This Licentiate thesis in Innovation and Design explores ways in which tools and joint inquiry interrelate. Joint inquiry – the collaborative exploration and definition of problems and solutions – plays a central part in Participatory Design processes. Tools involving the making or use of artefacts in workshops are developed to support joint inquiry between different actors in these processes. The aim of this research is to contribute to the deliberate design and systematic evaluation of tools for joint inquiry. This work addresses the gap of a lack of systematic evaluations in Participatory Design research and the need to evaluate designed activities and environments in relation to designer-participant collaborations.

A Research for Design and a Research through Design approach is used, in which tools and design experiments are created as a means of developing tools and knowledge about tools. The tools were created for students, teachers and researchers in academic contexts to explore the topic of co-production, as well as for a museum project joining youth and researchers. The research outcome is a structured framework to distinguish ways in which the tools (the situation, artefacts, purposes for and ways of using the artefacts) contributed to various factors in joint inquiry. For example, creating symbolic visualisations and embedding metaphors in artefacts stimulated the emergence of other metaphors that contributed to humour, encouraging contributions, and recognising problems – indicators for joint inquiry. The analysis framework provides a starting point towards designing and evaluating tools more systematically.
DESIGNING TOOLS FOR JOINT INQUIRY

MAKING AND THINKING TOGETHER

Laura Gottlieb

2020

School of Innovation, Design and Engineering
Designing Tools for Joint Inquiry

Thinking and making together
Abstract
Positioned within the research program and subject area of Innovation and Design, this research focuses on the relationship between tools and joint inquiry. Joint inquiry – the collaborative exploration and definition of problems and possible solutions – plays an important part in Participatory Design processes. Tools, usually involving the making or using of artefacts in workshops, are developed and used to support joint inquiry between different actors. The aim of this research is to contribute to the deliberate design and systematic evaluation of tools for joint inquiry. This work addresses the literature gap comprising a lack of systematic evaluations in Participatory Design research and a need to evaluate designed activities and environments in relation to emerging designer-participant collaborations.

This research is a starting point towards developing a systematic approach for designing tools for joint inquiry and introduces two frameworks for this purpose. The first is the Communities of Inquiry framework, from the field of computer-mediated communication in distance education, which is used to identify indicators in joint inquiry. The second framework is a categorisation used to distinguish different aspects of a tool. Combining the two frameworks aids the understanding of the relationships between tools and indicators for joint inquiry. A Research through Design and Research for Design approach is used to study conversations between people and in interaction with tools. Nine design experiments are described, all of which involve the design and testing of tools to support the initiation of joint inquiry. The tools were primarily created and tested within an academic context with design students and researchers, with a focus on the topic of co-production – that is, close collaboration between academia and external actors. One tool was created and used within a museum with youth and researchers.

The results from the design experiments show that the tools supported the Communities of Inquiry indicators in the following ways: eliciting metaphors stimulated humour and encouraged contributions, renegotiating artefacts provoked brainstorming, commensality promoted phatic communication, setting etiquette and humour, the relationship between material properties and metaphors prompted problem recognition, and formats directed towards personal experiences led to self-disclosure and emotional expression. The tools were a hinderance to the Communities of Inquiry framework when there was dominant participation and when the tools were considered to be inappropriate for certain work contexts. Future research will continue to develop means of systematically evaluating and designing tools that support communicative practices in Participatory Design processes.
Designing Tools for Joint Inquiry

Sammanfattning


Resultaten från designexperimenten visar att verktygen stöttar följande indikatorer i ramverket för Communities of Inquiry på följande sätt: framkallandet av metaforer stimulerade humour och encouraged contributions, förhandlandet av artefakter provocerade brainstorming, commensality var i förhållande med phatic communication, setting etiquette och humour, relationen mellan material och metaforer ledde till recognising problems och format riktade mot att lyfta personliga erfarenheter ledde till self-disclosure, focusing discussion och emotional expression. Verktygen hindrade indikatorer i Communities of Inquiry ramverket i relation till dominant deltagande, samt när verktygen framstod som olämpliga i arbetskontext. I framtiden kommer den här forskningen att fortsätta utvecklingen av systematiska sätt att utvärdera och avsiktligt skapa verktyg som stödjer kommunikation inom processer för Participatory Design.
To Mom, for all the support and inspiration.
To Abraham, in loving memory.
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List of Papers

This thesis is based on the following papers:


Other publications:


Publications I – VI are included in the appendix.
List of figures

Figure 1. Wire, Mälardalen University, 2017. ..............................................................17
Figure 2. Philosophical Teatime, Royal College of Art, London, 2015. ......................19
Figure 3. Categorisation of a tool. ...............................................................26
Figure 4. The Communities of Inquiry model. .......................................................30
Figure 5. Design experiments. ...............................................................37
Figure 6. Framework for the analysis. ..............................................................41
Figure 7. KT Cards categories .............................................................................45
Figure 8. KT Cards used in student course. .........................................................45
Figure 9. Wire sculpture made in workshop. ..........................................................50
Figure 10. Two participants combining their wire sculptures. .................................50
Figure 11. Shapes used in collaging exercise. ..........................................................53
Figure 12. Workshop at Participatory Innovation Conference 2018. .........................53
Figure 13. Gibbs’ Reflective Cycle model. .............................................................59
Figure 14. Student’s collage visualising process. ....................................................59
Figure 15. Individual visualisations in teatime CT#3. .............................................62
Figure 16. Collaborative visualisations in teatime CT#2. .........................................62
Figure 17. Teas for blending, work in progress. ........................................................68
Figure 18. Participants co-producing a tea blend at DRS. ........................................68
Figure 19. Associating adjectives with the coffee. ....................................................72
Figure 20. The packaged coffee (left); description of a coffee (right). .......................72
Figure 21. PDC exhibition. .................................................................................76
Figure 22. Workshop during PDC 2018. ...............................................................76
Figure 23. Diagram of collage made in group 1 (A) and group 2 (B). .......................79
Figure 24. One of four tables, Museum Teatime ..................................................81
Figure 25. Museum Teatime set-up. .....................................................................81
Figure 26. Teapot at the end of the workshop, Museum Teatime.........................82
Figure 27. Participants around a tea time table, Museum Teatime .........................82
Figure 28. Analysis framework. ...........................................................................93
Figure 29. Collaborative Landscapes (left) and Paper Landscapes (right). .............96
Figure 30. Paper Landscapes, group 1 (left, A) and group 2 (right, B). .................101
Contents

1 Introduction .................................................................................................................. 15
  1.1 Research and Design Interest ........................................................................... 15
  1.2 Research Focus ................................................................................................. 18
  1.3 Aims, Research Questions and Contributions ................................................. 19
  1.4 Delimitations ...................................................................................................... 20

2 Previous Research and Theory ................................................................. 21
  2.1 Tools for Joint Inquiry ....................................................................................... 21
  2.2 Joint Inquiry ...................................................................................................... 26
  2.3 Metaphors .......................................................................................................... 31
  2.4 Commensality .................................................................................................... 32

3 Design Research Approach ............................................................................... 34
  3.1 Research through Design .................................................................................. 34
  3.2 Design Methods .................................................................................................. 36
  3.3 Research Methods .............................................................................................. 36
  3.4 Analysis Framework ........................................................................................... 38

4 Design Experiments ......................................................................................... 40
  4.1 Knowledge Triangle Cards ................................................................................. 41
  4.2 Wire ................................................................................................................... 47
  4.3 Collaborative Landscapes .................................................................................. 50
  4.4 Paper Landscapes .............................................................................................. 56
  4.5 Cookie Teatimes ................................................................................................. 59
  4.6 Tea Compositions ............................................................................................... 65
  4.7 Coffee Compositions ......................................................................................... 69
  4.8 Fabric Landscapes .............................................................................................. 73
  4.9 Museum Teatime ................................................................................................. 78

5 Summaries ........................................................................................................... 87

6 Results and Discussion ............................................................................... 91
  6.1 Towards a Systematic Approach ....................................................................... 91
  6.2 Supporting Joint Inquiry Indicators ................................................................. 93
  6.3 Hindered Joint Inquiry Indicators ................................................................... 101
  6.4 Research for and through Design .................................................................. 103

7 Conclusion .......................................................................................................... 105

Bibliography ......................................................................................................... 107

Appendix ............................................................................................................... 112
1 Introduction

This chapter introduces the research and design interest, research focus, aims, research questions and contributions.

1.1 Research and Design Interest

Near the beginning of this PhD project, I gave researchers in a meeting a metre-long wire and the instruction to visualise their research (figure 1). The purpose was to share their practices with each other in relation to the topic of co-creation. After a few minutes, each researcher had a sculpture and a story to share. With this simple, material exercise, I experienced the mundane office space becoming a place of intimacy and engagement.

Figure 1. Wire, Mälardalen University (Photo: Laura Gottlieb)
There were personal stories and playful interactions shared, and the researchers described the conversation as kind, shared and one that allowed several perspectives to emerge. This use of a wire exemplifies my practice and my fascination with designing tangible artefacts and “making” activities as a means of supporting dialogue and interpersonal relationships. I later came to use the notion of Playful Triggers to explore tools in relation to building intimate and playful interactions that support participation, multiple perspectives and social relationships (p. 24).

The practice of designing for dialogue developed in relation to my studies in Philosophy (Southampton University, 2009–2012) and Information Experience Design (Royal College of Art, 2013–2015). In my interdisciplinary design training, design was understood as a means of investigating systems and things through material practices (Walker 2018). In this context, I started exploring ways in which materiality could prompt inquiry on existential topics. This involved finding ways to invite people into conversations, prompt engagement, and use artefacts to trigger reflection and new ways of thinking. I have explored this practice within museums, galleries and institutes of higher education. For example, in my master’s project, Philosophical Teatime (figure 2), I designed a teatime in a gallery to invite visitors to reflect on existential questions on meaning and death. A metaphorical tea set and desserts introduced ideas from Martin Heidegger (1927/1996). Other design research projects I have worked on have similarly focused on stimulating dialogue and reflection between exhibition visitors (Gottlieb & Sun 2016).
Throughout my PhD studies, I have come to understand the important role of design in relation to dialogue. In a time of existential crises, when humans can no longer consume and live in the same way as we have been doing if we want to enable a future for the generations to come, we need to develop new ways of being and doing (Escobar 2018). The design researcher plays a role in creating new narratives and understandings (Light et al. 2017). In my practice of designing for dialogue and inquiry, I am interested in exploring topics that can provide perspectives on ways of doing and being in relation to our ecology and each other. This practice not only concerns what is being inquired, but also how we inquire. Through material practice, various experiences and understandings can unfold. Furthermore, the experiences I explore relate to an ethical practice of promoting caring relationships between people. Although a conversation may not seem profound in relation to our grand ecological challenges, every conversation can bring something new into the world. This something new – albeit slight and always in relation to the past – carries possibilities of change (Butler 1995).
1.2 Research Focus

This research focuses on the relationship between tools and joint inquiry – processes centred on collaboratively framing problems and possible solutions in order to bring about change. Collaborative design processes such as Participatory Design are centred on joint inquiry in which multiple stakeholders are involved in change processes (Steen 2013). To facilitate joint inquiry processes in which multiple stakeholders participate, express perspectives and interests, and form mutual understanding, designers and/or researchers develop tools. These tools often involve creative exercises and the making of artefacts, also known as Generative Tools (Sanders & Stappers 2014). An example of such a tool could involve making and describing collages in a workshop as a means of identifying issues, dreams and interests, and to help us to listen to each other. Such tools have a visual and creative component to support communicative and collaborative practices (Sanders 2000). This research investigates this common practice in order to better understand how tools contribute to joint inquiry processes and how to design tools for joint inquiry. Due to the short nature of my studies, the tools in this research involve the initiation of joint inquiry by stimulating social relationships and evoking multiple perspectives. Both actions are important in order to promote participation and explore multiple ways of framing and addressing a situation.

By studying the relationship between tools and joint inquiry, I aim to contribute to the literature on this topic with a systematic approach to designing and evaluating tools. This aim addresses the gap in systematic evaluations in the Participatory Design research field, as identified in an extensive literature review by Bossen, Didler and Iversen (2016). Systematic evaluations are needed to build on other researchers’ work and knowledge and to develop Participatory Design tools and methods. My research also addresses the need to understand how designed activities and environments relate to the collaborative practices between designers and participants (Drain and Sanders 2019). My work thereby contributes to Participatory Design research by introducing a systematic approach towards evaluating tools in relation to indicators for joint inquiry.
This research uses a Research for Design and a Research through Design approach, which involves developing and testing tools and generating knowledge from design experiments (more on p. 35). In this work, nine design experiments are described in which tools were developed and evaluated. Two frameworks are used as a starting point towards evaluating the relationships between tools and joint inquiry. One of these frameworks distinguishes different aspects of a tool (Eriksen 2009): artefacts, formats of explorations, framings of focus and situation. The other framework – Communities of Inquiry (Wanstreet and Stein 2011) – differentiates indicators for joint inquiry. The tools were designed in relation to the MDH Living Lab, which is an arena within Mälardalen University (MDH) that focuses on developing methods for collaboration between academic and external partners. Thus, the tools were created to reflect on and develop methods for collaboration. These developed tools include: cards and card-sorting activities, teatimes, abstract collage activities, wire sculptures, and coffee- and tea-blending activities (described in chapter 3). They have been tested with the intended users, including graduate and post graduate students and teachers (two design experiments), researchers and teachers (five design experiments), industry-academic collaborators (one design experiment), and youth and researchers (one design experiment).

1.3 Aims, Research Questions and Contributions

The overall aim of this research is to support the practices of designing tools for joint inquiry. To do so, I research the distinguishing attributes of a tool and introduce a framework from the Communities of Inquiry as a means of systematically evaluating the interrelationship between tools and joint inquiry. The following research questions support this aim:

RQ1. What indicators in the Communities of Inquiry framework do tools support?

RQ2. In what ways do tools support and hinder the indicators in the Communities of Inquiry framework?
Through my research, I aim to contribute theoretically to the Participatory Design research field by introducing a systematic approach for designing and evaluating tools. I also aim to contribute in practice by designing tools that support joint inquiry on co-production in line with the objectives of the MDH Living Lab. This research is situated within the research program and subject of Innovation and Design, in which joint inquiry is crucial to collaborative design processes.

1.4 Delimitations

Joint inquiry involves a focus on learning and developing knowledge – aspects that I have not evaluated in my research thus far, due to the short time frames of my design experiments. Further research will focus on the longer term significance of using tools in relation to changes in people’s perspectives and understandings. Developing this research towards evaluating learning addresses a gap in the research field of Participatory Design by systematically evaluating one of its core aims: mutual learning (Bossen, Didler, & Iversen 2016).
2 Previous Research and Theory

This chapter introduces previous research and theory in relation to tools for supporting joint inquiry, including Participatory Design literature on defining and explaining the role of tools and Communities of Inquiry literature on evaluating joint inquiry. Theories on metaphors and commensality are also discussed, as these are significant for the tools developed in my research.

