TOOLS FOR PROXIMITY

Helping designers to make sense in the boardroom

Bas Leurs

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“The real voyage of discovery consists not in seeking new lands but seeing with new eyes.”

Marcel Proust (1871 – 1922)

Preface

Eighteen years ago, in the final stage of my bachelor in graphic design, I had to choose a theme as the premise for my graduation work. In my modest aversion towards predictability, concreteness and banality, I decided to opt for “frames” as the central theme of my work. I believed its ambiguity should serve its purpose as a generative statement, rather than elaborating on a more concrete theme that would produce stereotypical images. It was only one week before my final presentation that it occurred to me that “desire” was the actual theme of my work. Nevertheless, until that moment, the term “frames” had perfectly fulfilled its purpose to help me develop and embody my artistic vision.

Since then, almost two decades have passed by and currently I am at the end of my second educational endeavor in higher education: the master program Design for Interaction at the faculty of Industrial Design Engineering of TU Delft. While writing the last bits of this thesis I realize that much of my current work – surprisingly – revolves around the theme of “frames” again (see chapter 3). It seems like history is repeating itself. Yet, this time, the notion of *frames* represents a collection of metaphors that serve as cognitive lenses for senior decision makers rather than the metaphor *frames* that represents an idiosyncratic artistic framework for me as an artist-designer. In hindsight, I may say that writing this thesis, as well as the rest of the master program, have given me invaluable new views on the world and my practice as a designer. More than I ever expected. I am therefore indebted to a number of people, who have either provided me bits and pieces of new frames, or have helped me to develop them.

I would like to begin with a word of gratitude to Pieter Jan, Pieter, Stella, Marieke and Aad-Jan for your inspiring lectures and courses. I am grateful to Fleur for being my “mentor mom” and helping me to find my way at the faculty. Thank you Grant, Maria, Bea, Thijs, Fawn and many others for giving me an excellent time at the faculty and in i.d-Kafee. Tim, thank you for our great conversations on design, education and all things that matter. Muchos gracias go out to my JMP compañeros: Esteban, Pepijn, Simon, Alejandro and Joan, for the good laughs and fun.

I owe many thanks to Tim, Erwin and Deborah at CMD. Doing almost a full time master course, next to an almost full time position in Rotterdam was quite a challenge; thank you for your flexibility and making it possible. I am grateful to my colleagues at CMD as well, for letting me do this. Also thanks the stewards of StadsLab Rotterdam for helping me with my prototype.

Ingrid, many thanks for nudging me to enroll for DfI, it has been a very enriching decision. Also many thanks to you and Lilian for your supervision, your wise words of advice and giving me the opportunity to explore this subject in my own way. Your views on PSS and designing for social interaction haven given me valuable insights in the operation of networks and organizations. Many thanks to the members of PSS 101 for sharing their ideas and experiences. A special word of gratitude goes to Behzad; it has been tremendously inspiring, exciting and an extraordinary pleasure working with you. I enjoyed every minute of unraveling the “black magic” that you do.

Lastly, I am most thankful to my love Melanie. Thank you for all your patience and support.

Summary

This thesis presents a toolkit that aims to increase cognitive proximity among strategic designers and senior decision makers. In keeping with the general aim of the research program CRISP - PSS 101, these tools aim to establish a shared language and shared understanding (overlap in mental models) among these disparate actors. Such sharedness is crucial in their collaborative efforts when developing new value propositions or when involved in strategic innovation. However, appropriate tools for heterogeneous network communication and collaboration at a strategic level appear to be missing. In addition, it is suggested that designers have an added value by providing senior decision makers with new frames that help them perceive their business environment as well as the strategic activities in a new way. A better understanding of, for instance, the social reality of their customers will help them identify latent needs, explore new business opportunities and develop new propositions.

This yields two main questions: (1) how to support strategic designers in their interaction with senior decision makers to establish a common ground? And (2) how can strategic designers help senior decision makers develop new mental models of their business ecosystem? These two questions are intricately linked as they provide the ends as well as the means for interaction.

The research takes an explorative approach, starting with developing a tentative conceptual framework of “what is going on”. This framework is grounded in preliminary observations and a literature study, which focuses on strategic thinking for dynamic business ecosystems (e.g. Product Service Systems) and theoretical concepts concerning social meaning-making like: cognitive proximity, mental models, sensemaking, frames and metaphors. The findings from this literature study are presented in a conceptual model and used to define a set of design guidelines that serve as the foundation for the design and application of the toolkit. The central premise of the design guidelines is formed by the concept of metaphor. Metaphors have the intrinsic quality to bridge communication and generate new understanding. This notion of metaphor is operationalized with a number of complementary concepts, like: causality, open-ended, generative, transferable, embodied and recognizable.

The toolkit includes two types of artifacts: diagrams and three-dimensional objects (i.e. tangible). The diagrams primarily intend to support communication in one-to-one conversations or small group meetings, whereas the three-dimensional objects support communication in workshop sessions for larger groups. These symbolic artifacts (i.e. metaphors) are in fact the stimuli that prompt sensemaking, which consequently stimulates mental model development and generate shared understanding.

The application of the toolkit is examined in a variety of empirical studies. These studies include

interactions between Behzad Rezaei, a strategic design consultant, and senior decision makers from public and private sector organizations. The toolkit is deployed in the early stages of a client-consultant relationship to facilitate the first encounters between Behzad and senior decision makers. Most of the data was collected through observations during workshops and meetings. The observations focused on how the tools were used during the meetings and workshops and how they affect the interaction between the strategic designer and senior decision makers. Subsequently an evaluative interview is conducted to reflect upon the application of the toolkit and to concatenate the results of the empirical studies.

The results show how the toolkit fulfills several roles to serve a variety of purposes: it facilitates communication, supports frame creation, initiates sensemaking, develops understanding and stimulates sensegiving. The toolkit not only increases proximity between strategic designers and senior decision makers, but once senior decision makers succeed in their sensegiving attempts, the toolkit also amplifies proximity between strategic designers and other organizational members.

These results are analyzed through three lenses (i.e. dimensions): cognitive, physical and socio-material. The aim of the analysis is to extract principles that may contribute to subsequent research or tool development. From the analysis a number of principles emerge that seem to enhance the interaction between actors (i.e. strategic designers and senior decision makers, and senior decision makers and their organizational members) and their hermeneutic interaction with the world (i.e. business ecosystem). These principles include bridging metaphors, generative metaphors (i.e. analogies), memes, shared display, mapping, multimodality, transparency, coordination, reflection (i.e. perspective taking and making) and malleability. In particular multimodality, mapping and malleability seem fundamental for stimulating and facilitating activities like reflective conversational interactions, perspective taking and making, boundary crossing, strategic sensemaking and sensegiving. Consequently these activities promote the development and alignment of mental models in such a way that they help actors establish a common ground.

Moreover, the principles portray two processes that form the answer to the key questions above. The first process involves the alignment of mental models to create cognitive overlap; it corresponds with the first question. It encompasses processes like coordination and embodiment. The second process relates to the second question, it concerns the shaping or development of mental models to increase their accuracy. It involves methods and activities like: (re)framing, sensemaking, reflective dialogue.

Contents

Introduction

Introducing the background, aim and approach of the current work.

Chapter 1

Introduction

This chapter addresses the research problem and its background. Subsequently, this chapter describes the position of the current work in the research program CRISP-PSS 101, the aim of the current work, its underlying research questions and its relevance. Furthermore it explains the research approach, the philosophical stance that is taken and describes the research design. This chapter is concluded with an outline of the chapters.

1.1 Problem identification

Over the past three decades, design has evolved from shaping objects and symbols into shaping decisions (Boyer, Cook & Steinberg, 2011; Buchanan, 2001; Chick & Micklethwaite, 2011, p. 23; see also e.g. Yee, Jefferies, & Tan, 2013). With this transformation, new strands of design[1] (e.g. service design, social design, sustainable design and transformation design) have emerged (Sanders & Stappers, 2008, 2012, p. 17; Sangiorgi, 2011). Particularly with the advent of networked products and services[2], designers have slowly progressed towards a more strategic level of design practice (Boyer, et al., 2011; Gardien & Gilsing, 2013; Hargadon, 2005; Manzini & Vezzoli, 2003; Raijmakers, Thompson, & Van de Garde-Perik, 2012). Yet, it seems that appropriate tools, methods and skills for these new areas of design activity are missing (Manzini & Vezzoli, 2003; Morelli & Tollestrup, 2007). Designers may experience such deficiencies in their collaboration and communication with executives and management, particularly when they are involved in the co-creation of new value propositions and development of business-models (Henze, Mulder, & Stappers, 2011; Henze, Mulder, Stappers, & Rezaei, 2012).

But there is more to it. The present time shows a vast majority of organizations – both in the public and private sector – withstanding turbulent and continuous changes in their business environments. As a matter of fact, these business environments are becoming progressively more unstable and unpredictable (Camillus, 2008; Pina e Cunha & Vieira da Cunha, 2006; Reeves & Deimler, 2011). A recent study shows that a majority of 1,500 CEOs beliefs that complexity is accelerating to a point where it is escalating[3] (see IBM, 2010). In addition, preliminary and explorative observations[4] indicate a growing awareness among senior decision makers about the increased misfit

[1] These new and emerging strands of design are more ambitious and inclusive than traditional design disciplines (e.g. product design, graphic design and architecture): the focus is not only on business goals and user needs, but also on societal needs. They often involve networked collaboration between actors from many different backgrounds.

[2] See e.g. Cordóba Rubino, Hazenberg & Huisman (2011), Kuniavsky (2010) and Van Kranenburg (2008).

[3] It is in fact a system of systems, a global system that comprises of numerous other interconnected sub-systems, that has given rise to vast new opportunities, but also unprecedented challenges (IBM, 2010).

[4] This involves several, often informal, conversations with executives and senior managers, which took place at the beginning of a meeting, or during workshops and seminars.

between their organization and their business environment. This disjoint has become even more apparent since the economic downturn has exacerbated. As one of them noticed: *"when we keep doing what we have been doing, we will not get what we used to get"*. So, this demands for a strategic change – and perhaps even a radical change – if they want their organizations to sustain.

Consequently, these decision makers are in need of a new understanding (Camillus, 2008). Designers can be of great value for senior decision makers in providing new perspectives[5] and help them make sense of the uncertainty, ambiguity and complexity that permeates their business periphery (Calabretta, 2013; Steinberg, 2012; Stevens & Moultrie, 2011). Furthermore, designers can help them identify new opportunities, develop new value propositions and support strategic innovation. Therefore, design and strategy should go hand in hand, they complement one another. Traditionally, design is considered as the process of creating value for people[6] (English, 2007) and strategy as the art of creating value for organizations (Normann & Ramírez, 1992). Both practices share an orientation towards the future and both practices inherently intend to initiate change; a change in reality that accords with the envisaged future (see Costanzo & MacKay, 2008; Jones, 1970/1992; Nelson & Stolterman, 2003; Normann, 2001).

However, in practice, design and business usually inhabit two disparate *thought worlds*[7] (see Dougherty, 1992), each with a different logic, jargon and practice (Bilton, Cummings, & Wilson, 2003; Calabretta, 2013; Liedtka & Ogilvy, 2011). The incommensurability of these two *thought worlds* may form a barrier for constructive collaboration and communication. Moreover, in order to collaborate and communicate, it is essential to have a shared language and understanding[8] (Clark & Brennan, 1991; Conklin, 2006; Isaacs & Clark, 1987; see e.g. Bergema, Valkenburg, Kleinsmann, & De Bont, 2010; Kleinsmann, Valkenburg, & Buijs, 2007).

1.1.2 Problem statement

With the emergence of new design disciplines and the advent of networked product service systems, designers are in need of tools and methods that help them operate in new areas of design activity. These tools and methods should facilitate collaboration and communication between business and design to help organizations innovate and develop new value propositions. A common ground, in terms of shared understanding and shared language, is a prerequisite for successful collaboration. These issues, and a number of others, are addressed in a Dutch research program, in which the current work is positioned.

[5] See Thackara (2005), who put it like: "To do things differently, we need to perceive things differently" (p. 6).

[6] In contrast to this statement, Hatami (2013) considers design as a value facilitator, rather than a value creator.

[7] Dougherty (1992) describes these thought worlds as: "a community of persons engaged in a certain domain of activity who have a shared understanding about that activity" (p. 182). Incompatible thought worlds may hamper the sharing of ideas and visions. For example, senior decision makers tend to use numerical models for decision making (Liedtka & Ogilvie, 2011), unlike designers who seem to struggle with making their efforts measurable (Calabretta, 2013; Calabretta, Gemser, Wijnberg & Hekkert, 2012). Senior decision makers, on the other hand, show some reluctance to embrace the value of design (Calabretta, 2013); they lack "design literacy" (Bruce & Bessant, 2002, p. 50) and seem to feel uncomfortable with the chaos and interpretive thinking styles that come along with design (Liedtka & Mintzberg, 2006; Bason, 2013, p. x).

[8] There are of course more success factors for collaboration, such as common interests, similarities in knowledge bases (Kleinsmann, Valkenburg & Buijs, 2007), but also mutual trust, agreement on goals, frequency of communication, availability of resources and expertise, involvement in decision-making, sense of ownership, agreement on roles and responsibility (see Mattessich & Monsey, 1992).

1.2 Positioning the research

In January 2011 a consortium of scientific and industrial partners embarked on a collaborative research program *Creative Industry Scientific Programme* (CRISP). CRISP is funded by the Dutch government's Economic Structure Enhancing Fund (FES) to stimulate the growth of the Dutch design sector and creative industries[9]. In order to do so, the CRISP program strives to generate and disseminate the knowledge, tools and methods necessary for designing systems of products and services. The CRISP program consists of eight research projects. This thesis is part of one such project within the CRISP program, namely the project Methods for Conceptualizing Product Service Networks, in short termed as PSS 101.

[9] See www.crispplatform.nl

1.2.1 PSS 101

PSS 101 focuses on the networked nature of PSS development and aims to develop a framework of methods, techniques and tools that improves the conceptualization and communication between the actors who are involved in heterogeneous networked collaboration (Henze, et al., 2011).

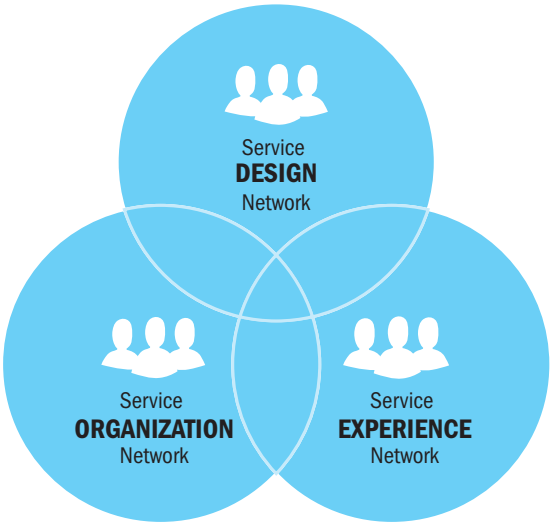

Figure 1: The Service Organization Network (Providers), Service Design Network (Designers and Design Researchers) and Service Experience Network (Customers, Users) have to collaborate to deliver innovative Product Service Systems (adapted from Henze, et al., 2011).

The framework starts from the assumption that a human-centered approach can improve communication and collaboration among different networks (Henze, et al. 2011; Henze, et al., 2012). In the initial framework[10] (see figure 1), Henze, et al. (2011) discern three types of networks: the Service Organization Network (constellations of service providers and manufacturers), Service Design Network (designers, design consultants and design researchers) and Service Experience Network (customers, users). PSS 101 concentrates on the collaboration between these networks[11].

[10] See Henze, et al. (2013) for a revised and elaborated version of the framework, which has an emphasis on network activity, rather than mere tool mapping. For the sake of clarity the initial version of the framework (see Henze, et al., 2011) is used to specify the scope of this thesis.

[11] That is where the network circles overlap in the framework, but collaboration also happens within the networks of course.

The research is carried out by a team of researchers (Delft University of Technology, the Design Academy Eindhoven) and practitioners (Océ, Exact, Connect to Innovate/4C-MG, STBY, Zuidzorg) from the Service Design Network and Service Organization Network. As such, the research team forms a community of practice[12] that represents a variety of disciplines: industrial design, change management, software and service engineering, human-centered design, organizational development, business strategy, product development and service design (Henze, et al. 2011).

Behzad Rezaei, the proprietor of Connect to Innovate, is one of the practitioners of PSS 101. As a strategic design[13] consultant Behzad is a representative of the Service Design Network, working for and with his clients in the Service Organization Network. He is usually involved in strategic innovation at executive-level – the so-called "C-level" – with a particular interest in social innovation[14] and public service innovation. He works for both public and private sector organizations. Behzad's practice as a design consultant is the center of the current work. He regularly experiences incongruences in his communication and collaboration with executives, particularly in communicating his proposition. It is in particular the social dimension that makes his proposition complicated (see exhibit 1). Apparently, given the complexity of his proposition, Behzad is in need for tools that help him share his story and ideas and demonstrate the dynamics of his proposition.

Exhibit 1: Connect to Innovate proposition

Often, organizations focus on homogeneous market segments and their main concern is to optimize financial and operational value. This view is incompatible with the systemic nature of the strategic challenges organizations are trying to cope with. Behzad claims that focusing on social value – value that causes people to connect – will lead to new approaches that help organizations and their customers to resolve systemic issues together. In his view, organizations should therefore facilitate cooperative behavior. By initiating cooperation between various actors (e.g. customers, local enterprises and experts), such cooperatives may solve complex and wicked challenges. Essential to such cooperatives is that the members mutually influence each other's success. Thus, organizations merit by enabling their peripheral stakeholders to become successful, this will minimize cost of coordination and consequently leverage operational and financial value.

In his approach, Behzad is keen to identify social patterns that instigate cooperation, reciprocity and mutual success. To identify such patterns, Behzad probes beyond existing customer segments (usually traditional market segments). Instead, he explores an organization's indirect

[12] See Wenger (1998) or Wenger and Snyder (2000) for an elaborate discussion on communities of practice.

[13] The term "strategic designer" may easily be confused with "strategy designer". A deliberate distinction is made between these two notions. In the current work, the term strategy designer refers to a class of designers who conceive and develop corporate and business strategies. These are in fact the decision makers; as such, this class involves business leaders, senior managers, and policy makers. Strategic designers on the other hand are facilitators of a strategy development process. They rather facilitate the decision making process than actually making the decisions. This class of designers employs a designerly way of thinking and acting.

[14] The term "social innovation" is broadly used and there seems to be little consensus on this emerging field. Caulier-Grice, Davies, Patrick and Norman (2012) present an elaborate work on the definition of social innovation. They have developed the following definition of social innovation: "Social innovations are new solutions (products, services, models, markets, processes etc.) that simultaneously meet a social need (more effectively than existing solutions) and lead to new or improved capabilities and relationships and better use of assets and resources. In other words, social innovations are both good for society and enhance society's capacity to act" (Caulier-Grice, et al, 2012, p. 18).

business context to discern its weak ties (i.e. friend of a friend[15]). Weak ties may bring about new opportunities, complement dyads of actors and resolve conflicting interests. In addition, in his endeavors to identify cooperative patterns, Behzad scrutinizes relations between various stakeholders to determine the social focal points. These social focal points concern the "reason to connect", the reason why individual stakeholders choose to collaborate. Once he has identified the reason to connect he may deploy various strategies to facilitate cooperation. This usually entails forging unforeseen and unconventional linkages between heterogeneous stakeholders. Reconfiguring these linkages helps establish an equilibrium that engenders sustainable value for organizations as well as their direct and indirect stakeholders. Much of his approach therefore involves situated meaning-making and experimentation, which often contrasts with the planned strategies of large organizations. One of the challenges is therefore to align the internal operations of an organization with the potential value that is hidden in its surrounding social networks. It involves organizational transformation, from hierarchical structures and push strategies to networked collaboration and co-creation.

Thus, for business leaders it is crucial to understand the social dynamics of their business environment. Understanding the social reality of their customers will help them identify latent needs, explore new business opportunities, mobilize the strength of weak ties and develop new propositions. For business enterprises it also enables them to generate corporate virtue, which is usually referred to as the corporate social responsibility.

[15] See Granovetter (1973).

Note, for the sake of terminological clarity, hereafter the term "strategic designer" is used to refer to Behzad's practice in particular and the design practice of similar designer consultants in general. Design consultants or designers are considered as practitioners who either had formal education in design, or employ a designerly way of thinking and acting[16] that resembles the practice of a designer with a formal education. In addition, the term "senior decision maker" refers to actors who hold top management positions concerning the overall strategy of an organization or business. As such the term *senior decision maker* corresponds with senior management positions that include: executives, directors, political leaders, business leaders, senior strategists.

[16] See the work of Brown (2008), Terrey (2010), Kimbell (2009, 2011), Cross (1982, 1990, 2011) and Dorst (2006b, 2010, 2011) for a description of these designerly traits.

