researchers at RISE. Its core component was a selection of participatory design methods from the "Method Collection", complemented with other features to address the team's shared concerns in a way that fit their practices to experience design-led problem framing. The methods and features were selected and combined in a way to be teachable and applicable for non-designers in one day. The purpose of the "Framing Teaser" was to facilitate participation in the experience

of problem framing. The tool was developed as a guide for the learning process of new practices and as a way for the researchers to start to initiate change themselves. The name “Framing Teaser” refers to the fact that the tool is only a teaser for design-led problem framing and represents only a small fragment of design. This should prevent users jumping to the conclusion that they now to know all about problem framing in design.

The “Framing Teaser” should be replicable for researchers outside the scope of this thesis. It consists of four parts: the overall design principles, a list of practices, a yellow card, a question catalogue, and four method packages, which will all be explained in the following paragraphs.

Based on research on shared concerns a list of desired and unwanted practices was formulated. The list made those two types of practices clear and explicit, facilitating the recognition of “current practices” and “desired practices”.

In order for the researchers to reflect on their practices to see if they were executing unwanted practices, a physical item was introduced as a tool to trigger reflection upon their own but also their team members’ behaviour. This was a yellow card, a metaphor from football to encourage them to reflect on unwanted behaviour, whenever coming across the card. A yellow card is bright enough to be seen, wherever it is stored, under a pile of papers or pinned on a board. It can also be brought along to meetings as a subtle warning when someone else is starting to fall into unwanted practices. The yellow card has the purpose of lying around and creating random moments of reflection whenever coming across it and as a communication tool among the team.

When the researchers realize that they are executing unwanted practices, the question catalogue helps them choose from the four method packages to drive their practices towards the desired ones. The method packages were developed based on the shared concerns, addressing “Frame Creation”, “Customer Needs and Actions”, “Solution Creation”, and “Creative Constraints”. The question catalogue proposes a method package based on the given answers which reflect the gap. The four method packages suggest concrete participatory design methods to overcome the unwanted practices when they appear. “Frame Creation” is about creating a frame for a problem from scratch. “Customer Needs and Actions” helps to frame the problem in a way to address real needs of customers. “Solution Creation” shapes problem frames that trigger new ideas for solutions, and “Creative Constraints” includes creativity in a problem frame despite strict constraints from outside. Three of the method packages were applied in the workshop. The chosen methods are explained in the next section.

Overall the “Framing Teaser” prototype has two purposes: The first purpose is to enable the researchers to detect and stop their

own and the team's unwanted practices. The second purpose is to direct them towards wanted practice, including the guidance to the right method package, and a clear explanation of the methods for application. The "Framing Teaser" was tested in the applicability of each of the four parts, as well as the overall approach of the tool.

### **5.2.3 INTERVENTION PLAN**

The plan for the intervention was to implement the "Framing Teaser" in form of a workshop. The participatory process of framing matched the format of a workshop (Dorst 2015). In the available timeframe, a one-day workshop was organized to collaboratively apply the "Framing Teaser" to the researchers' real-life cases. It was planned to spend one and a half hours on each case. The strategy was to introduce design practices to the RISE team's way of working by letting them experience a different kind of practice in an intensive way. With the overall goal of changing their practice in mind, it was desired for them to take the first small step by experiencing something new, but familiar enough to give them the feeling that a change of practice is feasible. During the one day, their experience was facilitated and a customized approach applied to integrate and embed the new experience into their existing structures, in order for them to do normal work "while also conducting critical participatory action research" (Kemmis et al. 2014, 93). The personal experience increases the likelihood of adapting the new practices in future because they can be related to as a lived experience.

The workshop day was split into four activity parts. A collection of participatory design methods was assembled from the "Framing Teaser" method packages to fit the scope and the particular challenges of the projects. After a short introduction about design and this thesis, the meeting started with a couple of warm-up exercises that were not related to any one case. Then the three specific cases were worked on. At the end of the day a short sum-up and feedback session was held, followed by the planning for the next day, where there was time for questions and consultancy on their projects. Furthermore, a handful of interviews during the days that followed were planned and conducted.



## CHOSEN METHODS

Case	Method	Reference	Modified Method
<b>Intro Warm-up</b>	<b>Brainstorm for Shared Vision</b>	<i>Osborn 1957</i>	Brainstorming to create a shared vision for the food system of 2050
	<b>5 Whys</b>	<i>Kohfeldt &amp; Langhout 2012</i>	Based on the shared vision, find out the underlying reasons for the vision by taking one aspect of the vision and asking “why?” five times.
<b>Case 1: “Decision Support”</b>	<b>Topic: “Problem Framing”</b>		
	<b>Mapping the Knowns, Unknowns and Assumptions</b>	<i>Ancona 2012</i>	Mapping the knowns, unknowns and assumptions about a problem to understand the problem and find gaps of knowledge.
	<b>Question Storming</b>	<i>Dyer et al. 2011</i>	Brainstorm only with questions to create new thoughts and new problem questions.
	<b>Question-based Discussion for Central Paradox</b>	<i>Dorst 2015</i>	Discuss to find the central paradox to understand what exactly it is that makes the problem so difficult to solve.
<b>Case 2: “SME Checklist”</b>	<b>Topic: “Customer Need &amp; Action”</b>		
	<b>Brainstorming for Key Stakeholders</b>		Brainstorm and list down the most important stakeholders, including potential users as basis for empathy research.
	<b>Empathy Interview</b>	<i>Spradley 1979; IDEO 2009; Kumar 2013</i>	Do a role-play and conduct an interview with a potential user to understand their position, values and needs.
	<b>Insights: Affinity Diagram</b>	<i>d.school 2011; Scupin 1997</i>	Collect all the gathered data from the interview, structure it in an affinity diagram and start making sense of the gathered data.
<b>Case 3: “Early Design Tool”</b>	<b>Topic: “Creative Constraints”</b>		
	<b>Rich Picture</b>	<i>Checkland &amp; Poulter 2010</i>	Map all the elements and processes to understand the problem as system and to understand the relationships between the elements.
	<b>Brainstorming for Abstraction</b>	<i>Osborn 1957; Dorst 2015</i>	Take some core characteristics of the problem and try to find the super-categories of the included factors.
	<b>Brainstorming for Metaphors and Analogies</b>	<i>Osborn; Dorst 2015; Schön 1983; Lawson 2005</i>	Take the abstraction and create a new context by creating metaphors and analogies from real life.

**Table 3**

## **5.3 INTERVENING WORKSHOP IN GOTHENBURG**

**February 2017**

This section is about the action and observing part of the action research cycle. It includes the detail planning and the conduction of the intervention, as well as the observation about what has happened.

### **5.3.1 WORKSHOP OBSERVATION**

The documentation of the implementation is split into two parts: the documentation of the workshop, including structure, schedule and procedure, and the documentation of the participants' personal experiences.

#### **DOCUMENTATION WORKSHOP**

The workshop proceeded as planned with very few changes. All the methods we presented smoothly with one on-the-spot change of plan in the case of the second method, because it was underestimated the importance of a high-quality outcome of one exercises which was to be the starting point of the following exercise. Therefore, one extra exercise was added in order to get to the needed outcome. Overall, the structure and logic of the introduced methods and tools was adapted to the RISE team's way of working to ease acceptance and application. As scientists, they very much appreciated that responsiveness and conceived them as tools they could grasp and understand. As Karin said, "It was a surprise that it [the tool] fit so well with the natural science ... I hadn't actually expected that." They welcomed the explanation of the idea and the aim behind each method, and Karin said, "We really got the feeling that it was a set of new tools that are actually proved and that can be used and have a legitimacy. It's not ... fluffy, it's based on something. ... I think that was very good because to us scientists this fits very well, and we feel safe." However, they mentioned in the end that they would have liked to have learned a bit more about the background of the method. At the end, in the sum up session, it was discussed whether they should focus on project-specific tutoring the next day in order to move along with their projects or if they would like to adjust the methods and method packages further in order to make them more applicable and replicable for other projects the future. They decided to focus on the latter, on generalizing the "Framing Teaser", because they were interested in improving the "Framing Teaser" according to their needs and making it more applicable for their own projects. Furthermore, they were interested in making the "Framing Teaser" more shareable with other colleagues who couldn't make it to the workshop. This decision led to an unexpected co-design session the next day for improving the first version of the "Framing Teaser" prototype.

The following day the group convened with all the learned methods written down on cards. Their feedback was that they would need method packages according to the state of the project and not according to certain project deficits as was proposed in the first version of the “Framing Teaser” prototype. The three most distinctive project states every project has were discussed, the most useful methods according to those situations were considered and combined in new ways. The outcome was a new set of packages for an easier, more applicable process. After the co-design workshop, four interviews of 30 minutes duration were conducted with the researchers about their experiences.

## **DOCUMENTATION EXERCISES**

This is the documentation of the conducted exercises that the most reactions and feedbacks were received on. This provides an insight into how they worked during the intervention and how they perceived the exercises.

## **SHARED VISION**

The team quickly realized the value of having a shared vision, for example in a project kick-off meeting, in order to bring all participants onto the same page. Usually they do not bring participants on the same page before starting a project and throughout the workshop they realized that it had been missing.

“I would say I have never experienced having a shared vision at the start of the project - unless there is only one person working. And not even then.” (Jennifer)  
“I absolutely agree. You need that to start with.” (Ulf)

They understood that the shared vision is a way to collect what the individuals know, because even if the coordinator has done it, the other participants have not. It is not just about agreeing upon something but about actually co-creating it. “It doesn’t really help that you agree on a piece of text, it’s what everyone associates with that text.” (Jennifer)

## **FIVE WHYS**

They reacted very well to the method of the Five Whys because they already knew it from a different context. They were surprised about its application under new circumstances and on a different system level, which was new and interesting to them. Using this method to find their underlying goals, for example, was novel and valuable to them.

## **QUESTION STORMING**

The feedback on this simple method was very positive. What surprised them most about this method was that all of a sudden new thoughts started coming up in their minds.

## **ABSTRACTION**

The abstraction exercise was the most difficult one for most of them. On the one hand one limitation was the delivery of a weak

explanation; on the other hand, it was challenging for them to decouple the concrete problem from its context and create abstraction through distancing.

### **METAPHORS AND ANALOGIES**

This exercise caused a few difficulties at the beginning, as it lacked smooth delivery of instructions. Furthermore, it was found to be difficult to start the exercise because of the content to be translated. However, this exercise left clear marks in the memories of the participants and Karin even took home some of the metaphors we created for the way she wants to work in the future. They also saw the potential of this exercise for creating overall guidance for a project. “I think one good metaphor helped the whole project. It covered some key elements in an easy way.” (Ulf)

### **EMPATHY INTERVIEW**

There was a lot of good feedback for the empathy interview exercises. They saw it as a structured way to talk to stakeholders, compared with the unstructured discussions they used to have. They saw the potential to get to the needs and challenges of the stakeholders in order to find the “hidden messages”. They would also like this exercise to help them to get a “wish list” from the stakeholders, which could guide their work and aims a bit better.

“[We would like to get a better] understanding of their needs and challenges. What do they want to use us for? How can we support them?”

(Ulf)

“A wish list of knowledge and science support.” (Jennifer)

The only thing that was missing was putting the method into a bigger context, allowing them to understand how to create and organize a situation to conduct an empathy interview. They also considered it beneficial to have a mobile toolbox for this exercise to take with them when they visit customers.

### **AFFINITY DIAGRAM**

The RISE team found this exercise interesting and challenging because of the myriad of possible iteration cycles of clustering and because it went deeper into the subject matter. They found this method the most useful one for working on their communication with customers, in order to adapt their language to them and make their message catchier.

### **DOCUMENTATION EXPERIENCE**

The documentation about the experience shows the different aspects of practices they experienced differently during that day. They can be directly compared to the observed, normal practices of the previous chapter and they are split into sayings, doings, relating and thinking.

### **SAY**

They were challenged to put new thoughts into words and make it fit on a Post-it note, which was almost as challenging as creating the

new thoughts in the first place. Jennifer struggled with this task and said, “I mean, it takes a bit of energy to try to pin point what you actually thinking of.” (Jennifer). Due to breaking down the project into junks that were actually understandable, I managed well to keep them focused and not drifting off to the other tasks they had in the back of their minds.

They intensively experienced the diverging and converging phases, where highly quantitative output is created without judgement in the first place, and only evaluated in the second place, as new way of sharing thoughts. The workshop encouraged them to articulate thoughts without considering them thoroughly before sharing. This division of firstly considering quantity and secondly considering quality was new and unfamiliar to them.

The workshop was very demanding in that contribution and participation was expected at all times. The value of this active participation was that it leads to the creation of a collectively produced output. The collective gathering of information and making sense of it as a team was new to them. They were not used to sharing insights and creating common understanding of a situation as team activity. They were used to one person formulating the insight and the others agreeing on it. They were furthermore not used to creating a common sense about the current situation, or about a desired future situation. They considered those exercises very valuable.

The time constraint forced them to produce outcome in a short time. Even though the outcome of these exercises was very good, they experienced it as very stressful, because they were not used to having such a short time constraint for their thinking processes.

They were used to being content with obvious information or outcomes. They experienced the iteration of processing information several times in order to create a deeper level of understanding as a totally new practice.

#### **RELATE**

The whole focus of the workshop was to make them relate differently to the time management of a project. It was new to them to spend so much time on the first step of a project, focusing on understanding and exploring the problem. However, they did understand the different idea of time management, where more time is spent on understanding and problem framing in order to save more time later.

They started to relate to other fields, outside their own profession, that could be included for solving a problem. They moved from “how to apply my own competences” to “what are my client’s needs that have to be met to solve the problem”. This shifted the focus away from themselves, towards the needs of others, thereby broadening the spectrum of possible solutions and needed competences to



**Karin Östergren**



**Ulf Sonesson**



**Jennifer Davis**



**Emma Holtz**



**Anna Woodhouse**

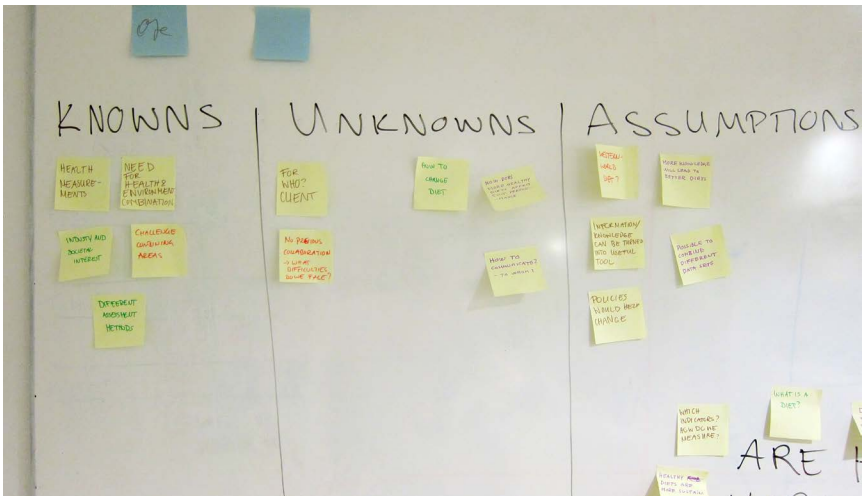


**Anna Ekman**

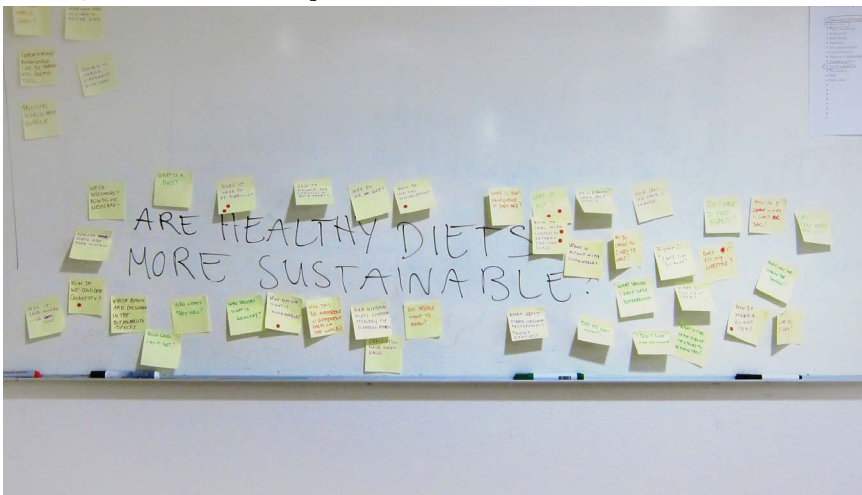
**Collaborative partner: researchers from RISE**



**Shared Vision**



**Knowns, Unknowns and Assumptions**



**Question Storming**

**Workshop documentation, February 2017 in Gothenburg**





meet the needs. Usually when they initiated a project, they started from their own competences and how they could help with solving the problem. This small shift away from their own competences gave them an idea of what else could be needed to actually solve the problem.