2.1 Tools for Joint Inquiry

Tools in Participatory Design

Tools created for and used in joint inquiry – that is, the exploration and definition of problems and solutions – are commonly used in Participatory Design to support designers and non-designers in collaborating on a design process. Such tools aim to support the involvement of diverse people (potential users, citizens and stakeholders) to elicit problems, form common understandings, trigger creativity and collectively envision possible futures. Mutual learning, empowerment and democracy are core aims in Participatory Design processes and research (Bossen, Didler & Iversen 2016) and adhere to the value of involving people in processes of change who are likely to be affected by those changes. Participatory Design processes and research originally focused on workplace politics and on involving workers and trade unions in processes of change (Nyggaard & Bergo 1975); it is now an approach that is widely applied to overall societal and innovation areas (Björgvinsson, Ehn, & Hillgren 2010).

The creation and use of artefacts in workshops in Participatory Design processes, so-called Generative Tools, is a common way to facilitate joint inquiry (Sanders & Stappers 2012). These artefacts can include a wide range of materials and objects, such as 2D collages, maps, 3D mock-ups (e.g. clay,
foam or Velcro), props for scenario-making and specially made cards. Creating artefacts supports people in expressing their feelings, thoughts and dreams (Sanders 2000). Elizabeth Sanders (2000), a pioneer of Generative Tools, describes how visual tools facilitate more effective collaborations by allowing people the time and space to listen to each other. Furthermore, the making aspect is an essential part of meaning-making between all the people involved, as is the exploration of future objects, concerns and opportunities (Sanders & Stappers 2014). Generative Tools are applied throughout the design process – from the “fuzzy” front end to the final specifications and prototyping (Sanders & Stappers 2012).

The use of artefacts in Generative Tools is characterized by telling, making and enacting (Sanders, Brandt, & Binder 2010, Sanders 2013). By making things, we use our hands to embody ideas as physical artefacts. Telling and enacting are also involved, as the ambiguous artefacts that are created say little on their own (Sanders & Stappers 2014). An artefact’s meaning is revealed through stories told or scenes in which the artefact plays a role. Depending on the purpose, for example – to dream, think, remember, map or envision the future – different types and uses of materials or artefacts are developed. Creating tools is a design process in itself, as the tools are customised in relation to specific situations and purposes (Sanders 2000).

Although not all my research involves Participatory Design processes, I create and use tools involving making, telling and enacting to facilitate inquiry, support social relationship and elicit diverse perspectives. I therefore learn from Participatory Design research and contribute to it with systematic ways of understanding tools aimed at supporting joint inquiry. In an extensive literature review, Bossen, Didler and Iversen (2016) identified a lack of systematic evaluations in Participatory Design. Through systematic evaluations – that is, the collection of information about activities in order to improve their efficiency or future use (Patton 1997) – other researchers can build on the outcomes and knowledge. My research is a starting point to develop a systematic evaluation of tools in relation to joint inquiry. This research could also support evaluations of the
relationship between designed activities and environments with the designer-participant collaboration in Participatory Design – a need identified by Andrew Drain and Elizabeth B. N-. Sanders (2019).

Playful Triggers

A particular tool that I have explored in my research is Playful Triggers, which is the use of ordinary artefacts in extraordinary ways or contexts (Loi 2007). This type of tool was developed by Daria Loi (2005, 2007) who drew inspiration from Cultural Probes (Gaver, Dunne & Pacenti 1999) and Sanders’ work on Generative Tools (2000). The purpose of exploring Playful Triggers in this thesis is to make use of this tool’s focus on stimulating social bonds and eliciting multiple perspectives – crucial elements in joint inquiry. An example of a Playful Trigger is giving a single green pea to conference participants and asking them to photograph it and answer the question, “What do you see?” (Loi & Burrows 2004). A management conference setting, which is where this Playful Trigger was originally carried out, is not a typical place for a green pea, and the open-ended task elicited multiple interpretations. The creators of this Playful Trigger portray the green pea as eliciting evocative, rich and diverse responses (Ibid.). The Playful Trigger is described as “breaking the ice” (Loi & Prabhala 2008); by using ordinary artefacts in unusual ways, the tool stimulates diverse interpretations, metaphors and participation. The Playful Trigger has been used in a variety of contexts, such as Participatory Design processes (Akama & Ivanka 2010), interview settings (Akama 2008, Akama et al. 2007), and in user research in industry contexts (Loi & Prabhala 2008).

Play, wonder, learning and metaphors are important features of Playful Triggers (Loi 2007). However, it is not clear from a theoretical standpoint nor through empirical examples how the tools contribute to these features. Loi describes the metaphors embedded in her Playful Trigger designs; however, she does not show empirical findings of how these designs stimulate new perspectives, metaphors, learning or playfulness (2005, 2007). Yoko Akama (2008) does provide empirical examples of metaphors emerging in her use of Playful Triggers, but does not discuss the role of
metaphors in her study. My aim is to contribute to the literature on Playful Triggers by gaining a better understanding of the relationship between metaphors and Playful Triggers. This understanding could also support the use of metaphors in tool design more broadly. In my work, I have used Playful Triggers proactively as a means of explaining the outcome of a design experiment, and in order to inspire tool design.

Defining a tool

To study tools, I use a categorisation by Mette Agger Eriksen (2009) that distinguishes the various aspect of a tool: artefacts, formats, framings and situations. I find this categorisation useful, as it incorporates material and non-material aspects of a tool; for example, facilitation, artefacts, questions and context. This categorisation can create ambiguity, on the other hand, as it broadens the spectrum of what is included in a tool. For example, using this categorisation, a workshop (i.e. situation) is an aspect that makes up a tool. The following categorisation (figure 3) is used in the analysis of the design experiments:

Figure 3. Categorisation of a tool. (Diagram by Eriksen (2009); adapted by Laura Gottlieb)
Design materials (artefacts, materials): This aspect of a tool includes material artefacts used in the collaboration to engage, explore, combine and ascribe meaning to during the workshop or event. Eriksen distinguishes between two categories of design materials: basic- and pre-designed design materials. Basic design materials denote materials brought along to a workshop without specific plans about their meaning, such as pens, paper, disposable cups, pipe cleaners, clay and game pieces. Pre-designed design materials are those that have been selected, prepared or designed before a meeting, such as video clips, mock-ups, prototypes or board games. I refer to design materials as materials and artefacts, as I do not necessarily use the tools for a design process. For example, a material can be a wire that is used to create an artefact – a wire sculpture.

Framings of focus: The framings of focus denote the why and the what being jointly explored. This category encompasses the aim that defines what the tool is focused on, which artefacts are used and how. When selecting the term, Erikson was influenced by Donald Schön’s work (1983) on how one engages with problem setting by framing the context and naming things to attend to.

Formats of exploration: The formats of exploration specify how the artefacts are used in relation to the framing. The formats include the pre-defined rules for ways of engaging, such as turn-taking, time frames, instructions and questions. The facilitator plays a crucial role in defining and setting this structure.

Situation: The tools are usually used in a workshop setting, project, institution and culture. The particular situation influences what and how the tool is used. Mads Bødker’s notion of institutional artefacts (2009) highlights expectations within particular contexts in which the tools are used. This layer draws attention to norms within given situations.
2.2 Joint Inquiry

Defining joint inquiry

Joint inquiry is a key practice in collaborative design processes like Participatory Design, in which collaborative exploration and definition of problems and solutions take place (Steen 2011). Joint inquiry originates from John Dewey, who propagated reflection and the scientific method towards processes of change. Dewey (1938) proclaimed that through joint inquiry, indeterminate and problematic situations can be made determinable and preferable. Drawing on personal experiences is important in order for the changes to be relevant to those involved in joint inquiry. Dewey’s theory of inquiry has been influential and productive in the fields of technology, design and engineering (Hickman 1990). Joint inquiry bears similarities to Herbert Simon’s “Science of Design”, in which problems are framed and hypotheses are tested as a means of “changing existing situations into preferred ones” (1969, p. 111). Dewey describes the joint inquiry processes through the following steps (1938):

1) Identifying an indeterminable situation that is problematic (this involves feeling doubt – that something is amiss)
2) Defining a problem
3) Creating a hypothesis aimed at addressing the problem
4) Critically evaluating the proposed solution
5) Implementing and testing the hypothesis

Due to the shorter time frame of my design experiments (1–3 workshops each), I do not focus on the whole inquiry process. Joint inquiry usually happens over an extended period of time with the same group of people. The tools in the design experiments therefore focus on initiating joint inquiry by stimulating social relationships and multiple perspectives. Building social relations is important for joint inquiry, in which participants are expected to show themselves, contribute ideas and negotiate these ideas (Hadjioannou 2007). Eliciting multiple perspectives is also an important initial stage in joint inquiry in order to brainstorm, gain
a wider understanding of a situation and question assumptions (exploration phase in the Communities of Inquiry framework, p. 31).

I focus on tools for joint inquiry because many design and collaborative processes involve joint inquiry and are directed towards defining problems and finding possible solutions. It is therefore important to understand the practice of designing tools for joint inquiry – to evaluate their value and develop such practices. I do not, on the other hand, aim to prescribe this form of communication, as there are other forms worth exploring in the context of design. For example, David Bohm’s “dialogue” (2004) is an open-ended communication process that does not focus on problem definitions. Bohm’s dialogue is aimed at suspending judgement and relates to the embodiment of all perspectives. This method is concerned with wholeness and complexity over fragmentation, which could be important for design methodology (Lindh & Redström 2015). My work may also be extended to other forms of communication in future research.

Reflective practice

Donald Schön’s work on the Reflective Practitioner (1983) is highly relevant in relation to tools and joint inquiry. Schön’s studies on architectural practice put great emphasis on the materiality and situatedness of designing (1983). In his paper “Designing as reflective conversation with materials of a design situation” (1992), Schön highlights the materiality of situations as part of developing knowledge and professional practice. The materials – referring to both talk and tangible things – are part of the navigating through and framing of problems in an indeterminable situation.

Schön coined the term “reflection-in-action” to explain how professionals reflect in situations. This type of reflection is knowledge-in-use, which is not necessarily verbal nor has a meta-description of the practical knowledge. This notion emphasises that professionals know more than they can verbally express. Another term Schön uses is “reflection-on-action”, which involves developing questions and ideas about activities and
practices. By reflecting on past actions, practitioners build up a repertoire of examples, images and actions that they can draw upon. Schön’s reflective practice is used to describe situations other than designing. Akama (2008) uses Schön’s reflective practice to describe her use of Playful Triggers in interview settings. She describes interviewees navigating the questions through artefacts, which trigger both reflection-on-action and reflection-in-action. I also use Schön’s reflective practice to discuss the role of materials and artefacts in relation to inquiry processes.

Evaluating joint inquiry

To evaluate the relationship between tools and indicators for joint inquiry, I use the Communities of Inquiry framework developed from Dewey’s practical inquiry. The theoretical model was developed in the field of computer-mediated communication in distance education in order to evaluate inquiry-based learning (Garrison, Anderson, & Archer 2000). The term Communities of Inquiry was coined by Dewey (1938) and Charles Sanders Pierce (1877) to denote the people participating in joint inquiry. Lipman (2003) further defines Communities of Inquiry by the democratic and reflective form of discussion that is built over time with a group. The framework distinguishes between crucial aspects in joint inquiry: social presence, teaching presence and cognitive presence (figure 4). The following elements make up the Communities of Inquiry framework:

![Figure 4. The Communities of Inquiry model. (Adapted from Garrison et al. 2001, by Laura Gottlieb)](image_url)
Cognitive presence: The element of cognitive presence stems from Dewey’s practical inquiry and was developed by Garrison, Andersson and Archer (2001). Cognitive presence is defined as the ability to construct and confirm meaning through sustained reflection and discourse within a Community of Inquiry (Ibid.). Dewey’s practical inquiry process is translated into four phases in the Communities of Inquiry framework: triggering event, exploration, integration and resolution. This process can be explained through divergent processes of exploring multiple alternatives and perspectives, as well as convergent processes of identifying a problem and a possible solution (further explained in table 1).

Teaching presence: Teaching presence is key in joint inquiry, as the facilitator’s role is to design the experience, give instructions, provide focus and deepen the inquiry through questions (Anderson et al. 2001). Note that this category is called teaching presence rather than teacher presence, as participants in inquiry-based learning are expected to take on an active role in asking questions and shaping the content of the inquiry (Wanstreet & Stein 2011). The facilitator plays an important role in cognitive presence, in order to move the group on from the exploratory mode to deepening inquiry. The facilitator also plays an important role in establishing social presence.

Social presence: Social presence is defined as the ability of participants “to project themselves socially and affectively” in the group (Rourke et al. 2001, p. 3). Social presence creates a sense of belonging and thereby supports meaningful inquiry (Vaughan & Garrison 2005). The indicators of social presence were initially constructed from the theory of immediacy, which concerns “communication behaviours that enhance closeness to and nonverbal interaction with another” (Mehrabian 1969, p. 203). Interpersonal and trusting relationships allow people to be vulnerable and to offer perspectives that could contradict others (Hadjioannou 2007). Two particularly relevant indicators in my research are humour and self-disclosure. Humour includes teasing, joking and banter, and is important for social presence, as it can be an invitation to start a conversation, display
goodwill and reduce social distance (Gorhan & Christophel 1990). *Self-disclosure* – the revealing of personal information – is important for social presence, as it helps people to get to know each other and builds trust in a group (Culter 1995). *Self-disclosure* has a reciprocal function, as sharing personal information can prompt others to do the same (Ibid.).

In this work, the Communities of Inquiry framework is used to evaluate how tools support and hinder indicators for joint inquiry. The following table explains the indicators used in the Communities of Inquiry framework:

Table 1. Communities of Inquiry framework. (Modified from Wanstreet and Stein (2011) by Laura Gottlieb)

<table>
<thead>
<tr>
<th>Cognitive presence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Category</strong></td>
</tr>
<tr>
<td>Triggering event</td>
</tr>
<tr>
<td>Exploration</td>
</tr>
<tr>
<td>Integration</td>
</tr>
<tr>
<td>Resolution</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Social presence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Category</strong></td>
</tr>
<tr>
<td>Affective</td>
</tr>
<tr>
<td></td>
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</tr>
<tr>
<td>Open</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Cohesive</td>
</tr>
</tbody>
</table>
### Teaching presence

<table>
<thead>
<tr>
<th>Category</th>
<th>Indicators</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructional design</td>
<td>Setting curriculum</td>
<td>Planning the workshop and giving instructions</td>
</tr>
<tr>
<td></td>
<td>Establishing etiquette</td>
<td>Setting specifications for ways of communicating</td>
</tr>
<tr>
<td>Facilitating discourse</td>
<td>Encouraging contributions</td>
<td>Inviting responses and asking questions</td>
</tr>
<tr>
<td>Direct instruction</td>
<td>Presenting content/questions</td>
<td>Introducing topics and questions</td>
</tr>
<tr>
<td></td>
<td>Focusing discussion</td>
<td>Narrowing and deepening discussions around the topic</td>
</tr>
</tbody>
</table>

#### 2.3 Metaphors

Metaphors are used in some of the tools in this research and are important for Playful Triggers. Metaphors can be defined as “understanding and experiencing one kind of thing in terms of another” (Lakoff & Johnson 1980, p. 8). Using artefacts in tools to represent a concept pertains to a type of metaphor that relates to our sensory experiences of our environment. Lakoff and Johnson argue that, by understanding our experiences in terms of objects and substances, we can pick our experiences apart and treat them as discrete entities (Ibid., p. 25). Identifying our experiences as entities allows us to refer to them and reason about them.