1.2.2 Research scope

Until so far, the academic partners and industrial partners of PSS 101 have identified several methods and tools that have proven to be useful or successful (see Henze, Mulder, & Stappers, 2013). But the framework also includes some gaps, especially in the interaction

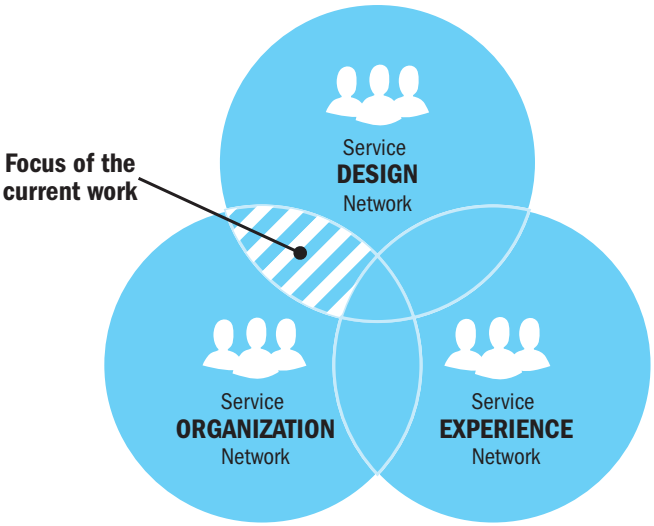

Figure 2: The scope of this research concerns the interaction between actors from the Service Organization Network and Service Design Network.

between actors from the Service Organization Network and Service Design Network (see figure 2). This interaction encompasses activities at strategic, tactical and operational levels (Henze, et al., 2013). Tools for communication and collaboration between these two networks – and the interaction between senior decision makers and designers at strategic level in particular – appear to be missing (Henze, et al., 2012). This thesis therefore focuses on tools that support these actors to communicate and collaborate.

1.3 Research aim and questions

The aim of this graduation project is twofold. First, it aims to provide designers with tools to facilitate interactions between them and senior decision makers. These tools should support designers establish a common ground between them and senior decision makers, which help them to communicate and collaborate for developing new propositions and strategic innovation. Second, the interaction should allow designers to help senior decision makers with developing new models of their business environment. A better understanding of, for instance, the social reality of their customers will help them identify latent needs, explore new business opportunities and develop new propositions. It is important to note that these two objectives are complementary and inextricably linked. The first objective is pragmatic and a prerequisite to attain the second objective; the second objective is more hermeneutic in nature and holds the purpose of the interaction[17].

This results in the two main questions for this research: (1) how can (strategic) designers be supported in their interaction with senior decision makers to establish a common ground in terms of a shared language and shared understanding? And (2) how can strategic

[17] Simply put, an interaction is useless without a purpose, and a purpose without an interaction is rather impossible to attain.

designers help senior decision makers reconceptualize their current business environment?

These questions aim to obtain a good understanding of the phenomena of interest. Currently little is known about – or better to say, little explicit knowledge is available – on how designers can have more impact in the boardroom. This research therefore contributes to design practice in two ways. First, it provides designers with tools that help them collaborate with their clients – and senior decision makers in particular – on strategic issues. Second, it generates insights that help other designers develop new tools and strategies, or improve current ones, which will advance their practice. More particularly, this thesis adds new tools to the PSS 101 framework and brings new knowledge to PSS 101 community of practice as well. Moreover, the results are expected to have value for the members of CRISP and the creative industry in general.

1.4 Research design

One of the challenges of the research is to deal with the dynamics and complexities of the social realm. Any approach to the study of the social dimension of human activity is built on specific assumptions about reality, truth and validity. Therefore it is important, as Archer (1995) and Maxwell (2005, p. 36) suggest, to make the paradigmatic stance[18] of the research explicit. Logically, this research position should correspond with the research aim and nature of the current work. As such the research position forms the basis for methodological considerations; it frames perceptions, guides reasoning and justifies decisions (Crouch & Pearce, 2012, p. 57; Maxwell, 2005, p. 36).

[18] This entails the explication of the philosophical underpinnings (i.e. its ontological, epistemological, axiological and methodological assumptions).

Because little explicit knowledge is available on tools and best practices, this research adopts an explorative approach (see Stebbins, 2001, p. 9). Exploratory research is conducted to clarify ambiguous situations and obtain a better understanding of the nature of a problem. The purpose of the exploratory research is to provide insight, understanding and clarification, its purpose is not conclusive, nor confirmatory[19] (Stebbins, 2001; Zikmund, Babin, Carr, & Griffin, 2012). To explore effectively it is required to approach the research with flexibility and open-mindedness (Stebbins, 2001, p. 6).

[19] Confirmatory research aims to test hypotheses, unlike explorative research, which aims to generate new ideas to form a theory that emerges from the data (Stebbins, 2001, p. 9). As such, explorative research may be qualified as primarily inductive, whereas confirmative research holds a deductive disposition towards research (Stebbins, 2001, p. 7).

1.4.1 Philosophical assumptions

Given the social dimension (i.e. social cognition) of this research, its aim and yet underdetermined end state, support a research position that follows the constructivist paradigm[20]. The constructivist paradigm maintains – as the name already suggests – that knowledge is constructed by the researcher in the social realm. This is in stark contrast

[20] Also referred to as constructivism or social constructionism (see Collins, 2010, p. 38; Easterby-Smith, et al., 2002).

to the positivist paradigm, which maintains that knowledge is discovered[21] (Easterby-Smith, Thorpe, & Lowe, 2002; Guba, 1990; Guba & Lincoln, 1994). The dichotomy between the constructivist and positivist paradigms is reflected in the debate between respectively social and natural sciences, or in a similar vein between qualitative and quantitative research approaches[22] (see Guba & Lincoln, 1994). Design usually borrows from the social sciences, in particular if it concerns – like in the current work – the study of human activity, performance and experience in a social setting (Hummels, Redström, & Koskinen, 2007).

Constructivism is concerned with the process of understanding; as such it aims to construct meaning from usually qualitative data (Easterby-Smith, et al., 2002). To put it more precisely, from a constructionist stance "the aims of the researcher are to understand how people invent structures to help them make sense of what is going on around them" (Easterby-Smith, et al., 2002, p. 34). The social dimension, in particular interpersonal communication, should therefore receive a significant amount of attention in a constructivistic research setting (Easterby-Smith, et al., 2002).

The constructivist paradigm builds on the assumption that reality is determined by people, hence socially constructed (Collins, 2010; Easterby-Smith, et al., 2002). Its ontology[23] is *relativist*, which means that multiple realities exist as personal and social constructs (Collins, 2010; Easterby-Smith, et al., 2002; Gray & Malins, 2004; Guba, 1990; Guba & Lincoln, 1994; see also Goodman, 1978). It should be noted, however, that none of these personal or social constructs can be regarded as indisputably true[24], since many instances of reality exist in the social construct of the world (Collins, 2009; Goodman, 1978). The constructivist epistemology[25] is characterized as *subjectivist*, which means that the researcher is involved in the situation. The researcher and the object of investigation are thus interactively linked (Easterby-Smith, et al., 2002; Gray & Malins, 2004; Guba, 1990; Guba & Lincoln, 1994; Malterud, 2001). As a consequence, methodologies are – in keeping with the general aim of the empirical studies – interpretive (Easterby-Smith, et al., 2002; Gray & Malins, 2004; Guba, 1990; Guba & Lincoln, 1994). It is important to note that these interpretations are value-laden with personal skills, values, beliefs, interest, preconceptions and experiences of the researcher (Collins, 2010; Malterud, 2001). Therefore a personal account on the research stance is given in exhibit 2.

Exhibit 2: Personal research stance

The value-laden[26], transformative[27] nature of design and the subjectivist epistemology of the current work, require that I am clear about my

[21] See for an in-depth discussion of the differences between the constructivist and positivist paradigm the work of Collins (2010); Easterby-Smith et al. (2002, p. 27-57); Gray and Malins (2004, p. 19); Guba (1990); Guba and Lincoln (1994).

[22] Also consider the dichotomy between deductive and inductive approaches (Collins, 2010, p. 48). Note that such contrasting approaches often imply that strategies are incompatible, whereas they could also be seen as complementary (Malterud, 2001).

[23] Assumptions made about the nature of reality (Collins, 2010, p. 37; Guba & Lincoln, 1994, p. 108).

[24] In contrast to a positivistic stance which pursues truth (Guba, 1990; Guba & Lincoln, 1994).

[25] The nature of the relation between the researcher and the researched (Guba & Lincoln, 1994, p. 108).

[26] Press (1995) argues that design is value-laden process and for that reason designers should make their values explicit when involved in research.

[27] See Crouch and Pearce (2012); Jones (1970/1992).

philosophical assumptions as a researcher and experiences as a designer. My stance stems from my disposition towards "design logic" rather than "business logic"[28]. I hold a background in arts, visual communication and technology. My professional experience is grounded in my practices as an entrepreneur, designer and educator; working in, with and for small-scale to large-scale organizations. These experiences provide me with a rich framework to relate to for reflection. Most important is my belief that design should be meaningful for its (end)-users, viable for business and sustainable for the environment[29]. All this gives me specific lenses through which I perceive reality: how I frame its current state, conceptualize the desired future state and how I plan to make the change happen[30]. I am aware that my idiosyncratic frames may, directly or indirectly, affect the frame of others (strategic designers, senior decision makers, participants). The interplay between these frames adds a level of complexity to the current work.

My role in this research is twofold. First, I am a "tool designer"; I design and create tools that help strategic designers to advance their practice in strategic innovation. In this role I intend to transform perceptions and practices[31]. Second, I am a researcher. I study the practice of a strategic designer and in particular his interactions with senior decision makers. In this role I aim to understand how the aforementioned tools can be designed, how they are being used and how they affect interactions between actors. This means that I am actively involved in the research situation: I transform the situation[32], which I observe and which I am part of.

This has consequences for my position as a researcher and raises an issue for further consideration: which position do I take to understand the social realm of the interaction? Positions can be taken from complete participation to complete detachment (Gold, 1958) and from overt to covert observation (Patton, 2002, p. 271; Stafford & Stafford, 1993). The position that is taken for this research is known as "participant-as-observer" (Gold, 1958; Easterby-Smith, et al., 2002, p. 110). I believe some intimacy with the situation is needed to scrutinize the multifaceted nature of the interaction under study. During workshops and meetings, I conduct observations while acting as a full participant of the interaction. This position is taken in order to participate in the interaction between Behzad and his clients in a natural way while avoiding role pretending. A detached position, such as complete observer, is likely to interfere too much in the interaction in terms of the "observer effect" (i.e. the so called "Hawthorne effect", see Stafford & Stafford, 1993). A complete observer role may raise also some ethical issues (see Stafford & Stafford, 1993), causing possible harm to the relationship between Behzad and his clients. Yet the subjects are informed about my intentions and that they are under observation.

[28] See Liedtka and Ogilvie (2011).

[29] Not just in an ecological sense, also the value that is created for society and the worth that is generated for the common good, for short-term and long-term.

[30] See the Analysis-Synthesis Bridge Model of Dubberly, Evenson and Robinson (2008), which represents a comprehensive model of this transformation process.

[31] Frames tend to steer attention, structure perception and as a consequence shape reality (see e.g. Morgan, 2006), they are the centerpiece of the current work (see chapter 3). In this work designers are provided with frames that help them transform the perceptions of senior decision makers. It is important to note that these frames are not neutral. They are intentionally shaped with personal experiences of the tool and strategic designer and may be appropriated by their end-user, the strategic decision maker. Frames are thus composites of multiple individual frames; each user or creator adds a piece of personal perceptions and conceptions.

[32] As many have argued (see, e.g. Crouch & Pearce, 2012, p. 15; Doblin, 1987; Jones, 1970/1992, p. 4; Nelson & Stolterman, 2002, p. 16; Simon, 1969/1996), design is inherently transformative in nature.

1.4.2 Research approach

The approach for this project is as follows (see figure 3): the research starts with establishing a conceptual framework, which is grounded in preliminary observations and a literature study. This framework serves as the foundation for the design of the toolkit, which is subsequently deployed and evaluated in several empirical studies. An evaluative interview is conducted to reflect upon the application of the toolkit and to concatenate the results of the empirical studies. A more detailed account of the research stages is given below.

Figure 3: A literature study establishes a conceptual framework forming the premise for a set of tools, which are deployed and evaluated in several empirical studies. In conclusion an evaluative interview is conducted to reflect upon empirical experiences.

1.4.3 Conceptual framework

The research starts, in keeping with Maxwell (2005), with developing a notion of "what is going on". Therefore, activities in the initial stage focus on the establishment of a *conceptual framework* (Maxwell, 2005; Miles & Huberman, 1994). Such a framework[33] aims to construct a system of key factors, variables, concepts, theories, and assumptions; it intends to explain the relation between these components (Maxwell, 2005; Miles & Huberman, 1994). The conceptual framework serves as a tentative foundation for the current work, it offers guidelines and a frame of reference to inform the design process of the toolkit and it directs observations in ensuing research activities.

It is, as Maxwell (2005, p. 37) suggests, good practice to establish a conceptual framework in experiential knowledge, existing theory and prior research. In particular the researcher's experiential knowledge often serves as the primary source of a conceptual framework. This suggestion may raise some epistemological issues on validity and reliability. Yet, the aim of the conceptual framework is not to validate, instead it aims to establish a grounded understanding of a research problem. Moreover, research cannot be separated from real life, as Maxwell (1992, 2005) contends: researchers are inextricably part of the world they observe.

Thus, for this reason some personal experiences and reflections precede an in-depth literature study. In this way, the richness of experiential knowledge forms a solid starting point, which sets the direction and scope of an interdisciplinary literature study. This literature study includes state of the art knowledge from domains such as: cognitive sciences, system dynamics, social sciences, organizational research, management research, business studies and design theory[34].

[33] Maxwell (2005) uses the term conceptual framework in a broader sense than Miles and Huberman (1994). Maxwell (2005) includes ideas and beliefs about the phenomena studied, which do not necessarily need to be explicated in written form. The phenomena under study do not manifest themselves prominently, the conceptual framework developed in this thesis will therefore build upon Maxwell's ideas of a conceptual framework.

[34] See appendix A for an overview of the subjects encompassing the literature study .

1.4.4 Empirical studies

The findings from this literature study are concluded in a conceptual model and used to define a set of design guidelines that serve as the foundation for the design and application of the toolkit. The application of the toolkit is examined in a variety of empirical studies. These empirical studies aim to understand how the toolkit is being used, and how it contributes to the practice of developing a shared understanding in the boardroom. The variety of these studies, grounded in a rich collection of observations, is needed to ensure validity of the research (see Stebbins, 2001. p. 47).

Data collection took place from February 2013 to July 2013. During this period a number of interactions between Behzad and his (prospective) clients were observed. These interactions included a workshop and a number of meetings with the alderman and his senior managers of the municipality of Bussum, and a workshop with the senior strategist and his colleagues for HZCP, an internationally operating firm active in the food industry. In addition some attributes of the toolkit were employed in several other interactions between Behzad and his clients. These interactions were, however, not directly observed but evaluated in an interview with Behzad. Furthermore the toolkit was used in a session with partners and colleagues of Behzad, dubbed the Connect to Innovate Network (C2I Network). Purpose of the session was to discuss Behzad's refined proposition and evaluate the final iteration of the toolkit.

Most of the data was collected through observations during workshop sessions and meetings. For these observations the role of a participant-as-observer (Gold, 1958, p. 220) was taken. This means that observations were conducted as a member (co-moderator) of the workshops and meetings – although the role typically concerns more observation than participation. During the sessions, notes and photographs were taken to capture the most notable interactions. Additionally, the workshop sessions were, if possible, captured on video for later analysis. The observations and analysis focused on how the tools were used during the meetings and workshops and how they affect the interaction between the strategic designer and senior decision makers.

Ultimately, a semi-structured interview was conducted to evaluate the application of the toolkit. For each case Behzad reflected on the context, purpose and effect of the tools, how it affected his interactions with senior decision makers and how these interactions influenced their strategic thinking.

1.5 Outline

This thesis is outlined in three major parts (see figure 4). The first part focuses on establishing a conceptual framework grounded in preliminary observations and a literature study. It includes chapters 2, 3 and 4. The second part covers the empirical research: the design and application of the toolkit. This involves chapters 5 and 6. The third part encompasses chapters 7, 8 and 9; it presents the key learnings of the research and closes with a personal reflection. The contents of the chapters are as follows:

Chapter 1 introduces the research problem, its background, the aim of the current work and its underlying research questions. An account of the research approach and research design is given, supported with the philosophical stance that is taken. Following this introduction, **chapter 2** aims to understand the challenges of strategic innovation in turbulent and networked business ecosystems. It briefly discusses the principles of Product Service Systems and its implications for strategic management. It argues for a complementary role of design. **Chapter 3** covers the cognitive aspects of the conceptual framework. The aim is to understand what is needed to establish a shared understanding. It focuses on extracting principles from cognitive and organization science, such as cognitive proximity, mental models, sensemaking, framing and metaphors. **Chapter 4** presents a comprehensive model of the conceptual elements as discussed in chapter 2 and 3. It elaborates on the linkages between these elements. Building on the conceptual model, the notion of metaphor is used to construct a set of design guidelines that serve as a starting point guiding the design of the toolkit. **Chapter 5** describes the design process and presents the configuration of the toolkit. It covers its underlying rationale and how the design guidelines from chapter 4 are materialized. **Chapter 6** reports on the deployment of the toolkit. The results from the meetings and workshops are presented and complemented with the results of the evaluative interview. **Chapter 7** discusses the findings from chapter 6, it aims to extract principles and identify relations with the conceptual model and literature study. **Chapter 8** presents the conclusions; it answers the main research questions and discusses its implications and presents recommendations for design practice, design education and further research. **Chapter** 9 involves a reflection on the research and design activities, and attempts to extract some personal learnings.

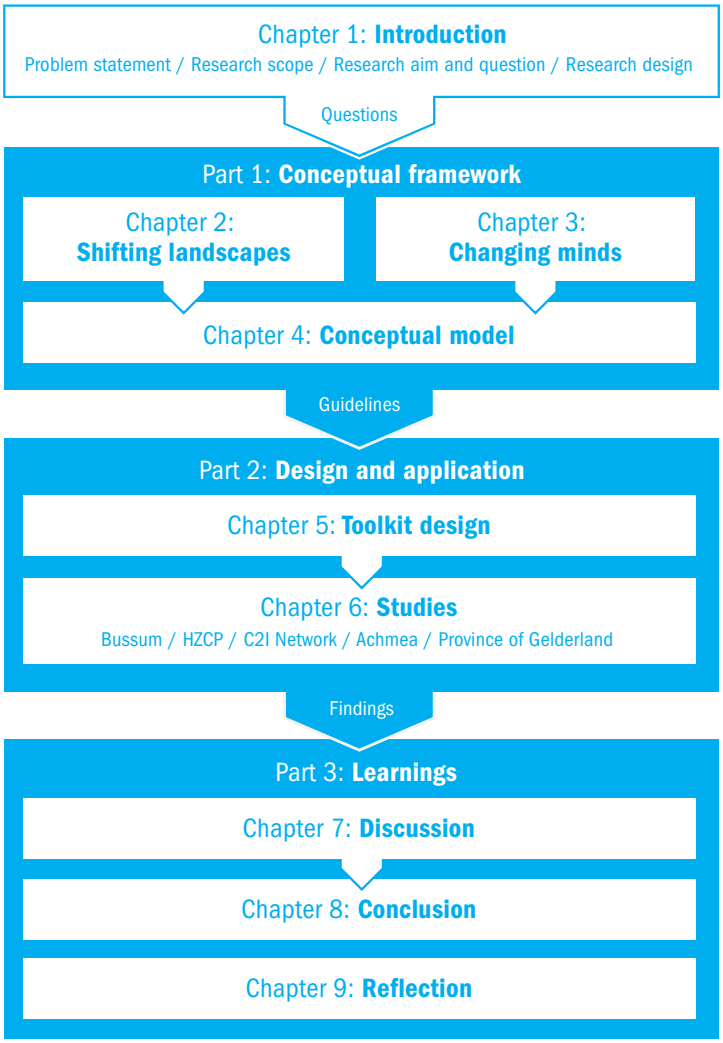

Figure 4: Thesis outline

Part 1: Conceptual framework

Develop an understanding of “what is going on”.

Chapter 2

Shifting landscapes

Currently, organizations find themselves in a situation that is characterized by a continuous flux of disruption. What has caused this situation? And what are the problems organizations are currently dealing with? This chapter portrays shifts in the business landscape of organizations: the progression of a network economy and emergence of Product Service Systems. How do organizations retain a fit with such developments? How does this affect their strategic endeavors? Senior decision makers are struggling to make sense of the turbulence, uncertainty and ambiguity that pervades their business periphery[35]. These issues give rise to new opportunities for designers. But what is exactly the added value of design?

2.1 The network economy

Nowadays, the ancient Chinese proverb "May you live in interesting times" is perhaps more relevant than ever before. The post 9/11 era is indisputably marked by political, economic and environmental crisis on one hand, and vast technological advancement on the other (Hill, 2012). Information and communication technology in particular, have resulted in network infrastructures (i.e. the internet) that enable (global) knowledge sharing at decreasing cost and increasing speed (Lim, 2007). Van Baalen and Moratis (2001) coin these developments as the network economy[36], an economy that is constituted by speed, intangibles (knowledge) and connectedness. These three factors have a large impact on how organizations run their business and how their products and services affect the everyday life of their customers[37]. In this sense, organizations are defined as institutions, such as a firm, corporation or governmental body, which serve as legal entities for collective and purposeful action in the private, public and non-profit sector (see Normann, 2001, p. 2).