### **THINK**

The change that stood out most was the unusual and structured approach to starting to think differently. Most of the changes observed were connected to their way of thinking.

They experienced having new thoughts that they had not had before, as well as formulating those new thoughts into words. The new way of thinking and acting was exhausting for them and maybe did not feel like the most natural process. “I needed to use a lot of energy in my head, so I was quite tired afterwards.” (Jennifer) “I think we all were.” (Emma)

Karin also mentioned how much she struggled with abstract thinking during the exercise of “Analogies and Metaphors”, which she experienced as very far from how she usually thinks: “The most challenging tool was when we got into the abstraction of things and getting it on a higher level and on metaphors. ... It brought me into ways of thinking that I’m not used to at all.” (Karin)

The step-by-step fragmentation of information into manageable bits gave them access to a more structured way of thinking. The clear structure of breaking down the situation into smaller chunks of information, putting them into context and only then starting to make sense of it, helped them to stay focused on one thread of thoughts and to not get distracted. The structure helped their minds to go collectively in one direction. Ulf approved: “You added a lot of interesting approaches, not at least how to ... use some kind of structured tools... to sort of help your mind, your brain to not go in different directions.”

During the workshop I guided them through a structured way of breaking down information, in order to be able to combine it into a new way later on. For the first time they practiced a structured way of taking defined steps in their thinking process. It only allowed them to think of and focus on one set of things at a time, forcing them to ignore the rest of the problem situation, which kept their thoughts in order. Emma’s reflection is based on this experience: “Doing this kind of workshop... allows you ... to just think a little part at the time, using these small questions. In a normal project meeting, I would be sitting, trying to put all things together in my head, like trying to make a puzzle, trying to make sense of everything at once.” (Emma)

They experienced this as an unusual flow of thoughts in situations where they usually got stuck. Karin reflected that she realized that she “started to think in a different way and didn’t get stuck.”

(Karin) A set of questions were introduced that were much simpler than what they were used to, which forced them to break complex thoughts down into simple phrases. They reflected that those questions forced them to think differently, or as Emma said, “In some ways, we were forced to think in a different way.” (Emma). It led to an in-depth understanding of the initial situation.

Due to the exceptionally large size of the group compared to normal meetings, there were more intensive discussions going on, encouraging each other to expand boundaries. As Karin said: “I found people being more creative and thinking ... wider than we usually do.” (Karin).

## **SUMMARY**

They all experienced the intervention in very different ways. What they all had in common was that they shared new experiences, learned new methods and gained new insights. All of their minds explored places they had never been before. The most extreme and significant experiences they had were in new ways of thinking. Through the new experience, there were productive moments of surprise, especially when they surprised themselves. Besides the experiences, they gained a general understanding about design and that it is an approach which is applicable to their field. The structured approach to problem framing met the needs of scientists. They all saw the potential of design approaches and believed that the learned methods could be of use in their future work.

## **5.4 REFLECTING**

February 2017, Discussion and Interviews

### **POTENTIAL AND LIKELINESS FOR CHANGE**

In the discussions and interviews, a collective reflection happened upon the event, what changed, what was different and, most importantly, the potential for future change. Overall, what emerged was that through the workshop, all participants learned something that would help them in their work. They all started to understand the benefits of design and they were all highly motivated to obtain the learned approaches. However, there were also doubts about a future implementation.

The strongest concern about a possible change was that they only had a very short time to learn the new approaches. One day was very little time in which to learn and internalize a new way of thinking and practicing. Jennifer was concerned about “how quickly we will be able to adapt different thinking structures. ... It takes time to change habits.” As there was no time to repeat any of the exercises, chances are high that most of the learned approaches will soon be forgotten. A further constraint concerning time is their availability for exploring new ways of working. They

are short on time resources and their prioritization lies in a very economic thinking, with direct results. Therefore, despite their motivation and positive attitude towards design approaches, they doubt that the change will happen, due to lack of time to start exploring and applying the methods on their own: “It’s [the design approach] really good but it [the change] might not happen” (Ulf). Furthermore, they fear wasting time on executing the exercise wrongly and therefore not getting to the needed and expected outcome.

Another aspect was timing. The learned approach is very much focused on the pre-project phase, which only occurs a couple of times per year when starting new projects. Therefore, the repetition of the methods does not happen frequently and is likely to be forgotten.

They also doubted that a change in practice would happen without a facilitator. In order to change practice over time, they felt that they would need a qualified person in charge who firstly pushes the approach to be implemented, secondly navigates the participants’ focus of thought and thirdly gives support and guidance in basic design practices, which are still new and therefore not mastered well. All three aspects are underdeveloped at the moment and will keep the goal of implementing design thinking from evolving. Emma put this nicely into words: “It’s much easier to have a facilitator who thinks of: ‘What ... do we need to do? ... Which method is best in this situation to get our answers? Or what we need to do as a next step?’ so I think [we lack] both, knowing how to address specific situations and which methods to use, but also then to collect it and take it further.” (Emma)

However, their optimism and motivation to create change despite the difficult situation is encouraging, as Karin said, “I think you got a stamp on it yesterday, when everybody said, ‘Let’s implement this in our group’! I think most of us are really devoted to making a change.” (Karin) They mentioned that they already sensed a development of their thoughts in a conscious, but probably also subconscious way. “We have developed our way of thinking without knowing it; we would perhaps behave slightly differently, which is also a change, even if it’s not structured and documented.” (Ulf) Furthermore, all of them said that their motivation for applying design methods increased over the days and that they would like to use the methods in the future. They even increased their interest in integrating designers into their projects. They started to see great potential in using design approaches in their working life. They sensed that this new approach could help them to loosen their struggles with current problems. They all have a very positive mindset about taking a small step towards that change and they started to value design and designers more. Karin pointed out that she is aware that this project was just a teaser and that she would really like to bring in designers in the future.

## **5.5 RE-PLANNING (IMPROVEMENT)**

The next step of action research, after the reflection, is to take the findings of the reflection as a basis from which to plan the next intervention (Kemmis et al. 2014). Unfortunately, the step of re-planning is not well explained in the Action Research Planner and does not differ from the first step of planning the first intervention. Originally, I had planned to do this step on my own, after the conducted workshop and my observations and insights about my approach. However, after the workshop the researchers were so interested and motivated in further customizing the approach to make it fit their requirements even better that we planned an ad hoc co-design session for the next day. Sitting together and the “Framing Teaser” prototype was improved. The analysis of the format and the content was based on the collected insights. The new components and features for the next version of the “Framing Teaser” prototype are based on the co-design session.

### **5.5.1 ANALYSIS FORMAT**

#### **STRENGTHS**

The feedback about the strength of the “Framing Teaser” prototype concerned primarily the format and the structured approach. The following paragraphs will evaluate this further.

The presentation and implementation of the “Framing Teaser” happened in form of a workshop, which was strongly appreciated because it allowed the participants to actually participate. The “Framing Teaser” was presented in a slide show and further explained its structure and the instructions. This format of introduction ensured understanding. The RISE team considered most of the instructions for the methods clear enough to be applied with only a few comprehension questions. They learned the methods by doing them and they appreciated the experience as it enabled them to be able to relate to it later in their working life.

The structured approach of the “Framing Teaser” worked very well for them as scientists, because it was compatible with their normal scientific research practices. They felt safe when presented with the well-thought out tools. “It’s apparent that we like structures.” Ulf appreciated that “What you gave was a structured approach – more than just a gut feeling.” (Ulf) For them, this was a tool to help their minds and thoughts to not go into different directions, but to stay on the same page. They valued the well-structured workshop day. Karin mentioned that she especially liked that in the end, we tied everything together so well, that she had the feeling she really got something out of it.

#### **WEAKNESSES**

The weakness of the “Framing Teaser” prototype is that it does not consider background information about the methods and does

not explain the quality and characteristics of the outcome of the exercises. The RISE team criticised the lack of justification for the choice of methods. They would have liked to have known more about the methods, their background and especially their clear goals and outcomes. Emma also mentioned she would have liked to have seen the methods in the context of a project timeline, in order to see when which methods can be applied time-wise. They missed the overall context, purpose and background of the methods.

Furthermore, the “Framing Teaser” prototype lacked a clear explanation of the expected quality and characteristics of the outcome to be produced. They could not grasp the difference between “hard facts” and “empathic insights”. This understanding would have been essential in order to create an outcome on which to build upon in following exercises. The participants did not have basic design skills and the “Framing Teaser” lacked to address fundamental aspects. They would have needed extra guidance and explanation of basic design methods, including a deeper understanding of the outcome.

### **5.5.2 ANALYSIS CONTENT**

In the following paragraphs, the 4-step approach created for the “Framing Teaser” prototype to address unwanted practices is analysed.

#### **LIST OF PRACTICES**

Some of the practices listed were an “eye-opener” for them, for example the “solution tweaking”, which came up several times. The practice of which was discouraged during the intervention. “It opened my eyes to what we as a group and me as a person do wrong at present. We do a lot of good things, but we do sometimes repeat the same mistake.” (Ulf) As an approach to understanding their wanted and unwanted practices, it became evident that the presented list was too extensive. The team showed a tendency to only focus on one particular practice. Parts of the list, especially the “solution tweaking”, were very valuable, whereas the rest of the list, particularly in that form, did not add any value to the “Framing Teaser”.

#### **YELLOW CARD**

The yellow card proved its function as it was observed to be hanging on Karin’s dashboard the day after the workshop. The metaphor of the yellow card translated its purpose well and made them understand how to reflect upon unwanted practiced. Ulf said, “You used the yellow card as a symbol, for keeping that in mind, not doing the same mistake again” (Ulf). He even suggested having a red card for the “Solution Tweaking”, as this was an absolute “no-go” for him. The feedback was that having a real

object with a message does a good job reminding them to reflect, whenever they happen to see it. Even if it is just lying around, it does the job, as long as it doesn't end up in the bin.

## **QUESTION CATALOGUE**

The question catalogue was redundant, as it was too complicated and time intensive to apply. The idea of having questions that would lead to the corresponding design method packages did not turn out as a valuable approach. The suggestion for improving the process of finding the right methods to implement is documented in the new features of the “Framing Teaser 2.0”.

## **METHOD PACKAGES**

The RISE team researchers considered the combination of methods they were introduced to as very useful. Some of the methods weren't new (like the Five Whys) but the way it was instructed for them to use it was different and new. The combination of methods helped them to break the processes apart and helped with the understanding a problem. What was lacking in the method packages was the possibility of options for possible combinations of the individual methods. The team would have liked to have known more about the methods' background, purpose and how different methods build on each other. They would have liked to see how the methods were interlinked and how they could be combined in a smart way, like looking at puzzle pieces and showing which ones go together well. They said that this would add value in usability and would make it easier to choose one (or more), which seemed difficult at the time. They acknowledged that they were still very much dependent on a designer, because they did not know “what [was]working and how to combine these in a smart way” (Karin).

The biggest critique, however, was the concept of how the “Framing Teaser” was supposed to be embedded into their working life. The idea of going through the question catalogue and choosing a method package did not turn out to be a user-friendly approach. Therefore, we decided to re-build the packages to combine the methods in a new way that would make the whole “Framing Teaser” more applicable by addressing the needs in real life.

### **5.5.3 LACKING COMPONENTS**

Through their insights and feedback during the co-design session, the components that were lacking from the first version of the “Framing Teaser” prototype were identified.

## **SHARING FEATURE**

The research team at RISE demonstrated a strong sense of integration and a need to share and pass on the newly learned

practices. They had a strong urge to include others into their process. The “Framing Teaser” lacks the aspect of sharing, which means that it not only has to be self-explanatory, but also explicable to others in their own language.

### **THE MAINTAINER**

One weak aspect of the “Framing Teaser” was that it failed to address a “maintainer” or “steward”, a person who would take on the responsibility to push the design approach forward (Schön 1983; Boyer et al, 2013). This was clearly visible in their concern for forgetting the newly learned methods and approaches. Several participants expressed their concerns: “We can’t just leave it as a leaflet and say ‘Ok, this is available.’” (Jennifer) “No, that’s not possible, that’s impossible.” (Emma) At this stage of implementation, the responsible person does not yet need to be a designer, but rather someone who is able to refresh the learned approaches in people’s minds. This might lead to a further degree of implementation and a closer collaboration with designers in the future. If the “Framing Teaser” could have managed to have developed the knowledge in order to put a person in charge whose role and tasks would be clearly defined, the team would struggle less in the future with wondering how to proceed.

### **5.5.4 NEW FEATURES - FRAMING TEASER 2.0**

Based on the feedback, discussions, interviews and co-creation session, the new features required for the next prototype of the “Framing Teaser” were identified.

The yellow card as tool for reflection and communication worked well as such and can be directly adopted. The list of practices and the question catalogue can be discarded.

A chapter about general design methods, explaining and elaborating about creative mindsets, environments and an in-depth statement about the outcome of the methods will be included.

The individual design methods will be introduced more thoroughly, including background, expected outcome, guidance for executions and combinations of possibilities. The latter could be visualized in “mini packages”, proposals of how (else) the methods could be combined.

Three new method packages will be made to fit the three distinct phases each research project passes through. The first phase is the “Research Strategy” where the team finds out about needs and challenges in society and industry, and names the challenges they will address in the next research projects. The second phase is the “Research Proposal”, where research offers are developed or research plans are elaborated for concrete calls. The

third phase is the “Kick-off Meeting”, where the stakeholders align and consensus about the project is created. An additional, last possibility for applying design would be in an “In-project Development” package, where a designer would be included in a project budget to develop and apply more design approaches in a project.