According to Lakoff and Johnson, metaphors play a large part in structuring how we conceptualise reality (Ibid.). The pervasiveness of metaphors in our language means that they make up our conceptual structures of how we perceive and interact in the world – our everyday realities. The metaphors and language we use highlight certain aspects of a concept over other aspects, which relate to our behaviour. A famous example from Lakoff and Johnson is how, in Western culture, we talk about “argument as war” (Ibid.). The language we use to describe arguments is similar to how we talk about war – we win or lose an argument; we attack or defend it. We do not generally speak of “arguments
as dance”, in which the discussants aim to perform an argument in a balanced or aesthetic way. This example demonstrates that some metaphors are more suitable in relation to our understandings and our behaviour. It also raises a speculative question around the creative potential of metaphors in constructing our understanding and behaviour. For example, if I start to think of “arguments as dance”, this could expand my way of understanding and engaging in arguments. Although it may be argued that metaphors come into being later, to match the existing model of our mind (Quinn 1991), I adhere to Lakoff and Johnson’s non-linear perspective on mind, thought and metaphors. Therefore, if we use physical artefacts as a means of reasoning and inquiring about a topic, how could this affect our understandings and behaviour?

Lastly, a relevant aspect to my work is the relationship between metaphors and humour. In linguistic theory, metaphors and humour are connected to the “bisociation” of ideas. Arthur Koestler (1964, p. 51) describes the comic effect from the sudden bisociation of an idea where two habitually incompatible matrices (narrative storylines) overlap. By breaking expectations in the narrative pipeline, a tension can arise and be released through laughter. A fundamental idea in Koestler’s theory is that any creative act is the bisociation of two or more apparently incompatible frames of thought. According to Sakis Kyratzis (2003), metaphors pertain to the dualities in concepts. By crossing and fusing boundaries of the dualities, Kyratzis shows different ways in which this can lead to humour (Kyratzis 2003). One way in which metaphors relate to humour is through the fusion of two concepts. In a fusion, a new blend emerges from two different concepts; this can create ridiculous images. The connection between humour and metaphors is found in my empirical material and will be further discussed in chapter 6.

2.4 Commensality

Lastly, the concept of commensality is important to my work, as it is integral to some of the tools that I have designed. The term commensality
means eating at the same table or eating with other people (Sobal and Nelson 2003), and is one of the most important articulations of human sociability (Fischler 2011). Sharing food can signify or create intimacy (Miller, Rozin, and Fiske 1998) – it can signal a more personal relation, rather than a strictly professional one. The sharing of food and drink is a common social setting that is a reinforcement of social relations (Kerner et al. 2015). In informal settings such as a family dinner, commensality can be associated with conviviality – that is, living together and being merry (Fischler 2011). In my work, I study tools that are designed within established social practices that can be associated with conviviality.

Other design researchers have explored the use of commensality to stimulate social bonds (van Klaveren 2018, Barden et al. 2012, Gottlieb & Schaeffer 2018, Clarke et al. 2019). Ann Light and collaborators (2013, 2014), for example, created a “Tea Party” to prompt conviviality among citizens and to engage them in dialogue on societal issues. They embedded questions inside the food to prompt conversations on specific topics. In their work, the Tea Party is described as a simple mechanism to prompt an experience of conviviality (2014). Rachel Clarke and collaborators also noted that using commensality in their tools “appeared to support trust within the group” (2019, p. 12). In my research, I will discuss the relationship between commensality, tool design and the Communities of Inquiry indicators.

This chapter defines joint inquiry in line with Dewey’s theory of inquiry (1938) and highlights its relation to tools created in Participatory Design processes. From the theory and previous literature, I have gained frameworks by which to distinguish what makes up tools and indicators for joint inquiry. The role of metaphors and commensality is also expanded on, as these are relevant to the particular tools in this thesis. The theory and previous literature will be used in the discussion in relation to the empirical outcomes from my design experiments to understand how and why the studied tools supported or hindered the indicators for joint inquiry.
3 Design Research Approach

This chapter describes the research approach, design and research methods, design experiments and methods of analysis.

3.1 Research through Design

This PhD project uses a Research through Design approach in which design activities and artefacts are chief elements in the process of generating and communicating knowledge (Stappers & Giaccardi 2017). Research through Design denotes research that centres on studio practice through practical experimentation. This involves developing and testing artefacts, which creates “the possibility for people and products to engage in interactions that were not possible before, and these [interactions] can come into existence – indeed, become observable – through the design” (Ibid., 43.1.2).

The design experiments in this thesis involve the creation and testing of tools to build conditions for joint inquiry. The purpose is to develop knowledge about how tools support joint inquiry and to inform tool design. The tangible outputs are also Research for Design, in which research is intended to be used in developing products and services. This involves learning about potential users and their needs by conducting research activities such as workshops and observations (Ibid.). The tools were created with the intention of transforming them into a toolkit for the MDH Living Lab.

Experimentation is an important component in Research through Design, in which making is a part of defining research focus and interests (Eriksen and Bang 2014). Drawing on Schön’s theory of reflective practice (1983), Eriksen and Bang explain the role of experimentation in Research through Design and types of knowledge outcomes (Eriksen and Bang 2014). Schön describes the overarching question in experiments as being the question “what if?” and depicts various types of experimentations – from more
Design Research Approach

open-ended and exploratory experiments to hypothesis-driven ones (1983). The making process has been essential in driving my research forward and identifying my research interests. Experiments in design research take place in relation to a wider research context, group or program, which frames what is being experimented (Binder and Redström 2006). The research context, group or program is directed towards broader research questions. The design experiments are shaped by these environments and are also part of transforming the environment. The research context that has shaped my focus is the MDH Living Lab and its focus on methods of co-production. Co-production, in the MDH context, refers to close collaboration between industry and other external partners of the university (Öberg, Sannö, and Jackson 2018). My experimental approach of designing and testing tools to initiate joint inquiry has been a way to explore research avenues in relation to the MDH Living Lab (papers I, II and III). In turn, the work (paper III in particular) has become a way to develop the MDH Living Lab.

Nine design experiments (figure 5) are described in this thesis, including three published conference papers, and one submitted journal article. The design experiments are connected to each other and have been exploratory in order to probe and define the research focus.

Figure 5. Design experiments. (By Laura Gottlieb).

35
3.2 Design Methods

The design experiments were created in specific contexts: seminars, conferences, participatory design workshops and student courses. Tools were created to explore particular topics that were relevant in these contexts. Creating the tools was an iterative process that involved making mock-ups and testing the tools. This process led to producing a more finished prototype, which was tested in the workshop contexts with the intended users. The workshops with the users informed the further development of the prototyped tools. The process of developing the tools for initiating joint inquiry involved moving between having ideas, making and testing. This process is akin to Löwgren and Stolterman’s (2004) three levels of abstraction in early design work: the vision, the operative image and the specification. Initial ideas were transposed to operative images, that is, sketches and mock-ups, which were used to communicate with others. The conversations with others were a way to elicit questions about the design and to form specifications. In my research and design process, the workshop participants were a crucial part in developing the prototypes. The interactions between people and tools elicited questions and opportunities to develop the tools or create new ones. For example, Collaborative Landscapes was created as a response to the KT Cards after a workshop participant identified a gap in the cards and alternative ideas were proposed by participants.

3.3 Research Methods

Prototyped tools were studied in workshop settings through the following research methods: questionnaires, observations, audio recordings and video recordings. The purpose was to understand the tool’s role in initiating joint inquiry, the participants’ experiences and interactions with each other, and the artefacts. Table 2 summarizes the design experiments, participants, topics of inquiry, tools and research methods.
Table 2. Summary of experiments and research methods.

<table>
<thead>
<tr>
<th>Design experiment</th>
<th>Participants in study</th>
<th>Topic of joint inquiry</th>
<th>Artefacts and formats</th>
<th>Research methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge Triangle Cards</td>
<td>24 students and teachers (Paper I), 14 bachelor students (Paper III)</td>
<td>Collaborating with external partner                                                   Card deck, card-sorting and brainstorming activities</td>
<td>Questionnaire, observation, photos</td>
<td></td>
</tr>
<tr>
<td>Paper I, III</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wire</td>
<td>7 researchers</td>
<td>Research practices and co-creation                                                      Wire, sculpting</td>
<td>Questionnaire, observation</td>
<td></td>
</tr>
<tr>
<td>Collaborative Landscapes</td>
<td>11 researchers</td>
<td>Relationships between university-society collaborations, knowledge, and innovation        Geometric paper shapes, collaging activity</td>
<td>Audio recording, visual outcomes</td>
<td></td>
</tr>
<tr>
<td>Paper II</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paper Landscapes</td>
<td>9 students in the workshop (33 students in total)</td>
<td>Design collaborations with external organisations                                       Paper, collaging activity</td>
<td>Audio recordings, visual outcomes, questionnaires, (written assignments in wider study)</td>
<td></td>
</tr>
<tr>
<td>Paper III</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cookie Teatime</td>
<td>11 researchers, teachers</td>
<td>What is co-production?                                                                   Cookies and edible decorations, visualisation activities</td>
<td>Video and audio recording</td>
<td></td>
</tr>
<tr>
<td>Tea Compositions</td>
<td>5 researchers</td>
<td>Co-producing a tea blend to reflect on interpersonal relations                           7 types of teas, tea-blending activity</td>
<td>Audio recordings, questionnaire</td>
<td></td>
</tr>
<tr>
<td>Publ. V</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coffee Compositions</td>
<td>3 employees (out of 8 in workshop)</td>
<td>Co-producing a coffee blend to reflect on ways to collaborate                           4 types of coffee, coffee blend activity</td>
<td>3 interviews</td>
<td></td>
</tr>
<tr>
<td>Fabric Landscapes</td>
<td>13 researchers</td>
<td>Relationships between university-society collaborations, knowledge, and innovation        Geometric fabric shapes, tea, collaging activity</td>
<td>Photographs, notes</td>
<td></td>
</tr>
<tr>
<td>Publ. VI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Museum Teatime</td>
<td>25 youth, adults and researchers</td>
<td>How our ways of relating (e.g. through love) connect to sustainability                  Special cups, food colouring, placemats, teapots, pens, refreshments</td>
<td>Audio and video recordings, questionnaire, 1 interview</td>
<td></td>
</tr>
</tbody>
</table>
Questionnaires were important in order to understand people’s experiences of using the tools. At the same time, the audio recordings provided a means of analysing the conversations and how the artefacts were used. Video recordings were used on a few occasions to show how the participants interacted with the artefacts. It was important to use multiple methods to not only capture what people said, but also what they did and how the tools worked between people. In the workshops and data collection, I mainly played the role of the tool designer, workshop facilitator and researcher. Having these multiple roles will be further deliberated on in chapter 6.

3.4 Analysis Framework

The units of analysis were the designed tools and their relation to joint inquiry indicators. The units of observation were the conversations between people and their interactions with the tools. I use Eriksen’s categorisation (2009) to differentiate the aspects of a tool (formats, framings, situations and artefacts). Furthermore, I apply a framework from Communities of Inquiry that distinguishes various elements, categories and indicators of joint inquiry. In this way, I can compare the aspects of the tools in relation to the indicators for joint inquiry (figure 6).
The Communities of Inquiry framework was first used to analyse Museum Teatime in paper IV, and has since been used to reanalyse other design experiments. However, since the empirical data varies for each design experiment, the analysis varies as well. Some design experiments were neither audio recorded nor video recorded, which made it difficult to perform a detailed analysis. In these cases, I used the data that I had collected (e.g. notes and photographs) and compared these to the Communities of Inquiry indicators. For the design experiments that were audio and/or video recorded and transcribed, I coded or annotated the transcripts in relation to the Communities of Inquiry indicators. The next chapter describes the method and analysis for each tool in further detail.
4 Design Experiments

The following chapter describes nine design experiments involving the prototyping and testing of tools to initiate joint inquiry. Structured after Eriksen’s categorisation (2009), each prototyped tool is described in relation to the situation in which it is used, its framings of focus (i.e. purpose), its artefacts, and its formats of exploration (i.e. how the artefacts are used). Methods are described for each design experiment along with results and a brief discussion. The design experiments are presented in chronological order, from first to last. The design experiments include:

4.1 Knowledge Triangle Cards
4.2 Wire
4.3 Collaborative Landscapes
4.4 Paper Landscapes
4.5 Cookie Teatime
4.6 Tea Compositions
4.7 Coffee Compositions
4.8 Fabric Landscapes
4.9 Museum Teatime
4.1 Knowledge Triangle Cards

Framing and situation

*Knowledge Triangle Cards (KT Cards)* were created for the Knowledge Triangle Mindset Pilot Course at Mälardalen University in 2016. The pilot course introduced postgraduate students to the Knowledge Triangle – a conceptual framework focused on improving synergy between research, innovation and education (Markkula 2013). The theoretical framework was developed during the Swedish Presidency of the Council of the European Union in order to foster innovation and create a knowledge-based society. A key to this synergy is the knowledge exchange between higher education institutions and society. Graduate and postgraduate students are seen to play an active role in the collaboration and co-creation of new knowledge with researchers, businesses and municipalities (Ibid.). The aim of the *KT Cards* was to support students in choosing assignments, projects and thesis topics that supported their engagement in research and innovation processes, and to bring them closer to the labour market and societal needs. In line with joint inquiry, the cards were designed to identify issues or problems in relation to societal needs. The aim was to stimulate initial brainstorming on ways of approaching societal issues in collaboration with various stakeholders, processes and outcomes. The *KT Cards* were developed in a Research for Design approach to test ways to introduce and implement the Knowledge Triangle framework in the pilot course.