Networks allow new forms of organization, e.g. holarchies[38] (Gray & Vander Wal, 2012), collaboration (Downes & Nunes, 2013; see e.g. Hill, 2012) and value creation[39] (Cordóba Rubino, Hazenberg & Huisman, 2011; Normann, 2001). Together these constructs instigate value networks (see Allee, 2009; Bovet & Martha, 2000a, 2000b; Christensen & Rosenbloom, 1995, p. 238; Lusch, Vargo, & Tanniru, 2009; McGee, 2003; Normann, 2001; Normann & Ramírez, 1993; Stabell and Fjeldstad, 1998), reaching far beyond the (conventional)

[35] In management literature such situations are referred to as VUCA, which is short for volatility, uncertainty, complexity and ambiguity (see e.g. Bennett & Lemoine, 2014a, 2014b; Martin, 2012). It is borrowed from the U.S. military (see Richard & Barber, 1997). Apparently, for senior decision makers a VUCA world is the "new normal" (Martin, 2012).

[36] Benkler (2006) describes a similar concept of the "networked information economy". His work, however, is a political manifesto, rather than an objective account of a phenomenon.

[37] See also the publications of Nesta (www.nesta.org), which describe the impact of the network economy on society.

[38] Network technology (i.e. the internet) allows people to instantly build (worldwide) platforms or ecosystems that have no centralized governance (Moore, 2013). These platforms easily transcend institutional boundaries and foster collaboration and communication among people and organizations that share the same interest or purpose. This shows that the balance of power is shifting from hierarchical institutions to the networks that surround them (Grey & Vander Wal, 2012).

[39] In network constellations, value is constituted dynamically when systems of products and services are actually being consumed or "in use" (Vargo & Lusch, 2004; Woodruff & Gardial, 1996; Grönroos, 2008). This means that customers are no longer receivers of finite solutions, but active co-producers (Normann & Ramírez, 1992; Normann, 2001; Ramírez, 1999) or co-creators of value (Vargo & Lusch, 2004; Payne, Storbacka & Frow, 2007; Grönroos, 2011; Prahalad & Ramaswamy, 2004), whereas organizations have become "organizers of value creation" (Normann, 2001).

value chain[40] of an organization (Cummings & Wilson, 2003, p. 21; Den Ouden, 2012; Heracleous, 2013; Martin, 2012).

2.2 The emergence of Product-Service Systems

Apparently, over the past two decades, the network economy has accelerated the emergence of systems consisting of intertwined products and services[41] (Heapy, 2011). These systems are usually referred to as Product-Service Systems (PSS). A PSS can be defined[42] as: "an innovation strategy, shifting the business focus from designing (and selling) physical products only, to designing (and selling) a system of products and services which are jointly capable of fulfilling specific client demands" (Manzini & Vezzoli, 2003, p. 851). PSS encompasses both tangibles (products) and intangibles (services) (Brandstotter, Haberl, Knoth, Kopacek & Kopacek, 2003; Tukker, 2004). In its configuration, each PSS may consist of different ratios of product and service components (Morelli, 2003; Tukker, 2004; Baines, et al., 2007; Oliva & Kallenberg, 2003).

Recent years show an evolution of the *servitization*[43] of products and the *productization* of services (Miles, 2012), converging into a single offering of a fully integrated PSS (Baines, et al., 2007). Especially, over the past ten years, a shift in business thinking, from product-orientation to service-orientation, has become more prominent[44] (Heapy, 2011; Mont, 2002; Oliva & Kallenberg, 2003; Vargo & Lusch, 2004).

2.2.1 Key principles of PSS

It is generally agreed that PSSs bring synergies among three principles: customer value[45], competitive advantage[46] and environmental benefits[47] (Manzini & Vezzoli, 2003; Tukker & Tischner, 2006). Recent research (see Forlizzi, 2013; Henze, et al., 2011, 2013; Henze, et al., 2012), however, adds a fourth principle of a PSS, namely, its networked nature (see e.g. Kimbell, 2010; Mont, 2004). In this view, PSS networks combine all the activities, actors and elements of products and services into one integrated value proposition (Cordóba Rubino, et al., 2011). It is a subject though, that has not received much attention in research.

2.2.2 Networks and PSS development

The networked nature makes the conceptualization and development of PSSs a complex endeavor. PSS development entails close co-operation among customers, suppliers, manufacturers, service providers, other departments and perhaps even with the competition[48]. In concert these actors constitute a value network, which is often based on partnerships (Bovet & Martha, 2000b; Normann & Ramírez, 1993;

[40] For a long time, Porter's (1985) concept of a value chain has dominated the practice of corporate strategy. The value chain represents a rather traditional concept of an industrial production process, in which commodities can flow only in one direction through several predefined stages (Normann, 2001). With each step value is added and at the end of this process value is exchanged when products are monetized (Kimbell, 2010; Vargo & Lusch, 2004). However, the paradigm of a value chain cannot be maintained in a world where customers are adopting disruptive technologies faster than companies can adapt (Gray & Vander Wal, 2012).

[41] Tan and McAloone (2006) contend that there is nothing new to PSS. Organizations have always been offering products in conjunction with services (see also Parry, Newnes & Huang, 2011). Every product requires services (e.g. sales, delivery and support), as well as every service involves some sort of physical products (i.e. touch-points). According to Tan and McAloone (2006) a PSS can therefore best be classified as a metaphor, rather than a new value proposition. As a metaphor it allows consultants to discuss it as an approach (see e.g. Goedkoop, Van Hale, Te Riele & Rommens, 1999) and it helps researchers to examine its underlying principles (see e.g. Baines et al., 2007).

[42] See Baines et al. (2007) for further discussion of PSS definitions and the PSS concept in general.

[43] See also Normann (2001, p. 103) who refers to this trend as "servicification".

[44] These differences in business thinking are termed by Vargo and Lusch (2004) as Goods-Dominant Logic and Service-Dominant Logic (see also for some reflections Lusch & Vargo, 2006; Vargo & Lusch, 2006; Vargo & Lusch, 2008). Service-Dominant Logic relies on a value networks and embraces value-in-use, opposed to Goods-Dominant Logic which builds on the concept of a value chain and value-in-exchange (Lusch & Vargo, 2006).

[45] PSSs deliver solutions rather than mere products (Manzini & Vezzoli, 2003; Monti, 2002; Oliva & Kallenberg, 2003). This means that value does not result from exchanging goods but from actually accessing and using the solution offering (Vargo & Lusch, 2004). This proposition is also referred to as "value-in-use" (Vargo

& Lusch, 2004; Grönroos, 2008) or "the moment of truth" (Normann, 2000). Ideally, PSSs must be designed and organized around customers, their context and experiences, rather than considering value creation as an assembly line (Gray & Vander Wall, 2012). This means that customer value is primarily co-produced (Normann & Ramírez, 1992; Normann, 2001). In this respect, Edvardsson, Tronvoll and Gruber (2010) add a social dimension, termed as "value-in-social-context", to the value theory of Service-Dominant Logic, because value co-creation always involves a social structure.

[46] PSSs enable organizations to differentiate and diversify their products to better respond to customers' demand; it implies a shift from mass production to mass customization (Mont, 2002, Parker & Heapy, 2006) or personalization (Leadbeater, 2004). Additionally, through customization and personalization, organizations can build strong relationships with their customers (Goedkoop, Van Hale, Te Riele & Rommens, 1999; Mont, 2002; Oliva & Kallenberg, 2003).

Organizations are also given a competitive advantage in a sense that a service is more difficult to replicate (Oliva & Kallenberg, 2003; McGee, 2003). This builds on the assumption that the conception, creation and production of PSS offerings, require specific expertise and a culture (Polaine, Løvlie and Reason, 2013; Schneider & Bowen, 1995, p. 199). Expertise and culture are, however, ingrained in employees as tacit knowledge (McGee, 2003; Nonaka & Takeuchi, 1995, Normann, 2001, Lubit, 2001) or reflected in organizational values (Gebauer, Edvardsson & Bjurko, 2010; see e.g. Hsieh, 2010 and Zappos, 2011), which are difficult to encode and to manage.

[47] The sustainability potential of PSSs has been discussed by a large body of literature (see Baines et al., 2007; e.g. Mont, 2002; Manzani & Vezzoli, 2003; Brandstotter et al., 2003; Ehrenfeld, 2001; Goedkoop, Van Hale, Te Riele & Rommens, 1999; Enquist, Edvardsson & Sebhatu, 2007). These authors claim that PSSs reduce the ecological footprint through dematerialization (see Baines et al., 2007; Heiskanen & Jalas, 2000) and reconsideration of the product life-cycle (see Tan & McAloone, 2006; Sundin, 2009). However, PSSs are not inherently more sustainable as products, it is a myth as Tukker and Tischner (2006) explain. The sustainability potential of PSSs largely depends on the type of PSS. There are three types of PSSs: product-oriented services, use-oriented services and result-oriented services. Only the latter has the "Factor X" potential (Tukker & Tischner, 2006). As a matter of fact, as Manzini and Vezzoli (2003) contend, some PSSs may even generate unexpected and adverse side effects (see e.g. Pool, 2012; Plepys, 2002).

[48] Take for example Apple's relationship with Samsung. Samsung is one of Apple's component suppliers for mobile CPUs, while at the same time both firms compete for market share on the mobile market. Moreover, for several years Samsung and Apple have been battling each other on patent infringement in a series of lawsuits.

Stabell & Fjeldstad, 1998). The performance of a PSS, therefore, largely depends on the PSS network as a whole (Hargadon, 2005).

PSS networks, however, do not function as well as they should (Henze, et al., 2011). Collaboration and communication in these networks is often impeded. The constituent actors of PSS networks usually stem from different domains, practices, organizations or departments. Consequently these actors may have competing interests, inhabit disparate thought worlds, use a different jargon or hold incompatible perspectives on PSS (Bertoni & Larsson, 2010; De Lille, Roscam Abbing & Kleinsmann, 2012; Heinemann, Boess, Landgrebe, Mitchell & Nevile, 2011; Henze, et al., 2011). Despite its impact and importance, collaboration and communication in PSS development have been underexposed in PSS research (Henze, et al., 2011).

2.2.3 PSS networks as business ecosystems

The problem with PSS development is that its constituent members and organizations are part of a larger system that often transcends their own network and domain. In a metaphorical sense[49], organizations can be considered as part of a business ecosystem (Battram, 1998, p.172; Den Ouden, 2012, p. 17), similar to species in a biological ecosystem (Iansiti & Levien, 2004; Mars, Bronstein, & Lusch, 2012, 2014; Moore, 1993, 1996; Wheatley, 1992/2006, p. 84). Both systems share a large number of loosely interconnected members

[49] It is important to note that the metaphor imposed on an organizational phenomena, largely determines how it is perceived and understood (see Morgan, 2006).

that collaborate and compete with each other to perpetuate their existence (Iansiti & Levien, 2004). But interconnectedness also implies interdependentness (IBM, 2010; Iansiti & Levien, 2004; Van Baalen & Moratis, 2001): a small disruption in the ecosystem (e.g. a virus) may have far-reaching effects for all of its members. The business ecosystem is thus, likewise, a biological ecosystem, dynamic and subject to continuous change, either caused by external factors or triggered by its constituent members themselves (Jacobs, 2007). To retain a fit[50] with their business environment, organizations have to be adaptive to unexpected and possibly disruptive changes and respond accordingly (Hamel & Välikangas, 2003; Iansiti & Levien, 2004; Normann, 2001; Porter, 1996). Organizations can do that deliberately and consciously by taking action to acquire knowledge. This ability to initiate deliberate learning activities clearly demarcates business ecosystems from biological ecosystems[51] (Jacobs, 2007). However, one concept that applies to both types of ecosystems is the Darwinian "survival of the fittest". For organizations this concept presupposes that their very existence is determined by their fitness (Jacobs, 2007). Fitness is an organization's *raison d'être* as Normann (2001, p. 146) maintains.

[50] See Venkatraman and Camillus (1984) for an elaborate discussion on the concept of "fit".

[51] See Mars et al. (2012, 2014) for an elaborate comparison between biological and business ecosystems.

2.3 Strategic innovation

Organizations constantly have to renew their strategies in order to retain a fit with their business environment (De Wit & Meyer, 2010, p. 167; Iansiti & Levien, 2004; Porter, 1996). In general terms, strategy is about setting the direction of the organization, based on internal capabilities and its alignment with external opportunities and threats (Bhushan & Rai, 2004; Freeman, 1984). By strategizing, an organization aims to establish a future position, which will increase its relevance and success (Costanzo & MacKay, 2008; Mintzberg, 1978; Porter, 1996). As such, strategy is in essence "the art of creating value" (Normann & Ramírez, 1992). But, what makes a strategy – how do strategies come into existence?

2.3.1 The process of strategic innovation

The way strategy is generally described in literature[52] often denotes a deliberate process (i.e. a plan). But strategies are not necessarily plans (De Geus, 1988; Martin, 2014; Mintzberg, 1987b, 1994; Pina e Cunha & Vieira da Cunha, 2006); strategies can also emerge in response to evolving situations (Mintzberg, 1987a; Mintzberg & Waters, 1985). As Mintzberg (1987a) puts it more accurately: "strategies can be formed (emergent process) as well as be formulated (deliberate process)" (p. 68). Accordingly, Pina e Cunha and Vieira da Cunha (2006) also present the strategy process as a continuum, with strategic planning on

[52] See Ronda-Pupo and Guerras-Martin (2011) for an historical overview (from 1962 till 2008) on the evolution of strategic management.

one end and strategic improvisation on the other. Whether an organization tilts towards planning or improvisation depends on the state of the business environment[53]. A volatile and hyper competitive environment requires improvisation, whereas, in stable environments a more planned strategy is suitable (Pina e Cunha & Vieira da Cunha, 2006).

[53] Pina e Cunha and Vieira da Cunha (2006) consider organizations as complex systems that shape their environment and vice versa; organizations co-evolve with their environment.

Figure 5: Strategic thinking and strategic planning complement one another (adapted from Heracleous, 1998).

In a similar vein, Heracleous (1998) discusses two distinctive thought processes: strategic planning and strategic thinking. Strategic planning is often used to refer to a programmatic, analytical thought process, whereas strategic thinking refers to a creative, divergent thought process. In brief, strategic planning is analysis; strategic thinking is synthesis (Mintzberg, 1994). Both are useful at different stages of the strategic management process and are interrelated in a dialectical process (see figure 5). Analysis cannot go without synthesis and vice versa (De Wit & Meyer, 2010, p. 59; Heracleous, 1998). Moreover, it may be argued that organizations need to maintain an appropriate balance[54] between exploring new possibilities and exploiting old certainties (March, 1991).

[54] Organizations that are capable of effectively balancing exploitation and exploration are labeled "ambidextrous organizations" (O'Reilly & Tushman, 2004). It also implicates that leadership in the present time – with its rapid change and increasing uncertainty – requires cognitive ambidexterity (Neck, 2011), which means that contemporary leaders are able to combine "prediction logic" (Davenport & Lange, 2011) and "creation logic" (Fixson & Rao, 2011) to deal with issues that organizations and society are currently facing. In addition, see Heracleous (2013) who describes the capacity to balance strategic features that are considered contradictory or incompatible as Quantum Strategies. The emergence of such strategies shows that conventional strategies, such as Porter's value chain, no longer suffice. Apparently, organizations are looking for new strategies to deal with the inherent complexity of their business ecosystems.

2.3.3 Creating knowledge for strategic innovation

For strategic innovation, the knowledge held by an organization about its business environment is vital (Dawson, 2000; Freeman, 1984; Thomas, 1980). In a network economy, knowledge is – besides relationships (Normann, 2001, Normann & Ramírez, 1993) – a core capability of strategic innovation (Andersson, Curley & Formica, 2009; Dawson, 2000; Lim, 2007; McGee, 2003; Van Baalen & Moratis, 2001). In terms of strategic innovation, knowledge is defined as "the capacity to act effectively" (Dawson, 2000, p. 321). As such it enables organizations to act and to attain their objectives (Choo, 2006). Especially for business enterprises, knowledge and the capability to explicate, disseminate and share it, is the differentiating factor, which allows companies to gain a competitive edge (Civi, 2000; Lubit 2001; Vargo & Lusch, 2004; Vargo, Lusch & Tanniru, 2009).

Organizational knowledge is generated through a process of what Choo (2006) calls *structuring*. This process of meaning-making, comprises four stages: organizations (1) sense signals[55] from their environment, which progress through (2) data into (3) information and ultimately advances into (4) knowledge[56].

2.3.4 Sensing business environments

However, knowledge creation entails a deeper process than simply gathering information and analyzing it. Knowledge is created as the result of human interaction with its social and physical environment (Choo, 2006, p. 131). Therefore, in order to create knowledge, organizations need to actively engage with their business environment[57] and constantly monitor their value network (Lusch, et al., 2009). In this respect, knowledge creation concerns the interpretation of information that ensues from peripheral signals (see Ansoff & McDonnell, 1990, p. 479; Daft & Weick, 1984; Porac & Thomas, 1990). These signals are, nevertheless, often incomplete (Choo, 2001), littered with ambiguity (Hill & Levenhagen, 1995) or difficult to capture (Bay & Schoenmaker, 2008). Sensemaking supports senior decision makers to deal with this uncertainty and ambiguity by creating rational accounts of discontinuities in their business environment (Weick, 1995). These accounts not only serve as an explanation in retrospect, but also justify decisions for future strategic action (Maitlis, 2005).

2.4 Challenging beliefs

To make sense of their business environments, senior decision makers need to engage in practices that help them to see things differently and challenge their current beliefs (Heracleous & Jacobs, 2011; Jacobs & Heracleous, 2005). Senior decision makers need to shift their mode of thinking from rationalist, analytical and convergent thinking to creative, synthetic and divergent thinking (Heracleous & Jacobs, 2011). Consequently, strategic innovation requires changes in existing and ingrained assumptions and beliefs that senior decision makers hold of their business environment (De Gues, 1988; Hamel & Breen, 2007; Jacobs & Heracleous, 2005; Markides, 1997; Wang & Chan, 1995). This defines several needs for senior decision makers.

First, the conventional beliefs or "models of success" of the senior decision makers need to be challenged to change existing models of their business environment (Baden Fuller & Stopford, 1994; Barr, Stimpert & Huff, 1992; Jacobs & Heracleous, 2005; Johnson, 2008; Senge, 1992; Wang & Chan, 1995;).

Second, senior decision makers must develop new "perceptual filters"[58] (see Ansoff & McDonnell, 1990, p. 58; Starbuck & Milliken,

[55] Sometimes signals are referred to as "cues" (see e.g. Maitlis & Sonenshein, 2010).

[56] Note the resemblance with the DIKW (Data, Information, Knowledge, Wisdom) hierarchy (see Ackoff, 1989; Rowley, 2007; Zeleny, 1987).

[57] Shifts in these business environments result in an increasing emphasis on dynamic rather than static knowledge capabilities of organizations. It is therefore paramount for organizations to develop their dynamic knowledge capabilities continuously (Dawson, 2000).

[58] These perceptual filters can be understood as "lenses". See for example Thackara (2005), who refers to such lenses as "macroscopes" (p. 6) that help develop a fresh understanding of complex systems.

1988) through which they perceive their business environment and build an understanding of how it works (Hill & Levenhagen, 1995; Senge, 1992).

Third, senior decision makers are in need of tools to scan their business environment, capture weak signals[59] and manage complex information and stimuli (Battistella, Biotto, & Toni, 2012; Reeves & Deimler, 2011).

[59] See Holopainen and Toivonen (2012) for a discussion of Ansoff's notion of "weak signals".

2.4.1 Added value of design in strategic innovation

In regard to these needs, designers can be of great value for senior decision makers (Calabretta, 2013; Stevens & Moultrie, 2011). For example, designers help achieve a holistic view of a complex situation, stimulate creativity and provide fresh perspectives (Steinberg, 2012). They use visualizations and prototypes as tools to explore uncertainty, open up discussions, articulate problems, define solution spaces, identify opportunities and facilitate communication among stakeholders (Blomkvist & Segelström, 2013; Stevens & Moultrie, 2011). Designers are able to forge connections between seemingly unrelated elements into meaningful frames that help senior decision makers to perceive the world from a novel perspective (Bailey, 2013; Boyer, et al., 2011; Dorst, 2010, 2011; Dorst & Tomkin, 2011; Kolko, 2010a, 2010b). Perhaps the most valuable asset of designers is their human centered perspective towards innovation (see Brown, 2008, 2009; Esslinger, 2009; Merholz, Wilkens, Schauer, & Verba, 2008; Sato, 2009). With these tools and their mindset, designers offer solutions, in terms of new perceptual filters, that help senior decision makers to challenge their current beliefs and perceive their business environment anew.

However, as Bilton, Cummings and Wilson (2003) observe, traditionally there has been a tension between the creative industry and the boardroom. A mutual distrust, but actually a mutual misunderstanding, divides the *creatives* and the *suits* (Bilton, et al., 2003).