Lastly, the “Framing Teaser” would teach the team how to put a person in charge in order to maintain and develop the design approach. The maintainer’s tasks would include:

- Keeping the design approach alive in people’s minds (with reminders or gatherings for example).
- Including the design approach in new projects and include design as a topic in discussions.
- Explaining the aim and value of design and creating understanding and motivation for others.
- Explaining the approach to people outside the core team, enabling them to participate in and practice design methods.
- Sourcing design facilitators for workshops or collaborations, who know how to address their specific situation, and who would help with choosing which methods to use, how to collect the outcome and how to push the project further. Someone who minimizes the risk of wasting resources.
- Organizing training and trials to improve as team, to learn and to become better.
- Encouraging the team members to support each other.

#### **5.5.5 CONCLUSION**

The structure, content and the way the “Framing Teaser” was presented made the application of design methods feasible for them. The Action Research Planner was helpful for creating and structuring the “Framing Teaser”, which lead to very good applicability and feedback. The choices of methods were suitable for the cases and situations addressed and enabled the team to further develop their projects. However, because of their lack of experience with design methods, the team could not really evaluate if the chosen methods were the best ones, because they had no other methods with which to compare them.

The combination of the method into method packages was a good approach, but it did not fit their needs. The re-packaging helped to



create compilations that actually helped them to be realistically applied. Furthermore, the “Framing Teaser” lacked components that I had not considered for the first version. The RISE team’s feedback and engagement helped to unveil those gaps and inspired ways to overcome them.

Overall, the “Framing Teaser” scored well for its clear structure and applicable format.

## 5.6 EVALUATING

### 5.6.1 PROJECT SUMMARY

This table represents all of the action research steps that were taken, the outcomes and the most important aspects.

#### PROJECT SUMMARY TABLE

	Plan (Understand)	Action + Obser- vation (Workshop)	Reflection (Interviews)	Re-Planning (Co-Design Session)
<b>Actions (Facilita- tion)</b>	<ul style="list-style-type: none"> <li>— Observation of current practices (Say, Do, Relate, Think and Shared Concern),</li> <li>— Development of intervention plan (“Framing Teaser”)</li> </ul>	<ul style="list-style-type: none"> <li>— Implementation of intervention plan (“Framing Teaser” workshop)</li> <li>— Documentation of practices (Say, Do, Relate, Think)</li> </ul>	<ul style="list-style-type: none"> <li>• Conducting interviews on experience</li> </ul>	<ul style="list-style-type: none"> <li>• Collecting feedback and inputs</li> </ul>
<b>Outcomes</b>	“Framing Teaser” and Workshop plan	Protocol and documentation of Workshop	Understanding for potential future impact and change	Ideas for improvement
<b>Content Summary</b>	<ul style="list-style-type: none"> <li>— Practice: concerned about sustainability, desire to improve, open-minded</li> <li>— Shared concerns: ignorance about customer needs, solution tweaking, little knowledge about efficient problem framing</li> <li>— Tool: collection of structured participatory design methods, including yellow reflection card, edited for workshop format on real cases</li> </ul>	<ul style="list-style-type: none"> <li>— 1-day workshop</li> <li>— Application of tools on cases</li> <li>— Experience: New, structured thinking</li> <li>— Breaking down and simplifying thoughts and actions</li> <li>— Relate to others’ needs</li> <li>— Change perspective</li> </ul>	<ul style="list-style-type: none"> <li>Concerns for future implementation:               <ul style="list-style-type: none"> <li>— Time constraint</li> <li>— No maintainer</li> </ul> </li> <li>Optimism for future implementation:               <ul style="list-style-type: none"> <li>— Motivation</li> <li>— Mindset</li> <li>— Positive experience of design</li> <li>— Increased interest in design</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>What worked:               <ul style="list-style-type: none"> <li>— Structured approach</li> <li>— Workshop format</li> <li>— Choice of methods</li> <li>— Yellow card</li> </ul> </li> <li>What didn’t work:               <ul style="list-style-type: none"> <li>— Explanation of quality of method output</li> </ul> </li> <li>New version:               <ul style="list-style-type: none"> <li>— Combine methods differently in order to fit their project processes</li> <li>— Sharing feature</li> <li>— Maintainer</li> </ul> </li> </ul>

Table 4

### 5.6.2 PROJECT EVALUATION

The evaluation of the project is based on all the evidence gathered throughout the action research. This includes: one day of audio transcript from the workshop; photos; personal handwritten notes; notes from the insider observer (the book that the team documented themselves); more than two hours of interview transcripts from both online and on site discussions; two hours

of documentation and the transcript of the co-design session. A reflection on the initial goals for the evaluation of this action research follows.

## **ACTION RESEARCH PLANNER GOALS**

**1. CONDUCT A FULL, FIRST ACTION RESEARCH ITERATION CYCLE**  
**Yes.** A full first action research cycle was implemented despite the tight timeframe. Expectations were exceeded: the co-design session of the re-planning phase was unscheduled and as this was originally expected to do conducted independently, based on the collected data of the workshop. The RISE team's voluntary participation clearly demonstrated their high motivation and appreciation of the approach.

**2. UNDERSTAND THE INTERVENTION AS PART OF A LARGER GOAL.**  
**Yes and no.** The RISE team clearly saw the intervention as a small impact in a bigger picture, and they were genuinely interested in continuing to improve their understanding. However, some of them also saw this larger goal of a change of practice as overly utopian.

**3. STRONG SENSE OF DEVELOPMENT AND EVOLUTION**  
**Yes.** The extent of a sense of development depends on the participant. The RISE team mentioned only a small sense of development in their mindset and thinking.

**4. INITIATION OF A CHANGE OF PRACTICE**  
**Not yet.** This goal is very difficult to measure in a short timeframe, especially because the practices the team learned were not everyday practices. What they learned was only applicable at a specific point in a project and within the project it was not repeated. A repetition of practice could have shown a possible change. Nevertheless, the team gained new knowledge about design methods which was accessible and could be revisited when needed.

## **ADDITIONAL GOALS**

**5. UNLOCK THE ACUTE PROBLEMS OF THE CASE**  
**Yes, somewhat.** Most of the projects did not see a significant impact, due in part to a lack of flexibility in the problem definition. However, all of the researchers confirmed that their projects progressed at least a little bit during our collaboration.

**6. CREATE LEARNING THROUGH EXPERIENCE**  
**Yes.** The team all experienced the design practices and

could understand design through practicing it. They especially appreciated the structured fragmentation of a problem into manageable pieces, the guided new thinking and the possibility of taking on new perspectives. They commented that the workshop format was much better than, for example a lecture, because they could actively participate.

**7. BE ABLE TO REPLICATE PARTS OF THE INTERVENTION**

**Yes and no. Most of the methods had already been forgotten shortly after the intervention. Furthermore, some of the researchers did not have enough confidence and had not had enough practice to be able to replicate the intervention. They would need more professional guidance should they wish to replicate the intervention. Some of the methods, however, were embedded and could be replicated by going back to the notes and guides.**

# **PART III**

## **SUMMARY AND DISCUSSION**

## 6 SUMMARY

The aim of this project-driven thesis is to transpose and explore design-led problem framing into a pre-project phase of applied research for environmental sustainability. A set of activities grounded in design literature is developed and tested with a group of researchers at the Research Institute of Sweden (RISE) working in the field of sustainable food production. The thesis consists of two main parts: the first part operationalizes design-led ways of problem framing into actionable activities; the second is dedicated to using the developed activities, reflecting upon the experience and iterating the activities.

The first part was initiated by studying the relevant literature on problem framing in design. Its definition is investigated, its role in design and its potential for greater impact outside the field of design by systematically reviewing literature (see Chapter 2 “Literature Review”, p. 6). Dorst’s texts were the centrepiece of the literature review. Dorst’s lifetime dedication and contribution to the topic and the sheer volume of text he produced is truly inspirational. Guided by, but not limited to, the steps in Frame Innovation, five main themes for innovative framing were devised. For each theme, relevant existing methods were researched and used in design to create or lead to the desired outcome for problem framing. These were devised as a collection from which to select activities to be adapted for a specific situation and project context. These methods were collected in the “Method Collection” (see Chapter 3 “Collection of Methods”, p. 38).

The second part began with transforming the insights and knowledge attained through the first part into a real, applicable tool for RISE. In order to test design-led problem framing in applied research, the “Framing Teaser” prototype was created to guide the implementation. The prototype was based on the understanding of problem framing and it was customized for the working processes and needs of the team of researchers at RISE. The prototype consists of four sections, each one dedicated to a different stage of problem framing. Stage One was designed in the form of a list in order to make the practices explicit, detailing what the researchers wished to avoid and what they wished to improve. Stage Two was a yellow card that would randomly encourage the researchers to reflect upon their methods in order to detect if they were carrying out unwanted practices. If they did detect an unwanted practice, they could move to Stage Three, which consists of answering the questions from a question catalogue, which would then lead them to one of four method packages (Stage Four). The method packages are combinations of three to five design methods each, adopted from the “Method Collection”, which approach a specific aspect of problem framing and help the researcher to change his or her practice.

The terms of the proposed collaboration with RISE were negotiated and the potential researchers and collaborators who

would be working on projects pertaining to sustainable food production at RISE were contacted. RISE was interested in learning and applying design approaches in order to overcome their current challenges in framing their applied research projects during the pre-project phase. It was agreed to test the “Framing Teaser” prototype on actual research projects to determine if it could enhance their work. The “Framing Teaser” prototype was tested in a one-day workshop. The overall concept and approach of framing seemed to be well received. However, some features were perceived to be not user-friendly and not applicable within certain project contexts. Therefore, the following day a co-design session was held where the “Framing Teaser” was customized and improved to make it more user-friendly and more relevant to them. The final part of the intervention with RISE were, interviews, conducted in order to reflect on the workshop day.

## **6.1 REFLECTION & LEARNING**

The process through which I arrived at the collaboration with RISE has allowed me to learn about the importance of problem framing, the application of design in a non-design-led environment, and the transposition of the benefits of design approaches to a new, unexpected situation.

Problem framing is a less visible, and sometimes under-appreciated part of design because, contrary to other aspects such as ideation, it does not directly lead to a tangible output. However, the way a project (or problem) is framed is a critical factor for following any design approach. Although this may at first be surprising, I learned from experience that in applied research, the problem is often under-defined. The exact scope of the problem that is being solved within a project is often unclear, which diminishes the effectiveness and output of said projects. Indeed, in order to solve a problem, you have to know the problem. This is where design-led approaches are extremely helpful, since design has very clear methods to get to know the problem.

Out of personal interest, I had a vague idea for combining fields of design, applied research and food systems. I am happy that I was brave enough to do it, because it led me to experience first-hand what it means to drive change by new combinations of disciplines and methods. The fields that I chose to combine in this thesis turned out to be as interesting as expected. In this particular case, the combination worked well. I managed to find the relevant factors whereby the disciplines could influence each other. The experience of combining the fields step by step, exploring how one influences another and how these influences could be used for improvement, was excellent. The combination of those fields revealed a strong potential for channelling synergies and positively impacting each other for further developments and improvements. Although the project seemed unfeasible at the beginning, I eventually managed to link the fields together. Despite some hurdles, it was

interesting to not go for the obvious, but to actually explore new and unexpected combinations. My work showed me that there is significant potential for further research, not only in this particular combination of fields, but also in the more general field of design for applied research.

The collaboration with RISE turned out to be a great choice, particularly with regard to the real- life impact of my thesis and my learning process. It also tamed my enthusiasm for changing the practices of applied research, because it showed me their profoundly different way of working. It was a great challenge to adjust my proposed way of working as far as possible, while suggesting new ways and methods. Finally, I was very lucky with the people at RISE. They were very open and motivated, which made the experience very pleasant.

The actual act of transposing was a lot more work than expected, considering that Frame Innovation is already a hands-on approach. I learned what it means to operationalize and approach to an extent where it can be implemented. The theory about a practice does not automatically mean that it is workable or implementable. It is not enough to just extract the design practices apply them elsewhere; it requires extreme adaptability to be able to transpose the de-contextualized approach onto a new context. It was a fascinating and rich learning process.

After consideration I decided to reduce the amount of design methods for the workshop, minimize the content to convey to the researchers and focus instead on a maximal learning effect through deep understanding and hands-on experience. I chose to conduct a workshop so that they could experience design first-hand. I am indeed convinced that the workshop exercises increased the learning output, and the chance that the researchers will replicate and effectively apply the learned methods for themselves in the future. I ensured that the first day was very structured, but left the second day open. That was a good choice because it allowed us to decide collectively what was the optimum next step (leave them the space to decide what they need). The result was that they decided that they wanted to customize and improve the learned methods and thereby improve the tool and adapt it to fit their specific needs. With hindsight, I realize that I could have reduced the content even further, and that the workshop would still have been enormously effective.

Personally, I learned two main things from this workshop/testing phase: first, creating a theoretically implementable tool is very different from actually implementing it. In order to be effective and useful, a tool needs to be customized, which is best done by negotiating its features with the interested actors. Second, the work with the applied researchers showed me that increased and better problem framing is not reached so easily. There are different factual and interdisciplinary hurdles that impede the

application of design-led problem framing methods in applied research. A further challenge in creating lasting change is that the researchers would not have been able to replicate what they had learned because the aspects of problem framing they learned were only applicable at the very beginning of a project, which only occurs once every couple of months for them. Thus, whilst there is an evident interest in combining two fields and their different working methods, this needs a long-term approach.

The decision to implement a trial action research iteration cycle was a good choice, because it embedded the whole thesis in the perspective of a next, bigger research cycle. Furthermore, doing action research allowed me to simultaneously do research whilst creating an impact.

## **7 DISCUSSION AND OUTLOOK**

The three main aims I had for this project-driven thesis concerned (1) learning about framing in design literature (2) operationalization of framing in design into an applicable collection of activities to guide the problem framing process for a pre-project phase of applied research and (3) contribution to current projects within a collaborating organisation (RISE) by helping to change their practices for the better.

The operationalization of framing literature included the transposition of problem framing in design onto applied research for sustainable food production at RISE. I have reached this aim by using Dorst's work as a centrepiece. This and other, complementary literature helped me to gain in-depth understanding of problem framing and of what was required from each framing step. Further research into design methods gave me the tools and means to create this outcome. Within the scope of the thesis, I had to restrict myself to problem framing literature and had to leave out any additional literature that could have helped in structuring, for example, organizational change.

My aim was to create a practical approach to explore and reflect on problem framing in applied research. I managed to break down what I had gleaned from the literature into an approach that was implementable in the given timeframe of the thesis process. I used design as an enabler for the applied researchers to approach their current practices concerning the “fuzzy front end” of their work. My further intention was for the researchers (the RISE team) to be able to understand my approach and then to implement those design practices by themselves in their own projects.

My last and probably biggest aim was to initiate a change in the researchers' practices to enable more sustainable and effective research practices. Unfortunately, I realized that this was not possible within the scope of this thesis for two reasons: first, a



change of practice is not possible within the limited timeframe of a Master's thesis, and second, the impact of a change in research practices on the food system could not be measured quickly as it would only eventually happen over time and would require a longitudinal study. However, the researchers were able to derive some benefit from what I was able to do in the timeframe in that I was able to help to improve their practices around problem understanding, identification of problem opportunities and conceptual development. The impact that this intervention had on their projects was small but real. All members of the team managed to overcome the challenges of their current projects to a certain degree. Furthermore, they all positively valued the approach of design practices for their work and saw potential for further improvement.