Artefacts

To prompt reflection on ways of relating students’ projects to the aims of the Knowledge Triangle, a deck of cards was created (figures 7 and 8). The card deck has five categories with examples of various societal needs (Opportunity Cards), processes (Process Cards), collaborators (Stakeholder Cards) and outcomes (Outcome Cards), as well as financial means to execute the project (Funding Cards). The purpose was to connect students’ projects to societal issues and to inspire collaborations with external actors – important principles in the Knowledge Triangle (Markkula 2013). The
cards, containing examples of each category, aimed to make these abstract principles more concrete. Furthermore, by making a card deck, the intention was to explore gamification (Hamari, Koivisto, and Sarsa 2014). An inspiration for the card categories was *Personality Poker*. The *KT Cards* categories include:

- **Opportunity Cards (why)**  
  A societal problem that the project aims to address; e.g. human rights, equality, infrastructure.

- **Stakeholder Cards (who)**  
  Collaborators, partners and target groups that are involved in a project; e.g. citizens, universities, SMEs, large corporations.

- **Process Cards (how)**  
  Different strategies and methods to achieve project goals; e.g. design-oriented research, business model, case study.

- **Outcome Cards (what)**  
  Different types of project outcomes; e.g. event, product, service, course.

- **Funding Cards**  
  Types of funding to enable the project, e.g. investment, research grant, crowdfunding.

I prototyped the cards and tested them with the researchers and teachers involved in the pilot course. I then worked with graphic designer Asia Jopkiewicz to make a final version of the cards and tested these with students. The card design was in line with the graphic profile of the pilot course.

1 https://stephenshapiro.com/personality-poker/
Figure 7. *KT Cards* categories. (Photo: Laura Gottlieb)

Figure 8. *KT Cards* used in a student course. (Photo: Laura Gottlieb)
The workshops started with an introduction to the Knowledge Triangle framework. The following three activities were created to test various ways of using the cards:

- **Process-mapping**
  The purpose of this activity was to establish an overview of all the cards, explore the vocabulary and frame student projects in relation to the cards. In the activity, students chose cards that explained their projects and laid these out on the table. They then described their projects to other peers or to a teacher that could give feedback and suggest additional cards for the project.

- **Rummy**
  *Rummy* was intended to be a game for brainstorming new projects. Each participant had seven cards in their hands at all time. Taking turns, each person could choose to discard any number of cards and pick the same number of new cards from the deck. When a person had at least one card from each category and a project idea, they stopped the game and presented their idea. The other players continued the activity until they had found their cards and had a story to share.

- **Tarot**
  *Tarot* was created for groups to collectively explore the cards and potential collaborative projects. The activity was inspired by *Superflux’s Synbio Tarot Reading*[^2], which uses cards drawn at random to explore synthetic biology. By having students draw cards at random, the idea was that students would explore cards that they might not be inclined to choose. In groups of 3–4, each group picked one card at random from each category (five cards in total). Each group discussed

[^2]: https://superflux.in/index.php/work/synbio-tarot-reading/
what the cards could represent and how these could become a project. Two time frames were tested for the discussions: 10 and 20 minutes. If there were multiple groups, they presented their stories to the whole class.

Method

Three workshops using the KT Cards are reported on in paper I (WS1–3), and two workshops are examined in paper III (WS4–5). In paper I, observations, notes and questionnaires were used and there was a total of 36 participants, including PhD, master’s and bachelor’s students, and teachers. In paper III, the methods used included photos, questionnaires and verbal feedback, and a total of fourteen bachelor’s students participated. The analysis in paper I focused on the experiences of using the cards and ways to develop the cards and activities. In paper III, the visual outcomes (photos of the card layouts) were part of analysing how the students collaborated with external organisations. The results in the paper were compared to the Communities of Inquiry indicators.

Results and discussion

The artefacts and formats supported brainstorming in cognitive presence in the Communities of Inquiry framework. Ideas were generated about the student projects in relation to the themes of the cards – societal issues, collaborations, processes and outcomes. This involved recognising problems in relation to the Opportunity Cards by exploring societal issues and identifying problems. The cards thereby served the function of initiating joint inquiry in relation to identifying issues or problems and initial ways to address these through university-society collaboration.

In the workshops, students commented that the vocabulary on the cards was helpful. One master’s student was unfamiliar with the vocabulary and explained that it was valuable to gain new vocabulary for her master’s degree. A PhD student said that the cards would be useful in relation to writing funding proposals, as they contain the appropriate vocabulary. This
indicates that the cards supported students in developing a vocabulary appropriate for research, which is part of the aims of the Knowledge Triangle framework.

The data from the workshops indicates how various formats of exploration prompted various types of brainstorming to elicit unexpected ideas, manipulate the pace and promote competitiveness. As was the intention, students in WS5 said that selecting random cards in Tarot made them reflect on cards that they would not have chosen otherwise and thereby helped them to think differently. I therefore reflected on ways of developing formats to help students think differently about their projects. Having different time frames (10 or 20 minute) and numbers of groups (1–5 groups) seemed to affect the competitive group dynamics during Tarot. Students in WS3 described the competitiveness as either stressful or motivating – demonstrating that people had different preferences in relation to competitiveness. Similarly, gamifying the KT Cards through game-like activities was motivating for some students and caused discomfort for others. This result steered me away from pursuing gamification and competitiveness further.

The Research for Design approach – that is, developing a product and services for and with intended users – allowed further identification of gaps and opportunities for tool design. For example, one participant identified a gap in the KT Cards: namely, that the artefacts and formats did not clarify the interrelationship between the core elements of the Knowledge Triangle – research, education and innovation. This feedback led to the development of Collaborative Landscapes (p. 51). Furthermore, students and teachers suggested new ways of using the cards. For example, one student suggested using the cards together with external partners to brainstorm projects.
4.2 Wire

Framing and situation

This exploratory design experiment was done at a similar time as *KT Cards*, in 2017. The purpose of *Wire* was to reflect on and elicit examples of collaborative practices in research. In line with the aims of the MDH Living Lab, I wanted to explore ways to reflect on collaborative research to share practices and develop better understandings about collaborations. The workshop took place in a research seminar at MDH with a group of design researchers who had worked together for many years. The design experiment was exploratory as a means of discovering research interests, which is common in a Research through Design approach (Bang & Eriksen 2014).

Artefacts and formats

*Wire* emerged as an experiment in the staff kitchen with colleagues. I had just started working at MDH, and I gave co-workers a piece of wire on a few occasions to visualise their work as a means of getting to know them. I realised that using a wire was an interesting way to get to know people on a more personal level. I felt that the stories that emerged revealed “who you are” rather than merely “what you do at work”. I decided to do this experiment with a seminar group in order to explore how it could support inquiry on collaborative practices. At the start of a seminar, I gave the researchers a metre-long wire to visualise their research process (figure 9). After a few minutes, each participant presented his or her wire sculpture. I then gave the researchers a second wire of a different colour to visualise how their research connects to co-creation (figure 10). I did not define co-creation, in order to allow for multiple interpretations. Paper clips were added at the end of the exercise, to pin-point lessons learned from the projects and to help the researchers share their insights with each other. The second wire and the paper clips were then presented to the group. The wire exercise lasted for 30 minutes.
Figure 9. Wire sculpture made in workshop. (Photo: Laura Gottlieb)

Figure 10. Two participants combining their wire sculptures. (Photo: Laura Gottlieb)
Method

Seven design researchers participated in the workshop. I took notes during the workshop and sent an email out with questions about people’s experiences. The responses were drawn together and reflected on in relation to the Communities of Inquiry framework.

Results and discussion

The data collected in this design experiment was not extensive, nor was it intended to be a comprehensive study. I had an impression of social presence in the Wire, particularly in relation to self-disclosure. Participants expressed “who they are” in the sense that their personalities were described in relation to a research process. For example, one researcher described how they rush into a project (represented by a steep arch in the wire sculpture), and another researcher revealed their habit of switching research areas (represented by multiple loops of wire). The three participants who answered the questions in the email described the dialogic space as shared, kind, playful and not necessitating consensus. This response indicates social presence and brainstorming, in that multiple perspectives could be raised and could co-exist. This exploratory test became a direction for my research. The design experiment influenced my shift away from gamification and the ready-made cards (KT Cards) and towards a focus on making ambiguous artefacts in relation to stimulating social bonds. The Wire served an important function in initiating joint inquiry by engaging and inviting people to talk together and share personal experiences. As with Generative Tools, I saw the potential of making as a means of allowing people the time and space to listen to each other, and thus facilitating more effective collaborations (Sanders 2000).
4.3 Collaborative Landscapes

Framing and situation

Collaborative Landscapes came about from the KT Cards as a means of clarifying the interrelationship of the Knowledge Triangle framework: innovation, research and education. Knowledge Triangle literature describes a lack of concrete examples of how these elements interrelate (Markkula 2013). Collaborative Landscapes was therefore intended to prompt inquiry about how these elements connect in relation to concrete projects. This intention aligned with the aim of the MDH Living Lab: to prompt reflective practice (Schön 1983) on methods for collaboration. The purpose was to better understand processes of collaboration and how these could be developed, by reflecting on past experiences. Collaborative Landscapes was tested in a research seminar at MDH in 2017 with researchers from the design, innovation and business research fields. The study is elaborated on in Paper II.

Artefacts

Initially, I had intended to develop the KT Cards by adding symbols that could be used to clarify how projects relate to the Knowledge Triangle framework. This prototype looked messy, and I felt that I was imposing my own symbols and metaphors on the participants. Instead, I decided to give participants the opportunity to create their own symbols that visualise the interconnections of a project and the Knowledge Triangle. Different colours were used to visualise three aspects of the Knowledge Triangle: collaboration (black), knowledge (blue) and innovation (red). I used basic shapes for the tool – rectangles, triangles and circles – to enable “endless variations, combinations, permutations” (Dondis 1973) (figure 11). In Collaborative Landscapes, collages were made, as they give a holistic view of how elements co-exist and interlink (Arnheim 1997, Gauntlett 2007). I was also inspired by a workshop by Helga Schmidt and Katherine Hepthorn at the Royal College of Art in 2015, which utilised basic shapes to visualise concepts.
Figure 11. Shapes used in collaging exercise. (Photo: Laura Gottlieb)

Figure 12. Workshop at the Participatory Innovation Conference 2018. (Photo: Laura Gottlieb)
Formats

In pairs, researchers in the workshop co-created a collage that represented a university-society collaborative project (figure 12). This was possible because the participants knew each other and had previously collaborated together. Once the collages were finished, the shapes were glued to an A3-sized paper, and the researchers presented the collages to the whole group. After the presentations, the same pairs answered a list of questions about the project, and then discussed the answers with the whole group. The questions were developed from an MDH Living Lab document and were directed towards collaboration, innovation and knowledge outcomes.

Method

I facilitated the workshop and eleven researchers participated. The workshop lasted for 2.5 hours, and the data collected included participants’ feedback, the visual outcomes (the collages), and voice recording during the collage presentations and during the end discussion. The recording is 53 minutes long and was partially transcribed. The code names given to participants when handling the data included the group number and a participant number; for example, G1 P1 signified participant 1 in group 1. The results in Paper II were compared to the Communities of Inquiry indicators.

Results and discussion

The geometric shape collages prompted various metaphors such as “wheel of collaborations” and “kneading the knowledge dough”. These metaphors supported humour, an indicator of social presence in the Communities of Inquiry framework. There was engagement around each other’s collages as participants contributed metaphors and interpretations. The basic shapes could be combined and interpreted in many ways (Dondis 1973) and related to the creation of metaphors. In this sense, the basic shapes encouraged contributions, an indicator in teaching presence, as they prompted participants to contribute metaphors and interpretations. The following
transcript extract shows how the collages prompted *humour* and 
*encouraged contributions* in relation to metaphors and interpretations.

Table 3. Metaphors, contributions and humour.

<table>
<thead>
<tr>
<th>Red: humour</th>
<th>Blue: metaphor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>G2 P1</strong>:</td>
<td><strong>This visualisation is self-explanatory (laughter)</strong></td>
</tr>
<tr>
<td><strong>G1 P1</strong>:</td>
<td><strong>A lot of innovation.</strong></td>
</tr>
<tr>
<td><strong>G2 P1</strong>:</td>
<td><strong>Yea, a lot of red actually, it turned out.</strong></td>
</tr>
<tr>
<td></td>
<td><em>...The knowledge in society, academia, is growing. So this is visualising that there's a growth and an increase in knowledge gained by this wheel, which is the collaboration wheel.</em></td>
</tr>
<tr>
<td><strong>G1 P1</strong>:</td>
<td><strong>It's a good picture.</strong></td>
</tr>
<tr>
<td><strong>G2 P1</strong>:</td>
<td><strong>And this collaboration wheel is iterating, so it’s moving upwards here, so there’s an uphill, which is visualising the (laughter) challenges and frustration that you feel (laughter). This wheel drives this innovation, which creates value for society, this is companies, this is academia, but there is of course a shared knowledge pool somewhere here....</strong></td>
</tr>
<tr>
<td><strong>G? P?</strong>:</td>
<td><strong>Makes sense! (laughter)</strong></td>
</tr>
<tr>
<td><strong>G3 P1</strong>:</td>
<td><strong>A resemblance – this black circle, it represents the “triangle check act”, the learning cycle. And then the “knowledge value stream”. So that could represent the top.</strong></td>
</tr>
<tr>
<td><strong>G1 P1</strong>:</td>
<td><strong>This could be viewed as a “brödkavel” (rolling pin), “kavla deg” (kneading dough). You are building up a mass.</strong></td>
</tr>
<tr>
<td><strong>G2 P1</strong>:</td>
<td><strong>You are fixing the knowledge dough (laughter).</strong></td>
</tr>
</tbody>
</table>
The above result led to me discover the concept of a Playful Trigger (Loi 2007), which accentuates the use of ambiguous artefacts and metaphors to encourage contributions and social presence.

Moreover, the collages can be seen in relation to the cognitive presence indicator recognising problems, as the participants negotiated and developed ideas around their own and other’s collages. Some participants noticed that their understandings had changed through the workshop and no longer matched the visualisations. Other participants challenged and negotiated each other’s collages, leading to altered ideas (table 4). In this sense, Schön’s reflection-in-action is highly relevant, as the materials were important in forming and reforming understandings. Groups also renegotiated their understandings in relation to their own collages, noticing that their conceptions of the visualised projects had changed throughout the process.

Table 4. Negotiating collages.

<table>
<thead>
<tr>
<th>G1 P1:</th>
<th>The blue is only towards the end, I understand that was when you mapped it out as a case study. But I also understand that [the industry partner] was discussing things with you previously, so wouldn’t you say that there’s a knowledge transfer?</th>
</tr>
</thead>
<tbody>
<tr>
<td>G5 P1:</td>
<td>So yeah, maybe some of the blue should have been here [on the collage] because part of the learning came from what he was doing with other venture partners and stakeholders.</td>
</tr>
</tbody>
</table>
Reflection-on-action (Schön 1983) in which participants looked back on past experiences was fruitful in allowing them to gain new perspectives on collaborative practices. *Collaborative Landscapes* was supportive for Communities of Inquiry indicators in relation to engaging participation by contributing with metaphors and interpretations, and renegotiating one’s own and others’ collages and perspectives.
4.4 Paper Landscapes

Framing and situation

*Paper Landscapes* was used in 2018, in a workshop with Information Design bachelor’s students in their second and third years. The workshop was part of the MDH Living Lab study described in Paper III. The study focused on students’ comprehension of design collaborations with external organisations. The tool aimed to prompt reflective practice (Schön 1983) on the design process and the relationship between the methods of collaboration and the results. By sharing personal experiences on past actions, the participants could elaborate their understanding of the collaborative design process. This tool was similar to *Collaborative Landscapes*, and I was curious to explore whether metaphors and *humour* would emerge.