2.4.2 Opposing logics: business versus design

Liedtka and Ogilvy (2011) have elaborated on the differences between these opposing and seemingly incommensurable approaches of business and design[60] (see table 1). Liedtka and Ogilvy (2011) observe that business tilts towards analytical thinking and pursues control, whereas design draws on a rather generative approach aimed towards synthesis. These claims are nevertheless unsubstantiated by any empirical research, but are in line with the early work of Lawson (1979; 2004, p. 41) and recent research of Schar (2011). In addition, Martin (2009a) asserts that business thinking currently employs two dominant forms of logic, deductive and inductive reasoning, which both stem from

[60] It should be noted, however, the way business and design are portrayed as two opposing realms (e.g. Liedtka & Ogilvy, 2011; Martin, 2009a) is a relatively narrow view. In practice, the boundaries of business thinking and design thinking are often blurred. Pigeonholing people into business thinkers and design thinkers is not the aim of describing these two types of thinking. Instead, it should be seen as a continuum, which represents rather a propensity towards either analysis or synthesis, planned action or situated action, maintaining the status quo or challenging it, etc.

	BUSINESS	DESIGN
Underlying assumptions	Rationality, objectivity, reality is fixed and quantifiable	Subjective experience, reality is socially constructed
Method	Analysis aimed at providing one "best" answer	Experimentation aimed at iterating toward a "better" answer
Process	Planning	Doing
Decision drivers	Logic, numeric models	Emotional insight, experiential models
Values	Pursuit of control and stability, discomfort with uncertainty	Pursuit of novelty, dislike of status quo
Levels of focus	Abstract or particular	Iterative movement between abstract and particular

Table 1: Business and design, two opposing logics, which are potentially complementary or conflicting (Liedtka & Ogilvie, 2011).

scientific tradition[61]. Yet, for business there is an urgent need to broaden its repertoire of approaches in order to address the complex and open-ended challenges faced by organizations nowadays (Boyer, Cook & Steinberg, 2011; Stacey, Griffin, & Shaw, 2000). Inductive and deductive reasoning are inadequate for the underdetermined situations, which organizations are currently facing. It requires another form of logic, also known as abductive reasoning, which is considered as the logic of conjecture (Cross, 1990, p. 132). Many scholars consider this type of thinking imperative to design thinking (see Cross, 1990, 2011; Dorst, 2010, 2011; March, 1976; Martin, 2009a; Leavy, 2010; Kolko, 2010a, 2010b; Roozenburg, 1993; Roozenburg & Eekels, 1995). Business is, according to Martin (2009a), apparently missing this form of logic[62]. Moreover, designers frighten their clients with abductive reasoning; for clients it corresponds to "blue sky"-thinking, which echoes risks and unpredictable outcomes (Kolko, 2010a). Somehow, designers have to find a way to ease their clients in order to enhance their collaboration. They should therefore clearly explain how they cope with risks and how their activities yield business value.

2.5 Conclusion

The aim of this chapter was to understand the context of contemporary strategy making. Nowadays, organizations are challenged to the edge of their capacity to maintain a fit with their highly networked business environments. These environments are – as a consequence of its networked nature – constituted by alliances of organizations that jointly deliver value propositions for their customers. Such propositions are termed Product Service Systems. The interconnectedness of organizations also implies interdependentness, which in turn causes volatile and disruptive shifts in their business ecosystems. For senior deci-

[61] The genesis of contemporary organizations and human labor is in the work of Taylor (1911/2006). With the publishing of his work "The Principles of Scientific Management" he established a framework that has had a tremendous impact on business thinking and human labor over the past century. But according to Conklin (2009), currently a new paradigm is emerging, the Age of Design, which preludes the end of the Age of Science. The skills and knowledge that were dominant in the Age of Science are still important, but they are no longer sufficient. The complexity of the world and wickedness of problems requires another way of thinking, which is usually referred to as "design thinking".

[62] It is not surprising to see that design thinking has become an immensely popular notion in the realm of business and management. Consider, for example, the notable body of business literature on the subject, which is growing in size and attention (see e.g. Berger, 2009; Boland & Collopy, 2004; Brown, 2008, 2009; Liedtka & Ogilvie, 2011; Lockwood, 2010; Martin & Christensen, 2013; Martin, 2009a; Shamiyeh, 2010; Silva, Filho, Adler, De Figueiredo Lucena, & Russo, 2012). Also, several business schools have embraced the principles of design thinking and integrated them into their curricula (Dunne & Martin, 2006; Zuboff, 2009).

sion makers it is crucial to understand the principal mechanisms of these developments and they should therefore become more sensitive to the signals that herald them. It requires senior decision makers to replace their models of success and to look at their business ecosystem through a new lens. Designers may be of great value to provide senior decision makers with “new eyes” and make them more sensitive to their peripheral signals (see figure 6).

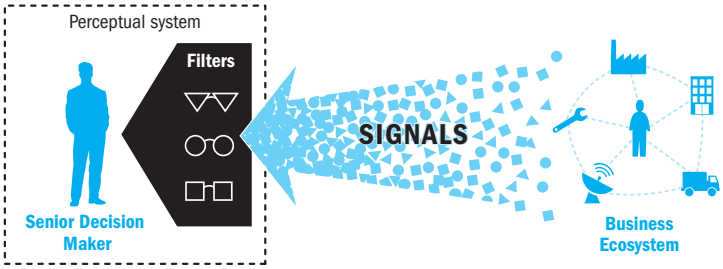

Figure 6: Senior decision makers need new perceptual filters (i.e. cognitive lenses) to selectively perceive new signals from their periphery.

However, designers and senior decision makers employ different types of logic, which usually frustrate their collaboration and communication. Yet, the abductive logic of design may complement the traditional deductive and inductive logic of business. This raises the following questions, which will be discussed in the following chapter. How to bridge cognitive differences between the design and business? And how to help senior decision makers to make sense of their business environment?

Chapter 3

Changing minds

The focus of this chapter will be on unraveling the linkages between several notions on cognition and perception. Shared cognition in terms of cognitive proximity is examined to develop an understanding of how heterogeneous network actors may achieve sharedness among mental models. The question is however: how to achieve sharedness? How to coordinate the cognitive alignment among heterogeneous actors? This chapter scrutinizes the purpose of mental models, their properties and nature and examines how mental models may influence perception, and how perception may influence mental models. Moreover, it elaborates on the questions: how do senior decision makers make sense of their business environment and how may designers help them to do so?

3.1 Observations

The previous chapter highlighted the differences in reasoning between design and business. A personal experience (see exhibit 3) illustrates the incommensurability between these different thought worlds and serves as a starting point for an in-depth literature study.

Exhibit 3: Colliding universes

In November 2012, I[63] *attended a meeting with my colleagues to discuss some issues that arose after our faculty was relocated. Besides the teaching staff of the bachelor course Communication & Multimedia Design, the two heads of department and the faculty dean attended the meeting.*

Since September 2012 the faculty of Communication, Media and Information Technology of Rotterdam University of Applied Science was situated in two refurbished office buildings in the city center of Rotterdam. However, soaring student numbers, some miscalculations in available space and the lack of adequate support systems initiated a causal chain where each solution seemed to be causing a host of new problems. At the time of the meeting, the teaching staff appeared to be very dissatisfied with the situation. So, soon after the meeting started, the discussion between the teaching staff and dean became tense and at some moments even fierce.

There seemed to be in particular a disagreement about the direction to take. The teachers urged to take care of the planning themselves, rath-

[63] In my role as a design educator.

er than depending on a rigid support system. In doing so, the teaching staff hoped to regain flexibility, which would help them to be more adaptable in case of unforeseen events. The dean, on the other hand, insisted that the teachers should put more effort in refining and preparing the planning, and once implemented, cohere to the plan. That would stabilize the situation, as he suggested.

The following day, over a cup of coffee, I reflected with the dean on the discussion in a one-to-one meeting. His prime concern seemed to be efficiency and control, while my colleagues and I were concerned with efficacy and adaptability. This second meeting showed, just as the day before, that we were holding opposing views and opinions on how we define the quality of an educational organization and how to manage such an organization. Moreover, both meetings show that the dean's disposition is essentially risk aversive, aiming to maintain the status quo; whereas the teaching staff tended towards taking a novel, experimental approach (i.e. trial-and-error), challenging the status quo.

When I left his room, I did not feel we had come any closer to consensus. Rather, I felt like we were more separated, both living in two totally different universes. The situation puzzled me: how can two people hold such opposing views and opinions on the same situation ?

The observations in exhibit 3 are exemplary of the differences between business logic and design logic, as described in table 1. The fierce discussion between the teaching staff and the dean seemed to accentuate these differences. But, these observations also raised some questions. What constitutes these opposing views – is it nature, nurture, or perhaps something else? And what is needed to establish a common ground between those two universes? A second observation (see exhibit 4) elaborates on these questions and provides hints, which help to direct this research.

Exhibit 4: Visualizing universes

In September 2012, my colleague Peter van Waart and I organized a meeting to welcome a group of new teachers and share the principles of our course with them. Over the years, we had developed a collection of diagrams, models, ideas, visions and theories, which we used in our lectures, workshops and also for curriculum development. In fact, this collection represented the principles of our organization and curriculum. For the meeting with our new colleagues, we compiled these principles into a presentation. Our colleagues appreciated it and valued its comprehensiveness. This motivated us to elaborate on it and turn it into a book, which we called: "The DNA of CMD"[64]. Copies of the book were distributed among the teaching staff, management and support staff. Furthermore,

[64] See Leurs, Van Waart, Best, Schelling and Fleumer (2012).

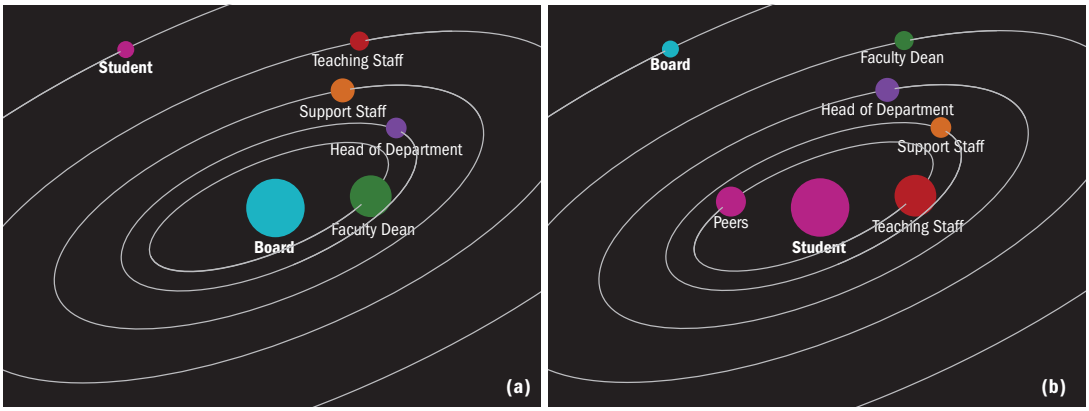

Figure 7: (a) The *management experience* positions the board of directors in the center of the solar system, while the students orbit as the most outer planet. (b) For the *student experience* it is the other way around, with the students in the center, and the board of directors in the edge of the solar system.

we felt that the executive board might be interested in this publication, so we sent them some copies as well.

Within a few days, we received a response from the board. The message that Gerard van Drielen – one of the board members – sent us, read: "What a beautiful presentation of your program and its underlying principles. It is a rich book that inspires anyone involved in education. What hit me most were the striking diagrams representing 'the student experience'" (G. van Drielen, personal communication, December 19, 2012).

Interestingly, the diagrams[65] of the "universes" (see figure 7) seemed to have caught his attention. I wondered; why did especially these diagrams get his interest?

[65] The credits for these diagrams go to my colleague Peter van Waart.

The diagrams (figure 7) aimed to depict the distance between the boardroom and the classroom, and how both actors have different perspectives on the organization and most importantly, how they experience it. Decisions made by the executive board sometimes collide with the interest of the students or the practice of the teaching staff. These observations raised the following question: what makes these diagrams so compelling?

3.2 Proximity

The seemingly incommensurability of *universes*, as described in exhibit 3, is clearly expressed in figure 7; it denotes a closeness between two organizational members. The diagrams in exhibit 4 are in fact embodiments of "proximity" – or rather the lack thereof. The notion of proximity is possibly what made the diagrams so compelling to the senior decision maker. But what kind of proximity is expressed in these diagrams?

3.2.1 Defining the concept of proximity

In general, the concept of proximity expresses the state of nearness between two or more organizational entities (e.g. firms, network ac-

tors). It is a popular concept in economic geography (e.g. Boschma, 2005; Menzel, 2008) and inter-organizational collaboration (e.g. Knoben & Oerlemans, 2006; Noorderhaven, 2000; Nooteboom, 1999). In these fields, proximity is considered as a key driver of an organization's innovative performance[66] (Boschma, 2005). When the term proximity is used, it commonly refers to the spatial and physical distance between two individuals or organizations. The literature though, shows an additional array of dimensions, such as, institutional, organizational, cultural, social, cognitive, emotive, technological, linguistic and political (see Boschma, 2005; Criscuolo, Salter, & Ter Wal, 2010; Hautale, 2011; Knoben & Oerlemans, 2006; Noorderhaven, 2000; Sacchetti & Sugden, 2004; Walukiewicz, 2007).

In research, these dimensions are usually discussed separately for analytical purposes. In organizational practice, on the other hand, these dimensions manifest themselves as a holistic system of interactions. As a system, these dimensions tend to complement one another (Boschma, 2005). If that is not the case, they may impede communication and collaboration. This is illustrated in exhibit 3, which shows how two actors, within the same room and organization, may still hold opposing views on the exact same situation.

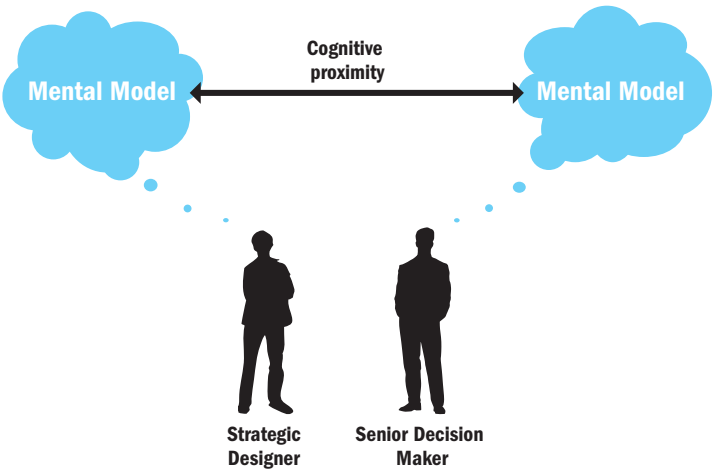

Figure 8: Physically a designer and senior decision maker may be situated near to each other (e.g. when they shake hands). But that does not mean they share mental models. The level of sharedness determines the cognitive proximity between two actors.

3.2.2 Cognitive proximity

These differences are explained by the notion of cognitive proximity[67] (see figure 8). Cognitive proximity refers to shared knowledge bases among dyads of actors (Boschma, 2005; Hautala, 2011). Knowledge bases as such, consist of mental models[68]. The sharedness[69] of these mental models forms the basis for network actors to work across differ-

[66] In similar vein, Uzzi and Spiro (2005) describe how "small world networks" foster creativity and leverage the financial and artistic performance of Broadway musicals. It is based on the assumption that constellations of interdisciplinary practitioners leverage innovation (Blackwell, Wilson, Boulton, & Knell, 2010).

[67] See the work of Hautala (2011) for a comprehensive overview of studies on cognitive proximity. Note that some authors refer to the notion of cognitive proximity as its antonym: "cognitive distance" (see e.g. Nooteboom, 1999, p. 13; Noorderhaven, 2000), in this sense a little cognitive proximity is equivalent to a large cognitive distance, and vice versa. To avoid any confusion, throughout this work the notion of cognitive proximity will be used. There are some cases though, where "cognitive distance" is more appropriate or clearer.

[68] Nooteboom usually refers to mental models (see Nooteboom, 1999, 2006) as "categories", "mental categories", or "categories of thought" (see e.g. Nooteboom, 1999, 2000, 2006, 2007). It remains unclear what Nooteboom exactly means by "category", as it used in his publications in a rather esoteric and inconsistent manner. However, in this thesis the notion of "categories of though", and alike, are considered as mental models.

[69] In terms of shared cognition Cannon-Bowers and Salas (2001) define four categories of "sharedness". These categories include: overlapping, similar or identical, compatible or complementary and distributed. The current work aims to establish an overlap in mental models. It is not necessary for designers and senior decision makers to hold identical mental models; it suffices to have portions of their mental models in common.

ent domains (Hautala, 2011; Nooteboom, 1999). The extent to which certain domain-related mental models are shared thus defines the level of cognitive proximity.

In practice, cognitive proximity allows heterogeneous network actors to establish common ground and to communicate with each other. Consequently, the ability to communicate and interact with new concepts accelerates the development of shared mental models; it facilitates interactive learning[70] (Boschma, 2005; Criscuolo, et al., 2010; Hautala, 2011; Menzel, 2008; Nooteboom, 2000; Schön, 1963, p. 9).

Boschma (2005) suggests, however, that too much, or too little cognitive proximity may impede learning. It is explained as follows. Too much proximity restricts the formation of novelty and engenders confirmation bias (Criscuolo et al., 2010). Too little proximity, on the other hand, usually yields novelty, but may come with the disadvantage of incomprehensibility (Nooteboom, 2000). In other words: "information is useless if it is not new, but it is also useless if it is so new that it cannot be understood" (Nooteboom, 2000, p. 72). Therefore, the tension between novelty and understandability needs to be balanced (Nooteboom, 2000, Criscuolo et al., 2010) toward an optimum level op cognitive proximity (Nooteboom, 1999, 2007).

In sum, when two network actors stem from two different domains (e.g. design and business), in their interactions they may possibly experience asymmetries in mental models. These asymmetries hamper cognitive proximity (see Nooteboom, 2000). The level of cognitive proximity is determined by alignment of mental models. This alignment allows dyads of heterogeneous network actors to establish a shared understanding. The alignment process, however, must be coordinated (Clark & Brennan, 1991; Nooteboom, 2000; Vlaar, Van den Bosch, & Volberda, 2006).

[70] Cognitive proximity enhances the absorptive capacity of an organization (Nooteboom, 1999, 2000; Nooteboom, Van Haverbeke, Duysters, Gilsing, & Van den Oord, 2007). Absorptive capacity encompasses the capability to exploit external resources and as such it is considered as an essential innovation competency (Cohen & Leventhal, 1990).

3.3 Mental models

The previous section highlighted the role of mental models in communication and collaboration between two domains. But what is meant by the term "mental models"? What purpose do they serve? What are their properties? What are the guiding concepts that appear to be vital to the practice of strategic thinking? And how can they be developed?

3.3.1 Defining the concept of a mental model

Although Johnson-Laird (1983) is generally credited for coining the term *mental model*[71], its origins may be traced back to Craik's (1943) work "The Nature of Explanation"[72]. According to Craik (1943) people construct and carry internal, symbolic representations of external reality in their minds, to anticipate and respond to future situations.

[71] The term "mental model" has been mentioned earlier in literature, even before Johnson-Laird's (1983) publication. See for instance some early work of Johnson-Laird (1980).

[72] See Johnson-Laird (2004) for a more detailed account on the history of mental models.

Since its introduction, a lot of work has been done to elaborate on Craik's (1943) ideas and scrutinize the purpose, structure, content and application of mental models. But, even with these efforts, a unified theory of mental models is still missing (Markman & Gentner, 2001; Rook, 2012). Because of this, much of the literature suffers from conceptual confusion (see e.g. Byrne, 1992; Doyle & Ford, 1998; Rook, 2012; Rouse & Morris, 1986). There are several explanations for this confusion.

First, its nature, the notion of mental model is a theoretical concept that does not exist in any reified form (Jonassen & Henning, 1996). Moreover, Staggers and Norcio (1993) even question if mental models actually exist, because of the fact that only indirect evidence is available to proof their existence. It seems that their inexistence or unperceivability make it problematic to examine mental models as a phenomenon (Klimoski & Mohammed, 1994; Zhang, 2009).

Second, the term *mental models* is used in a variety of disciplines[73] (see Gentner, 2001; Kolkman, Kok & Van der Veen, 2005). Each of these disciplines has it its own way of defining mental models[74] (see Kolkman, et al., 2005; Markman & Gentner, 2000, p. 228). Most of the literature, however, advances in interdisciplinary research, the three major fields are: cognitive science, human computer interaction and system dynamics (Rook, 2012; Rouse & Morris, 1986). Yet, these three fields still lack consistency in terms of application and definition.

Third, over the years authors have used various synonymous terms for mental models, such as, conceptual models, cognitive models, component models, causal models, meaning structures, mental categories, forms of thought, frames, cognitive maps, cognitive schemata, schemas (see De Wit & Meyer, 2010, p. 57; Johnson, 2008; Nooteboom, 2000; Rook, 2012; Sloman, 2005; Staggers & Norcio, 1993). The focus in this study is on literature in which the term *mental model* is used, rather than related terms as *cognitive maps* or *schemata* just to avoid any further confusion and misconceptions.

Regardless of this confusion, it can be said that mental models are representations in a person's mind of the world and how it works (De Wit & Meyer, 2010, p. 57; Senge, 1994). This level of specificity of this definition may still be somewhat robust, but in its essence it quite well reflects the common ground among various scholars and disciplines. However, a mere definition reveals little about the inner mechanisms of mental models. To establish a better understanding of its workings, a further examination of its purpose and its properties is needed.