Despite the fact that I could not reach my overall aim of effecting a lasting change in practice, it helped me to keep direction and to see the thesis as part of a bigger picture. Despite all its limitations, the research project achieved more than expected. The transposition and application of design pricked the researchers' interest and enabled them to experience of the potential impact of design. They started to think about and reflect upon their own practices and I managed to change their way of thinking – at least for a day. Overall, they felt that they had developed and changed, and when reflecting, they were surprised about the progress that they had achieved in just one day. This “strong and authentic sense of development and evolution” is one of the core success criteria for action research, which was attained, even in the relatively small scope of this thesis (Kemmis et al. 2014, 19).

Overall, the limits of this thesis did not allow me to impact the RISE team's practices as much as I had hoped. My time limit and RISE's generous but still restricted timeframe for experimentation curtailed the extent to which I could influence the team's working procedures. As regards the literature research I had to narrow my initial ideas down to the theme of problem framing, meaning that I could not explore any other theories about organizational change, for example. However, having such a big aim in mind gave my work direction and motivated me to pursue a bigger goal.

## **ROLE OF DESIGN IN APPLIED RESEARCH**

Although the findings are limited to the specific projects I helped frame at RISE, the initial impression is that there are needs and demand for design-led framing activities in the field of applied research. It is an approach that attacks the “fuzzy front” and provides tools to structure the often overwhelming initial chaos. The potential of problem framing as design practice in applied research is considerable in that it manages to unveil a part of the researchers' work that they normally do not consider sufficiently: focusing and approaching pre-project. This creates a more diverse and broader understanding of the problem, broadens the focus and

proposes a structured approach in which to consider more factors that could shape a project, e.g. the needs of their clients, the underlying problem or the shared interests in a multi-stakeholder project. Furthermore, the focus on the problem with the aim of deeper understanding, together with the consideration of more aspects from more different sources, allows the researchers to see the problem and therefore the project within the bigger picture.

The researchers agreed with me that a more conscious start for a project could potentially lead to a better structured project and more innovative solution approaches. Investing more time at the start of a project enables research to be more efficient and impactful at a later stage.

Problem framing is a particularly interesting approach in applied research, as applied research is not basic research for the sake of new knowledge, but a problem-solving approach. The design approach transferred to applied research helps to balance out the problem-solution relationship towards more problem understanding.

Design-led problem framing is not only for applied research; other fields would certainly benefit from it as well, but it is especially important and interesting in the context of applied research since the researchers themselves choose and define their projects. They seemed almost predestined for pioneering problem framing because they are so used to working on the project structure, it makes sense to introduce them to the pre-project phase, to framing the problem.

Despite all the positive aspects of introducing problem framing to applied research, the implementation also faces many challenges. Even if the researchers' motivation was driving the experiment, there were many structural aspects that make a true, long-term application difficult, including e.g. their particular practice architecture structure that leaves very little room for experiments or new approaches of working.

## **OUTLOOK**

Through working on my thesis I discovered a new field of research that opened up new and interesting fields for further research. Those aspects will be discussed in this section.

## **FIRST OF MANY STEPS**

In two aspects, this project is just the very edge of a new horizon. The first concerns the change of practice, which was my third aim, although one that I knew from the outset that I could not really reach. I realized that this is an enormous field that needs leadership, time, and a change of practice architecture, to name but a few elements. I am aware that the actual impact of this

thesis on the behaviour of the team was very small. For one day I managed to change their practice, but the long-term effects are unknown. An indicator for change potential was the team's motivation and engagement during this one day as well as the improvised co-creation session on the second day. An indicator for the absence of lasting change was their busy and rigidly structured working life, which left them little or no freedom to explore new ways of working. In addition, the lack of any ongoing leadership that could take on responsibility to push a change through would be a detriment to the teams continuing to explore their newly-learned working practices. In order to ensure the long-term impact of the workshop, it would be necessary to continue the guidance and keep it vibrant. More input in future projects would clearly be necessary to effect lasting change.

The second aspect concerns the approach of problem framing for a more sustainable food system. My thesis was just the first step in a chain of impacts in which the food system itself was the very last link. As of now, there is of course no observable impact on the food system. However, I would be very interested in observing such a project over a longer time period and in investigating the actual impact.

## **ROLE OF THE DESIGNER**

Although this thesis focused on design practice and design-led ways of working, I would like to conclude with some final thoughts about the role of the designer. In my approach, there is a difference between pushing for change and applying design. The first process requires a steward that guides and pushes the transformation. The second process requires a designer or a practitioner who is skilled in design practices. Therefore, when aiming to change practice towards design-led ways of working, both roles are of importance. When gradually implementing design, the person in charge, the maintainer, does not necessarily need to be a designer. They merely need to be a steward (Boyer et al. 2013) or a practitioner (Schön 1983), which means they need to have competences that cover (at least) basic knowledge about design and the capacities of designers but mostly also have the competence to lead change. In order to facilitate a good collaboration with designers it is furthermore beneficial if they know about briefing and managing a collaboration together with designers, which is a possible next step after framing. Apart from briefing, there are many other aspects of design that would be interesting to continue with after framing. I am also interested in further research approaches to transpose other project-stages of a design project into non-design-led fields and investigate what other qualities of design can be extracted and transposed (e.g. briefing).

## **FUTURE POTENTIAL FOR PROBLEM FRAMING**

Albeit small, the achievement I made with the "Framing Teaser" strengthened my interest in further developing the approach. I

would be very interested in creating more attempts for transposing framing in design onto other fields and contribute to the development in general. It would be particularly interesting to see if the approach also works on bigger scale.

If it works for applied research, it might also be interesting for other fields. I am convinced that the general approach of focusing on the problem could benefit other fields. Therefore, I would like to encourage fellow designers and researchers to discover untapped fields. Discovering and introducing new fields to design also implies a lot of communication work to share the value and impact of design-led approaches. Furthermore, I would be interested in knowing more about the required characteristics of such fields in order to be able to adapt design practices for them. Overall, I think I touched upon a new, interesting field, where I assume a big impact and great potential for new research projects.

# **ACKNOWLEDGEMENT**

**I gratefully thank a few people for supporting this thesis in various ways:**

**— Seungho Lee, who advised, guided and supported me, but most importantly kicked my ass and motivated me to do all this.**

**— The team from RISE, especially Karin Östergren, who started this whole experiment; Ulf Sonesson, Jennifer Davis and Emma Holtz, who dedicated their precious time to the experiment; and all other RISE researchers who participated so actively in the collaboration.**

**— Sylvie and Karen Herold, who worked their finger to the bones proof reading.**

**— Thom and Sean, who jumped in and edited last minute**

**— Maritere and Paula, who always had a moment for me to help me sort my thoughts.**

**— Nesa, who was my sun in the dark days.**

**— Veit, who helped me make the core of this thesis understandable for non-experts**

**— Kathrin, who made this all reader-friendly and looking good**

**— Richard, who was the most efficient and trustful help in any emergency situation.**

**— The lovely barista across the street, who kept me awake.**

# REFERENCES

- Ancona, D. (2012). Sensemaking: framing and acting in the unknown. *The handbook for teaching leadership: knowing, doing, and being.*, p. 3-19.
- Argyris, C. (2000). *Flawed Advice and the Management Trap*. Oxford, Oxford, UK: Oxford University Press.
- Basadur, M., Graen, G., & Green, p. (07 1982). Training in creative problem solving: Effects on ideation and problem finding and solving in an industrial research organization. *Organizational Behavior and Human Performance*, 30(1), p. 41-70.
- Boyer, B., Cook, J. W., & Steinberg, M. (2013). *Legible practices: Six stories about the craft of stewardship*. Helsinki: Helsinki Design Lab and Sitra.
- Brown, T. (2009). *Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation*. New York: Harper Collins.
- Buchanan, R. (1992). Wicked Problems in Design Thinking. *Design Issues*, 8(2), p. 5-21.
- Cambridge Dictionary. (no date). *Cambridge Dictionary - "Pattern"*. <http://dictionary.cambridge.org/dictionary/english/pattern> (last access 14.04.17).
- Chand, I., & Runco, M. A. (01 1993). Problem finding skills as components in the creative process. *Personality and Individual Differences*, 14(1), p. 155-162.
- Checkland, P. (2000). Soft Systems Methodology: A Thirty Year Retrospective. *Systems Research and Behavioral Science*, 17, p. 11-58.
- Checkland, P., & Poulter, J. (2010). Soft Systems Methodology. In M. Reynolds, & p. Holwell. *Systems Approaches to Managing Change: A Practical Guide* (p. 191-242). London: Springer London.
- Churchman, W. (December 1967). Wicked Problems. *Management Science*, 14(4), p. 141-142.
- Cooper, A. (2004). *The inmates are running the asylum*. Indianapolis: Sams.
- Cross, N. (2006). *Designerly ways of knowing*. London: Springer.
- Cross, N. (2011). *Design thinking: Understanding how designers think and work*. Oxford: Berg.
- Csikszentmihalyi, M. (1996). *Creativity*. New York: Harper Perennial.
- Cyert, R. M., & March, J. G. (1963). *A Behavioral Theory of the Firm*. Englewood Cliffs, NJ: Prentice-Hall.
- d.school. (2011). *bootcamp bootleg*. <https://dschool.stanford.edu/wp-content/uploads/2011/03/BootcampBootleg2010v2SLIM.pdf> (last access 14.04.17).
- De Bono, E. (1999). *Six thinking hats*. New York: Back Bay Books.
- Doorley, S., & Witthoft, P. (01 2012). *Designing Spaces for Creative Collaboration*. Harvard Business Review: <https://hbr.org/2012/01/designing-spaces-for-creative> (last access 14.04.17).
- Dorst, K. (2006). Design Problems and Design Paradoxes. *Design Issues*, 22(3), p. 4-17.
- Dorst, K. (2015). Frame Creation and Design in the Expanded Field. *She Ji: The Journal of Design, Economics, and Innovation*, 1(1), p. 22-33.
- Dorst, K. (2015). *Frame innovation : Create new thinking by design*. Cambridge, Massachusetts: The MIT Press.
- Dorst, K., & Cross, N. (2001). Creativity in the design process: co-evolution of problem-creation. *Design Studies*, 22(5), p. 425-437.
- Drucker, P. (1954). *The Practice of Management*. New York: Wiley.
- Dyer, J., Gregersen, H., & Christensen, C. (2011). *The innovator's DNA : Mastering the five skills of disruptive innovators*. Boston, Massachusetts: Harvard Business Press.
- Einstein, A., & Infeld, L. (1938). *The Evolution of Physics*. New York: Simon and Schuster.
- FAO. (2009). *How to Feed the World in 2050*. FAO Food and Agriculture Organization of the United Nations: [http://www.fao.org/fileadmin/templates/wfs/docs/expert\\_paper/How\\_to\\_Feed\\_the\\_World\\_in\\_2050.pdf](http://www.fao.org/fileadmin/templates/wfs/docs/expert_paper/How_to_Feed_the_World_in_2050.pdf) (last access 14.04.17).
- FAO. (2014). *New approaches to food systems needed to cope with climate change*. FAO Food and Agriculture Organization of the United Nations: <http://www.fao.org/news/story/en/item/247782/icode/> (last access 14.04.17).
- Hall, K., Guo, J., Dore, M., & Chew, C. (2009). The Progressive Increase of Food Waste in America and Its Environmental Impact. *PLOS ONE*, 4(11), p. e7940.
- Hekkert, P., & van Dijk, M. (2011). *ViP - Vision in design : a guidebook for innovators*. Amsterdam: BIS.
- Hertzberger, H. (1991). *Lessons for students in architecture*. Rotterdam: Uitgeverij 010.
- Hey, J., Joyce, C., & Beckman, p. (2007). Framing innovation: negotiating shared frames during early design phases. *Journal of Design Research*, 6, p. 79-99.
- IDEO.org. (2009). *The Field Guide to Human-Centered Design*. IDEO.org / Design Kit.
- Jones, J. C. (1992). *Design Methods*. New York: Van Nostrand Reinhold.
- Kelley, T., & Littman, J. (2004). *The art of innovation: Lessons in creativity from IDEO, America's leading design firm*. London: Profile.
- Kemmis, S., McTaggart, R., & Nixon, R. (2014). *The action research planner : Doing critical participatory action research*. Singapore: Springer Singapore.
- Kimbell, L. (2014). *The service innovation handbook: Action-oriented creative thinking toolkit for service organizations : Templates - cases - capabilities*. Amsterdam: BIS.
- Kohfeldt, D., & Langhout, R. D. (2012). The Five Whys Method: A Tool for Developing Problem Definitions in Collaboration with Children. *Journal of Community & Applied Social Psychology*(22.), p. 316-329.
- Kumar, V. (2013). *101 design methods : A structured approach for driving innovation in your organization*. Hoboken, New Jersey: Wiley.
- Lawson, B. (2005). *How Designers Think: The Design Process Demystified*. London: Architectural Press.
- Maher, M. L., & Poon, J. (1996). Modeling Design Exploration as Co-Evolution. *Computer-Aided Civil and Infrastructure Engineering*(11), p. 195-209.
- Malhi, Y., Roberts, J., Betts, R., Killen, T., Li, W., & Nobre, C. (2008). Climate Change, Deforestation, and the Fate of the Amazo. *Science*, 169-172.
- Manzini, E., Collina, L., & Evans, p. (2004). *Solution Oriented Partnership: How to Design Industrialised Sustainable Solutions*. Bedfordshire, UK: Cranfield University.
- Martin, R. L. (2009). *The design of business : Why design thinking is the next competitive advantage*. Boston, MA: Harvard Business Press.
- McNiff, J. (2013). *Action research : Principles and practice* (3rd edition Aug.). London: Routledge.
- Meadows, D., & Wright, D. (2008). *Thinking in systems: A primer*. Vermont: Chelsea Green Publishing.
- Mind Tools: *Essential Skills for an Excellent Career*. (1996-2017). <https://www.mindtools.com/> (last access 14.04.17).
- Minsky, M. (1975). A framework for representing knowledge. In P. Winston. *The psychology of computer vision* (S. 211-277). New York: McGraw-Hill.
- Mintzberg, H. (1970). Structured observation as a method to study managerial work. *Journal of Management Studies*, 7(1), p. 7-104.
- Nesheim, M., Maria, O., Peggy Tsai, Y., & Committee on a Framework for Assessing the Health, E. p. (2015). *A framework for assessing the effects of the food system*. Washington DC: National Academies Press.
- Nickerson, J., Silverman, B., & Zenger, T. (07 2007 ). The 'problem' of creating and capturing value. *Strategic Organization*, 5(3), p. 211-225.
- Osborn, A. (1957). *Applied imagination : principles and procedures of creative thinking*. New York: Scribner's. Oxford Dictionary. (14. 04 2017). *Oxford Dictionary - 'Analogy'*. <https://en.oxforddictionaries.com/definition/analogy> (last access 14.04.17).
- Paton, B., & Dorst, K. (11 2011). Briefing and reframing: A situated practice. *Design Studies*, 32(6), p. 573-587.
- Rittel, H., & Webber, M. (June 1973). Dilemmas in a general theory of planning. *Policy Sciences*, 4(2), p. 155-169.
- Schön, D. (1983). *The reflective practitioner: How professionals think in action*. New York: Basic Books.