Artefacts and format

Rather than using geometric shapes, as in *Collaborative Landscapes*, I gave students sheets of coloured paper. The reason for this was to explore what shapes the design students would create. The different colours represented various aspects of the students’ project, much like the *KT Cards* categories: purpose, stakeholders, processes, outcomes, learning outcomes and feelings. The collages were created in relation to Gibbs’ Reflective Cycle model (1988), and the reflection process was broken up into different stages (figure 13). Expressing feelings is important at the start of this process so as to not hinder reflection. Students made collages individually (figure 14), as they were working on individual design projects, and then introduced their collages in groups of three. Following the presentations, the groups answered a list of questions focusing on the connection between methods and outcomes.
Figure 13. Gibbs’ Reflective Cycle model. (Diagram adapted by Laura Gottlieb)

Figure 14. Student’s collage visualising process. (Photo: Laura Gottlieb)
Method

Nine students participated in the workshop (out of a total of 33 students in the whole study), which lasted for 1.5 hours. The students were asked to fill out a questionnaire at the end of the workshop to get feedback on whether the collages were useful for the students in reflecting on their design process. The collage presentations and group discussions were audio recorded and transcripts were made of the recordings. In the analysis, I annotated the transcripts and questionnaires in relation to the Communities of Inquiry indicator and compared the workshop to Collaborative Landscapes.

Results and discussion

Students used pens to write on their papers, and the collages they created were not symbolic like those in Collaborative Landscapes. Neither metaphors nor humour were prevalent in the workshop, which I found unexpected, as these were so prominent in Collaborative Landscapes. This result led me to the reflection that the geometric shapes (unlike the coloured paper) encouraged symbolic visualisations of the design process and the use of metaphors. The basic shapes enabled “endless variations, combinations, permutations” (Dondis 1973), and inspired symbols, metaphors and interpretations, while the coloured paper did not.

In the questionnaires, the students expressed feeling emotional support from sharing their processes with other students. For example, one student wrote: “[it was useful to share experiences with others] to hear that I am not the only one who is in a frustrated state in my studies”. The format of expressing emotions, as proposed by Gibb’s model (1988), and using coloured paper to visualise feelings on the collage led to self-disclosure as participants shared personal experiences. By reflecting-on-action (Schön 1983) and seeing their collages, some students understood their process more clearly and knew what they needed to focus on going forward.
4.5 Cookie Teatimes

Framing and situation

Cookie Teatimes were created to inspire the workshops at the Design Research Conference 2018 (Tea Compositions) and the Participatory Design Conference 2018 (Fabric Landscapes). Three Cookie Teatimes were held with researchers and teachers at my research environment at MDH. Many participants – although not all – had pre-established relationships and friendships with each other. The topic of inquiry focused on processes of co-production – the close collaboration between academic researchers, industry and municipalities (Öberg, Sannö & Jackson 2018). The purpose for choosing the topic of co-production was to promote these conversations in the research and education environment in line with the aims of the MDH Living Lab. I also aimed to identify challenges in co-production in order to inspire my own design of tools to support collaborative practices. In this way, the design experiments served as Research for Design. I intended to stimulate close interpersonal relationships through the design of a Playful Trigger (Loi 2007).

Artefacts

I used the teatime idea from my master’s project Philosophical Teatime as a means to invite people into conversation and introduce the topic of inquiry. Creating a teatime with unusual features was meant to stimulate social bonds, as in Playful Triggers. Cookie Teatimes introduced the topic of co-production through what was on the table – that is, the refreshments (figure 15). Inspired by the ambiguous visuals in Collaborative Landscapes, cookies and edible decorations were used to visualise co-production. The ingredients included icing (pink, blue, white, fudge), chocolate pieces (dark, white, multicoloured, raw), and raspberries. Different shapes of cookies were tested in the three workshops. The purpose was to test variations to inspire future workshops, and I took participants’ suggestions into consideration. In Cookie Teatime #1 (CT#1), circular, store-bought cookies were used for individual visualisations. For the next teatime, CT#2, I baked
Figure 15. Individual visualisations in teatime CT#3. (Photo: Laura Gottlieb)

Figure 16. Collaborative visualisation in teatime CT#2. (Photo: Laura Gottlieb)
a large cookie in order for the group to co-create a visualisation (figure 16). In CT#3, I baked triangular-shaped cookies to have a larger base for individual visualisations.

Formats
At around 3 pm, staff members meet in the staff kitchen for a coffee break – called a fika in Swedish. I choose this time and space to host a “Co-production Teatime” and invited staff through an email and a physical sign placed in the staff kitchen. In the three workshops, participants were introduced to my research project and invited to visualise “what co-production looks like” through the cookies and decorations. In the case of individual visualisations, participants presented their cookies to each other. Afterwards, I asked questions about difficulties in co-production and opportunities for tools to support communication in such collaborations. At the end of the workshops, the participants ate the cookies and gave feedback about the Cookie Teatime.

Methods
A total of eleven researchers and/or teachers participated, and the three teatimes were audio and video recorded and transcribed. There was a mix of participants from the research department and researchers from another department and institute. The data was sorted in relation to the aims of the teatime: (1) visualising co-production, (2) eliciting difficulties in co-production, and (3) exploring the possibility of using such tools with external partners. Feedback was given verbally by the participants at the end of the workshop, of their own accord. The transcripts were annotated with the Communities of Inquiry indicators.

Results and discussion
In Cookie Teatimes, I created the metaphor of co-production as a cookie. As participants visualised co-production with the cookies and edible ingredients, other metaphors emerged. For example, the rose petals came to represent the vision (CT#2, CT#3) and the fragility (CT#1) in co-production.
Designing Tools for Joint Inquiry

processes. The physical properties of the materials (textures, colours, flavours, shapes, size) became a way to reason about the topic. For example, the fudge came to represent the “glue” that binds collaborating partners – either through personal relationships or common interests (CT#2). This echoes Lakoff and Johnson’s claim (1980) that treating our experiences in terms of objects and substances allows us to refer to the experiences, categorise them and reason about them.

Engaging with the materials was part of brainstorming, as ideas about the topic came from engaging with the materials. For example, one of the participants expressed:

So, it’s not just that I had this idea of what [the cookie] would be, [the idea] was more shaped while building the cookie, I guess. So, the cookie building was good for understanding as well. (CT#1)

The making process was part of eliciting ideas about the topic, indicating reflection-in-action (Schön 1983). The “conversation with the materials” was part of the inquiry process. Participants in CT#1 remarked that the textures, tastes and looks of the material were unexpected, and that these opened up new perspectives. However, one participant in CT#1 expressed feeling distracted by the tastes of the decoration ingredients in relation to the task to visualise co-production.

Participants recognised problems when using the cookie as a metaphor for co-production. In CT#2, participants commented that the cookie materials were too static to represent the dynamic processes of co-production. For example, the decorations would need to move around on the cookie as the project develops. This elicited questions about how to choose suitable materials and metaphors for a topic, as well as whether unsuitable materials and metaphors could also be valuable. In my opinion, Lakoff and Johnson’s famous example of the metaphor of “argument as dance” (1980) demonstrates the value of “unsuitable” metaphors. Although dance does not capture how we generally talk about and engage in arguments, it can highlight what an argument is and is not, and offer other possibilities for
communicative practices. Hence, materials that prompt strange metaphors for a topic could bring clarity on what something is, as well as providing other possibilities.

Generating metaphors in *Cookie Teatimes* was related to *humour* – an indicator in social presence. There were unexpected utterances and connections between the topic and the material. For example, in CT#2, participants showed surprised and humorous reactions to emerging metaphors:

Table 5. "Fudge line!" – Metaphors and humour.

<table>
<thead>
<tr>
<th>CT#2</th>
</tr>
</thead>
<tbody>
<tr>
<td>P: So there should be more fudge lines.</td>
</tr>
<tr>
<td>M: More fudge lines! The first that’s ever been uttered.</td>
</tr>
<tr>
<td>(Several participants laugh)</td>
</tr>
<tr>
<td>A: Fudge line, new word.</td>
</tr>
<tr>
<td>P: Fudge lines of interest.</td>
</tr>
<tr>
<td>Ka: Critical line.</td>
</tr>
</tbody>
</table>

The elicitation of metaphors was related to the intention of stimulating social bonds in order to initiate joint inquiry. *Humour* in relation to metaphors was particularly prevalent in CT#2 when participants were co-creating the cookie. Here, participants were collectively making meaning of the material and of co-production through metaphors, which prompted continuous humorous interactions. Rosanna van Klaveren (2012) also discusses the format of co-creation activities in relation to stimulating a connection between participants. She observed a lack of connection between participants in relation to completing individual exercises. Therefore, van Klaveren proposes that collective activities could be more useful for the purpose of stimulating connections (Ibid., 4). A comparison of the sessions in *Cookie Teatimes* CT#1–3 also points to this conclusion. However, it should also be said that the participants in CT#2 were from the same research department and many knew each other well from before. In this sense, the framing of the project – that is, doing the workshop within a research environment – also contributed to social presence.
One of the intentions of the design experiment was to explore the possibility of designing a tool for collaborations between academia and industry/municipality partners. When discussing the potential of using such a tool between academic and industry partners, participants expressed both openness and apprehension. Participants said that industry partners are busy and may feel stressed sitting down for a tea, but that doing so could also be important. Other participants said that they would only try this tool with partners they know well. Bødker’s concept of an “institutional artefact” addresses the context dependency of artefacts that will have different expectations in various contexts with various people (2009). A Cookie Teatime can therefore be stressful and not appropriate in certain contexts with certain collaborative partners.

The teatime workshops elicited multiple challenges in co-production. One such challenge was that collaborations are people dependent and that it is difficult to continue the collaboration when people change jobs. I used these considerations in my next design experiment, Tea Compositions, in which I continued exploring Playful Triggers that could support new collaborations.
4.6 Tea Compositions

Framing and situation

*Tea Compositions* were created for conference participants in a 90 minute workshop session at the Design Research Society Conference (DRS) 2018 in Limerick (Publication IV, appendix). The purpose was to create a ritual that would support organisations and researchers at the start of a collaboration by enabling them to first experience and then reflect on the interpersonal dynamics in the collaboration. Through a ritual, I intended to explore self-inquiry and democratic participation in the sense of including all participants in decision-making processes. These aspects are important in co-production processes, according to Ulrika Florin and Erik Lindhult (2015), in order to promote different knowledge interests and needs. The ritual was also intended to function as a Playful Trigger to stimulate social presence between new collaborators. The idea of *Tea Compositions* was inspired by conversations during *Cookie Teatimes*, in which researchers discussed how people-dependent collaborations are and how individuals have their own particular ways of working. By simulating a co-production process – co-creating a tea blend – I hoped to evoke awareness about people’s various approaches to a task and ways of working together. In this way, I intended to promote reflection-on-action (Schön 1983) to reflect on experiences in the workshop, and reflection-in-action, as the experiences would be ongoing. The conference participants that attended the workshop included PhD students with experiences of collaborating with industry and municipality partners.

Artefacts and formats

At the start of the workshop, groups of participants were given a stack of paper cups, a kettle, and seven different teas or herbs: chamomile, mint, Assam black tea, gunpowder green tea, jasmine, hibiscus and lemon leaf (figure 17). I chose teas and herbs that I thought could work well in relation to each other. To start things off, I introduced the project, and everyone in the group discussed their understandings and experiences of working with
Figure 17. Teas for blending; work in progress. (Photo: Laura Gottlieb)

Figure 18. Participants co-producing a tea blend at DRS. (Photo: Laura Gottlieb)
co-production. Afterwards, the participants created a tea blend in small groups of 2–3 people (figure 18). The tea-blending process was given the following constraints: the tea blends needed to contain at least three ingredients; and all group members had to like it. Setting these constraints was intended to prompt negotiation between participants and a democratic decision-making process that could be reflected on afterwards. After 30 minutes of tea blending, all the groups tasted each other’s tea compositions and discussed questions in relation to the process.

Methods

A total of five participants joined the workshop, and questionnaires were used to gather the participants’ experiences. The questionnaire included statements on a Likert scale that concerned whether participants learned something, whether there were tensions in the tea-blending process, and whether this process drew parallels to co-production. The analysis involved comparing the participants’ answers.

Results and discussions

The intention of this design experiment was to stimulate democratic participation and self-inquiry. However, my experience of the workshop was that these intentions were not fulfilled. Despite the constraint in the process (everyone in a group had to like the tea compositions), I observed that one participant was more dominant than the others. A possible way to stimulate more self-inquiry in relation to the interpersonal dynamics could be the Lickert scale in the questionnaire. The responses to the statements in the questionnaire showed variations in how the participants experienced the tea-blending process. For example, two participants in the group wrote that they experienced tensions in the decision-making process, while another (the dominant) participant in the group wrote that they did not experience tensions. This artefact could therefore be useful in reflecting on people’s experiences and opening up self-inquiry. This type of exercise would need to be handled with care, especially with new groups of people.
From this workshop, I did not have an impression of social presence according to the Communities of Inquiry framework. A contributing factor could be that it was a new group of people. In relation to the aim of designing a ritual for researchers and external partners, a participant stated that industry partners might find such activities difficult due to limited time. On the other hand, the design experiment was picked up and tested by a research institute collaborating with a company from industry in *Coffee Compositions* (p. 70).
4.7 Coffee Compositions

Framing and situation

A Swedish research institute and a Dutch energy company were inspired by *Tea Compositions* to create their own ritual for initiating a collaboration. In September 2018, a group travelled from Holland to meet the research group in Sweden in order to explore common interests, problems and opportunities for collaboration. I was invited to design a Playful Trigger and to facilitate a workshop during this meeting. The group leaders wanted the group to relate on a personal level rather than through a rational process. After presenting the *Tea Compositions* idea, my involvement in the design of the ritual was disrupted due to a scheduling incompatibility. The organisations decided to continue developing my idea and created their own ritual: *Coffee Compositions* (a name I use to refer to it). The companies changed the tea to coffee, which they thought was more appropriate for the Swedish context. In this way, the Swedish hosts could introduce the Dutch guests to a Swedish *fika* (coffee break).