3.3.2 Purpose of mental models

Mental models can serve several purposes. In research for example,

[73] For example: reasoning and linguistics (Johnson-Laird, 1983; Gentner & Stevens, 1983; Rickheit & Habel, 1999), human-machine interaction (Rasmussen, 1979; Rouse & Morris, 1986), human-computer interaction (Norman, 1988; Cooper, Reimann & Cronin, 2012; Preece et al., 1994; Rogers, Rutherford & Bibby, 1992; Staggers & Norcio, 1993), management studies (De Wit & Meyer, 2010; Senge, 1994), organizational research (Rook, 2012), group cognition (Badke-Schaub, Neumann, Lauche & Mohammed, 2007; Cannon-Bowers, Salas, & Converse, 1993), system dynamics (Forrester, 1971; Doyle & Ford, 1998), learning and instruction (Jonassen & Henning, 1996; Gentner & Stevens, 1983; Gentner, 2001).

[74] Markman and Gentner (2000) distinguish two types of mental models: logical mental models and causal mental models. The first type represents a traditional view that focuses on abstract logical reasoning. The latter reflects a more contemporary view and asserts a domain-specific, knowledge-rich approach.

the mental model concept provides a framework for academic purposes to understand and explain human reasoning[75] (Gentner, 2001), whereas, in everyday life, the use of mental models is rather ubiquitous and versatile. For example, people employ simple mental models when they use scissors, pens and light switches (see Norman, 1988), but may use intricate or collective models when involved in complex activities, such as designing an aircraft (see Badke-Schaub, Neumann, Lauche, & Mohammed, 2007). In this sense, mental models are considered as versatile cognitive constructs used for (commonsense) reasoning, perception, language understanding or production, problem solving and in the prediction of evolving events (Gentner, 2001; Pribbenow, 1999; Rouse & Morris, 1988). In these cognitive processes two basic functions underpin the structure and purpose of mental models.

[75] See for example the work of Johnson-Laird (1983), and Rickheit and Habel (1999).

First, mental models aim to reduce cognitive load through filtering (Badke-Schaub, et al, 2007; Craik, 1943). Humans simply cannot handle the totality of the information displayed in their periphery. The reason for this is that the physiological and cognitive systems (e.g. sensory of memory system) of humans are limited (Besnard, Greathead, & Baxter, 2004; Craik, 1943; De Wit & Meyer, 2010, p. 56; Denzau & North, 1994; Richards, 2001). To deal with this complexity, humans construct internal working models — or "small-scale models" as Craik (1943) termed them — of external reality (Barr, et al., 1992; Johnson-Laird, 1983). These simplified models allow them to integrate and process new information with minimal cognitive effort (Badke-Schaub, et al., 2007). Mental models thus serve as filters through which the world is perceived, interpreted, evaluated and understood (De Wit & Meyer, 2010, p. 57; Gary & Wood, 2005; Nooteboom, 2000; Sterman, 1994). Mental models, as such, largely determine which information and perspectives are selected and used to examine external reality (Barr et al., 1992). As a consequence, information that does not match with one's mental model is omitted from observation (Schön, 1983, p.309).

Second, mental models allow mental simulation to predict future situations or system states (Gentner, 2001; Markman & Gentner, 2000). By simulation, or *running* the model, various scenarios of cause and effect are propagated through mental structures in one's head involving the use of imagery (Markman & Gentner, 2000; see e.g. Ferguson, 1977). This serves two purposes, one is to evaluate prospective future states; the other is to test hypotheses about reality (Christensen & Schunn, 2009; Kolkman, et al., 2005; Staggers & Norcio, 1993). The "runnability" is a key feature of mental models and allows people to generate meanings dynamically (Carroll, Olson, & Anderson, 1987). This makes mental models considerably richer than mere knowledge constructs (Zhang, 2009). The ability to run models is particularly use-

ful when dealing with uncertain situations where problem spaces are underdetermined and solution spaces are open-ended[76] (Ball & Christensen, 2009; Christensen & Schunn, 2009). In these situations, simulation helps people to anticipate and react in a more proficient manner, as such it may even be considered as a primitive survival mechanism (Craik, 1943).

[76] These are in fact so called design problems (see Restrepo & Christiaans, 2004).

Thus, through filtering, mental models reduce cognitive load. By simulation people generate predictions of possible future states. These simulations instigate (strategic) action as they help senior decision makers provide accounts for their decisions (Barr, et al., 1992; Senge, 1994).

3.3.3 Properties of mental models

The content and form of mental models are largely determined by their purpose (Johnson-Laird, 1983), the tasks they are related to (Badke-Schaub, et al., 2007), or their context in which they are employed (Rouse & Morris, 1986). For instance, in HCI, mental models primarily represent conceptions of computer systems (Cooper, Reimann & Cronin, 2012; Norman, 1988; Preece et al., 1994). In system dynamics mental models also represent systems, such as economic systems, physical systems, social systems, etc. (Forrester, 1998). Whereas in cognitive science, mental models usually correspond to the world in general (Cannon-Bowers, Salas, & Converse, 1993). These differences also imply a distinction between conceptual models, representing more abstract matters (e.g. functions and relations) and physical models, representing the physical world (Johnson-Laird, 1983; Rasmussen, 1979). In this respect, mental models may represent true situations, possible situations or imaginary situations (Johnson-Laird, 1983). These different representations can be held at the same time, within the same context. This means that people are capable of holding multiple mental models concurrently, even if these models are inconsistent or conflicting with each other (Gentner, 2001; Staggers & Norcio, 1993).

Furthermore, Johnson-Liard (1983) suggests that the construction of mental models often involves unconscious processes of thought, which means that mental models may not always be explicit. Conversely, they are held as tacit[77] constructs that are not readily known to others (Jonassen & Henning, 1996). These tacit constructs may include nonverbal elements or elements that are hard to verbalize (Rickheit & Sichelschmidt, 1999). As a consequence, mental models may be so deeply ingrained that holders are not even consciously aware of their existence (Jonassen & Henning, 1996; Senge, 1994).

[77] See Polanyi (1966/2009). See Taylor (2007) for a more elaborate discussion on the notion of tactit.

Moreover, the tacit nature of mental models makes them inherently idiosyncratic. Mental models are, according to Nooteboom (2010),

principally path-dependent. No two individuals can have exactly the same mental model[78], because both cannot have the exact same experience (Denzau & North, 1994), nor can two people perceive the world in exact the same way (Goodman, 1978).

This does not imply however, that mental models cannot be shared among a group[79] (see e.g. Denzau & North, 1994; Langan-Fox, Wirth, Code, Langfield-Smith, Wirth, 2001). Research shows[80], that group mental models have a significant effect on group performance and decision making (Badke-Schaub, et al., 2007; Cannon-Bowers, et al., 1993; Lim & Klein, 2006).

In sum, mental models are usually tacit and idiosyncratic in nature. Their form and content largely depend on their application. But what may the content of mental models be? And what form do they take?

[78] Martin (2009b, p. 51) refers to this as "Corporate Rashomon", especially when two people hold opposing views on the same phenomenon. See also Heider (1988), who describes the conflict between two opposing research paradigms as the "Rashomon Effect".

[79] Note that "shared mental models" and "team mental models" are two distinct concepts (see Langan-Fox et al., 2001).

[80] See Mohammed, Ferzandi and Hamilton (2010) for a historical overview of the notion of shared mental models.

3.3.4 Content of mental models

Mental models are generally described as a special type of knowledge (Jonassen & Henning, 1996; Rasmussen, 1979; Rouse, 1986). To be more specific: "Mental models are knowledge structures about the state(s) of a potentially changeable world" (Bainbridge, 1992, p. 119). Variants of these knowledge structures are also referred to as: schemata, schemas (e.g. Gentner, 2001; Zhang, 2009) or scripts (e.g. Gioia & Poole, 1984; Mandler, 1984; Schank & Abelson, 1977). These knowledge structures are not necessarily mental models (Klimoski & Mohammed, 1994), since mental models normally include domain specific knowledge[81] (Gentner, 2001; Hester, et al., 2012; Jonassen & Henning, 1996; Markman & Gentner, 2000; Nooteboom, 2000).

Furthermore, literature shows little consensus on the content elements of mental models. Instead, a plethora of content types is used, e.g., representations of a domain or situation (e.g. Besnard, et al., 2004; Gentner, 2001), propositions (e.g. Bainbridge, 1992), mental images (e.g. Bainbridge, 1992; Johnson-Laird, 1980, 1983), mental videos (e.g. Anderson, Tolmie, Howe, Mayes & Mackenzie, 1992; Bainbridge, 1992) symbols (e.g. Carley & Palmquist, 1992; Craik, 1943), system components and their relations (e.g. Carroll, et al., 1987; Staggers & Norcio, 1993), concepts (e.g. Carley & Palmquist, 1992; Hester, et al., 2012), beliefs (e.g. Gary & Wood, 2005; Gentner & Markman, 1997; Hill & Levenhagen, 1995; Norman, 1988), causal maps (e.g. Gary & Wood, 2005; Sterman, 1994) and causal relations (e.g. Goldvarg & Johnson-Laird, 2001; Hester et al., 2012; Jonassen & Henning, 1996).

This variety of content types implies that it is almost impossible to define the exact content of mental models. Rather it suggests that mental models may consist of a blend of content types.

[81] Causal mental models in particular involve domain specific knowledge (Markman & Gentner, 2000).

3.3.5 Form of mental models

Definitions of the form of mental models seem to be subject to less debate, which may also suggest that the debate is being avoided (Bainbridge, 1992). Yet, the literature shows quite some agreement on the structure of mental models. Two characteristics stand out.

First, mental models are simplified, though often acceptable, representations of a too complex reality (Besnard, et al., 2004; Senge, 1992). Because of that reason, mental models are inherently incomplete and inaccurate (see e.g. Barr, et al., 1992; Forrester, 1971; Gary & Wood, 2011; Gentner, 2001; Hill & Levenhagen, 1995; Johnson-Laird, 1983; Norman, 1983; Senge, 1994; Staggers & Norcio, 1993).

But simplification can also be considered as a quality (Badke-Schaub, et al., 2007). Especially when coping with new or unknown situations, simplified models turn out to be useful to quickly make sense of the state of affairs and to transfer existing knowledge to the new situation (Cannon-Bowers, et al., 1993). Yet, in more complex situations this argument does not necessarily hold. Recent research suggests that the quality of mental models strongly correlates with its accuracy, especially when complexity increases. In these situations more accurate mental models result in more appropriate and effective decisions, hence better outcomes (Gary & Wood, 2005, 2011). A high degree of precision, however, may come at the expense of flexibility and adaptability (Hill & Levenhagen, 1995).

Second, the accuracy of mental models may vary and can decrease or increase over time (Bainbridge, 1992). Accuracy decreases when, for instance, the environment (i.e. external reality) changes to an extent that it is no longer in line with its corresponding internal representation (Barr, et al., 1992). On the other hand, accuracy increases when people become more experienced with a system or situation. This may require active learning, such as training (Norman, 1988), double loop learning (Sterman, 1994) or sensemaking (Hill & Levenhagen, 1995; Senge, 1994). All this indicates that mental models are dynamic constructs (Besnard, et al., 2004; Forrester, 1971; Jonassen & Henning, 1996), which can be modified or manipulated (Cannon-Bowers, et al., 1993; Johnson-Laird, 1983; Rasmussen, 1979).

In brief, mental models are simplified representations with varying levels of accuracy. In this sense mental models have dynamic qualities as their accuracy may change over time, either through shifts in reality or deliberate manipulation and learning. This raises some questions: how does all this relates to strategic innovation? And if mental models can be changed or formed, how does this process look like?

3.3.6 Mental models and strategic innovation

The above discussion tends to magnify the differences in conceptions and perspectives on mental models. It illustrates how the research community struggles with the absence of a unified theory and the fuzziness that surrounds mental models (see e.g. Doyle & Ford, 1998; Rook, 2012; Rouse & Morris, 1986). Delimiting the scope to strategic innovation may perhaps help to discern some specific properties that add to the conceptual framework.

In strategic innovation, mental models serve two purposes. First, senior decision makers act on the models they hold of their business environments, as such, they serve as the drivers of strategic decision making (Porac & Thomas, 1990; Senge, 1992). Second, mental models serve as filters through which only significant signals from the business environment are perceived (Barr, et al., 1992; Hill & Levenhagen, 1995). This helps senior decision makers to detect invariances in their business environment and distinguish salient signals from noise or other irrelevant signals (Sloman, 2005; Starbuck & Milliken, 1988). Note that a totally accurate perceptual filter, with no distortion, is not necessary[82] (Senge, 1992). The efficacy of filtering is more important than its accuracy, as effective perceptual filtering amplifies relevant information (Starbuck & Milliken, 1988).

Given the complexity and dynamics of contemporary business ecosystems, this thesis builds on the notion of mental models as delineated in system dynamics (see e.g. Doyle & Ford, 1998; Forrester, 2009; Sterman, 1994). In this view, mental models include networks of different knowledge and belief structures about a system (e.g. business ecosystem) (Sterman, 1994). As such, mental models consist of sets of concepts[83] and are held to involve beliefs, assumptions and expectations about the causal relations operating among these concepts[84] (Hester, et al., 2012).

Human reasoning with causality is a natural and efficient way to make inferences to events that may even change the state of reality, therefore it may be stated that the world is full of causal systems (Markman & Gentner, 2000; Sloman, 2005). Imposing causal frames on the context of the events (i.e. business environment) is, according to Sloman (2005) extremely effective for understanding, predicting and controlling it. Cause-and-effect understanding is for this reason a feature of mental models that is of particular interest to strategy development (Hill & Levenhagen, 1995; Kurtz & Snowden, 2003; Wang & Chan, 1995). The accuracy of these causal relations determines to a large extent the quality of a mental model and thus the quality of strategic thinking (Barr, et al., 1992; Courtney, Lovallo, & Clarke, 2013).

[82] Note, if such a filter is possible at all of course.

[83] There is quite some debate on the definition of the term "concept" (see e.g. Barsalou, Kyle Simmons, Barbey & Wilson. 2003; Carey, 2009; Machery, 2009; Murphy, 2004). In this work, a concept is considered, in keeping with Barsalou et al. (2003), as a general notion about a particular category (e.g. dog, car, profit, organization, competitor), or as Laurence and Margolis (1999) put it: "concepts are mental particulars" (p. 5). In everyday life, such concepts serve as tools for coping with the world and interact with others. In this sense, concepts are patterns, like "stencils", that help people to attribute meaning to their experiences and perceptions (Schön, 1963).

[84] From the field of cognitive science, Carley and Palmquist (1992) present similar ideas on the structure of mental models. In their view mental models can be represented as networks of concepts. These relations are however not causal but rather semantic. In addition, A Disessa (2002, p. 30) refers to such complex systems of concepts as "conceptual ecologies", which she considers as intricate knowledge constructs that contain a large number of conceptual elements of varying types. The richness of these concepts and their linkages determine the level of expertise.

3.3.7 Developing mental models

The way mental models are formed depends on the context and the complexity of the situation or system. In everyday life, mental models are developed though experience (e.g. Norman, 1988); while in an educational context mental models are formed by means of training and instruction (e.g. Gentner & Gentner, 1983). A business context, particularly when it concerns "strategic learning", requires higher levels of meaning making (De Geus, 1988; Thomas, Sussman, & Henderson, 2001), such as double loop learning (e.g. Argyris, 1977; Heracleous, 1998; Normann, 2001; Sterman, 1994), transformative learning (e.g. Johnson, 2008; Mezirow, 2001) or sensemaking (e.g. Hill & Levenhagen, 1995; Thomas, et al., 2001; Tovstiga, 2013).

Schwandt (2005), however, points out that sensemaking and learning are not synonymous. Although both are cognitive processes concerned with the interpretation and establishment of meaning; an in-depth look shows differences in process and focal point. Sensemaking, on one hand, is an individual cognitive process in a social context. It is a pragmatic approach focusing on the reduction of equivocality. Sensemaking is usually a swift and hasty process. Learning, on the other hand, focuses on individual growth and development, usually through the process of critical reflection (see e.g. Kolb, 1984; Schön, 1983). As such, it is a rather deliberate process (Schwandt, 2005).

Since the current work is concerned with constructing shared meaning among multiple network actors, further underpinnings of mental model development will be grounded upon the notion of sensemaking instead of learning. The premise of the present work is after all collaborative and social, rather than concerned with individual growth.

3.4 Sensemaking

The previous section describes the nature and principles of mental models. It is argued that mental model development requires higher levels of learning; especially sensemaking accords with the social dimension of the current work. But what is meant by "sensemaking"? What are its distinctive features? And how is sensemaking related to strategic innovation? And most importantly, how does sensemaking support senior decision makers develop new mental models?

3.4.1 Defining sensemaking

In colloquial use, sensemaking commonly refers to "make sense out of" an undifferentiated mass of information or an unclear situation. It is a term that is usually meaningful on appeal and as such it may refer to a cognitive process of "meaning making", as well as an emotive process of "feeling making" (Schwandt, 2005). Although the emotive

aspect is often overlooked in research (Maitlis & Sonenshein, 2010), it clearly serves a purpose. Emotions serve as a warning when there are signals (i.e. stimuli) that require attention and perhaps even subsequent action (Weick, 1995, p. 45). Yet, the body of literature on sensemaking primarily concentrates on its cognitive aspects.

The cognitive aspects of sensemaking[85] have been studied in various scholarly domains: human computer interaction (see Pirolli & Russell, 2011), communication and information science (see Dervin, Foreman-Wernet & Lauterbach, 2003), organizational science (see Weick, 1995), but also military science[86] (see Sieck et al., 2007). The current work primarily draws on the body of work of organizational science and in particular on Weick's (1995) landmark publication "Sensemaking in Organizations". In this work Weick presented the first comprehensive framework on sensemaking, explaining how organizations construct meaning from discontinuities in reality or other discrepant events. The significance of sensemaking in a strategic context is shown when organizations are in need of revising their strategies because of shifts in reality (i.e. business environment) (Tovstiga, 2013, p. 49).

It is typical, however, that Weick (1995) withholds a precise and inclusive definition of sensemaking. Although he attempts to describe what it is about, he seems rather reluctant to exactly define what it is[87]. In his attempt to describe it, Weick explains: "Sensemaking is about such things as placement of items into frameworks, comprehending, redressing surprise, constructing meaning, interacting in pursuit of mutual understanding, and patterning" (Weick, 1995, p. 6). In addition he underscores the dual nature of sensemaking: "Sensemaking is about authoring as well as interpretation, creation as well as discovery." (Weick, 1995, p. 8). Hence, sensemaking is thus not mere interpretation; it also involves authoring (Weick, 1995, p. 6).

3.4.2 Properties of sensemaking

To elaborate on what sensemaking is and how it works, but also to distinguish sensemaking from other explanatory processes (e.g. understanding, interpretation and attribution), Weick (1995) introduces seven properties. Weick (1995, p. 17) describes them as: a (1) social, (2) retrospective[88] and (3) continuous process, which involves (4) identity construction and (5) enactment on (6) extracted cues (i.e. signals) to provide (7) plausible explanations rather than accurate ones. The spirit of these properties is well captured in the theme: "How can we know what we think until I see what we say?"[89] (Weick, 1995, p. 62), which in its simplicity strikingly reflects the inherent complexity of sensemaking.

[85] In literature the term "sensemaking" is spelled in different ways. For example, Dervin (2003) refers to it as "Sense-Making", Louis (1980) as "Sense Making" and Weick (1995) as "sensemaking". When "Sense-Making" is used, it particularly refers to Dervin's (2003) work in terms of a methodology. "Sensemaking" on the other hand, usually refers to Weick's body of work and denotes a social and cognitive process.

[86] See also the role of sensemaking in Network Centric Operations (Smith, 2006).

[87] Probably because of the dual and ambiguous nature of sensemaking.

[88] Gioia, Corley and Fabbri (2002) suggest that opposed to retrospective sensemaking there should be prospective sensemaking: how else do strategic leaders make sense of the future? It is thinking in the future perfect tense, as an attempt to make sense of the future. In a later publication, Gioia (2006) criticizes his earlier work and denounces the notion of prospective sensemaking, considering it as an errant. MacKay (2008) however delivers a strong argument for extending concept of sensemaking with prospective processes. MacKay (2008) asserts that prospective sensemaking is more than thinking in the future perfect tense. He considers counterfactual and prefactual thinking as the key drivers of mental simulation. Through mental simulation, and scenario thinking in particular, people make sense of possible futures.

[89] The theme originally read: "How can I know what I think until I see what I say?" but some first person singular pronouns (i.e. "I") have been replaced with its plural case (i.e. "we") to emphasize the social nature of sensemaking.

So, through sensemaking situations are progressively clarified, generally in hindsight, as a retrospective[90] account to explain surprises[91] (Weick, 1995, p. 11; see also Louis, 1980). Surprise in this sense, encompasses a discrepancy between anticipations and actual experiences (Louis, 1980). It raises the key questions "what's going on here?" subsequently followed by "what do I do next?" (Weick, Sutcliffe, & Obstfeld, 2005).