- Schön, D. (1984). Problems, frames and perspectives on designing. *Design Studies*, 5(3), p. 132–136.
- Schön, D. (1988). Designing: Rules, types and words. *Design studies*, 9(3), p. 181-190.
- Scupin, R. (1997). The KJ Method: A Technique for Analyzing Data Derived from Japanese Ethnology. *Human Organization*, 56(2), p. 233-237.
- Service Design Toolkit*. (2014). <http://www.servicedesigntoolkit.org/> (last access 14.04.17).
- Simon, H. A. (December 1973). The structure of ill-structured problems. *Artificial Intelligence*, 4, p. 181-201.
- Spradley, J. (1979). *The ethnographic interview*. Belmont, CA: Wadsworth.
- Spradley, J. (1980). *Participant observation*. New York: Holt, Rinehart and Winston.
- Standage, T. (2010). *An edible history of humanity*. New York: Walker.
- Stickdorn, M., Schneider, J., & Andrews, K. (2015). *This is service design thinking : Basics - tools - cases* (5th edition Aug.). Amsterdam: BIS.
- Strzepek, K., & Boehlert, B. (2010). Competition for water for the food system. *Phil. Trans. R. Soc. B*, 365(1554).
- Valentine, J., Clifton-Brown, J., Hastings, A., Robson, P., Allison, G., & Smith, P. (2012). Food vs. fuel: the use of land for lignocellulosic 'next generation' energy crops that minimize competition with primary food production. *Global Change Biol Bioenergy*, 4, p. 1–19.
- van Leeuwen, J., Rijken, D., Bloothoofd, I., Cobussen, E., Reurings, B., & Ruts, R. (2016). Thematic Research in the Frame Creation Process. *Proceedings of ServDes 2016*. 125, p. 352-364. Copenhagen: Linköping University Electronic Press.
- van Manen, M. (1990). *Researching lived experience: Human science for an action sensitive pedagogy*. New York: State University of New York.
- Weick, K. (1995). *Sensemaking in organizations*. Thousand Oaks: Sage.

# APPENDIX

## APP. 1 SHARED CONCERN TABLE

Concern	Reason for concern <i>This is a problem, because ...</i>	Potential of concern as leverage point <i>If ..., then ...</i>	Learning objectives that would enable change
<b>Practical Level</b>			
1. New performance task: “We don’t know how to successfully master the transformation of knowledge into desirable and impactful projects/products.”	This is a problem, because we want to meet the new expectations for the outcome of research and today we are not equipped with skills to approach that.	If we knew more design skills, we could imagine possible new ways for impact and then work in a more efficient and innovative way.	Learn basic design skills
1.1. Customer relations: “We don’t know what our customers actually need and want.”	This is a problem, because if we want to enable change in behaviour, we have to understand our customers’ needs and values in order to create user-friendly and desirable products.	If we had a structured way to take on their perspectives to understand their needs and values, we could invent effective products. If we knew how to co-operate with technicians on a human level – because they’re human after all – and complement our own technological approach with a human centred approach, we could create more user-friendly products.	Learn to take on others’ perspectives. Learn to become human centred. Learn to understand the customer.
“We don’t know how we can affect our customers’ thinking and behaviour.”	This is a problem, because our main goal is to eliminate customers’ unsustainable practices along the food production chain. This is a problem because it is no longer enough to just provide information, we also want to provoke new ways of thinking.	If we included existing (market) research data about customer behaviour and trends in an effective way, we could gain insight into how to effectively shape customer behaviour.	Learn to share sustainability as a value. Learn to include market research.
1.2 Problem pondering “We don’t know how to frame problems in order to set a new direction for solving them in a more user-centred way.”	This is a problem, because it forces us to stick with our old perspective on problems.	If we knew how to understand the problem we’re tackling better, we could easily push and speed up the projects toward a promising new direction.	Learn to be courageous, to frame problems differently.
<b>Structural level</b>			
2. Change of practice “We don’t know how to be creative as a research team within the constraints and limits of the system structure, such as research calls.”	This is a problem, because we cannot risk the funder’s money for a crazy idea, so we have to stick to familiar and safe project ideas.	If we knew how to be creative within tight boundaries, we would be innovative despite the limited field of the funder’s interest.	Learn to be creative within tight limits Learn to be creative within others’ fields of interest.

Table 5

## APP. 2 METHOD COLLECTION & APP. 3 FRAMING TEASER PROTOTYPE

at the end of this pdf







# **METHOD COLLECTION**



# TABLE OF CONTENT

<b>Basic Requirements</b>	<b>7</b>
Organizational Openness	7
Driving Core Team	7
<b>Shared Drivers</b>	<b>8</b>
Internal and external Drivers	8
Shared vision	8
<b>Search and Choice</b>	<b>10</b>
Problem Search	10
Analysis	10
<b>Problem Investigation</b>	<b>11</b>
Coevolution Problem - Solution	11
Shared Understanding	12
Key Stakeholders	12
System and Rich Picture	12
Insights	13
Persona	14
Stakeholder Motivations	14
Rich Picture	14
Central Paradox	16
Paradox's context	16
Problem setting	16
<b>Problem Frames</b>	<b>17</b>
Principles and Patterns	17
Themes	17
Filtered Themes	18
Nomological Network	18
Metaphors and Analogies	18
Frame Evaluation	19

all page numbers link back  
to the table of content

**The “Method Collection” is, as the name implies, a collection of methods. It is a collection of possible methods that would lead to the required outcome and processes for problem framing. The collection is the first step in operationalization of frame creation and at this point not a complete, concluded version. It is a rough overview of possibilities, including the most important methods that could lead to valuable contributions. It introduces the methods and their background, referring to further research for more details. It is structured in the same way as the literature review and can be read parallel. Each section in the literature refers to a section in the “Method Collection”, providing the background to and a manual for the methods. It can be used to further operationalize my literature review.**

# OVERVIEW METHODS

## (Thesis Chapter 3, p. 37)

Literature Themes	Required Outcomes and Processes	References	Methods	Reference
Basic Requirement	Organizational Limits and Abilities	Nickerson et al. 2007		
	Organizational Openness	Dorst 2015	<b>Dialogical Approach</b>	<i>Dorst 2015</i>
	Driving Core Team	Van Leeuwen et al. 2016; Dorst 2015	<b>Sharing Session, Trend Matrix</b>	<i>Kimbell 2014; Kumar 2013</i>
Shared Drivers	Know Internal and External Drivers	Lawson 2005	<b>5 Whys</b>	<i>Kohfeldt &amp; Langhout 2012</i>
	Collective Knowledge	Schön 1983		
	Shared Vision	Ancona 2012; Paton & Dorst 2011; Hekkert & van Dijk 2011; Dorst 2015	<b>Brainstorm for Shared Vision</b>	<i>Osborn 1957</i>
Search and Choice	Problem Definition and Understanding	Rittel & Webber 1973; Nickerson et al. 2007	<b>Analysis: Six Sigma, Statistical Process Control, Total Quality, Lean Management, Quality Function Deployment</b>	<i>Nickerson et al. 2007</i>
	Problem Search	Dyer et al. 2011	<b>Reflection</b>	<i>Dorst 2015; Schön 1983</i>
			<b>Question Storming</b>	<i>Dyer et al. 2011</i>
Problem Choice	Dorst 2015; Schön 1983	<b>Brainstorming</b>	<i>Osborn 1957</i>	
Problem Investigation	Co-evolution of Problem and Solution	Lawson 2005; Cross 2011; Dorst 2015	<b>Investigation of Problem Through Solutions</b>	<i>Dorst 2015; Maher &amp; Poon 1996; Lawson 2005</i>
	Shared Understanding	Weick 1995; Ancona 2012	<b>Mapping the Knowns, Unknowns and Assumptions</b>	<i>Ancona 2012</i>
	Key Stakeholders	Dorst 2015	<b>Brainstorming for Key Stakeholders</b>	

	<b>System/Rich Picture</b>	<i>Dorst 2015; Checkland &amp; Poulter 2010; Lawson 2005; Kumar 2013; Meadows &amp; Wright 2008</i>	<b>Empathy Research (ER): Empathy Interview</b>	<i>Spradley 1979; IDEO 2009; Kumar 2013</i>
			<b>ER: Observation</b>	<i>IDEO 2009; d.school 2011; Kumar 2013; Mintzberg 1970; Spradley 1980</i>
			<b>ER: Peer Observation</b>	<i>IDEO 2009</i>
			<b>ER: 6 Hats</b>	<i>De Bono 1999</i>
			<b>Insights: Affinity Diagram</b>	<i>d.school 2011; Scupin 1997</i>
			<b>Persona</b>	<i>Cooper 2004; Service Design Toolkit 2014; Kumar 2013</i>
			<b>POV Insights</b>	<i>d.school 2011</i>
			<b>Stakeholder Motivation Matrix</b>	<i>Manzini et al. 2004</i>
			<b>Rich Picture</b>	<i>Checkland &amp; Poulter 2010</i>
		<b>Central Paradox</b>	<i>Dorst 2015</i>	<b>Question-based Discussion for Central Paradox</b>
	<b>Paradox Context</b>	<i>Dorst 2015</i>	<b>Restructuring (previous findings), Paradox Context Creation</b>	<i>Dorst 2015</i>
	<b>Problem Setting</b>	<i>Schön 1983; Dorst 2015</i>	<b>Discussion and Report</b>	<i>Schön 1983</i>
<b>Problem Frame</b>	<b>Principles and Patterns</b>	<i>Dorst 2015; Ancona 2012</i>	<b>Brainstorming for Abstraction</b>	<i>Osborn 1957</i>
	<b>Problem Abstraction</b>	<i>Dorst 2015; Ancona 2012</i>		
	<b>Themes</b>	<i>Dorst 2015; van Manen 1990</i>	<b>Affinity Diagram, Filtering Themes</b>	
	<b>Nomological Network</b>	<i>Dorst 2015</i>	<b>Nomological Network</b>	<i>Dorst 2015</i>
	<b>Metaphors and Analogies</b>	<i>Dorst 2015; Schön 1983; Lawson 2005</i>	<b>Brainstorming for Metaphors and Analogies</b>	<i>Osborn 1957</i>
	<b>Frame Evaluation</b>	<i>Dorst 2015</i>	<b>Frame Analysis</b>	<i>Dorst 2015</i>

(Table 2)



# **BASIC REQUIREMENTS**

(THESIS CHAPTER 2.4.1, P. 15)

## **ORGANIZATIONAL OPENNESS DIALOGICAL APPROACH**

In order to find a balance between radical openness and goal-directedness, Dorst introduces a dialogical approach (Dorst 2015). The basic idea is for designers and partner organizations to “come together regularly in meetings to question the assumptions and challenge the conventional ways of working.” (Dorst 2015, 38). This would include collectively discussing the following questions:

- How are we working?
- Why are we working that way?
- Is there another way of working?
- What do we know for sure? And what are we assuming?
- How open are we to radically different ways of working?

(also see p. 12 “Knowns, Unknowns and Assumptions”)

## **DRIVING CORE TEAM SHARING SESSION**

The idea of a sharing session is first to collect thoughts individually and then to share them in the group. The idea of this exercise is one way to find out about the motivations and values that circulate in a team. First, quietly answer the following questions for yourself and write down each thought on a Post-it. Secondly share your answers and thoughts with the others. You now have a cloud of motivation and value. Then cluster the Post-its in order to find the shared values and motivations. It is very important that no one gets judged for her values or motivations. The exercise is about seeing the diversity and the things in common.

### **Questions for starting, based on Kimbell:**

What matters to me? And why?

What is my motivation to act and change?

Why am I here?

Exchange or add further questions if desired, such as:

Who do you think you are?

What do you think is the team’s motivation for change?

What do you know is the team's motivation for change?  
What is your interest in finding problems?  
What is your gut feeling for the problem?  
What do I consider as to be shared concerns?  
(Kimbell 2014)

## **TREND MATRIX**

The trend matrix is a method explained in Kumar's "Design Methods 101" as a way to observe the development of different trends that are potential motivators for the team (Kumar 2013). He suggests to structure the trends of different fields, considering for example markets, technology, science or social phenomena. It is a way to manage a continuous stream for inspiration from new trend forecasts that might steer your problem. The trend matrix shows a timeline on the x-axis from past to future. On the y-axis it shows the different defined categories. The grid can be filled with what the team knows about different trends.

## **SHARED DRIVERS**

(THESIS CHAPTER 2.4.2, P. 17)

## **INTERNAL AND EXTERNAL DRIVERS**

### **5 WHYS**

One way to find out about the organizational values is to discuss the most significant characteristics of the organization, take the most plausible answer and turn it into a 'why'-question. Repeat this process five times in order to find possible core values. The technique of the five whys was originally developed by Sakichi Toyoda for the Toyota Industries (Kohfeldt & Langhout, 2012). His goal was to analyse root causes in manufacturing processes. Later, the approach was adapted by educators and social scientists to improve the process of problem definition (ibid).

## **SHARED VISION**

### **BRAINSTORM FOR SHARED VISION**

Brainstorming helps to create collectively a clear shared vision that the team cooperatively wants to work for. A shared vision gives form to the shared values that will be considered during the work and will clarify what the overall aim of the project is. The value lies in creating the vision together rather than just agreeing on the vision of one person. Brainstorming is a common method to collect

ideas and opinions, and a good, inclusive way to create a collectively shared vision. The method was originally developed by Alexander Osborn in 1957 but copied and refined myriad times. It is a method for generating ideas that is especially effective when practiced in a group. In his research he found out that the brainstorming method conducted in groups “had produced 44 percent more worthwhile ideas than the solo method” (Osborn 1957, 82). Concretely he suggests the perfect number of people to be between five and ten (ibid). He argues that one reason the method is so fruitful for group sessions is because of the power of association. The imagination of one member is stirred by the idea of another member, leading to a chain reaction of ideas. Osborn strongly defends the success of group brainstorming and claims that “[f]iascoes are usually due to failure of leadership” and takes the example of hasty judgment that prevents shy participants from contributing (ibid, 80). His guide for panel sessions include: “(1) Judicial judgment is ruled out. Criticism of ideas must be withheld until later. (2) “Free-wheeling” is welcomed. The wilder the idea, the better; it is easier to tame down than to think up. (3) Quantity is wanted. The greater the number of ideas, the more the likelihood of winners. (4) Combination and improvement are sought. In addition to contributing ideas of their own, participants should suggest how ideas of others can be turned into better ideas; or how two or more ideas can be joined into still another idea.” (ibid, 84). Osborn strongly encourages the facilitators to adapt his methods personally and gives a strong example from ones of the researched facilitators who personalized the first rule: “If you try to get hot and cold water out of the same faucet at the same time, you will get only tepid water. And if you try to criticize and create at the same time, you can’t turn on either cold enough criticism or hot enough ideas. So let’s stick solely to ideas—let’s cut out all criticism during this session.” (ibid, 84). Furthermore, Osborne emphasizes the importance of the specificity of the questions to brainstorm about; the more specific the better. If there are different questions to brainstorm about, take them sequentially. For starter questions I recommend using the strategic tool “PEST Analysis” (Mindtools). Brainstorming helps to create collectively a desired future built upon each other’s ideas and executed in a structured way.

A continuation of the brainstorming for a shared vision is the mental experiment of the future context (Hekkert & van Dijk, 2011). As soon as the shared vision takes on a clear form, all problems, questions and ideas can be investigated in the future context to see how they change in a different context.