Artefacts and formats

In *Coffee Compositions*, the participants co-created their own coffee blend. The coffee blend was intended to be connected to the characteristics and personalities of the group. In this sense, the coffee blend became a metaphor for the dynamic of the group. The coffee-blending activity took place in the morning, before any formal introduction of the companies had been made. Four types of coffee were brewed and tasted, and the participants attributed qualities to the coffees and wrote these on the cups. For example, participants described the coffees as earthy, strong, smooth, grounded and “a picker-upper” (figure 19). Next, the participants introduced themselves and their colleagues by attributing qualities to one another, such as nerdy, optimistic and chaotic. The whole group then attributed qualities to the kind of collaboration that they would like to have and chose coffees to include in the group’s coffee blend. The group’s coffee blend included the characteristics of groundedness, inspiration, comfort,
Figure 19. Associating adjectives with the coffee. (Photo: Laura Gottlieb)

Figure 20. The packaged coffee (left); description of a coffee (right). (Photo: Lizette Reitsma)
and reflection. As a surprise, the workshop organisers later packaged the coffee blends and sent them to the participants after the event (figure 20, right picture).

**Methods**

The two group leaders and one person from the Swedish company were interviewed about their experience with *Coffee Compositions*. The interviews were held six and eight months after the workshop (two in person and one online). My questions were open-ended and asked the interviewees to recount their experiences, describe what had happened in the workshop, report on whether it had led to something and state whether they would do it again. A total of 2 hours and 16 minutes were recorded, and notes were taken during the interviews. The notes were compiled into themes. Some parts of the interview were then revisited in order to re-listen to relevant aspects from the themes. Data had not been collected during the workshop because I was unaware that the companies were doing this workshop until afterwards. The companies invited me to interview them about their experience of the workshop, considering that it had been successful. The Communities of Inquiry indicators were compared to the results from the thematic analysis.

**Results and discussion**

Prior to this workshop, I was accustomed to designing tools and facilitating workshops. It was therefore interesting to see what happened when I did not assume either role. According to the interviews, it was valuable for the leaders from both companies to co-create *Coffee Compositions* and the workshop together. This endeavour gave them the opportunity to experience what it was like to collaborate with each other; they said that it had strengthened their relationship as friends and future collaborators. The interviewees described the workshop as creating an open and vulnerable space where people could introduce themselves, which planted a seed for future collaborations. One interviewee said that having had an experience together made it easier to connect in the future. The interviews indicated that there was social presence – encompassing emotional expression, self-
disclosure and humour. For example, all the interviewees mentioned feeling compassion towards one participant who had not drunk coffee for many years but had made an exception for the workshop. Self-disclosure can be seen in relation to the format, in which participants described themselves and colleagues through adjectives. One interviewee remarked that it was “heart-warming” to hear colleagues describe each other. Furthermore, one interviewee mentioned that ascribing adjectives to the coffee first enabled the group to laugh together. In this sense, Coffee Compositions had a similar function to Playful Triggers as an “ice-breaker”, and supported humour in social presence.

The interviews indicated the sensitivity of re-using the tool in various contexts and showed that the tool could become “gimmicky” if used several times. The elements of newness and surprise could therefore be important for such a tool. Moreover, the leader of the Dutch company said that he would feel embarrassed to do this workshop in his normal work environment, as their meetings focus more on work. The participant from the Swedish company also questioned whether the company’s leadership would see this kind of workshop as a waste of resources. These queries emphasise the crucial aspect of framing; here, the purpose was to get to know new collaborators, so the tool was not intended to be used in an ordinary work setting. The feedback from the interviewees also highlighted the context dependency of the tool, or what Bødker calls “institutional artefacts” (2009). Different contexts have different expectations and norms, and such activities may be risky and require openness in such contexts. The leader from the Dutch company said that travelling to a new context created an openness to try something new.
4.8 Fabric Landscapes

Framing and situation

This tool was created for a workshop and exhibition session at the Participatory Design Conference 2018 (PDC 2018). The intention was to create a Playful Trigger (Loi and Burrows 2006) to support reflection-on-action (Schön 1983) in relation to co-production. As the tool would be used with design researchers at PDC 2018, I decided to focus the tool on sharing experiences with and identifying problems in university-society collaborations. At the same time, the tool was still aimed at stimulating interpersonal relationships, as conference participants may not know each other. Fabric Landscapes was exhibited in August–October 2018 at the Z33 House for Contemporary Art in Hasselt, Belgium (figure 21). Publication VI outlines the conference proposal.

Artefacts

Fabric Landscapes was developed from Collaborative Landscapes and similarly used different coloured geometric shapes to visualise the interrelationship between university-society collaborations, innovation and knowledge (figure 22). The following elements were visualised in Fabric Landscapes: society (white), university (black), innovation (red) and knowledge (blue). Rather than using paper shapes, I created fabric shapes that would last for the duration of the exhibition. I also wanted to explore the fabric material for making a “toolkit” for collaborators to reuse in projects. The fabric shapes would then become part of the tablecloth, “setting the table” for inquiring into a topic, and for brainstorming and identifying difficulties in collaborations. I kept the format of a teatime from my previous design experiments and served tea at the start of the workshops to set a calm pace and to introduce the project.
Figure 21. PDC exhibition. (Photo: Kristof Vrancken)

Figure 22. Workshop during PDC 2018. (Photo: Capucine Falgas)
Formats

Two workshops were held immediately after each other, each lasting 20 minutes. The workshop started with tea drinking and an introduction to the project. Next, the participants worked in pairs to visualise co-production using the shapes and colours. As the participants had not collaborated before, the visualisations represented a general scenario of a university-society collaboration. After 5–10 minutes, the pairs presented their collages to the rest of the group. When the first workshop (with group 1) was finished and the participants had left, another group of participants arrived for the second workshop (group 2). The second group received the previous group’s collages and interpreted and adapted these to represent their ideas of co-production. After group 2, the collages remained on the table for the exhibition visitors to interact with. A menu was printed that invited visitors to sit around the table and visualise their collaborative processes.

Methods

In each workshop, there were 6–7 conference participants. Pictures and notes were taken during the workshops, and these were used for the analysis. The analysis involved reflecting on the fabric material, the feedback and actions in relation to the fabric. I then reflected on how these relate to Communities of Inquiry indicators. The video and audio recordings failed, and there was not enough time to use questionnaires.

Results and discussion

Participants wanted to “break out” of the rigid material and suggested using more flexible materials, such as paint or dancing, and spreading things out, such as salt and pepper. One group even shredded the sides of the fabric shapes and spread out the threads on their collage (picture B in figure 22). Participants also suggested experimenting with scale and working with larger shapes and colour nuances. In this sense, having the fabric shapes be more durable placed limitations on the participants’ desires for visualising university-society collaborations. The paper shapes
in the Collaborative Landscapes could be more easily manipulated, as paper can be ripped, cut, scrunched up, bent and written on. However, the rigidity of the material can also be a positive aspect in relation to inquiry. The physical limitation evoked discussions on suitable materials and metaphors for the topic. The rigidness highlighted the dynamic process of co-production, which could not be appropriately visualised through the fabric shapes. This finding echoes Lakoff and Johnson’s (1980) description of the value of metaphors in relation to sensory experiences as a means of reasoning about experience. The physical properties prompted negotiation about what co-production is or is not. Furthermore, the design experiments prompted speculative questions about how different materials could bring forth various understandings of co-production, depending on the physical properties. Lakoff and Johnson argue that metaphors can bring forth something new, altering behaviour and understanding. Hence, it could be interesting to further explore how different materials enable different metaphors and understandings of co-production.

Using different formats in Fabric Landscapes – that is, creating collages using shapes (group 1) or altering a pre-made collage (group 2) – highlighted ways to heighten provocation and engagement in the inquiry process. The pairs in group 2 that interacted with the already-made collages seemed to quickly engage in the process of interpreting and reshaping the collages. For example, one pair in group 2 (picture B in figure 23) changed the collage from group 1 (picture A in figure 23) completely, critiquing the collage as “the Silicon Valley Model of Innovation”. The format of receiving a collage rather than mere geometrical shapes therefore played an important role in eliciting problems and puzzlement – the first phase of cognitive presence in the Communities of Inquiry framework.
Figure 23. Diagram of the collage made in group 1 (A) and then altered by group 2 (B). (Diagram by Laura Gottlieb)

My impression from the workshop was that social presence was not prevalent between the workshop participants and therefore did not result in a Playful Trigger. A contributing factor for this finding could be the short time frame of the workshop session, which did not allow enough time for participants to get to know each other. In relation to reflection-on-action, the short time frame hindered deeper inquiry into the topic of difficulties in co-production. However, the time frame did allow collages to be shared and materials’ suitability for visualising co-production to be negotiated.
4.9 Museum Teatime

Framing and situation

*Museum Teatime* was developed for a Participatory Design project within a regional museum in Sweden in April 2019. In this project, youth (14–19 years old) and design and climate researchers participated for four weekends at the museum over a six-month period to inquire about carbon dioxide emissions through participatory theatre methods. I was invited to the project to design a teatime during the third weekend of the project. The teatime aimed to create a space for reflection rather than quick solutions, in order to allow participants to consider various aspects and problems in relation to the climate crisis. The teatime drew inspiration from relational ontology, which connects the ecological crisis to how we understand and relate to other beings and “nature”. Relational ontology involves a personal transformation in order to embody and understand the interdependence of all things (Escobar 2018). During the teatime, new participants (friends and family of the youth and researchers) would participate. I therefore intended to support social presence by designing a Playful Trigger.

Artefacts

To explore the topic of how our ways of relating connect to sustainability, I introduced concepts from relational ontology into the teatime (figure 24). The concepts were embedded onto the tableware as a means of eliciting reflections on this topic. The intention was to create a Playful Trigger through unusual ways of engaging with the concepts in the teatime. I placed a concept from relational ontology inside each teacup, to give participants the impression of drinking the word. The words were chosen from “Design for the Pluriverse” (Escobar 2018) and were: *love, compassion, interconnection, local, community* and *responsibility*. The tea cups that were used were second-hand, in line with the guidelines of the museum project to reduce carbon dioxide emissions. The second-hand cups inspired the use of food colouring to write the words inside the cups, as it was not possible to fire the already-made tea set with non-toxic porcelain paint. The food
Figure 24. One of four tables, *Museum Teatime*. (Photo: Laura Gottlieb)

Figure 25. *Museum Teatime* set-up. (Photo: Laura Gottlieb)
Figure 26. Teapot at the end of the workshop, Museum Teatime. (Photo: Laura Gottlieb)

Figure 27. Participants around a tea time table, Museum Teatime. (Photo: Andreea Strineholm)
colouring added an interesting twist and a surprising element, as the colouring would dissolve into the tea and the participants would actually drink the word. The tea selected for the teatime had an unusual, bitter flavour and a bright red colour. The purpose was to use the same red colour as the food colouring so that the dissolving word would blend into the drink. Each participant had a placemat that contained a menu of the words in English and their Swedish translations.

Formats
Youth, adults, design researchers and one climate researcher were mixed and spread across four teatime tables in a generic event space in the museum (figure 27). After a brief introduction, participants chose a cup with a word from the middle of the table. In relation to their words, participants were asked to draw or write down reflections on their placemats. After three minutes of individual reflection, each participant shared his or her story with the others at the tea table. When all the stories had been shared, the designated facilitators (the design researchers) asked the participants whether there were any common themes. The participants received water-based pens to write emerging themes on the teapots (figure 26). The facilitators also asked the question of how the stories might relate to sustainability. At the end of the session, participants picked a new word that described what they would like to take with them in the future and wrote these on or in their cups.

Method
The workshop lasted for 1.5 hours and a total of 25 people participated. This included thirteen youth (14–19 years old), four adult participants (25-60 years), eight design and climate researchers (one of which was the museum director). Data was collected in the form of questionnaires, audio recording and video recording. In addition, I had an informal conversation with a participant at an event six weeks after the workshop and notes were taken. I transcribed the audio recordings and annotated the video material in order to familiarise myself with the material. The Communities of
Inquiry framework was then used to analyse the material, and the transcripts were coded in NVivo, a qualitative data analysis software, in relation to the indicators for joint inquiry. I also mapped the indicators from cognitive and teaching presence on the same sheets of paper to reveal the relationships between the indicators. The study is described in paper IV.

Results and discussion

The results show a prominence of the indicators humour, phatic communication (small talk), and self-disclosure, and the study indicates ways in which the teatime design supported social presence. First of all, the teatime setting and food prompted phatic communication and humour. Participants were talking and laughing in relation to the food and tea. For example, participants teased each other for their love of chocolate (table 6).

Table 6. Commensality, phatic communication, and humour.

<table>
<thead>
<tr>
<th>At table 2 (H is the facilitator)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
</tr>
<tr>
<td>(Laughter)</td>
</tr>
<tr>
<td>H</td>
</tr>
<tr>
<td>L</td>
</tr>
<tr>
<td>(Laughter)</td>
</tr>
<tr>
<td>C</td>
</tr>
<tr>
<td>H</td>
</tr>
<tr>
<td>(Laughter)</td>
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<tr>
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<td>B</td>
</tr>
<tr>
<td>H</td>
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<tr>
<td>L</td>
</tr>
<tr>
<td>(Laughter)</td>
</tr>
<tr>
<td>H</td>
</tr>
<tr>
<td>(Laughter)</td>
</tr>
</tbody>
</table>

The format of choosing cups and words at the start of teatime also prompted humour, as participants teased each other. For example, one
participant assigned a cup to someone else. A participant described this activity as an “ice-breaker”, which corresponds to the function of Playful Triggers (Loi and Prabhala 2008).

Many participants already knew each other, which helped explain why they felt comfortable teasing each other. Hence, social presence was a precondition to the workshop. However, the data shows how the artefacts and formats of the teatime activated social presence through humour and phatic communication. Table 7 gives an example of how the unusual elements of the teatime, such as the bitter and bright red tea, were part of humour and phatic communication (table 7).

Table 7. Uncertainty, phatic communication and humour.

At table 4 (M is the facilitator)

L Help yourself to some tea when you’re finished.
(E takes a grape)
(J pours tea first for self, and then for E, A and S)
(M pours tea) Oh, it’s red tea!
(S and T laugh)
(M That’s wicked. That is wicked!
(E What is that?
(M It’s pomegranate.
(T Granatäpple [pomegranate]
(J Jag hällde upp hos er [I poured for you]
(T It’s a bit sour.
(E Mmhmm
(T Extremely beautiful colour
(M It is, look at the text dissolves!
(T Mmm
(Laughter)
(M pours tea for self)
(J smells tea, then tastes it and makes a facial expression, eats a grape)
(E You don’t like it?
(J No, it’s not sweet.
(T No, it’s not sweet. It’s a bit sour.
(J It’s not nice.
(T Like, like!
The food and tea can also be seen as establishing etiquette in teaching presence, as the participants poured tea and offered food to each other. The context of commensality can be seen to stimulate behaviours of sharing the food with each other. The shared teapots and plates of food could be a way to reinforce relationships by having the participants tend to each other. Other design researchers using commensality in their tools have reported on the impact of commensality on social presence (Light and Akama 2014, Clarke et al. 2019, Barden et al. 2010). For example, Light and Akama (2014) describe their “Tea Party” tool as a simple mechanism to prompt conviviality – that is, a merry atmosphere. In my research, commensality is similarly related to conviviality, specifically in relation to phatic communication and humour.