These two questions illustrate that sensemaking involves both cognition and action (see Weick, 1995, p. 30). The first question refers to the sensemaking as a cognitive process, whereas the second question refers to it as an action oriented process. It presupposes "enactment" to socially construct meaningful accounts of reality, which do not need to be valid or true (Weick, 1995, p. 30). Take for example Weick's (1990) story of how a military unit found its way through the Alps while using a map of the Pyrenees. The soldiers were, however, not even aware they were using the wrong map. In spite of that – or better to say, thanks to that – they enacted on it, and eventually returned to their base safely. In this respect, action may be considered as an articulation of implicit presumptions (Hill & Levenhagen, 1995).

90 Steve Jobs wonderfully described the nature of retrospection in sensemaking during his renowned Stanford commencement speech: "Of course it was impossible to connect the dots looking forward when I was in college. But it was very, very clear looking backwards ten years later. Again, you can't connect the dots looking forward; you can only connect them looking backwards. So you have to trust that the dots will somehow connect in your future" (Jobs, 2005). However, sensemaking is – as Klein, Moon and Hoffman (2006) argue – not simply a matter of connecting the dots. It is crucial to know which dots to connect. Skills and adeptness are needed to identify what counts as a dot in the first place and to distinguish the meaningful signals from the transient and false signals.

91 Especially in the case of a "reality shock" (Louis, 1980).

3.4.3 Frames

Weick's (1990) example of the lost unit shows that sensemaking is in essence a way of seeing, but also a way of not seeing (Choo, 2006, p. 18). In fact, sensemaking is a process of framing and reframing, which requires a reciprocal connection between data and frame[92] (Klein, Moon & Hoffman, 2006b; Sieck et al., 2007). The Data/Frame Theory suggests that frames define what counts as data, while at the same time the data are (re)shaping the frames themselves (Klein et al., 2006b). This means that perception is determined to a large extent by the frames that are imposed on external reality[93] (Schön, 1983, p. 309; Schön, 1987, p. 4). In other words, sensemaking is a "process of fitting data into a frame, and fitting a frame around the data" (Sieck et al., 2007, p. v). The frame and the data thus work in tandem to generate plausible explanations of what people perceive (Sieck et al., 2007).

92 See also Minsky (1974), who describes frames as data-structures: "a frame is a data-structure for representing a stereotyped situation" (p. 1).

93 In terms of problem solving, Covey (2004) addressed the role of frames as: "The way we see the problem is the problem" (p. 44).

Frames have a specific purpose; they set the boundary of attention[94] to only identify significant peripheral signals and to filter these signals (Levenhagen & Hill, 1995; Sieck et al., 2007; Starbuck & Milliken, 1988). Frames are in this sense cognitive patterns that allow humans to make sense of their experiences (Fillmore & Baker, 2010; Minsky, 1988, p. 245). Frames can take various forms, e.g., stories, maps, diagrams or metaphors (see Ancona, 2012; Heracleous & Jacobs, 2008a, p. 117; Hill & Levenhagen, 1995; Klein et al., 2006b;

94 This process of delimiting attention is referred to as "naming" (see e.g. Schön & Rein, 1994, p. 26; Duck, 2012, p. 34), or "bracketing" (see e.g. Weick, et al., 2005). The essence of this process is well captured in Louis Pasteur's famous quote: "Where observation is concerned, chance favors only the prepared mind."

Weick, 1990). Sensemaking is essentially about connecting signals and frames to create an account of what is going on (Maitlis & Sonenshein, 2010).

3.4.4 Sensemaking and strategic innovation

The role of sensemaking in strategic innovation is reflected in a rich stream of research (see e.g. Balogun & Johnson, 2005; Battistella, et al., 2012; Daft & Weick, 1984; Davenport, Leibold, & Voelpel, 2007; Gioia & Chittipeddi, 2005; Gioia & Thomas, 1996; Gioia, Corley & Fabbri, 2002; Hill & Levenhagen, 1995; Kurtz & Snowden, 2003; MacKay, 2009; Madsbjerg & Rasmussen, 2014; Maitlis, 2005; Martin, 2009b; Porac & Thomas, 1990; Senge, 1994; Smircich & Stubbart, 1985; Starbuck & Milliken, 1988; Thomas, Clark & Gioia, 1993; Voelpel, Leibold, Tekie, & Von Krogh, 2005; Wright, 2005). The abundance of literature even suggests that strategizing without sensemaking is simply impossible.

Sensemaking is needed when the senior decision makers' understanding of their business environment becomes unintelligible at a certain point in time. This usually occurs when senior decision makers are surprised by radical or unexpected shifts in their business environment. In such situations, sensemaking involves coming up with a plausible understanding of these shifts (Ancona, 2012). As such, sensemaking supports senior decision makers in structuring flux (Weick et al., 2005), but also establishes a common ground among various stakeholders to socially construct accounts of their experiences (Klein et al., 2006a). Moreover, sensemaking aims to achieve shared meaning, in terms of shared mental models[95] as the outcome of its process (Maitlis & Sonenshein, 2010). Shared meaning serves as a framework that supports senior decision makers in coping with incomplete, underdetermined and ambiguous information by jointly formulating presumptions to fill in the blanks (Choo, 2001).

Sensemaking, in relation to strategic innovation, involves the process of creating mental models of a complex and dynamic business ecosystem. It is a social and ongoing effort to understand causal relations among stakeholders and peripheral occurrences in order to attribute meaning to invariances and anticipate their trajectories. It serves to define actions and act accordingly.

According to Hill and Levenhagen (1995), this process (see figure 9) starts with a hunch (i.e. a "felt belief"), which constitutes a premature mental model of the given business environment. They labeled this type of mental model as "intuitive model". Most of its content is implicit and lacks structure. This intuitive model includes emotive affect and tacit knowledge constructs (Hill and Levenhagen, 1995) and

[95] A "shared mental model" can be described as the extent to which a number of individuals (a dyad or polyad) possess a similar internal representation of a certain situation or phenomenon (Langan-Fox, Wirth, Code, Langfield-Smith & Wirth, 2001).

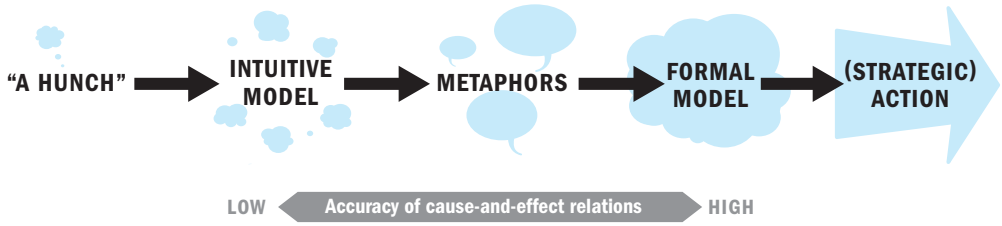

Figure 9: Sensemaking process: metaphors are the building blocks of mental models (adapted from Hill and Levenhagen, 1995).

holds incoherent and incomprehensible representations of cause and effect relations (Kurtz & Snowden, 2003). At this stage senior decision makers "may not know precisely why they know what they belief they know" (Hill & Levenhagen, 1995, p. 1061). Therefore, much of the intuitive belief structure often remains unarticulated.

However, as Hill and Levenhagen (1995) suggest, metaphors provide a common ground for communication (e.g. figurative speech). In conversational interactions, metaphors allow senior decision makers and strategic designers to surface and to share their intuitive models. This helps them develop these tentative models into more "formal models" (see e.g. Nonaka, 1991, p. 99; see also Tsoukas, 1991). The content of these formal models is more explicit and articulate, they hold detailed and rational accounts of causality about the given business environment (Hill & Levenhagen, 1995; Kurtz & Snowden, 2003). Formal models are thereby more accurate[96] than intuitive models (Hill & Levenhagen, 1995).

In this process, metaphors are the stimuli that are placed into the framework (see Starbuck & Milliken, 1988; Weick, 1995, p. 4), that allow senior decision makers to reframe their current conceptions of their business environment, to ultimately enact upon them.

[96] Perfectly accurate mental models do not exist; the term "plausible" may therefore be more appropriate than "accurate". This follows Weick's idea that sensemaking is driven by plausibility rather than accuracy (see Weick 1995, p. 55; Weick et al., 2005). However, in keeping with Gary and Wood (2005, 2011) the term accuracy is used.

3.5 Metaphors

Human cognition seems fundamentally metaphorical in nature. In everyday life, human thoughts, actions and communication (e.g. language) are pervaded with metaphors (Lakoff & Johnson, 1980/2003). Metaphors usually serve as vehicles to proceed from the known to the unknown, they help connect ideas in new ways so that new knowledge can emerge (Battram, 1998, p. 56; Nisbett & Ross, 1985). As such, a metaphor is commonly defined as "understanding one conceptual domain in terms of another conceptual domain" (Kövecses, 2002, p. 4; see also Apter, 1982, p. 62; Lakoff & Johnson, 1980/2003, p. 5). This implies that metaphors essentially include mappings (see figure 10) between a common base domain, that is usually concrete or physical in nature, and a target domain, that is generally more abstract (Kövecses, 2002). Metaphors accentuate the similarities between the two domains

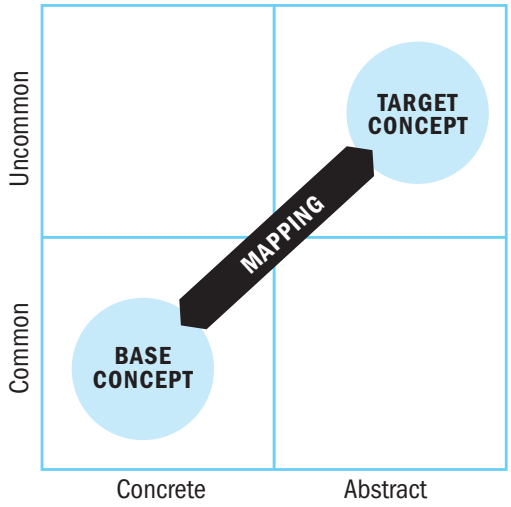

Figure 10: Metaphors are essentially mappings between a common base concept and a unfamiliar target concept (adapted from Goldschmidt, 2001)

and ignore the differences (Morgan, 2006, p. 5). Thus, the process of metaphor is in essence the displacement of concepts (Schön, 1963, p. 4); it stimulates the formation of new concepts and generates understanding.

Good metaphors are an invitation to see things anew (Barrett & Cooperrider, 1990); they are "generative"[97] (Heath & Heath, 2007; see Schön & Rein, 1994, p. 23) and create new perceptions and explanations. They intend to spark new understanding (Bethanis, 2006) by reframing current perceptions (Heracleous & Jacobs, p. 22; Schön & Rein, 1994, p. 23; see e.g. Dorst & Tomkin, 2011; Paton & Dorst, 2011). It is important to note that the way of seeing, created through a metaphor, also becomes a way of "not" seeing. For example, when thinking of an organization as a *culture*, one will not see it as a *structure* (Morgan, 2006; see also Mars et al., 2012, 2014).

Moreover, metaphors not only shape how reality is perceived, actually they shape reality. For example, when a manager thinks of an organization as a *machine*, he will see it as a machine, and most likely design and manage it as a machine (Morgan, 2006). In that sense, in an organizational context (figurative) language is a medium of change: when "language becomes action" it is likely that it transforms an organization (Bethanis, 2006). Metaphors can thus impose powerful frames on reality in terms of shaping perception and governing action.

3.5.1 Metaphors and strategic innovation

In strategy development, metaphors play a central role in intersubjective meaning making (Heracleous & Jacobs, 2011). In this respect, metaphors offer a flexible framework for understanding ambiguous

[97] Schön and Rein (1994) explain generative metaphors as "a process by which a familiar constellation of ideas is carried over to a new situation, with the result that both the familiar and unfamiliar come to be seen in new ways" (p. 26–27). In brief, one thing is seen as another – A is seen as B. The diagrams in exhibit 4 (see figure 7) are an example of a generative metaphor; they help to look at a situation in a new way.

information and coping with large amounts of data (Hill & Levenhagen, 1995; Nonaka, 1991).

Metaphors provide a common language as a basis for communication between different domains (Bethanis, 2006; Hill & Levenhagen, 1995) and help to express the inexpressible (Koskinen, 2005; Nonaka, 1991). As such, metaphors allow senior decision makers to make sense and to give sense (Hill & Levenhagen, 1995).

Sensegiving is an integral part of strategic innovation and therefore an essential capability for (business) leaders (Hill & Levenhagen, 1995). Sensegiving allows them to instill their vision in the members of their organization, e.g. middle management, subordinates and other internal as well as external stakeholders (Bartunek, Krim, Necochea, & Humphries, 1999). It encompasses activities that aim to influence the sensemaking process of other organizational actors (Gioia & Chittipeddi, 1991).

Metaphors are usually expressed linguistically (e.g. figurative language), but may also be realized in nonlinguistic ways, such as pictures, movies, sculptures or symbols (Kövecses, 2002; Glenberg & Langston, 1992). For strategy development in particular, Heracleous and Jacobs (2008a, 2008b, 2011) propagate the use of "embodied metaphors". Embodied metaphors are "physical constructions that can be touched, moved, examined from various angles and serve as engaging occasions for sense making"[98] (Heracleous & Jacobs, 2008a). Embodied metaphors are not ready-made; rather they are *crafted* during an interactive workshop (Heracleous & Jacobs, 2008a, 2011). Embodied metaphors introduce a birds-eye view to strategic sessions, by providing senior decision makers with a tool to conceptually and physically construct a model of strategic components (e.g. actors) and their relations (Heracleous & Jacobs, 2011). These constructs enable reflective dialogue, which may instigate shifts in mental models (Heracleous & Jacobs, 2011; Jacobs & Heracleous, 2005; see e.g. Barry, 1994). Crafting embodied metaphors encourages sensemaking in a sense that it establishes a strategic practice in which senior decision makers are involved in interpretation and authoring at the same time (Heracleous & Jacobs, 2011; see also Weick, 1995, p. 8).

[98] Several authors describe a similar practice. For example, Barry (1994) refers to it as "symbolic construction" and Doyle and Slms (2002, p. 73) labeled it was "cognitive sculpting".

In short, metaphors are the building blocks of mental models (see figure 9). They provide frames to see things anew. In this way, metaphors enable communication across domains and allow heterogeneous network actors to develop shared understanding. Metaphors include mappings of a base domain, which is the shared domain, and a target domain. In particular the concept of embodied metaphors seems to provide a powerful device that inspires strategic thinking (see Heracleous & Jacobs, 2011).

3.6 Conclusion

In order to collaborate and communicate, strategic designers and senior decision makers need a certain level of sharedness between mental models. The level of sharedness determines the cognitive proximity between two heterogeneous network actors; it enables interactive learning, which in turn enhances the level of sharedness.

For senior decision makers the quality of their mental models is important, because it allows them to mentally simulate cause-and-effect scenarios of their strategy making and predict possible future states of the business environment. Thus, the causal relations of mental models largely determine their quality. This accuracy may increase through higher levels of constructing meaning, such as sensemaking. Sensemaking is prompted by actively putting stimuli (i.e. new perspectives, or frames) into the framework of engrained "models of success". Metaphors may act as such stimuli. The transferral nature of metaphors provides strategic designers and senior decision makers with common concepts and a shared vocabulary. This allows them to align their disparate models and establish a common ground (see figure 11).

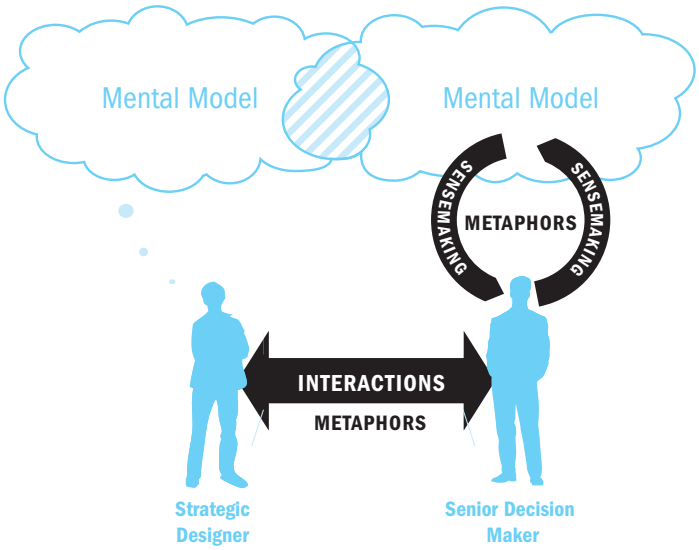

Figure 11: Strategic designers and senior decision makers establish a shared understanding by aligning two mental models in such a way that they overlap. In their interaction metaphors help develop a shared language. In addition they serve for senior decision makers as cognitive frames that stimulate sensemaking, which consequently amplifies the development of mental models.

Chapter 4

Conceptual model

How do the aforementioned notions of proximity, mental models, sensemaking, frames and metaphors connect in a way that they support strategic designers in their interaction with senior decision makers? And what is the relation between these notions and the way senior decision makers (re)conceptualize their business environment? This section connects these notions into a conceptual framework and attempts to provide a tentative answer to these questions. The previously discussed theoretical components and their linkages are presented in a conceptual model (see figure 12). Subsequently, building on the conceptual model, the central concept of metaphor is used to construct a set of design guidelines that serve as a starting point and guideline for the design of the toolkit.

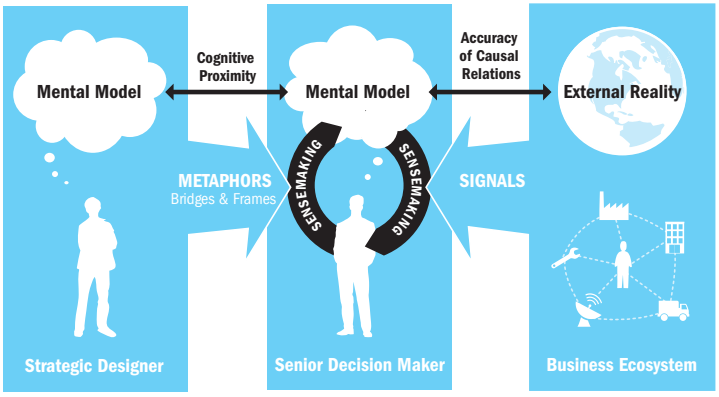

Figure 12: The conceptual model representing the theoretical components and linkages.

4.1 Explaining the conceptual model

To begin with, to support designers in their interaction with senior decision makers, both actors need to become proximate in a cognitive sense. This means that the designers' and senior decision makers' mental models need to be aligned in such a way that they become compatible with regard to the strategic issues they are dealing with.

Metaphors are powerful devices to coordinate the alignment process. In this process, metaphors serve two purposes. First, they serve as bridges, mapping two practices: the design and strategy domain. As such metaphors help establish a common ground, supporting communication and collaboration. Second, these metaphors serve as frames that constitute new perceptual filters helping senior decision makers to perceive reality in a nov-

el way. They become more aware and sensitive of weak, or hitherto unnoticed signals from their business environment (i.e. business ecosystem). In addition to the alignment of mental models, metaphors allow senior decision makers to influence the sensemaking process of their organizational members, which is also a form of alignment. For this reason the concept of metaphor is operationalized as the central premise for the set of design guidelines in the next section.

As such, these frames stimulate sensemaking and help senior decision makers to attribute meaning to peripheral signals that indicate discontinuities or opportunities from their business environment[99]. Sensemaking is the process of constructing more accurate mental models of the causal relations between strategic elements (e.g. competitors, supporting systems), events[100] and their potential to change the business environment, to either the advantage or disadvantage of the senior decision makers' business.

The empirical studies that follow in chapter 6 therefore start from the assumption that strategic designers and senior decision makers should be able to collaborate when designers succeed in increasing their cognitive proximity. This allows strategic designers to provide senior decision makers with new frames, which should enhance their capacity to develop more accurate causal models of their surrounding ecosystem.

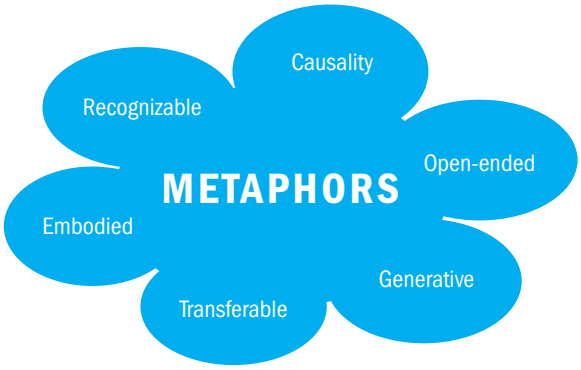

Figure 13: Design guidelines, a conceptual starting point and guideline for the design of the toolkit.

4.2 Design guidelines

As discussed in chapter 3, metaphors provide a common language to bridge differences in language and may serve as filters to perceive reality in a novel way, generating new understanding. Metaphors, as such, are essential in collaborative strategic meaning-making (see figure 12). The concept of metaphor therefore forms the central premise for the set of design guidelines. These design guidelines[101] are derived from the literature study in chapter 2 and 3. They serve as an inspiration, as well as guiding principles for the design of the toolkit. The concept of metaphor is augmented with an arrangement of complementary and more concrete concepts, which operationalize this rather abstract

[99] Figure 12 illustrates how sensemaking is central to interpreting peripheral signals and mental model development. It should be noted that such sensemaking processes not only apply to senior decision makers; strategic designers are also concerned with sensemaking. To emphasize the sensemaking processes of senior decision makers, the sensemaking process of designers is not depicted.