## **SEARCH AND CHOICE**

(THESIS CHAPTER 2.4.3, P. 19)

### **PROBLEM SEARCH ANALYSIS**

Nickerson enumerates five methods of analytic processes to find well-defined problems: Six Sigma, statistical process control, total quality, lean management and quality function deployment (Nickerson et al. 2007). These approaches are useful when looking for well-defined problems, which, however, are in no need for creative frame creation. These methods are also helpful to understand if a problem is well- or ill-defined.

### **REFLECTION**

Both Dorst and Schön place emphasis on the act of reflecting to find and understand a problem (Dorst 2015; Schön 1983). Dorst explains that reflection is not limited to working hours and is often a social activity (Dorst 2015). Schön furthermore claims that the practitioner has to stop what he/she is doing in order to be able to reflect (Schön 1983). Together, these concepts recommend collective reflection in a team when facing a problem. This can take place in a formal, but also in an informal way.

### **QUESTION STORMING**

Dyer et. al introduce “Question Storming” as method to create new questions in order to spark new ideas (Dyer et al. 2011). Their approach is to generate questions around a problem in order to unlock the gridlock by not thinking about the solution but the question. The exercise is about following the path of questions, not the answers. The idea is to not answer any of the questions and to not add any preambles. They introduce some rules to organize the session (ibid):

- Set a time (between 4 and 20 minutes) and generate as many questions around a problematic

situation as possible.

- Name one person to write down all the questions so that everybody hears all the questions.
- Always ask “what is”, “what caused”, “why”, “why not” and “what if”. If you run out of questions, embrace the silence. More questions will come up.
- After the session, prioritize the questions and decide which question is the most catalytic and which one holds the most potential for disrupting the status-quo.
- Choose questions the team cannot answer immediately.

## **PROBLEM INVESTIGATION**

(THESIS CHAPTER 2.4.4, P. 22)

### **COEVOLUTION PROBLEM - SOLUTION INVESTIGATE PROBLEMS AND SOLUTIONS**

Based on research of Dorst, Maher & Poon, and Lawson, I have extracted some approaches that help to take advantage of the relation between problems and solutions (Dorst 2015; Maher & Poon 1996; Lawson 2005). These vehicles improve the process of understanding the problem and generating solution ideas and are meant to be asked during collaborative sessions.

**Observe the amount of ideas to evaluate the fruitfulness of the problem frame: Does the problem frame spark solutions? If not, can we change the problem frame to increase our ideas?**

**Continue moving between problem and solutions to understand both sides better: What can we learn about the problem from our solution idea? What can we learn about solution ideas from our problem understanding?**

**Use one solution idea to explore more solution ideas: based on this solution idea, what other solution ideas are there?**

**If a solution about a change of behaviour appears, ask: Which one of the existing behaviours can we improve or use to our advantage?**

**Every solution will lead to new problems: which possible new problems could this solution idea cause?**

# **SHARED UNDERSTANDING**

## **KNOWN, UNKNOWN AND ASSUMPTIONS**

In order to create a shared understanding of the problematic situation and structure the unknown, Ancona suggests creating a map (Ancona 2012). Such a map of the unknown could be complemented with knowns and assumptions to help to reveal the gaps of knowledge. By putting the knowns, unknowns and assumptions into relation with each other, the map would create confidence to approach new fields.

The map can be started with the questions:

- What do we know about the problem?
- What do we not know about the problem?
- What do we assume about the problem?

# **KEY STAKEHOLDERS**

## **BRAINSTORMING FOR KEY STAKEHOLDERS**

Identifying the key stakeholders is a way to create a picture or a map of the people who impact or are being impacted by the problem, or “those who are clearly going to be necessary participants in any possible solution.” (Dorst 2015, 76) Usually, the key stakeholders include clients, users or people of the target group.

# **SYSTEM AND RICH PICTURE**

## **EMPATHY INTERVIEW**

Interviews are a good and common way to gather qualitative data with plenty of literature for guidance. The purpose of an empathy interview is to empathize with the interviewee to understand his/her situation and perspective. An example of detailed research to understand the aims and purposes of ethnographic interviews is “The Ethnographic Interview” by James Spradley (Spradley 1979). For more practical guidance, there are plenty of helpful interview templates, such as the one created by “service design toolkit” (Service Design Toolkit), which guide the interviewer through a whole interview with exemplary questions and aspects to consider. In general, based on my research, I noticed some important factors, repeated in various sources, such as: good interview preparation, including a well elaborated choice of interviewees; the importance of the question “why”, “how” and “can you tell me more”; an excellent, un-interpreted documentation of the spoken

and unspoken; and a well-structured interview debrief (IDEO 2009; Kumar 2013; Spradley 1979).

## **OBSERVATION**

A successful way to gather data about stakeholders is to observe them in their routines. There are different structured approaches that guide an effective observation, such as IDEO's "Guided Tour" (IDEO 2009, 64), d.school's "What? How? Why?" (d.school 2011, 7) or the "Five Human Factors" explained in Kumar's "101 Design Methods" (Kumar 2013, 247). Another method for observing is shadowing, which is grounded on Henry Mintzberg's iterations on structured observation (Mintzberg 1970). Many observation methods are based on Spradley's research on "Participant Observation", which therefore is a good source for further background knowledge about the methods (Spradley 1980).

## **PEER OBSERVATION**

Another way of gathering observation data is to launch a "peer observation". The idea of the "peer observation" is to ask peers to observe each other according to clear instructions (IDEO 2009, 60). Cameras and observational templates are common tools to distribute among the peer observers to facilitate the observation. The advantage of "peer observation" is the gathering of insights that are observed from the insider perspective. For the external observer, many of the insider insights remain unseen.

## **6 HATS**

In case of restricted circumstances with no time, access or resources to do any empathy research, the "6 Hats" is an alternative for including various perspectives and needs despite limitations. De Bono, the creator of the 6 Hats, established a way to get as many different perspectives as possible by doing role plays and taking on another person's perspective (De Bono 1985).

## **INSIGHTS**

### **AFFINITY DIAGRAM**

The affinity diagram is one way to process the gathered data from interviews and observations into insights. The idea of the affinity diagram is to share the gathered data in the group and intuitively cluster it in order to organize the data and start making sense of it. The method was developed by Jiro Kawakita, a Japanese cultural

anthropologist. It is based on intuitive and non-logical thinking processes and is used for collective decision-making processes in various fields (Scupin 1997). The method can be iterated in several circles to go beyond the obvious clusters (d.school 2011, cards 13-14).

## **PERSONA**

Personas have been developed by Alan Cooper and represent typical (but not stereotypical) users (Cooper 2004). The archetypes are based on the outcomes of the research process and represent everything one knows about this particular group of people. A persona may include a name, stories, skills, practices and behaviour. The description about him/her can be split into rational and emotional components, including needs and capacities. For further guidance, the Service Design Toolkit and Kumar have published templates to create personas (Service Design Toolkit 2014; Kumar 2013).

## **POV INSIGHTS**

To deepen the understanding about a persona, “Point Of View” (POV) is an excellent tool to create further insights by filling in the gaps of the following sentence:

[USER] needs to [USER’S NEED] because [SURPRISING INSIGHT] (d.school 2011, card 21).

## **STAKEHOLDER MOTIVATIONS**

### **MOTIVATION MATRIX**

In order to further explore stakeholders and their relationship to each other, Manzini et al. developed the “Motivation Matrix”, a template to find out about and visualize motivations and relationships in a structured way (Manzini et al. 2004). The stakeholders are listed up on the x- and y-axis. Each field of the grid shows how the motivation of the stakeholders in the y-axis affects the motivation of the stakeholders in the x-axis.

## **RICH PICTURE**

The “Rich Picture” is a method from “Soft Systems Modelling” with the aim to gather, structure and understand information about a complex problem. Based on Checkland and Poulter, I created a simplified version of the guidance to give an idea what steps it contains (Checkland & Poulter 2010):



- Name and map all the key features and their relationships. Start with Post-its to move the elements around, then switch to whiteboard drawings. If the start does not feel natural, these question can help to open up a discussion:
  - Where does this problem arise? In which system(s) do(es) the problematic situation appear? How does the problem change over time? How does the system try to reach its goal? What is the system influenced by? What is the system's goal? What is good about the problem?

Start with analysing the created picture in three steps.

- **Analysis One:**  
Take a look at the individuals and groups of stakeholders and find out about the different roles of:
  - who is the client, the one who “caused the intervention to happen”?
  - who is the practitioner, the one who is “conducting the investigation”?
  - who is the problem owner, the one who is “concerned about or affected by the situation and the outcome”?

At this point it is important to focus on people's roles and not on the individuals themselves, because people can have multiple roles (ibid, 212).

- **Analysis Two:**  
Name the roles, norms and values that are represented by the stakeholder. Roles are the social positions that distinguish people. Norms are the “expected behaviours associated with [...] a role“. Values are “the standards – the criteria – by which behaviour-in-role gets judged“ (ibid, 215).
- **Analysis Three:**  
The last analysis is about exploring power and power relationships. Have a closer look about what role “information” has, as a lot of power originates from having information (ibid, 218). The questions that should be answered are the following:
  - “How is power expressed in this situation?”
  - “What are the ‘commodities’ which signal that power is possessed in this situation?”

- “What are the processes by which these commodities are obtained, used, protected, defended, passed on, relinquished, etc.?” (ibid, 217)

For further information about creating “Rich Pictures”, see Chapter 5.2.6.1 Making Rich Pictures in “System Approaches to Managing Change“ (Checkland & Poulter 2010).

## **CENTRAL PARADOX**

### **QUESTION BASED DISCUSSION**

One way to find the central paradox is to consider the rich picture and the stakeholders, and discuss the questions:

- “What makes the problem hard to solve?”
- “Where is the gridlock?”
- “Where is the real opposition of views, standpoints, or requirements?” (Dorst 2015, 74)

## **PARADOX’S CONTEXT**

### **CREATE PARADOX CONTEXT**

The goal of creating a context is to understand what factors shaped the central paradox. Some of the methods that were introduced before to explore the problematic situation can now be applied to explore the core paradox’s context, including “Knowns, Unknowns and Assumptions”, “Rich Picture” and “Stakeholder Analysis”. The goal is to apply those methods, starting from the central paradox. In creating the context, Dorst emphasizes investigating the key stakeholders who have been involved or who likely will be involved, focussing on “significant influences on their behavior” and the “strategies they currently employ” (Dorst 2015, 76).

## **PROBLEM SETTING**

### **DISCUSSION AND REPORT**

Create a coherent explanation of what you have done so far that is understandable for an outsider, including:

- The key elements that shape and define the problem.
- The key stakeholders and the problem owners (inside and outside the organization), including their aims and values.
- The central paradox and the opposing and

- conflicting views on the problem, including the proof that there is no obvious solution apparent.
- The expanded context of the paradox.
  - The “decision to be made”, “ends to be achieved” and “means which may be chosen” (Schön 1983, 40).
  - The fundamental organizational and personal values that align with the approach.
  - Summarize everything in a document.

## **PROBLEM FRAMES**

(THESIS CHAPTER 2.4.5, P. 29)

## **PRINCIPLES AND PATTERNS**

### **BRAINSTORMING**

The principles and patterns generate the basis for understanding the problem in a more abstract way and decontextualize the problem. The abstract form of the problem enables communication without generating solutions. In order to find the underlying principles and patterns in the first place, look at how the pieces of the problem are talking to each other. Discuss:

- How do different parts relate to each other? Why?
- What is the relation shaped by? What causes this behaviour?
- What happens if you detach them from current stereotypes and labels?
- What are the rules of the system?
- What are the patterns of the system?
- Summarize and filter the most important and significant principles and patterns.

(See previous chapter “Brainstorm for Shared Vision” for more information about the method, p. 8)

## **THEMES**

### **AFFINITY DIAGRAM**

One way to find themes is to do an affinity diagram. As themes reflect the personal, human experience, the affinity diagram should be focussed on the human level and on lived experience. Themes are a “set of significant experiences” which are hidden in needs, motivations and practices (Dorst 2015, 66). Collect the stories and insights and start an affinity diagram. The following questions might help to start the clustering:

- Is there a compelling insight you heard again and again? Is there a consistent problem the people you're designing for face? What feels significant? What surprised you?
- Once you have clustered the insights, discuss the questions "What is going on here?" and "What is this example an example of?" (van Manen 1990, 86). Discuss which essential themes characterize the phenomenon of the problem situation.

## **FILTERED THEMES**

### **FILTERING**

Once you have some themes, filter them by excluding any theme that presupposes a profession specific solution concept (Dorst 2015). Look for the themes that work in multiple fields and that do not anticipate solutions in a certain field. Choose a theme that inspires all of you.

## **NOMOLOGICAL NETWORK**

### **NOMOLOGICAL NETWORK**

In case you are struggling with finding metaphors and analogies, a "Nomological Network" might help to overcome the challenge (Dorst 2015). Take a theme, put it in the middle of a whiteboard (or a big sheet of paper) and "surround it with concepts that have been shown in earlier research to have a relationship with it" (Dorst 2015, 164). This resembles a reverse affinity diagram. Those word clouds relate to the central concept and help to create new frames (ibid, 161).

## **METAPHORS AND ANALOGIES**

### **BRAINSTORMING**

Metaphors can create strong images that can be used to great effect in everyday communications and thinking. One way to find metaphors and analogies is to look at the problem phenomena, the patterns and principles, and the themes, and find examples in real life where the same phenomena, patterns, principles and/or themes occur too. Find a real world example of the abstracted problem. Write down the first (usually obvious) metaphors and analogies that you have in mind, to get them out of your brain. Then push further to find more precise and maybe more hidden ones. Here are a couple of triggers to come up with metaphors and analogies:

- Pick a couple of random words and try to connect them as a warm-up exercise to get your brain

working.

- “It’s like a \_\_\_\_.”  
“It’s like a \_\_\_\_ for your \_\_\_\_.”  
“Think of it as \_\_\_\_\_.”  
“If it were a \_\_\_\_, it would be a \_\_\_\_\_.”
- If you called the problem something else, what would it be? If you compared it to something else, what would it be?
- Look up key words of your problem in a thesaurus and scan the synonyms and antonyms for metaphors.
- Where else do these conditions occur, and what has been done to solve them?

(See chapter “Brainstorm for Shared Vision” for more information about the method, p. 8)

## **FRAME EVALUATION**

### **FRAME ANALYSIS**

A frame should work as bridge from problem to solution. It should be fruitful and have high inspirational strength. Based on Dorst’s points for frame quality, I derived a list of questions that guide the evaluation of a frame (Dorst 2015):

- How well does your frame manage to create an image that spans and integrates a broad range of issues?
- How coherent is your frame? Does it provide a stable (non-contradictory) basis for further thought?
- How robust is your frame in the sense that the images it conjures in the minds of the participants are sufficiently similar to provide a “common ground” for the discussion of the problem and possible solutions?
- How inspiring and original is your frame (not necessarily to the world, but at least to you)?
- How thought-provoking and lively is your frame? Does it engage people’s imagination so their thoughts move along in the proposed direction? (Dorst 2015)

If the questions lead to any doubt about the quality of your frame, go back to previous exercises, deepen your understanding and improve your frame.