Light and Akama’s work (2012) highlights the importance of the facilitator in the group dynamics that emerge and in how people can become engaged in a design process – or remain unengaged. The facilitators played a large role in the Communities of Inquiry framework indicators. The facilitators in Museum Teatime focused discussion, encouraged contributions, and elicited
puzzlement. In relation to social presence, the facilitators influenced self-disclosure. One way in which they did so was to ask participants about their personal experiences. When participants shared general reflections in relation to the words in their cups, facilitators asked follow-up questions about the participants’ personal experiences. The facilitators also shared personal experiences, which prompted other people to do the same. Cutler (1995) describes the reciprocal effect of self-disclosure: it encourages others to do the same. The facilitators and participants thus prompted self-disclosure by asking questions and sharing personal experiences. The ambiguous drawings on the placemats supported facilitators in asking deepening questions about the participants’ experiences. Table 8 shows an example of personal questions asked to a participant which elicited a personal and vulnerable story about experiences with racism.

Table 8. Personal questions and self-disclosure.

<table>
<thead>
<tr>
<th>At table 4 (M is the facilitator)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>T  May I ask – do you have [racism] in your class, do you have the same experience?</td>
<td></td>
</tr>
<tr>
<td>S  Yeah.</td>
<td></td>
</tr>
<tr>
<td>T  You have?</td>
<td></td>
</tr>
<tr>
<td>S  I don’t know.</td>
<td></td>
</tr>
<tr>
<td>A  But you said that there was?</td>
<td></td>
</tr>
<tr>
<td>S  There is, there are many racists. They don’t want to talk to, not just Syrians, but all immigrants.</td>
<td></td>
</tr>
<tr>
<td>J  I have those in my class as well.</td>
<td></td>
</tr>
<tr>
<td>S  I have tried to talk to them normally. I am not trying to be Swedish but just as I am. But they don’t accept, so I spend time by myself.</td>
<td></td>
</tr>
<tr>
<td>T  No.</td>
<td></td>
</tr>
<tr>
<td>S  I have [participant] A in my school.</td>
<td></td>
</tr>
</tbody>
</table>

In the questionnaires, all the participants wrote that they experienced a sense of togetherness; in other words, social presence. Participants said that they felt free to say anything and be vulnerable – indicating risk-free expression and self-disclosure. One participant wrote:

It felt like we could talk about things that made you vulnerable, but that everyone could receive this and we got some kind of connection. It felt like we could talk on a deeper and more personal level for the first time. (Table 3)
One participant, however, wrote that the togetherness faltered, as some people were more dominant in the conversation than others. Although the format of giving everyone “airtime” – time to speak – was intended to include everyone, it was not sustained throughout the workshop. Furthermore, the questionnaire responses revealed two aspects that were important for the participants’ experience of togetherness that are not encompassed in the social presence indicators. These aspects included “having a common goal” and “everyone having space”, the latter of which is important for democratic participation. As democratic participation is a crucial element in Communities of Inquiry (Lipman 2003), the framework and social presence could be developed to include this aspect.
5 Summaries

This chapter summarizes the empirical results from the design experiments in relation to the Communities of Inquiry framework.

KT Cards
The artefacts and formats supported brainstorming on societal issues and ways of approaching these issues. The different formats of using the cards affected the pace, competitiveness and ways of thinking together. My impression from the workshops was that social presence was not prevalent; however, due to the lack of audio and video recording, this result is not elaborated on. Testing the tool with intended users led to the development of another tool: Collaborative Landscapes.

Wire
In this exploratory design experiment, social presence was prevalent in relation to self-disclosure. Self-disclosure related to the format of asking the question “describe your research process”, as participants shared stories about their personal approaches to research. Participants described the tool as creating a kind, playful and shared space, which did not necessitate consensus.

Collaborative Landscapes
Creating collages using geometrical shapes prompted metaphors, which in turn encouraged contributions and prompted humour. Participants contributed with questions and negotiated their own and each other’s collages stories, thereby recognising problems. The participants noted that their understandings of the visualisations and projects had changed throughout the workshop.
Paper Landscapes
Giving students coloured A4 paper did not result in the students creating symbols or metaphors as in Collaborative Landscapes. There was also no humour in relation to the collages. The participants used pens to write on the pieces of paper, making the collages literal and not figurative. Visualising feelings on the collage prompted self-disclosure, and students said that this was supportive. Furthermore, the students described understanding their process more clearly upon seeing their visualisation and coming to better understand what they need to focus on going forward.

Cookie Teatime
Providing participants with a metaphor – a cookie as co-production – elicited metaphors and humour from the participants. In the format in which the participants co-created a visualisation (CT#2), there was a more prominent use of metaphors and humour. The framing of the workshop – inviting the research department into conversation – meant that many (although not all) of the members of a group knew each other. This is also likely to have contributed to social presence. The cookie-building process supported brainstorming, as ideas were generated on the topic during the process. Participants expressed uncertainty about using this tool with external partners, and some said that they would only use the tool with collaborators they know well. Moreover, the participants in CT#2 said that it was difficult to visualise the dynamic process of co-production through a static material – thus recognising problems in the metaphors afforded by the material properties.

Tea Compositions
The intention with Tea Compositions was to simulate reflection on collaborative processes and promote democratic participation by setting the format of everyone having to like the tea blend. However, this did not seem to be successful, as there were still dominant participants. I did not have the impression of social presence in the workshop; a contributing
factor may have been the new group of participants. The participants said that doing such an activity with industry partners could be difficult, due to industry’s time constraints. The tool was picked up and adapted by two companies initiating a collaboration in *Coffee Compositions*.

**Coffee Compositions**

From the interviews with the participants and creators of *Coffee Compositions*, there seemed to have been social presence in the workshop. One contributing factor could have been the format of attributing adjectives to oneself and one’s colleagues, prompting *self-disclosure* and *emotional expression*. There were queries about carrying out such a workshop in other framings that focus more on work. In relation to *Coffee Compositions*, it was valuable for the leads of both companies to co-create the tool together, as it gave them the chance to experience what it was like to collaborate with each other. They commented that this strengthened their relationship as friends and future collaborators.

**Fabric Landscapes**

Participants *recognised problems* in the fabric material and wanted to break out of the rigid material in order to represent nuances and dynamic processes over time. Trying two different formats revealed that starting with ready-made collages (rather than geometric shapes) prompted rapid engagement, such as critiquing and changing the inherited collages. Based on my impression, there did not seem to be social presence through *humour* and *self-disclosure*. A contributing factor could be the short 20 minute time frame for the workshops, which did not seem sufficient for participants to form close social bonds.

**Museum Teatime**

Social presence was prevalent in *Museum Teatime*, and all participants expressed feeling a sense of togetherness in the questionnaires. Commensality and the unusual features of the teatime (choosing cups, tea, food colouring) prompted *phatic communication* and *humour*. For example,
a participant described the choosing of cups as an “ice-breaker” that prompted teasing and laughter. The shared food and tea can be seen as *establishing etiquette* in teaching presence, as participants tended to each other by pouring tea and offering food to each other. The facilitators played a large role in *self-disclosure* by asking questions about participants’ personal experiences. The facilitators also shared personal experiences, which prompted others to do the same. The placemats with drawings *encouraged contributions* and interpretations, and supported facilitators in asking follow-up questions. Participants described feeling vulnerable, compassionate, and free to say anything, which indicates *emotional expression* and *risk-free expression*. The framing, in which many participants knew each other from previous workshops, supported social presence. A participant remarked that a hinderance to togetherness was that some people took more “space” than others.
6 Results and Discussion

This chapter discusses the empirical results of the design experiments in relation to the theory and previous research. The purpose is to answer the research questions: (RQ1) What indicators in the Communities of Inquiry framework do tools support? (RQ2) In what ways do tools support and hinder the indicators in the Communities of Inquiry framework?

6.1 Towards a Systematic Approach

This research aims to develop an understanding of how to design and evaluate tools for joint inquiry. Tools in Participatory Design processes are created to support joint inquiry between multiple stakeholders. It is therefore important to understand how and why tools and joint inquiry interrelate, in order to deliberately design tools for joint inquiry.

Furthermore, the pursuit of a systematic approach addresses the need for systematic evaluations in the Participatory Design research field (Bossen, Didler, and Iversen 2016). This thesis is a starting point towards developing a systematic approach to evaluate and design tools in relation to indicators for joint inquiry.

The Communities of Inquiry framework (Wanstreet and Stein 2011) and a categorisation of a tool (Eriksen 2009) were adopted in order to develop a systematic approach. These frameworks distinguish what makes up a tool and a joint inquiry, which allows for these attributes to be identified and interrelated (figure 28).
Figure 28. Analysis framework. (Diagram by Laura Gottlieb)

Since the frameworks were used to analyse the data towards the end of this research process, not all of the design experiments were systematically designed and/or designed in relation to the frameworks. Different methods of data collection were used for various design experiments; these included notes and photographs in *KT Cards*, but audio and video recordings, interviews and questionnaires in *Museum Teatime*. As a result, different indicators from the Communities of Inquiry framework could be distinguished in relation to the data collection methods. For example, in the last design experiment, *Museum Teatime*, more Community of Inquiry indicators were identified in the data due to the detailed recording of the workshop than were identified in *KT Cards*. Future design experiments will be deliberately designed to study the indicators in the framework.

Using the Communities of Inquiry frameworks introduced methodological challenges into the analysis. The framework is predominantly used for quantitative analysis in its original field – computer-mediated communication in distance education – in which the indicators are coded.
and used for statistical analysis. In my research, a qualitative approach is adopted to study ways in which indicators for joint inquiry and tools interrelate. Coding the indicators fragmented the material, and it became difficult at times to see the relationship between indicators and the tools. In Museum Teatime, I addressed this issue by mapping the indicators from cognitive and teaching presence onto the same sheets of paper, thereby revealing the indicators’ interrelationships. I will keep developing and working with visual methods of analysis to better understand the material as a whole. The addition of quantitative methods, however, could compliment the analysis of the design experiments.

Lastly, further development of the analysis framework is needed in order to account for human communication and interactions with the tools. The Communities of Inquiry framework was developed for online and text-based learning environments and was created to analyse text. Although this is beneficial for identifying joint inquiry indicators in relation to language, the framework leaves out the richness of gestures, facial expressions, tone of voice and interactions. I compensate for this by using video recordings in Museum Teatime and by annotating the interactions between participants and artefacts into the transcripts. However, further frameworks and methods of analysis could complement the analysis of interactions between people and artefacts.

6.2 Supporting Joint Inquiry Indicators

In relation to RQ1, “What indicators in the Communities of Inquiry framework do tools support?”, the following indicators were found in the empirical data in relation to the tools: humour, phatic communication, emotional expression, self-disclosure, encouraging contributions, setting etiquette, recognising problems, brainstorming and focusing discussion. Although other indicators were present in the empirical data, such as simple agreement, not all were observable in relation to the tool. To understand whether the tools supported the indicators, the answers for RQ2, “In what ways do tools support and hinder the indicators in the
Communities of Inquiry framework”, were used to see which indicators interplayed with the tools. The following sections describe ways in which tools support Communities of Inquiry indicators, answering the second research question.

Metaphors for humour and encouraging contributions
Artefacts that embedded metaphors or promoted symbolic visualisations supported the indicators *humour* and *encouraging contributions*. When I had embedded metaphors into the tool, such as “cookie as co-production” (*Cookie Teatime*) or provided geometric shapes for making collages (*Collaborative Landscapes*), the participants created new metaphors that prompted verbal participation and making jokes. The geometric shapes allowed for multiple “variations, combinations, permutations” (Dondis 1973) (figure 29, left picture), prompting figurative, symbolic visualisations of co-production. In other design experiments in which the artefacts did not contain an explicit metaphor or promote symbolic visualisation, the participants did not create metaphors for the artefacts. For example, in *Paper Landscapes*, the participants used A4 paper to make collages but did not create symbolic visualisations or metaphors, and *humour* was not prevalent in this workshop. The participants used pens instead to write concepts on the paper (figure 29, right picture). The geometric shapes and embedded metaphors gave a sufficient start to prompt participants to create symbolic visualisation and new metaphors, which supported *humour* in social presence.

Figure 29. Collaborative Landscapes (left) and Paper Landscapes (right).
The formats of exploration were also influential in relation to eliciting metaphors and *humour*. In *Cookie Teatime* CT#2, the collective decoration of a cookie prompted more metaphors and *humour* than decorating cookies individually. Although the individual process of *making* and then *telling* stories about the visualisations also led to metaphors and *humour*, it did not do so to the same extent as when co-creating the cookie. Van Klaveren (2012) also discusses the formats of co-creative activities in relation to stimulating connections between participants. She observed a lack of connection between participants in relation to completing activities individually, and therefore proposes that collective activities could be more useful for the purpose of stimulating social connections (Ibid., p. 4). My research also points to this conclusion, albeit with a narrower focus on co-creating ambiguous, symbolic artefacts to elicit metaphors and *humour*.

*Humour* is an indicator for social presence, as it can be an invitation to start conversation, display goodwill and limit distance between participants (Gorhan and Christophel 1990). *Humour* thereby serves an important function in initiating joint inquiry by stimulating social bonds and encouraging participation. Designing metaphors or artefacts for symbolic visualisations could thus be a deliberate approach to initiate joint inquiry by stimulating *humour* and *encouraging contributions*. In linguistic theory, metaphors and humour are connected through the bisociation of ideas, in which breaking the expected narrative line can cause tensions and comic relief (Koestler 1964). By *fusing* concepts – that is, mixing aspects from different concepts – unexpected utterances can come about and evoke *humour* (Kyratzis 2003). This was seen in the empirical data in *Cookie Teatime*, where unexpected combinations emerged from the concept of collaborations and cookie ingredients, resulting in humorous statements such as, “More fudge lines! The first that’s ever been uttered” (CT#2). The connection between metaphors and humour explains the importance of metaphors in Playful Triggers in stimulating social relationships and initiating collaborations. My research builds on Loi’s (2007) and Akama’s work (2008) by presenting how and why designing tools with metaphors
and symbolic artefacts can contribute to social presence by stimulating metaphors and fusing concepts to provoke comic relief.