[100] According to Czarniawska (2006), events are the centerpiece of sensemaking. The attention of organizational research should therefore concentrate on the structure of events rather than actors or objects. In this sense, an organization results from the structuring of events, not the other way around.

[101] These design guidelines should not be confused with design requirements. Design requirements usually define the constraints of the solution space and are used to evaluate a solution. Design guidelines on the other hand are initiating concepts, they serve as a starting point to give the process a certain direction; as such they can be understood as what Darke (1979) called "primary generators". Given the open-endedness and explorative nature of this research, defining a starting point seems more sensible instead of determining the precise conditions of an end state.

notion. These complementary concepts include: causality, open-ended, generative, transferable, embodied and recognizable. Each is discussed in more detail below.

Recognizable: A recognizable base concept allows people to grasp a more complex target concept (see § 3.5). The base concept usually has a universal quality; it may represent concrete objects or natural phenomena that represent familiar concepts and surpass cultural boundaries and (Kövecses, 2002).

Open-ended: Open-endedness allows for appropriation of a concept or artifact (Redström, 2008). It encourages a sense of ownership and engages people with the material, situation or the new frame (Gaver et al., 2004; see e.g. Leurs, Schelling & Mulder, 2013). By attributing their own meaning to artifacts or concepts, open-endedness helps people to cope with ambiguity and craft their vision or strategy (Heracleous & Jacobs, 2011; see § 3.5.1; see also Weick's example in § 3.4.2). The level of openness is largely determined by the fidelity and finishedness of the material or the concepts (Brandt, 2007; Redström, 2008).

Causality: Cause-and-effect relations allow mental simulation and predict future states of situations (Gentner, 2001, see § 3.3.2). Causality helps to grasp, predict and control emerging events (Sloman, 2005).

Transferable: Insights, ideas and visions need to be shared in order to foster organizational sensemaking. "Memes" (Dawkins, 1976/1989) may facilitate this process of sensegiving (see § 3.5.1) and subsequently stimulate organizational sensemaking. Memes are independent replicators of visions, concepts or specific patterns (e.g. heuristics, design patterns). Just like genes they are subject to mutation and natural selection (Ball, 1984; Battram, 1998, p. 66; Dawkins, 1976/1989). Effective memes are memorable (Heath & Heath, 2007) and propagate themselves by spreading from one mind to the other (Dawkins, 1976/1989). As such , memes are influential cognitive devices that may have a large impact on the social construct of reality, and as a consequence hold the capacity to change reality itself[102] (Normann, 2001, p. 168).

Generative: Generating a new interpretation of an existing and deeply engrained idea stimulates to turn something familiar into something strange. This displacement causes tension and raises paradoxes. It is essentially supposed to be discomforting to spark new understanding and reframe existing perceptions (Bethanis, 2006; see § 3.5).

Embodied: Embodiment concerns the materialization of abstract concepts and tacit visions into tangible or discernable artifacts (e.g. three-dimensional objects, maps, drawings, diagrams, computer models). Making the intangible tangible stimulates the crafting of strategy[103] and allows for reflective dialog and creative thinking (Heracleous & Jacobs, 2011; see § 3.5.1).

[102] In the business realm, management scholars and consultants are usually the inventors of memes. Take for example management concepts such as total quality management, service management, and core competences. Such concepts have become catalyst of organizational change (Normann, 2001).

[103] See also Mintzberg (1987b) who draws an analogy between strategy making and shaping of clay into a pot. It is the intimate connection between thought and action that stimulates involvement and sensitiveness and fosters a sense of harmony and integration with an organization.

Part 2: Design and application

Putting theory into practice: design and use of the toolkit.

Chapter 5

Toolkit design

In the previous chapter a body of literature was used to develop an understanding of "what is going on". The previous chapter is concluded with a conceptual model, which serves as a framework for the design, application and evaluation of the toolkit. The question that arises at this point is how to put all this understanding into practice? This chapter describes the configuration of the toolkit and its underlying rationale.

5.1 Purpose of the toolkit

The general aim of the toolkit is to support strategic designers and senior decision makers in becoming more proximate; it should facilitate them in developing a shared language and understanding. The purpose of the toolkit is therefore to coordinate the cognitive alignment process of two actors.

The toolkit is used in the early stages of a client-consultant relationship, where it facilitates the first encounters between strategic designers and senior decision makers. It is the pre-briefing stage of what could become a consultancy job for the designer. At this stage the strategic designer aims to clarify his proposition (see exhibit 1), process and methods, which entails an approach for social innovation and (public) service innovation. As such it is positioned at the very early beginning of the fuzzy front end[104] of innovation.

It should be noted that the dyadic relation between the strategic design and senior decision maker is initially asymmetric. As a consultant, it is the designer's role to provide new frames and entice his client (i.e. the senior decision maker) to vacate his comfort zone and progress towards the "zone of proximate development"[105] (see Vygotsky, 1930/1978, p. 86). In this manner, the strategic designer is, what Vygotsky (1930/1978) refers to as, the "more knowledgeable other"[106].

5.2 Design process

Over the course of four months a set of tools were designed, created, deployed and refined. For the creation of each tool a *design session* was held. Participants of the design sessions included Behzad and the author. Usually the aim of these sessions was to prepare a workshop or meeting that involved an interaction with senior decision makers where Behzad's proposition was presented or discussed. To support

[104] See Koen et al. (2001) for a comprehensive explanation of the fuzzy front end.

[105] This movement in fact increases proximity.

[106] The well-know proverb of Muhammed and the mountain may illustrate this approach. In the interaction, Muhammed is ushered – step-by-step – towards the mountain, rather than moving the mountain towards Muhammed. If it was the other way around, the premise of tool would be to move the designer's thought world towards the business realm, yet that is not the case. Such interactions between novices and experts can be accommodated by referential processes, as Isaacs and Clark (1987) suggest.

Behzad in these interactions a set of diagrams and a tangible mapping tool were created. These tools are based on the design guidelines presented in the previous chapter. An iterative process of deployment and further refinement of the tools followed the design sessions. The design and refinement of each tool comprised a process of six distinct stages (see figure 14), which is discussed below.

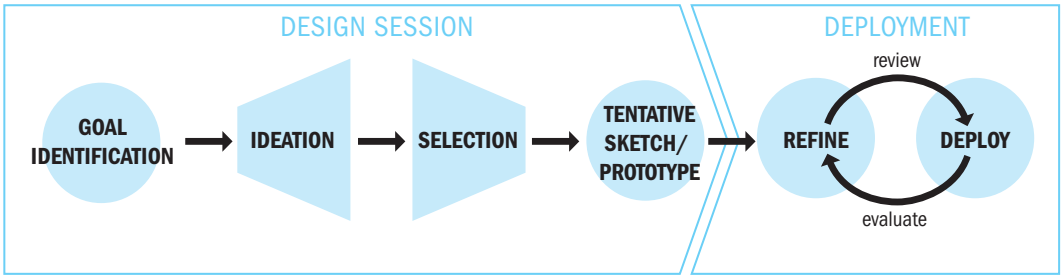

Figure 14: Design process for creating Tools for Proximity.

Each design session started with (1) goal identification and setting the scope of the workshop or meeting: "After the workshop, when the participants leave the room, what should be different?" Once the goals were defined an outline of the script was formulated: "What is the story to tell? How are we going to tell this story? And why is this story relevant?" The second stage concentrated on (2) ideation and divergent thinking. It involved exploring the possibility space through story telling sharing personal experiences, analyzing comparable cases (see figure 15), as well as discussing theories, assumptions and observations. To support the conversation ideas and notes were recorded with swift visual notes and sketches (see figure 16). Often, metaphors and concepts intuitively emerged from these conversations. The ideation stage was followed by (3) selection and convergence. This stage focused on selecting ideas, frames, patterns and elements that may constitute a coherent model, concept or narrative. The design guidelines served as criteria to select potential concepts, metaphors and elements. This selection was subsequently elaborated into a (4) tentative sketch (see figure 17) or prototype (see figure 18), which were (5) refined into models or prototypes with a higher degree of fidelity (see figure 19). The tools were reviewed and discussed before (6) being deployed. After deployment the tools were evaluated and refined if necessary.

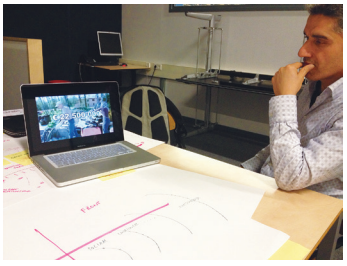

Figure 15: Ideation stage of design session. Exploring the possibility space by story telling and analyzing comparable cases (e.g. Estonia clean in one day).

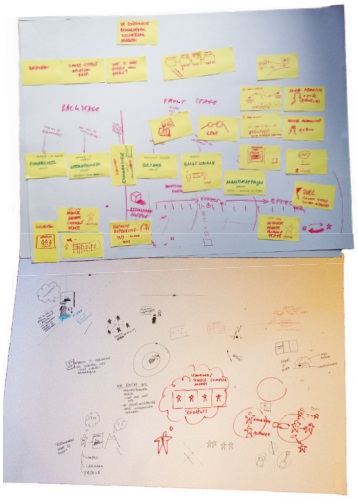

Figure 16: Ideas were recorded with visual notes to support the conversation and ideation process.

5.3 Configuration of the toolkit

The toolkit includes two types of artifacts: diagrams and three-dimensional objects. The diagrams primarily intend to support communication in one-to-one conversations or small group meetings (maximum of five participants), but may be used in workshop sessions as well. There are three key diagrams: (1) Value Canvas, (2) Innovation Mindsets and (3) Social Innovation Process. Additionally, there is one auxiliary dia-

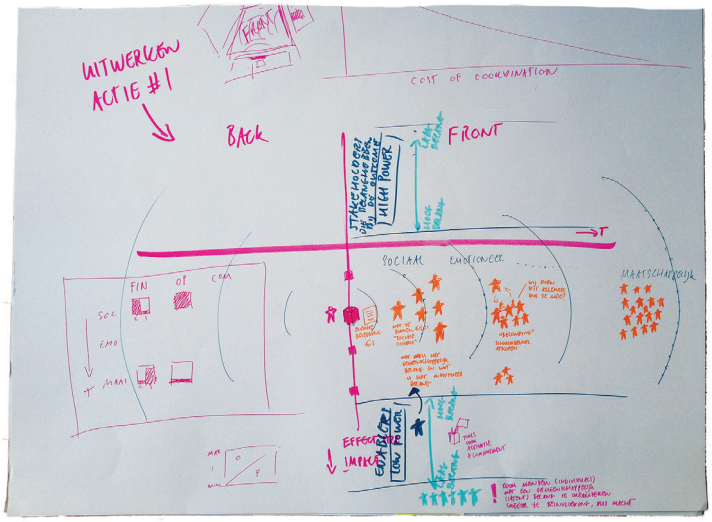

Figure 17: Tentative sketch of the Value Canvas diagram, representing the ripple effect.

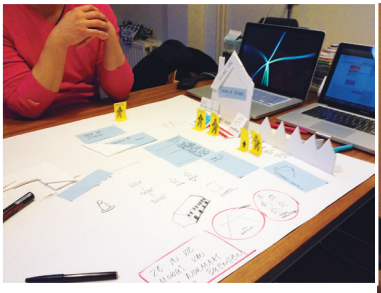

Figure 18: Crude prototype of Value Network Mapping Tool, which was created to elaborate on the story outline (i.e. script) on sustainability. Actors were quickly drawn on sticky notes and artifacts representing a house or a street were cut from foam board.

Figure 19: Refined prototype of Value Network Mapping Tool.

gram: (4) The Iceberg, which helps explain some principles of human motivation. The three-dimensional objects encompass the Value Network Mapping Tool. It supports communication in interactive workshop sessions for larger groups (maximum twelve participants).

Below is described for each tool: its purpose, on which metaphors, guidelines, concepts or corresponding materials the tool is based and how the tool evolved.

5.3.1 Value Canvas

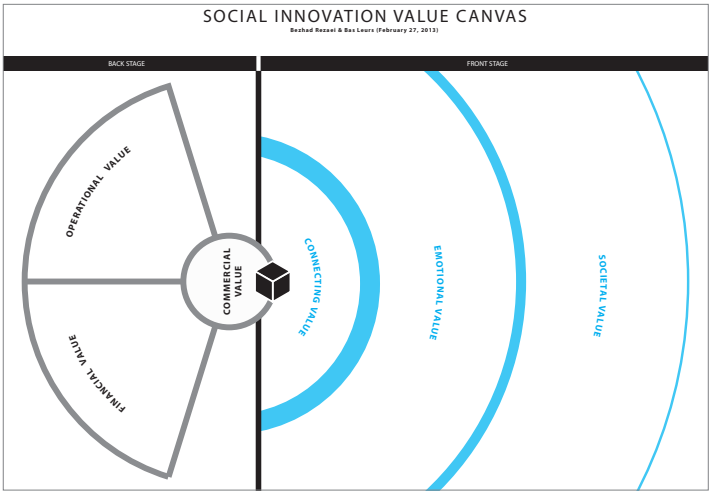

Figure 20: Social Innovation Value Canvas

The Value Canvas diagram[107] (see figure 20) aims to explain: "how to start a revolution?" The diagram provides an overview of an integral value system that underpins the process of social innovation according to Behzad. It expresses cause-and-effect relations between six discrete value constructs[108], which are dived by internal and external value. Internally, every organization includes constructs such as financial, operational, and commercial value. This applies to profit and non-profit organizations, as well as public and private organizations. Externally, for its business ecosystem, an organization may yield merits such as social, emotional and societal value[109]. Senior decision makers often concentrate on the internal organization and business value[110] (i.e. a composite of financial, operational and commercial value mechanisms) (Ancona, et al., 2009). Therefore, much of their attention is directed towards the output (i.e. result) of their organization, rather than the outcome (i.e. effect) of their activities (see Cole & Parston, 2006). The Value Canvas intends to shift the focus from internal to external value constructs.

The Value Canvas diagram is based on two ideas. First, it depicts in an abstract sense the natural phenomenon of a "ripple effect"; the effect a small pebble can have when tossed into a still pond. This met-

[107] In conversations and sessions a Dutch version of the diagram was used to preclude any language issues with the participants. See appendix B for the original Dutch version.

[108] Value is a slippery notion. Its varying meanings regularly cause terminological confusion. In literature as well as in everyday communication it may refer to different concepts. In general, when used as a singular (i.e. value; see e.g. Normann, 2001, p. 7) it refers to value as monetary worth or economic return, whereas the plural (i.e. values; see e.g. Rokeach, 1973 and Schwartz, 1992, 2006) refers to principles of behavior or moral standards (Boztepe, 2007; Den Ouden, 2012, p. 21). However, value can hold more than economic return. For example, in the private sector financial value is the main concern, whereas the public sector pursues social or public value (Cole & Parston, 2006). For this reason, in the current work the notion of value will be considered in a broader sense, it refers to a worth or merit that yields from activity (e.g. exchange, use). Values on the other hand are considered as motivational constructs that drive and govern human behavior (see also Fishbein & Ajzen, 1975).

[109] See appendix D for a detailed description of these value mechanisms.

[110] The recent crisis in the financial sector shows the adverse effects of a perverse fixation on mere financial value. The performance of an organization, and the reward for its leaders, employees and shareholders, should perhaps be evaluated by a broader set of criteria than the narrow economic and efficiency metrics used today (Ancona et al., 2009). However, as Cole and Parston (2006) suggest, business performance is much easier to measure than the long-term outcome of an organization's strategy. This is perhaps why decision makers usually hold a tendency towards quantitative metrics, rather than qualitative criteria. The maxim: "You are what you measure" expresses the salient role of metrics on organizational behavior.

Figure 21 Output and outcome (adapted from Cole & Parston, 2006).

aphor expresses the scaling of a small intervention (e.g. product release, policy implementation, or grass root initiative[111]) to an array of activities and large-scale effects. Second, it makes a clear distinction between output and outcome (see figure 21). Outputs are the goods, products, policies, or services delivered by an organization. The outcomes are the effects (e.g. benefits or consequences) engendered by the outputs. The anticipated outcomes may be evaluated on three time scales: initial, intermediate and long-term[112]. This means that organizations have to learn to look from the outside in, instead of the inside out (see Merholz, et al., 2008).

For meetings and workshops, primarily the first iteration of the Value Canvas is used (see figure 20). A second iteration[113] entails typical stakeholder dimensions like power and interest, but was considered too complex and would probably confuse more than it would clarify. For this reason, the second iteration of the diagram was not used in interactions with senior decision makers.

5.3.2 Innovation Mindsets

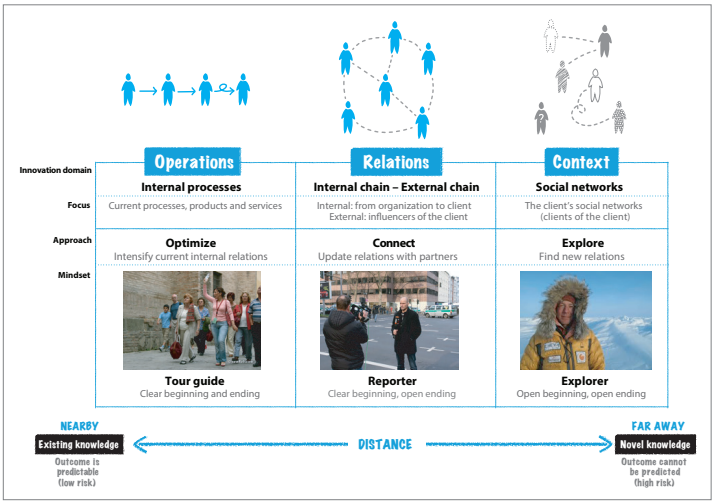

Figure 22: The Innovation Mindsets Diagram depicts three types of knowledge types: algorithms, heuristics and mysteries.

The diagram "Innovation Mindsets" (figure 22) aims to support senior decision makers in articulating their strategic question. What are they trying to achieve? Do they need to optimize their value proposition by reconfiguring some existing processes, or are they in need of a new

111 A grass root initiative "Estonia Clean in One Day" echoes the three stages of social, emotional and societal value quite accurately. The case video on YouTube (www.youtube.com/watch?v=A5GryIDl0qY) illustrates how the initiative started with a group of 20 volunteers, who believed they could clean Estonia's nature from its litter. Subsequently, this group engaged 500 partners (opinion leaders, NGO's, politicians) to become ambassadors of the initiative. These ambassadors, in turn activated 50,000 volunteers who cleaned Estonia in one day. The case video clearly illustrates how a small initiative can exploit causality to have a large impact.

112 Jones (1970/1992, p. xxix) describes a similar time scale: very short-term (immediate), normal (two years), long-term (ten years). There are, however, different ways to look at time. Time is, according to Normann (2001, p. 198), not a process that moves from left to right, where the present moves away from the past towards the future (see e.g. Jones, 1970/1992; Cole & Parston, 2006). Conversely, the future "arrives" at the present and so does the past. The here-and-now is where flows to the future and the past converge.

113 See appendix C.

innovative value proposition? Optimizing value usually relies on the exploitation of existing knowledge. Creating new value on the other hand usually yields from exploring uncharted territory and the acquisition or production of new knowledge (see March, 1991; Leavy, 2010). Senior decision makers, however, incline to focus on optimization, even when their business is in dire need for novel insights. This tool helps senior decision makers, in conversation with a designer, to identify the type of knowledge that is needed.

This diagram largely builds on Martin's (2009a, 2010) concept of the "Knowledge Funnel". In successful organizations knowledge progresses through three stages: from (1) mysteries, to (2) heuristics, to (3) algorithms (Martin, 2009a, 2010; Leavy, 2010). These three stages correspond with the three challenges presented in the diagram, respectively: (1) context, (2) relations and (3) operations. Each challenge requires a different mindset, which are represented by a metaphor. (1) The explorer deals with open beginnings and endings. This mindset is needed to explore uncharted territory and may thus produce new knowledge. However, the outcome is not predictable and may involve high risks (see also March, 1991). (2) The reporter deals with clear beginnings and open endings. This mindset is needed to bridge the internal and external realm of an organization. It may yield new knowledge at a medium risk level. (3) The tour guide deals with clear beginnings and endings. This mindset is most suitable for optimizing existing processes. It involves low risks and predictable outcome, but may lack the capability to produce novel knowledge (see also March, 1991).

Several versions of this diagram were made. The first iteration[114] portrays a rather abstract notion of strategic actors and their linkages. Subsequent iterations[115] build on Dorst's (2010, 2011) formulas of abductive, inductive and deductive reasoning, which correspond with the three stages of the Knowledge Funnel: mystery, heuristics and algorithms. This notation was omitted from later versions, as it made the diagram unnecessarily abstract. The final iteration is augmented with process steps[116]; this version helps explain how social innovation projects usually traverse through this process.

[114] See appendix E.

[115] See appendix F.

[116] See appendix G.

5.3.3 Social Innovation Process

The Social Innovation Process diagram[117] (figure 23) displays the transformation from a hierarchical organization to a holarchy (see Gray & Vander Wal, 2012). It depicts the initial state, process and future state. This diagram aims to explain that the process is not a straight line from A (initial state) to B (end state), but rather a journey that encompasses in a metaphorical sense a detour (i.e. scenic route). Senior decision makers tend to think in *short cuts*, whereas taking the scenic route is

[117] See appendix H for the original Dutch version.