# FRAMING TEASER

PROTOTYPE 1.0

*+ Notes for Prototype 2.0*





# TABLE OF CONTENT

<b>Introduction</b>	<b>5</b>
1. List of practices	6
2. Yellow Card	7
3. Question Catalogue	7
4. Packages A—D	7
<b>Workshop</b>	<b>11</b>
Overall	12
Mindset	12
Diverge – Converge	12
Post-it “rules”	12
What’s missing?	12
Reverse Brainstorming	12
Fresh perspectives	13
Warm— up	13
Shared vision	13
5 Whys	14
<b>A Problem Framing</b>	<b>14</b>
Workshop Selection	15
Question Storming	15
Knowns, Unknowns and Assumptions	16
Central Paradox	16
<b>B Customer Needs and Actions</b>	<b>17</b>
Workshop Selection	17
Key Stakeholder	17
Empathy Interview	18
Affinity Diagram	18
<b>C Solution Creation</b>	<b>19</b>
<b>D Creative Constraints</b>	<b>20</b>
Workshop Selection	21
Rich Picture	21
Principles and Patterns	22
Metaphors and Analogies	23
<b>Appendix</b>	<b>27</b>
Question Catalogue	27
Interview Template	30

all page numbers link back  
to the table of content



# INTRODUCTION

The “Framing Teaser” prototype is the core piece of the intervention part and a possible framing guide to introduce the practitioner to a first experience of framing. It is based on an understanding and knowledge about framing. The prototype tool was made to be implemented and tested for the first time within the scope of this thesis in real life, during the intervention phase of action research cycle. It was developed based on action research principles, and took into account the observed practices and the shared concerns of the researchers at RISE. Its core component was a selection of participatory design methods from the “Method Collection”, complemented with other features to address the team’s shared concerns in a way that fit their practices to experience design— led problem framing. The methods and features were selected and combined in a way to be teachable and applicable for non— designers in one day. The purpose of the “Framing Teaser” was to facilitate participation in the experience of problem framing. The tool was developed as a guide for the learning process of new practices and as a way for the researchers to start to initiate change themselves. The name “Framing Teaser” refers to the fact that the tool is only a teaser for design— led problem framing and represents only a small fragment of design. This should prevent users jumping to the conclusion that they now to know all about problem framing in design.

The “Framing Teaser” should be replicable for researchers outside the scope of this thesis. It consists of four parts: the overall design principles, a list of practices, a yellow card, a question catalogue, and four method packages, which will all be explained in the following paragraphs.

# 1. LIST OF PRACTICES

Based on research on shared concerns a list of desired and unwanted practices was formulated. The list made those two types of practices clear and explicit, facilitating the recognition of “current practices” and “desired practices”.

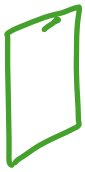
## Avoid

- solution tweaking
- guessing and assuming (about users & customers)
- pure desktop research
- jumping to obvious solution
- feeling limited and restricted

## Ameliorate

- problem framing
- changing perspectives
- field and empathy research
- talking to experts
- ideation processes
- explore abilities

*only focus on solution tweaking*



## 2. YELLOW CARD

In order for the researchers to reflect on their practices to see if they were executing unwanted practices, a physical item was introduced as a tool to trigger reflection upon their own but also their team members' behaviour. This was a yellow card, a metaphor from football to encourage them to reflect on unwanted behaviour, whenever coming across the card. A yellow card is bright enough to be seen, wherever it is stored, under a pile of papers or pinned on a board. It can also be brought along to meetings as a subtle warning when someone else is starting to fall into unwanted practices. The yellow card has the purpose of lying around and creating random moments of reflection whenever coming across it and as a communication tool among the team.

*Worked well, keep it. Karin already has it on her pin board.*

## 3. QUESTION CATALOGUE

When the researchers realize that they are executing unwanted practices, the question catalogue helps them choose from the four method packages to drive their practices towards the desired ones. The method packages were developed based on the shared concerns, addressing "Frame Creation", "Customer Needs and Actions", "Solution Creation", and "Creative Constraints". The question catalogue proposes a method package based on the given answers which reflect the gap.

*leave out. does not work well. too much effort.*

## 4. PACKAGES A— D

The four method packages suggest concrete participatory design methods to overcome the unwanted practices when they appear. "Frame Creation" is about creating a frame for a problem from scratch. "Customer Needs and Actions" helps to frame the problem in a way to address real needs of customers. "Solution Creation" shapes problem frames that trigger new ideas for solutions, and "Creative Constraints" includes creativity in a problem frame despite strict constraints from outside. Three of the method packages were applied in the workshop. The chosen methods are explained in the next section.



*good and useful packages. clearly explained. but could be better. re package methods!*

# OVERVIEW METHODS AND PACKAGES

Methods	Reference	A	B	C	D
Dialogical Approach	<i>Dorst 2015</i>				
Sharing Session, Trend Matrix	<i>Kimbell 2014; Kumar 2013</i>			X	
5 Whys	<i>Kohfeldt &amp; Langhout 2012</i>				
Brainstorm for Shared Vision	<i>Osborn 1957</i>			X	
Analysis: Six Sigma, Statistical Process Control, Total Quality, LEAN Management, Quality Function Deployment	<i>Nickerson et al. 2007</i>				
Reflection	<i>Dorst 2015; Schön 1983</i>				
Question Storming	<i>Dyer et al. 2011</i>	X		X	X
Brainstorming	<i>Osborn 1957</i>				
Investigation of Problem Through Solutions	<i>Dorst 2015; Maher &amp; Poon 1996; Lawson 2005</i>				
Mapping the Knowns, Unknowns and Assumptions	<i>Ancona 2012</i>	X			
Brainstorming for Key Stakeholders			X	X	X
Empathy Research (ER): Empathy Interview	<i>Spradley 1979; IDEO 2009; Kumar 2013</i>		X		
ER: Observation	<i>IDEO 2009; d.school 2011; Kumar 2013; Mintzberg 1970; Spradley 1980</i>				
ER: Peer Observation	<i>IDEO 2009</i>				
ER: 6 Hats	<i>De Bono 1999</i>				
Insights: Affinity Diagram	<i>d.school 2011; Scupin 1997</i>		X		
Persona	<i>Cooper 2004; Service Design Toolkit 2014; Kumar 2013</i>		X		
POV Insights	<i>d.school 2011</i>				
Stakeholder Motivation Matrix	<i>Manzini et al. 2004</i>				
Rich Picture	<i>Checkland &amp; Poulter 2010</i>				X
Question— based Discussion for Central Paradox	<i>Dorst 2015</i>	X			X
Restructuring (previous findings), Paradox Context Creation	<i>Dorst 2015</i>	X			
Discussion and Report	<i>Schön 1983</i>				
Brainstorming for Abstraction	<i>Osborn 1957</i>	X			X
Affinity Diagram, Filtering Themes				X	X
Nomological Network	<i>Dorst 2015</i>				



show how methods can be combined (mini-packages). smart combinations



add more background information about methods, plus expected outcome







# OVERALL

There are some things to keep in mind to facilitate the activities. The suggestions can be considered during every session:

*good, but further elaborate general design methods and creative mindsets*

## MINDSET

When working in a team and practicing brainstorming— like activities, make sure you have a positive, upcycling, non— judgmental environment. This includes the guidelines by Osborn (Osborn):

- Defer judgement.
- Encourage wild ideas.
- Build on the ideas of others “yes, and...”
- Stay focused on the topic.
- One conversation at a time.
- Be visual.
- Go for quantity.

## DIVERGE – CONVERGE

Every exercise includes the two— step process of first diverging and then converging (Basadur). During the diverging process, judgment is put aside and quantity is priority. During the converging process, the produced outcome is evaluated, sorted and rated. Do not try to do both at the same time as it dilutes the quality of both steps.

## POST— IT “RULES”

When using sticky notes, make sure you use them in the best way possible:

1. Maximum of five words. Keep it short and write only one thought per Post— it
2. Capital letters. In order to avoid illegible handwriting, switch to capital letters.
3. Draw. Be visual and draw as much as possible.
4. Use thick pens. It makes the writing on the Post— its readable from a distance.

## WHAT’S MISSING?

Ask yourself every now and then: What is missing? What do we not see? This is important to be aware of the unconscious borders of thought that we automatically set for ourselves.

## REVERSE BRAINSTORMING

If you are at a roadblock in a brainstorming session,

re— formulate the brainstorming question negatively to create a new flow of thoughts. For example, if the original brainstorming question is “how can we make the food system more sustainable?”, the reversed brainstorming question could be “how can we make the food system more unsustainable and environmentally damaging?”

## **FRESH PERSPECTIVES**

Another aid for overcoming a stuck situation is to take on a new, fresh perspective of another person. Continue with the session, but empathise with another person, for example: Your 7— year— old daughter/niece, Steve Jobs, Pippi Langstrump, a drug lord, Walt Disney, Superman, your grandmother, Homer Simpson, someone in a wheelchair, a homeless person, a cancer patient, a soldier, an IKEA clerk, the Dalai Lama, etc.

## **WARM— UP**

To start a collaborative design session, do a warm— up exercise to set the tone and put the people in the right mood. One suggestion is to start with a shared vision and the 5 Whys

### **SHARED VISION BACKGROUND**

The purpose of a shared vision is to create common sense about what future scenario to work for. Several researchers have studied the importance of having a clear idea about the future (Ancona, Paton, Hekkert and van Dijk, Dorst). Every team should have a collectively created, explicit future vision as an internal driver.

### **INSTRUCTIONS**

Topic: The food system of 2050

Time: 2<sup>1</sup>/question – min. 5 Post— its/person

Using one Post— it per question, each person writes down at least five answers for every question, then sticks his/her Post— its on the whiteboard.

- How do we want people to cook in the future?
- How do we want people to work in the future?
- How do we want people to shop in the future?
- What policies and regulations do we want for the future?

*simple and  
effective.  
good for  
any meeting*

## 5 WHYS

The five whys help to explore the underlying values that shaped the shared vision. Take one aspect (= one Post— it) of the shared vision that seems interesting and significant to you and ask yourself:

- “Why do we want this?”
- “but why?”
- “but why?”
- “but why?”

*they already knew the method but from different context. surprise what was behind their shared vision!*

...

The outcome should provide deeper understanding about the forces that shape a desired future.

# A

## PROBLEM FRAMING

### OVERVIEW

This package is useful when one is stuck in the pre— phase of a project and therefore in need of a new perspective. It helps to reveal root causes of problems and guides the process of re— framing the current situation. The process helps you to answer the following questions:

- What are the questions around the problem?
- What is the core question of our problem?
- What are the knowns, unknowns and assumptions?
- What is the central paradox?
- What is the paradox’s context?
- What does the problem look like in an abstract way?
- What are the metaphors and analogies for the problem?

### METHODS

**QUESTION STORMING—** to get away from solutions and back to questions.

**MAPPING KNOWNs, UNKNOWNs AND ASSUMPTIONs—** to test how much you are stuck with assumptions.

**CENTRAL PARADOX—** to get to the core or the problem

**PARADOX’S CONTEXT—** to get away from paradox

**PRINCIPLES AND PATTERNS –** to get even further away

**METAPHORS AND ANALOGIES –** to compare to other situations

# WORKSHOP SELECTION

## QUESTION STORMING

### BACKGROUND

Dyer et. al introduce “Question Storming” as method to create new questions in order to spark new ideas (Dyer et al. 2011). Their approach is to generate questions around a problem in order to unlock the gridlock by not thinking about the solution but the question. The exercise is about following the path of questions, not the answers. The idea is to not answer any of the questions and to not add any preambles. They introduce some rules to organize the session (ibid):

1. Set a time (between 4 and 20 minutes) and generate as many questions around a problematic situation as possible.
2. Name one person to write down all the questions so that everybody hears all the questions.
3. Always ask “what is”, “what caused”, “why”, “why not” and “what if”. If you run out of questions, embrace the silence. More questions will come up.
4. After the session, prioritize the questions and decide which question is the most catalytic and which one holds the most potential for disrupting the status— quo.
5. Choose questions the team cannot answer immediately.

### WORKSHOP INSTRUCTIONS

1. Decide around which problem question you want to create questions
2. Set a 7’ time frame
3. Generate as many questions around the problematic situation as possible. No answers or solutions allowed.
4. Write down your questions on Post— its. Read them out loud when putting them on the wall. (min. 20 questions)
5. In order to bring in fresh perspectives, decide upon a couple of characters from whose perspective you will do the same exercise. Go extreme!
6. Look at your questions. Vote with stickers for the question that inspires you most and where you see the most potential to disrupt the status quo.
7. As team, discuss and choose 1— 3 questions that

*simple but effective. easy method to quickly generate new thoughts. better evaluation criteria for next time.*

you find interesting, that you cannot solve on the spot and that you're interested in investing some time into solving.

## KNOWN, UNKNOWN AND ASSUMPTIONS BACKGROUND

In order to create a shared understanding of the problematic situation and structure the unknown, Ancona suggests creating a map (Ancona 2012). Such a map of the unknown could be complemented with knowns and assumptions to help to reveal the gaps of knowledge. By putting the knowns, unknowns and assumptions into relation with each other, the map would create confidence to approach new fields.

The map can be start with the questions:

- What do we know about the problem?
- What do we not know about the problem?
- What do we assume about the problem?

*good to bring everyone on the same page and share what people know about the problem.*

## WORKSHOP INSTRUCTIONS

1. Decide on a problem statement you want to work on; write it down on an A4 piece of paper.
2. Think of everything you know, don't know and assume about the problem.
3. Silently write down everything on Post— it notes and stick them to the according column.
  - Get inspired by what is already on the wall.
4. Read through all the Post— its and ask if you don't understand anything.
5. Once you're done with that, discuss and sum up what you know, don't know and assume on the bottom of the column.

## CENTRAL PARADOX

### WORKSHOP INSTRUCTIONS

Identifying the central paradox is a method introduced by Dorst (Dorst 2015). In order to move past the central paradox, as a first step one has to identify what the central paradox is. What makes the problem so hard to solve? Which two views or requirements or needs or interests are in opposition?

1. Look at the output you've produced so far and discuss the following questions.
  - Decide who will take notes and write down all paradoxes.
    - What makes the problem so hard to solve?

*ok. would have been better if we had more data/information/material about project.*

- Where is the gridlock?
- Where is the real opposition of views, standpoints, or requirements?
  - Who is the problem owner?
2. Discuss which paradoxes are the strongest and most important. Choose one to three.

# B

## CUSTOMER NEEDS AND ACTIONS OVERVIEW

This package is useful to get to know the potential customers in order to respond to their needs and actions. It helps to answer the following questions:

- Who are our key stakeholders?
- Who are our stakeholders on a human level?
- How may we observe the users/customers?
- How may we talk to our core stakeholders and interview them?
- How may we gain insights from our empathy research?

## METHODS

**KEY STAKEHOLDERS** – to know whom to include.

**EMPATHY RESEARCH** – to get to know the stakeholders

- OBSERVE
- EMPATHY & EXPERT INTERVIEW
- PERSONA
- INSIGHT AFFINITY DIAGRAM

*simple.  
not very  
new. still  
important*

## WORKSHOP SELECTION

### KEY STAKEHOLDER

### BACKGROUND

Identifying the key stakeholders is a way to create a picture or a map of the people who impact or are being impacted by the problem, or “those who are clearly going to be necessary participants in any possible solution.” (Dorst 2015, 76) Usually, the key stakeholders include clients, users or people of the target group.