Commensality for humour, phatic communication and setting etiquette

Another way in which tools supported indicators in the Communities of Inquiry framework was through commensality. The empirical data in *Coffee Compositions, Tea Compositions, Fabric Landscapes, Cookie Teatime* and *Museum Teatime* show a relation between the refreshments and the indicators *humour* and *phatic communication* in social presence. The participants made jokes about liking, disliking and eating particular refreshments, and commented on the teatime setting. Creating tools in relation to the situation of commensality could therefore support social presence indicators. The connection between commensality, *humour* and *phatic communication* relates to findings in other design research using commensality in tools to strengthen social relationships (Light and Akama 2014, Clarke et al. 2019, Barden et al. 2010). Light and Akama (2014), for example, describe their “Tea Party” tool as a simple mechanism to prompt conviviality – that is, a merry atmosphere. My research points to a similar finding and specifies commensality and conviviality in relation to *humour* and *phatic communication*.

The context of commensality brings specific norms to the table that could be a way to deliberately design for joint inquiry indicators – either by encouraging specific norms or by breaking expectations of such situations. An example of encouraging specific norms is found in *Museum Teatime*, where the shared tea and food plates activated behaviours of tending to each other by pouring tea and offering food to each other. This behaviour can be connected to the indicator *setting etiquette* in teaching presence, and is associated with sharing food and drink. The tool design could also be a way to break the specific norms and behaviours of a commensality situation as a means of supporting social presence. In the design experiments, the Playful Trigger concept was used to tweak commonplace situations by encompassing out-of-the-ordinary ways of using cups,
refreshments, and choice of tea. The unusual use of the artefacts in these situations stimulated *humour* and *phatic communication*. For example, a participant in *Museum Teatime* described the choosing of cups with words at the start of the session as an “ice-breaker” that allowed participants to start to tease and laugh with each other. Following or breaking norms and conventions of particular situations (as Playful Triggers attempt to do) could therefore be a way to promote *setting etiquette* and encourage *humour* and *phatic communication*.

**Artefacts and framings for brainstorming**

Framing the tool in relation to reflecting-on-action (Schön 1983) and using artefacts for this purpose supported the indicator *brainstorming* in cognitive presence. The design experiments *Collaborative Landscapes*, *Wire, KT Cards, Paper Landscapes, Tea Compositions* and *Cookie Teatime* involved reflection-on-action in their framing. The tools focused on reflecting on experiences of collaborative practices in order to learn from those experiences and to inform future actions. Reflection-on-action and using artefacts such as collages and cards to visualise and represent the topic supported the introduction of new and multiple perspectives on the topics of inquiry. For example, in *Collaborative Landscapes*, participants negotiated their own and other’s collages and stories, by suggesting various positions and sizes of the geometrical shapes. The collages evolved throughout the workshop, as did the stories about past collaborations. The collages enabled the participants to perceive interrelationships between various elements (Arnheim 1997, Gauntlett 2007), and these relationships were then renegotiated by the participants. The artefacts and formats in *KT Cards* also supported *brainstorming*, as the cards and vocabulary were deliberated and chosen for a particular project and peers suggested alternative cards. Framing the tool with reflection-on-action and using artefacts for this process supported *brainstorming* by encouraging the participants to negotiate different options for visualising and representing the topic. However, it can be questioned to what extent the artefacts supported *brainstorming*, and whether the different and new perspectives would have emerged without the artefacts. To answer this question, a
comparative study would need to take place. Nonetheless, this research shows a correlation between the use of artefacts to visualise a topic and the multiple perspectives that emerged, indicating brainstorming. The artefacts were therefore useful for initiating joint inquiry by opening up various perspectives on the topics, and for negotiating ideas within the group.

Moreover, the making of the artefacts supported brainstorming and shaped the content of the inquiry, indicating reflection-in-action (Schön 1983). For example, a participant in Cookie Teatime expressed that she did not know what to visualise in relation to co-production at the start, and that this understanding was shaped by the cookie-building process. The participant was inspired by the texture of flower petals in her visualisation, which came to represent the fragility of co-production. In this sense, “the conversation with materials” (Ibid.) was part of eliciting topics for the conversations. Participants in Cookie Teatime CT#1 expressed that the textures, flavours and colours added surprising elements to the topic of co-production. However, using multiple sensory elements also had a distracting effect. For instance, one participant in Cookie Teatime CT1 said that the flavours and edibility of the materials was distracting for visualising co-production. In this case, the participants perceived the materials differently – whereas the multiple sensory elements were useful for some participants, they were overwhelming to others.

Materials and formats for recognising problems

Another way in which tools support the Communities of Inquiry indicators is through the materials used for creating metaphors (fabric shapes, paper shapes, cookie ingredients), which triggered recognising problems in cognitive presence. Participants in Cookie Teatime and Fabric Landscapes identified problems in the materials being used to visualise co-production and described the materials as too rigid and static. A participant in Fabric Landscapes even shredded the sides of a rigid fabric shape in order to be able to spread out threads on his collage (figure 30, B). Recognising problems in the materials prompted a negotiation on what co-production is and what it is not. Participants discussed which materials could better visualise co-
production and suggested more fluid materials like paint and dance. The properties of the material were therefore a means by which to reason about experiences, as described by Lakoff and Johnson (1980). The physical properties of the materials became a springboard from which to negotiate what the topic of inquiry was and what materials correspond to it.

Moreover, certain formats were more provocative for recognising problems. An example of this occurred in Fabric Landscapes, where group 2 inherited group 1’s collages to interpret and alter. The group 2 participants displayed more engagement and provocation in this exercise than the group 1 participants, who started with mere shapes. Group 2 (figure 30, B) completely remade group 1’s collage (figure 30, A), and called group 1’s collage “the Silicon Valley’s Innovation Model”. The example highlights the value of exploring provocative formats and artefacts to evoke engagement, thereby recognising problems and alternative perspectives.

Figure 30. Paper Landscapes, group 1 (left, A) and group 2 (right, B).

While artefacts and formats can prompt recognising problems, using artefacts may present a risk if participants do not recognise problems in relation to the materials. The understanding of the topic could be limited to the particular metaphors prompted by the materials. This query emerged in my master’s research, when artefacts were used for metaphors to represent philosophical ideas (Gottlieb 2014, p. 33). There were limitations in exploring concepts through metaphors, as the artefacts would frame ideas in particular ways and prompt assumptions. As Lakoff and Johnson
propose (1980), metaphors are part of shaping our understanding and behaviour. Different materials and artefacts would therefore enable various metaphors, understandings and behaviours. To address this query, the facilitator plays an important role in expanding the topic beyond the realms of those particular materials and metaphors.

Formats and facilitation for self-disclosure and focusing discussion

I started my research with a focus on artefacts and how they contribute to the initiation of joint inquiry. Throughout my experiments, I have come to understand the indispensable role of the facilitators. As described by Light and Akama (2012), people are part of the methods. This means that studying design methods and tools includes studying the people implementing them. In Museum Teatime, the facilitators (and, in some cases, participants) played a central role in focusing discussions and eliciting self-disclosure. The facilitators deepened inquiry on the topic and focused questions on people’s experiences, thus contributing to both cognitive and social presence. The facilitators in Museum Teatime also disclosed personal experiences, after which other participants followed. Disclosing personal experiences can prompt others to do the same (Culter 1995). The facilitators therefore supported self-disclosure by focusing discussions on personal experiences and sharing their own experiences.

Self-disclosure in Wire, Museum Teatime, Coffee Compositions and Paper Landscapes can be seen in relation to the formats – that is, the questions and activities directed towards disclosing personal information. For example, in Coffee Compositions, participants shared adjectives describing themselves and their colleagues. This format of introducing themselves was related to the framing of the workshop, which emphasised getting to know each other on a personal level. In Paper Landscapes, the collage-making process used Gibb’s reflective cycle (1988) and involved describing feelings that emerged in the process that the students were visualising. Visualising feelings also led to self-disclosure, as the participants shared their emotional experiences and commented that they had experienced emotional support.
Results and Discussion

from this activity. Furthermore, the ambiguous artefacts supported the facilitators and participants in asking personal questions. In the Museum Teatime, the facilitators asked further questions about the participants’ drawings on their placemats; the artefacts were therefore conducive for eliciting self-disclosure.

The design experiments show how various formats, artefacts and framings contributed to eliciting self-disclosure. Although it may seem obvious that personal questions lead to self-disclosure, it is important to articulate and highlight the role of self-disclosure in social presence and to deliberately design tools for this purpose. Self-disclosure is important for joint inquiry, as it helps people to get to know each other and builds trust in a group (Culter 1995), which are crucial aspects in initiating joint inquiry (Hadjioannou 2007). Moreover, the design experiments show that self-disclosure occurred in relation to emotional expression, another indicator in social presence. In Coffee Compositions and Museum Teatime, participants expressed feelings of compassion in relation to sharing experiences. Participants described feeling intimacy and vulnerability, which seem to relate to emotional expression and self-disclosure. Therefore, designing for self-disclosure and emotional expression could be a way to shape intimate and vulnerable spaces, thereby providing a means for groups to build trust and get to know each other.

6.3 Hindered Joint Inquiry Indicators

The questionnaires and verbal feedback revealed ways in which tools hinder indicators in the Communities of Inquiry framework. The following sections describe these hindrances.

Dominant participation

The questionnaires in Museum Teatime reveal how tools can hinder social presence in the Communities of Inquiry framework. Participants in the workshop highlighted that “everyone having space” was important for a sense of togetherness – in other words, social presence. One participant
remarked that togetherness was lost when not everyone had “space”, as some participants were more dominant in the conversation. Dominant participation was therefore a hindrance to social presence. Democratic participation – “everyone having space” – is central for Communities of Inquiry (Lipman 2003). However, none of the indicators in the Communities of Inquiry framework describe democratic participation. It could therefore be important to include such an indicator in the analysis framework – for example, in social presence. Evaluating democratic participation as part of the framework would highlight what formats and artefacts support and hinder this indicator. In this research, artefacts and formats were created as a means of promoting everyone’s participation in the design experiments. Museum Teatime, Collaborative Landscapes, Paper Landscapes, Fabric Landscapes and Wire involved the format of giving all participants “air time” – that is, time to share and talk about their artefacts. In Tea Compositions, the format involved all participants having to like the final outcome, which would require their involvement in the making process. However, although these formats invited everyone to participate verbally, equal verbal participation did not sustain throughout the whole workshop. This is not to claim that participation only happens verbally. Nonetheless, formats and artefacts could be further developed to encourage and invite verbal participation throughout the workshop.

“Not work”

Tools can be a hindrance to Communities of Inquiry if the tools are considered to be inappropriate for the context. Verbal feedback from participants in Coffee Compositions, Cookie Teatimes and Tea Compositions revealed tensions related to using Playful Triggers in industry contexts, as there are certain expectations of what is “work” or “not work”. Participants said that industry partners have limited time and may feel stressed sitting down for a teatime, although doing so might be needed (Cookie Teatime, CT#2). The feedback from participants suggests that such tools require openness (Coffee Compositions) and knowing the collaborators from previous encounters (Cookie Teatime, CT#1). It can also be important to frame the situation as one of getting to know new colleagues and
collaborators, as in *Coffee Compositions*. The contextual appropriateness of the tools echoes Bødker’s distinction of *institutional artefacts* (2009), in which the institutions and cultures within a context mark certain expectations and values. The tools that are intended to be Playful Triggers could thus pose a challenge in initiating joint inquiry if they are considered to be inappropriate, stressful or intimidating.

### 6.4 Research for and through Design

This thesis shows a range of design experiments that were created for research, to develop tools and to obtain knowledge about these tools. The design experiments guided the exploration of research interests and inspired further design experiments. An important consideration in this type of design research is the multiple roles of the designer, facilitator and researcher. As the tool designer, facilitator and researcher, I am part of the tool and have various degrees of influence on the results; I also have a particular outlook when analysing the tools. One way in which I address this consideration is by taking on different roles in the various design experiments. For example, in *Museum Teatime*, I did not facilitate the inquiry between participants and, in *Coffee Compositions*, I neither designed the tool nor facilitated the conversations. By taking on different roles, I gained various degrees of distance and different perspectives in relation to the tools studied. Nonetheless, as a researcher who creates tools and is interested in the topic, I bring certain assumptions with me and assume the value of tools for collaborative and communicative practices. Creating my own tools and participating in others’ design experiments has been a process of revealing my assumptions and deliberating on them. Experiencing multiple viewpoints – as a participant, researcher, designer and facilitator – has been crucial for my own reflective practice, enabling me to reflect-on-action and reflect-in-action (Schön 1983). Furthermore, taking on diverse roles led to interesting discoveries. For example, the co-creation of the tool in *Coffee Compositions* by the companies was a crucial part in simulating collaboration between the company leads. These results
revealed to me the value of refraining from the role of “designer” and “facilitator” – roles I had previously assumed and taken for granted.
7 Conclusion

The starting point for this research was my own practice of designing tools to initiate joint inquiry in museum and academic contexts. This research examines the interrelationship between tools and indicators for joint inquiry in order to develop systematic ways of designing and evaluating such tools. Developing a systematic approach addresses the gap in Participatory Design research related to systematic evaluations. Two frameworks – the Communities of Inquiry framework (Wanstreet and Stein 2011) and Eriksen’s categorisation of a tool (2009) – were used to analyse the relationship between tools and joint inquiry. This research builds on the work of Sanders (2000) and Loi (2007) concerning the development and use of tools to support collaborative and communicative practices.

In relation to the research questions, the tools supported the indicators from the Communities of Inquiry in the following ways:

- Artefacts embedded with metaphors or prompting symbolic visualisations elicited metaphors and contributed to humour and encouraging contributions.
- Artefacts and formats such as collages and cards were used to negotiate and deliberate alternative perspectives on the topic of inquiry, contributing to brainstorming.
- Situations involving commensality related to setting etiquette, phatic communication and humour.
- The material properties of the artefacts and their related metaphors prompted recognising problems.
- Formats, including facilitation, that were directed towards eliciting personal experiences related to focusing discussion, self-disclosure and emotional expression.
The research shows that the tools supported valuable indicators for initiating joint inquiry such as self-disclosure, humour, emotional expression, recognising problems and brainstorming. The design experiments reveal ways of designing for such indicators through various artefacts, formats and framings. The research also indicates that tools hindered the Communities of Inquiry when dominant participation occurred and when the tools were considered to be inappropriate for the context. These findings open up ways to develop the Communities of Inquiry framework in order to study tools and support joint inquiry.

To consolidate this research, I intend to select tools from the design experiments and make them available to researchers, teachers, students and external partners as part of the MDH Living Lab. In future research, I aim to continue exploring the relationship between tool design and communicative and collaborative practices in Participatory Design processes. This future research will take a deeper look at transformational processes over time and at how tools impact the process. I would like to continue developing tools (as in Museum Teatime) that prompt inquiry about our ecological understanding and responsibility, and to explore places and situations for this type of inquiry.
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Designing Tools for Joint Inquiry


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