## WORKSHOP INSTRUCTIONS

1. Write down all of the potential direct users of the product on Post— its and stick them on the wall.

## EMPATHY INTERVIEW

### BACKGROUND

Interviews are a good and common way to gather qualitative data with plenty of literature for guidance. The purpose of an empathy interview is to empathize with the interviewee to understand his/her situation and perspective. An example of detailed research to understand the aims and purposes of ethnographic interviews is “The Ethnographic Interview” by James Spradley (Spradley 1979). For more practical guidance, there are plenty of helpful interview templates, such as the one created by “service design toolkit” (Service Design Toolkit), which guide the interviewer through a whole interview with exemplary questions and aspects to consider. In general, based on my research, I noticed some important factors, repeated in various sources, such as: good interview preparation, including a well elaborated choice of interviewees; the importance of the question “why”, “how” and “can you tell me more”; an excellent, un— interpreted documentation of the spoken and unspoken; and a well— structured interview debrief (IDEO 2009; Kumar 2013; Spradley 1979).

### WORKSHOP INSTRUCTIONS

In this workshop, we will roleplay the empathy interview, as we do not have access to real stakeholders right now.

For this exercise, half of you will take on the role of a potential stakeholder you are most familiar with. The interviewer focuses on one particular action he/she wants to find out more about.

1. Read through the interview template.
2. Conduct the interview
  - You may ask the proposed questions, but I encourage you to also ask your own questions.
  - Interviewers take open notes and sketch together with interviewee.
3. After the interview, take a moment to reflect:
  - stood out, what were his/her motivations and values.

(See Appendix for Interview Template p.30)

*very good! could have put more time into this one! learned about active listening and personal facts.*



## AFFINITY DIAGRAM

### BACKGROUND

The affinity diagram is one way to process the gathered data from interviews and observations into insights. The idea of the affinity diagram is to share the gathered data in the group and intuitively cluster it in order to organize the data and start making sense of it. The method was developed by Jiro Kawakita, a Japanese cultural anthropologist. It is based on intuitive and non— logical thinking processes and is used for collective decision— making processes in various fields (Scupin 1997). The method can be iterated in several circles to go beyond the obvious clusters (d.school 2011, cards 13— 14).

*very useful, especially the crispy headlines. made them think a lot and process information*

### WORKSHOP INSTRUCTIONS

1. Write all the data you gathered in the interview down on Post— its, one piece of information per Post— it. Explain the point to the others when sticking it to the wall. Share as many stories as you can.
2. Once all the Post— its are on the wall, start clustering them intuitively all together into groups of max. 7 Post— its.
  - Avoid self— evident groups and naming the groups.
3. Once all (or most) of the Post— its are in a group, give each group a crisp headline (written on a different colour Post— it)
4. Re— cluster the Post— its and iterate as many time as desired.

## C

### SOLUTION CREATION

#### OVERVIEW

This package is most useful when struggling with coming up with new ideas or when stuck with a problem. It helps to answer the following questions:

- How can we name our external drivers?
- What trends might come?
- How does our shared vision look like?
- What are the questions around the problem?
- What is the core question to our problem?

- Who are our key stakeholders?
- What are our problem themes?
- What are our metaphors and analogies for the problem?

## **METHODS**

**TREND MATRIX** – to stay up to date with trends and get inspired

**SHARED VISION** – to define for what to look for

**QUESTION STORMING** – to broaden the solution field

**KEY STAKEHOLDERS** – to generate insights and get inspired by the user

**THEMES** – to know what the problem is about

**METAPHORS AND ANALOGIES** – to inspire for solutions

# **D**

## **CREATIVE CONSTRAINTS**

### **OVERVIEW**

This package is useful when a limiting brief or restrictive circumstances block practitioners from innovation. It helps to answer the following questions:

- What are the questions around the problem?
- What is the core question to our problem?
- How does the problem look like from a system's perspective?
- What are the elements and processes of the system?
- Who are our key stakeholders?
- What is the central paradox?
- What is the underlying problem?
- What are the problem themes?
- What are possible metaphors and analogies for the problem?

### **METHODS**

**QUESTION STORMING** – to broaden possibilities to expand the brief

**KEY STAKEHOLDERS** – to understand what client actually wants

**RICH PICTURE** – to understand the boundaries

**CENTRAL PARADOX** – to find out what the central and underlying problem is

**PRINCIPLES AND PATTERNS, THEMES** – to create distance to the

problem

**METAPHORS AND ANALOGIES** – to see the problem in a new context

## **WORKSHOP SELECTION**

### **RICH PICTURE**

#### **BACKGROUND**

The “Rich Picture” is a method from “Soft Systems Modelling” with the aim to gather, structure and understand information about a complex problem. Based on Checkland and Poulter, I created a simplified version of the guidance to give an idea what steps it contains (Checkland & Poulter 2010):

- Name and map all the key features and their relationships. Start with Post— its to move the elements around, then switch to whiteboard drawings. If the start does not feel natural, these question can help to open up a discussion:
  - Where does this problem arise? In which system(s) do(es) the problematic situation appear? How does the problem change over time? How does the system try to reach its goal? What is the system influenced by? What is the system’s goal? What is good about the problem?

Start with analysing the created picture in three steps.

- **Analysis One:**

Take a look at the individuals and groups of stakeholders and find out about the different roles of:

- who is the client, the one who “caused the intervention to happen”?
- who is the practitioner, the one who is “conducting the investigation”?
- who is the problem owner, the one who is “concerned about or affected by the situation and the outcome”?
- At this point it is important is to focus on people’s roles and not on the individuals themselves, because people can have multiple roles (ibid, 212).

*this one was very difficult. difficult to see relations between elements. instructions were not clear enough, they were struggling*

- **Analysis Two:**

Name the roles, norms and values that are

represented by the stakeholder. Roles are the social positions that distinguish people. Norms are the “expected behaviours associated with [...] a role“. Values are “the standards – the criteria – by which behaviour— in— role gets judged“ (ibid, 215).

- **Analysis Three:**

The last analysis is about exploring power and power relationships. Have a closer look about what role “information” has, as a lot of power originates from having information (ibid, 218). The questions that should be answered are the following:

- “How is power expressed in this situation?”
- “What are the ‘commodities’ which signal that power is possessed in this situation?”
- “What are the processes by which these commodities are obtained, used, protected, defended, passed on, relinquished, etc.?” (ibid, 217)

For further information about creating “Rich Pictures”, see Chapter 5.2.6.1 Making Rich Pictures in “System Approaches to Managing Change“ (Checkland & Poulter 2010).

## **WORKSHOP INSTRUCTIONS**

The “Rich Picture” is a method from “Soft Systems Modelling” that aims to gather, structure and understand information about a complex problem. It includes mapping all the key features and relationships of a problem and analysing the stakeholders and their roles, norms, values and power relationships.

1. Identify the key features (people, places, things, structures) and processes that are involved in the problem.
2. Write them down on Post— its and arrange them on the wall.
3. Look at the relationships that hold the elements together and discuss. Identify more elements if necessary.
4. Move them around until the system makes sense to you.

## **PRINCIPLES AND PATTERNS**

### **BACKGROUND**

The principles and patterns generate the basis for

understanding the problem in a more abstract way and decontextualize the problem. The abstract form of the problem enables communication without generating solutions. In order to find the underlying principles and patterns in the first place, look at how the pieces of the problem are talking to each other. Discuss:

- How do different parts relate to each other? Why?
- What is the relation shaped by? What causes this behaviour?
- What happens if you detach them from current stereotypes and labels?
- What are the rules of the system?
- What are the patterns of the system?
- Summarize and filter the most important and significant principles and patterns.

## **WORKSHOP INSTRUCTIONS**

The principles and patterns generate the basis for decontextualizing and understanding the problem in a more abstract way. The abstract form of the problem enables communication without generating solutions.

1. Look at your system map, especially on behaviour, structure and process and make statements that describe the problem. Write down 1— 4 simple phrases.
2. Make the statements more abstract step by step.
  - Start with the most concrete description and end with “things that do things”.
  - Go through different stages of abstraction and focus on supercategories.

## **METAPHORS AND ANALOGIES**

### **BACKGROUND**

Metaphors can create strong images that can be used to great effect in everyday communications and thinking. One way to find metaphors and analogies is to look at the problem phenomena, the patterns and principles, and the themes, and find examples in real life where the same phenomena, patterns, principles and/or themes occur too. Find a real world example of the abstracted problem. Write down the first (usually obvious) metaphors and analogies that you have in mind, to get them out of your brain. Then push further to find more precise and maybe more hidden ones. Here are a couple of triggers to come

up with metaphors and analogies:

- Pick a couple of random words and try to connect them as a warm— up exercise to get your brain working.
- “It’s like a \_\_\_\_.”
- “It’s like a \_\_\_\_ for your \_\_\_\_.”
- “Think of it as \_\_\_\_\_.”
- “If it were a \_\_\_\_, it would be a \_\_\_\_\_.”
- If you called the problem something else, what would it be? If you compared it to something else, what would it be?
- Look up key words of your problem in a thesaurus and scan the synonyms and antonyms for metaphors.
- Where else do these conditions occur, and what has been done to solve them?

## WORKSHOP INSTRUCTIONS

1. Look at your system map and abstractions, and search for patterns in the problem.
2. Use the following questions to inspire you:
  - How do different parts relate to each other? Why?
  - What shapes the relationships? What causes this behaviour?
  - What happens if you detach them?
  - What are the rules of the system?
3. Name four of them and discuss what is significant about them.
4. Look at the patterns and find real world examples where those patterns occur too.
5. Once you have found several metaphors and frames, vote for the ones that are most inspiring to you.

*difficult start, but then really good pictures to relate to. insight about reality through a wrong metaphor.*

## NOTES

### lacking components:



sharing feature

make it easily sharable with co-workers



maintainer

they need someone in charge who takes on responsibility to push design approach forward.

add a job description to next version



re-packaging

new packages, based on research project phases:

**Research Strategy:** find out about needs and challenges in society and industry, create project ideas:

- brainstorming for shared vision
- 5 whys
- empathy interview
- affinity diagram

**Research Proposal:** developing research offers and research plans for calls:

- knowns, unknowns and assumptions
- question storming
- rich picture
- metaphors and analogies

**Kick-off Meeting:** stakeholders align and consensus about project is created:

- brainstorming for shared vision
- affinity diagram
- question storming
- knowns, unknowns and assumptions

**In-project Development:** include a designer in a project and further develop design approach:

- to be defined





# APPENDIX

App. 1

## QUESTION CATALOGUE

### INSTRUCTIONS

Sort the question by the strength of the answer YES:

- A. Are we stuck and need a fresh perspective on the problem?
- B. Have we forgotten about the human factor?
- C. Are we struggling with coming up with novel ideas?
- D. Do we feel limited in our creativity by the project constraints?

Strongest Weakest

1. \_\_\_\_\_ 2. \_\_\_\_\_ 3. \_\_\_\_\_ 4. \_\_\_\_\_

Go to the question package of the strongest YES according to the question letter (A, B, C or D). If you answer 4 or more questions with NO, apply methods of the chosen package to problem situation. If you answer less than 4 answers with NO, check the question package of the second strongest YES.

## **A: PROBLEM FRAMING**

- Have we explored all the questions around the problem?  Yes  No
- Do we know the core question to our problem?  Yes  No
- Have we mapped out the knowns, unknowns and assumptions?  Yes  No
- Do we know the central paradox?  Yes  No
- Do we know the paradox's context?  Yes  No
- Do we understand the problem in an abstract way?  Yes  No
- Can we talk about the problem in an abstract way?  Yes  No
- Do we have metaphors and analogies for the problem?  Yes  No

## **B: CUSTOMER NEEDS AND ACTIONS**

- Have we identified all of our stakeholders?  Yes  No
- Have we identified our key stakeholders?  Yes  No
- Do we know our stakeholders on a human level?  Yes  No
- Have we observed the stakeholders (e.g. users, customers)?  Yes  No
- Have we talked to and interviewed our core stakeholders?  Yes  No
- Have we created insights from our empathy research?  Yes  No

## C: SOLUTION CREATION

- Do we know all of our external drivers?  Yes  No
- Do we have an idea of what trends might come?  Yes  No
- Do we have a clear shared vision?  Yes  No
- Have we explored all the questions around the problem?  Yes  No
- Do we know the core question to our problem?  Yes  No
- Have we identified all of our stakeholders?  Yes  No
- Have we identified our key stakeholders?  Yes  No
- Do we have one or more problem themes?  Yes  No
- Do we have metaphors and analogies for the problem?  Yes  No

## D: CREATIVE CONSTRAINTS

- Have we explored all the questions around the problem?  Yes  No
- Do we know the core question to our problem?  Yes  No
- Have we looked at the problem from a system's perspective?  Yes  No
- Do we know the elements and processes of the system?  Yes  No
- Have we identified all of our stakeholders?  Yes  No
- Have we identified our key stakeholders?  Yes  No
- Do we know the central paradox?  Yes  No
- Do we know the underlying problem?  Yes  No
- Do we have one or more problem themes?  Yes  No
- Do we have metaphors and analogies for the problem?  Yes  No

# INTERVIEW TEMPLATE

## PREPARATION:

- Be clear about what you want to find out
- Consider the choice of interviewees
  - Gender
  - Mainstream and/or extreme
  - Background and knowledge
  - Experts and/or amateur
- Be well prepared
  - Have your questions ready
  - Have a plan of how to document

## GENERAL RULES

- Always ask “why?” (5 why’s)
- Wait! Be comfortable with silences and just wait. The interviewee will answer.
- Only gather data. No opinion or interpretation.
- Encourage stories. Ask questions that get people telling stories.
- Look for inconsistencies. Sometimes what people say and what they do are different. These inconsistencies often hide interesting insights.
- Don’t suggest answers to your questions. Even if they pause before answering, don’t help them by suggesting an answer. This can unintentionally get people to say things that agree with your expectations.
- Ask only one thing at a time.
- Adapt language. The language used should be adapted to the interviewee.
- The formulation of the question should be simple, avoid complex phrasing or words.
- Don’t assume any prior knowledge of your interviewee.
- The purpose is to listen to the respondent and to understand the answers.

## INTERVIEW QUESTIONS

1. Present yourself and the purpose of the interview.
  - “Hello, my name is \_\_\_ and I work for \_\_\_\_. I’m working on this project about \_\_ ...”
2. “Tell me about yourself”
  - Start with open, general questions.
    - What is your job?
    - What is your background?
    - How does your working routine look like?
    - ...
3. Specification: “Can you show me?”
  - Ask them to show you the relevant actions, tools and spaces relevant to your product/ service, so you can see how they do things currently. Try prompts like: “walk us through your routine for...” Or “tell us about the last time something went...”
    - When you start making decisions about new processes, how does this go step by step?
    - What do you consider when making decisions?
    - Which tools and software do you use most often?
    - ...
4. Digging deeper: “Tell me why!”
  - Ask open— ended questions about your topic area, and be sure to follow up with, “Can you tell me why that is important?”
  - Try to understand the real values and needs
    - Why do you consider those things?
    - Why do you use those tools?
    - What do you like about those tools?
    - ...
5. “Thank you for your time”
  - Always finish an interview with asking “What is missing?”, “What have I left out?” and “What would you like to add?”. Wait! This question always takes a moment.
  - “Who else can you think of who could be of any help?”
6. “Thank you for your time!”