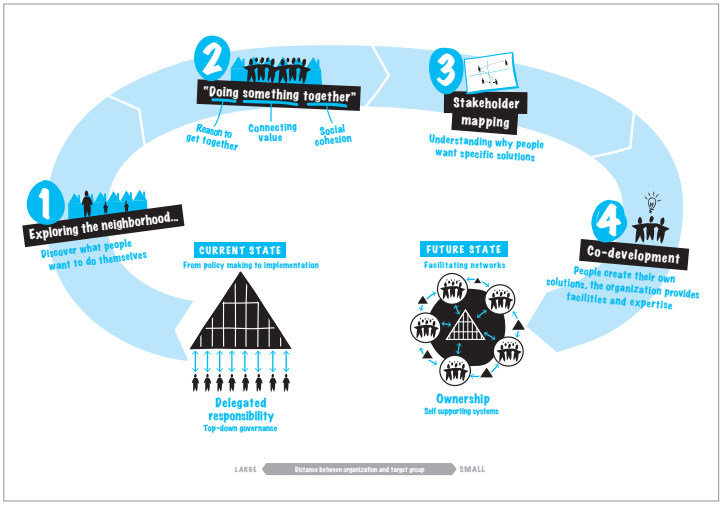

Figure 23: Social Innovation Process

necessary to identify patterns in the social context of business environment. The diagram helps explain the notion of "the reason to connect".

The diagram builds on some basic process models of design, which generally comprise an initial state, transformation function (i.e. process) and desired future state (see Doblin, 1987). In addition, the two organizational states are inspired by the work of Grey and Vander Wal (2012) who refer to these states as *the divided company* and *the connected company*. Typical features of the divided company are: hierarchy, division of labor, specialization, predictable in stable environment. The connected company is characterized by: networked structure, autonomy, flexible and adaptive in uncertain environments.

Only one version of this diagram was made, no further iterations were needed.

5.3.4 The Iceberg

The purpose of the Iceberg diagram (figure 24) is to explain some basic principles of human motivation. The diagram displays the metaphor of an iceberg, with two levels: above the surface and below the surface. The visible tip above the surface encompasses what people say, do and use. These utterances and actions are explicit and thus observable. Human action, however, is driven by constructs that are hidden below the surface and include beliefs, motives, intentions and goals (Fishbein, & Ajzen, 1975, p. 15). These are usually latent, tacit and not observable. The diagram clarifies the role of these motivational constructs in human centered innovation and helps explain the need for specific research methods – qualitative, rather than quantitative – that aim to empathize with people in order to understand what makes them tick (see Fulton Suri, 2008; Kouprie, & Sleeswijk Visser, 2009; Mattelmäki, & Battarbee, 2002; Sanders, 2000; Sleeswijk Visser, 2009;

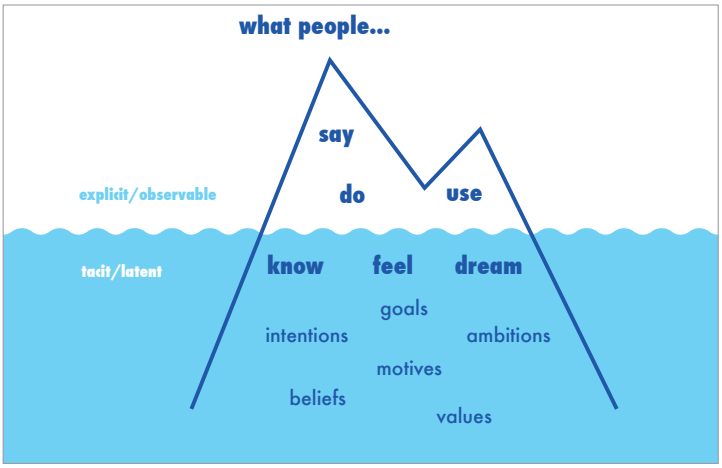

Figure 24: Iceberg diagram

Sleeswijk Visser, Stappers, van der Lugt, & Sanders, 2005; Van Rijn, Sleeswijk Visser, Stappers, & Özakar, 2011). The diagram builds on the work of Sleeswijk Visser, et al. (2005; see also Sleeswijk Visser, 2009) and Sanders (1992) who have used similar representations of "pyramids" with varying degrees of explicitness and knowledge levels of people's motivational constructs (see figure 25). The Iceberg metaphor is also a popular concept in change management (see Krüger, 1996; Atkinson, 2012).

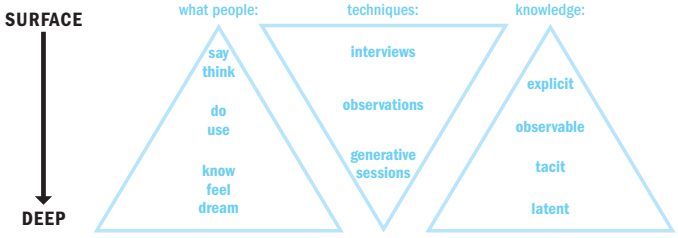

Figure 25: Different knowledge levels and varying degrees of explicitness (adapted from Sleeswijk Visser, et al., 2005).

Only one version of this diagram is made. Occasionally, hand drawn models of the Iceberg were made during meetings or sessions when necessary.

5.3.5 Value Network Mapping Tool

The Value Network Mapping Tool (see figures 26 and 27) aims to make the value network tangible and animate complex patterns of causality between its actors (i.e. stakeholders). It makes the strategic designer's proposition explicit and encourages discussion between the strategic designer and his client. The tool essentially maps the business ecosystem: it visualizes its underlying social network and indicates where latent social value is hidden in its weak ties (see Granovetter, 1973; see also Normann's "customer's customer"[118], 2001, p. 71). As such, it complements the other tools and helps the strategic designer to em-

[118] Normann (2001, p. 71) asserts that true customer orientation goes beyond the conventional organization-customer relation. Instead, organizations should attempt to understand the relationship between their customers (first level) and their customer's customers (second level). It is in fact, as Normann (2001) maintains, the customer's customers that make an organization successful, because they help to make the first level of customers successful.

Figure 26: First iteration of the Value Network Mapping Tool. Most attributes are hand drawn.

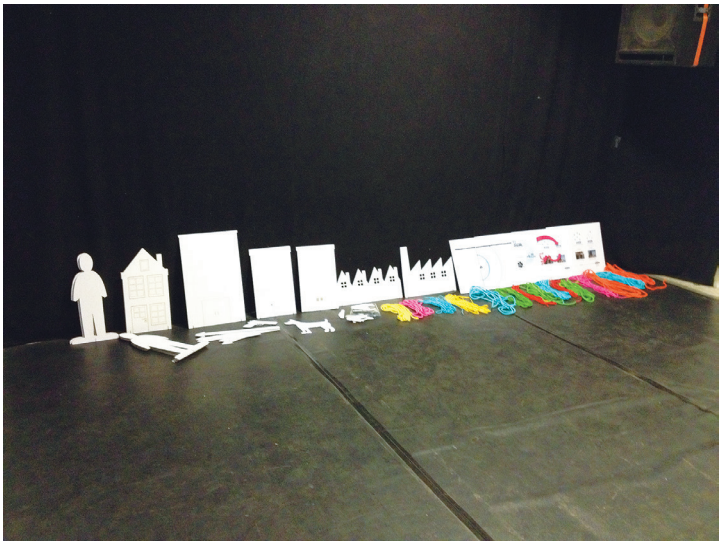

Figure 27: Second iteration of the Value Network Mapping Tool.

body the Value Canvas (see § 5.3.1) and enact the Social Innovation Process (see § 5.3.3).

The Value Network Mapping Tool primarily builds upon the concept of "embodied metaphors" (see § 3.5.1; see also Heracleous & Jacobs, 2008a, 2011; Jacobs & Heracleous, 2004). In addition the tools builds on the work of several other scholars and practitioners who have presented similar instruments on collaborative strategy making, PSS development or business modeling[119]. See for example: "cognitive sculpting" (Doyle & Sims, 2002, p. 73; Sims & Doyle, 1995), "tangible business model sketches" (Mitchel, 2013; Mitchel & Buur, 2010), "tangible value network maps" (Buur & Mitchell, 2011), "tangible value modeling" (Lu, Dorst & Keijzers, 2011), "Lego Serious Play" (Bürgi, & Roos, 2003;

[119] Note that, despite these efforts, there is still little knowledge of how tangible artifacts (or "things") help facilitate collaboration in innovation sessions (Heinemann, et al., 2011).

Gauntlett, 2007; Lego, 2010), "Desktop Walkthrough" (see e.g. Stickdorn & Schneider, 2010, p. 190; Blomkvist & Segelström, 2013; Segelström & Holmlid, 2011), "Actor Network Mapping" (Morelli & Tollestrup, 2007), "Net-Map" (Schiffer & Hauck, 2010; Schiffer & Waale, 2008) and "prototyping for interaction and participation"[120] (Boess, Pasman & Mulder, 2010; see also Boess, Pasman & Mulder, 2011). In general, these tools aim to facilitate social interaction, discussion and sharing of mental models. In fact they serve as catalysts through which tacit mental models are made explicit.

There are, however, also some differences. For example, in sessions that employ "tangible value network maps" or "Lego serious play"; tinkering materials such as bric-a-brac and Lego-bricks enable participants to create artifacts from scratch. For the Value Network Mapping tool, much of its material is prefabricated to enable quick and easy set up of the network. The reason for this is that time with senior decision makers is often limited. Note that in this sense prefabricated does not mean that the material is finished, or that its use is predetermined. On the contrary, the fidelity of the material is held low, allowing participants to appropriate the material and ascribe their own meaning to it. The premise of the Value Network Mapping Tool is thus appropriation, instead of creation[121].

The "tangible value modeling" tool on the other hand shows the use of *objects trouvé* (found objects), which hold no particular meaning in relation to the issue addressed. The lack of meaning seems to stimulate social interaction, because it needs to be negotiated (Buur & Mitchel, 2011). This is in contrast to the Value Network Mapping Tool, of which most of its attributes, such as the human figures, already signify a meaning: they represent human actors. This is to avoid confusion and unnecessary discussions, because once a meaning is encoded, it also needs to be decoded. The aim of the session is, after all, to establish understanding on systemic innovation, not to negotiate the meaning of individual objects.

The tool consists of a collection of tangible objects, which include a set of generic attributes and case specific attributes (see figure 28). The generic attributes generally represent the actors of the value network (i.e. stakeholders) and their relations. Three-dimensional symbols of human figures, streets and buildings (houses, offices, factories) are used to represent these actors[122], which are supplemented with arrows and colored strings to indicate relations or interactions between actors. The colored strings allow participants to attribute meaning to these relations (e.g. red for strong ties and blue for weak ties) and refer to it in discussions. The case specific attributes, or the contextual attributes, depend on the strategic issue that is addressed in the

[120] These prototypes should not be considered as conventional prototypes (e.g. Buchenau & Suri, 2000; Houde & Hill, 1997) that represent a future design, but rather as "'artefacts plus interactions' of some kind that have some effect in a given context." (Boess, et al., 2010, p.96).

[121] Sanders and Stappers (2008, 2012) describe four levels of creativity: doing, adapting, making and creating. The Value Network Mapping Tool concentrates on adapting, whereas embodied metaphors and Lego serious play focus on higher levels like making and creating.

[122] These actors are in fact stakeholders and represent, in keeping with Freeman (1984): "any group or individual who can affect or is affected by the achievement of the organization's objectives" (p. 46). A human figure may represent an individual or a group and an office building may represent an organizational entity such as an insurance company. In general, these actors have agency and may alter the course of an organization, or initiate changes in its surrounding ecosystem.

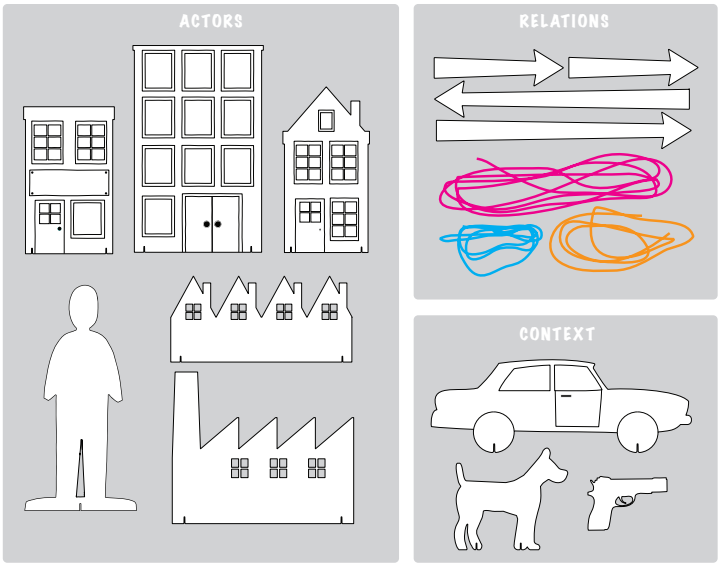

Figure 28: The Value Network Mapping Tool consists of generic attributes (actors and relations) and case specific attributes, which depend on the client or the context.

session and may thus vary for each client or its context. For example, a session for a city council that concerns the issue of sustainability and renewable energy generation may include small-scale models of solar panels, inverters and insulated glazing. While a session for an insurance company, concerning e.g. an armed robbery may include artifacts representing a pistol and cash money to enact the crime and its effects on the social network of the victim.

Two versions of the Value Network Mapping Tool were made. As a tentative prototype, the first iteration was hand-made (see figures 19 and 26). The second iteration (see figure 27) was produced with a laser cutter, allowing free-form contours and saving production time.

Initially the tool was designed for tabletop use, but this idea was soon abandoned. Putting the artifacts on the floor allows for a more spacious set up and active engagement of the participants, avoiding a *slouched meeting posture*. However, for this set up it seemed that the size of the artifacts was too small. The height of a human figure is approximately 10 cm. So, participants had to kneel to (re)position them. Also, some of the artifacts, in particular the human figures, easily tipped over. As suggested by a number of authors, physical posture affects the thinking, attitudes, motivations and emotions of participants (Briñol & Petty, 2008; Briñol, Petty, & Wagner, 2009; Riskind & Gotay, 1982). A vertical posture may, for example, make people feel more confident: “We postulate that people in an erect, vertical posture are seen as (and feel) more confident than people who are slumped over.” (Briñol, et al., 2009, p. 1055). For that reason the second iteration is bigger in size. The size of a human figure is for example 50 cm. This allows participants to reposition attributes without kneeling down.

Rather they slightly have to bend over to pick up an attribute and move it to a new position, which improves their experience and enhances their cognitive capacities. The large size also offers more space to draw and write on. As a matter of fact, these large size artifacts function as a *canvas*, allowing participants to draw freely.

One other improvement is that the materials of the second iteration have a more distinctive silhouette shape. The meaning of the attributes of the first iteration can only be perceived from the front side that holds for example a print of a human figure. The backside only shows a rectangular piece of cardboard. Laser cutting technique allowed for more free-form contours. Distinctive silhouettes allow participants to recognize attributes from their shape (e.g. human figure), regardless of the viewpoint.

	Diagrams				Tangibles
Artifact Key metaphors	**Value Canvas** Ripple effect	**Innovation Mindsets** Tour guide, Reporter, Explorer	**Social Innovation Process** Detour	**The Iceberg** Iceberg	**Value Network Mapping Tool** "Embodied metaphors"
Causality Depict cause-and-effect relations	■		▪	■	■
Open-ended Allows users to appropriate concepts or materials.	▪	▪	▪		■
Generative Aims to generate new understanding	■	■		▪	■
Transferable Allow ideas to spread through networks	■	■	■		
Embodied Materialize abstract concepts into tangibles	▪	▪	▪		■
Recognizable Use familiar concepts for finding common ground	■	■	▪	■	■

■ = **Prominent feature** ▪ = **Present but less salient feature**

Table 2: Each tool is based on metaphors and a number of complementary design guidelines, which may be incorporated as a prominent feature, or less salient one.

5.4 Summary

The general aim of the toolkit is to increase proximity between strategic designers and senior decision makers, in doing so it should help senior decision makers to reconceptualize their business environment.

The previous chapter presented a set of design guidelines that served as guidelines for the design of the toolkit and provides a description of the toolkit. The concept of metaphor is the key design guideline,

in addition this central premise is complemented with a number of other design guidelines: causality, open-ended, generative, transferable, embodied and recognizable to operationalize the abstract notion of metaphor. The toolkit comprises four diagrams (Value Canvas, Innovation Mindsets, Social Innovation Process and Iceberg) and a tangible Value Network Mapping Tool. Each tool builds on a composite of design guidelines as shown in table 2.

Chapter 6
Studies

This chapter reports on three studies and a semi-structured interview on the use of the toolkit during a number of meetings and workshops for governmental and commercial organizations, as well as a workshop with a group of designers and business consultants. The studies include workshops and meetings with the municipality of Bussum, HZCP and C2I Network. The aim of the observational studies is to see how participants interacted with the toolkit and how the materials supported their social interactions. Observations were captured as field notes, photographs and if possible on video. Video footage was later transcribed and analyzed. In addition, a structured interview reports on meetings that did not involve direct observation. These meetings include interactions with the deputy of the province of Gelderland and senior management of insurance company Achmea. In conclusion, the application of the toolkit is evaluated. This evaluation reflects on the context, purpose and effect of the tools, how it affected Behzad's interactions with senior decision makers and how these interactions influenced their strategic thinking.

6.1 Study 1: Bussum

The municipality of Bussum is situated in the center of the Netherlands and has a population of approximately 32,500[123]. Bussum, just like many other Dutch municipalities, is struggling with severe budget cuts. Their challenge is: doing more with less. This situation directs Bussum into a new role of facilitation rather than coordination. Bussum is therefore looking for new collaborative approaches with citizens. In December 2012, Behzad had met Gerard-B, a council member of the municipality of Bussum, at a community evening on sustainable housing and local energy production. In a casual conversation Behzad discussed with Gerard-B his ideas on public services and social innovation. Gerard-B was inspired by Behzad's ideas and invited him to develop a proposal for a pilot project on sustainability and public service innovation.

[123] See en.wikipedia.org/wiki/Bussum

6.1.1 Methods and materials

The study includes repeated observations during a number of meetings and a workshop, spanning a period of six months, from February till July 2013. Observations were captured as field notes and photographs.

The purpose of the preliminary meetings, prior to the workshop, was to explore the issues Bussum was trying to resolve and to prepare the workshop. The subsequent workshop aimed to clarify Behzad's proposition and establish understanding on how social innovation may help Bussum with public service innovation. The meetings after the workshop focused on negotiating the budget and project scope.

Participants of the preliminary meetings were Martin-K (town clerk) and Gerard-V (program coordinator Environmental Policies and Sustainability). Participants of the workshop include Gerard-B (alderman, concerned with Healthcare, Sustainability and Finance) and Gerard-V. Martin-K was supposed to attend as well, but was ill. Following the workshop, a meeting took place with Gerard-B, Martin-K and Gerard-V to discuss Behzad's offer. Which was in a later stage followed by a meeting with Henke (program manager Act Local Support) and Geert-Jan (program manager Childcare & Elderly). The meetings and the workshop took place at the city hall, except for one preliminary meeting with Gerard-V that took place at the bistro of Amersfoort railway station. Meetings lasted for 1 to 1.5 hours; the duration of the workshop was 2.5 hours.

Figure 29: Preliminary meeting with Gerard-V and Martin-K. Introducing the workshop setup and its materials.

Figure 30: Bric-a-brac as supplementary materials to the toolkit for make shift constructions.

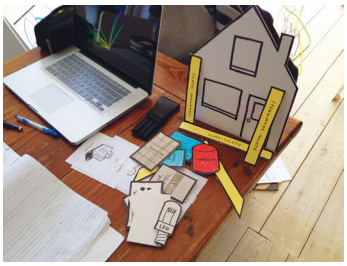

Figure 31: Attributes to illustrate the context of the strategic situation: a house with small-scale models of typical energy saving attributes, such as solar panels, inverters and insulated glazing.

Materials used in meetings prior to the workshop included: the Value Canvas diagram[124] and the Iceberg diagram. Also, in a preliminary workshop meeting with Martin-K and Gerard-V, a week before the workshop some attributes of the tangible Network Mapping Tool (e.g. the colored strings, a house and a number of human figures) were introduced to elucidate the setup of the workshop (see figure 29). Materials used in meetings after the workshop also included the Value Canvas diagram, Three Types of Challenges diagram and Social Innovation Process diagram.

For the workshop the Value Network Mapping tool (first version) served as the primary tool, complemented with the Value Canvas diagram, Ostenwalder's Business Model Canvas[125] and examples of cultural probes to explain design research tools if necessary. The workshop took place in the boardroom. Initially, the Value Network Mapping tool was intended for tabletop use. However, to actively engage participants – and to avoid a typical slouched meeting posture – the attributes were placed on the floor. The generic attributes (i.e. actors and relations) were complemented with case specific attributes and tinkering materials for makeshift constructions (see figure 30). The case specific attributes included a house with small-scale models of typical energy saving attributes, such as solar panels, inverters and insulated glazing (see figure 31).

Prior to the workshop, the session plan was discussed with Behzad, who had prepared a script. Also a dry run with the Value Network Map-

[124] Also referred to as "the ripple".

[125] See Osterwalder and Pigneur (2010).

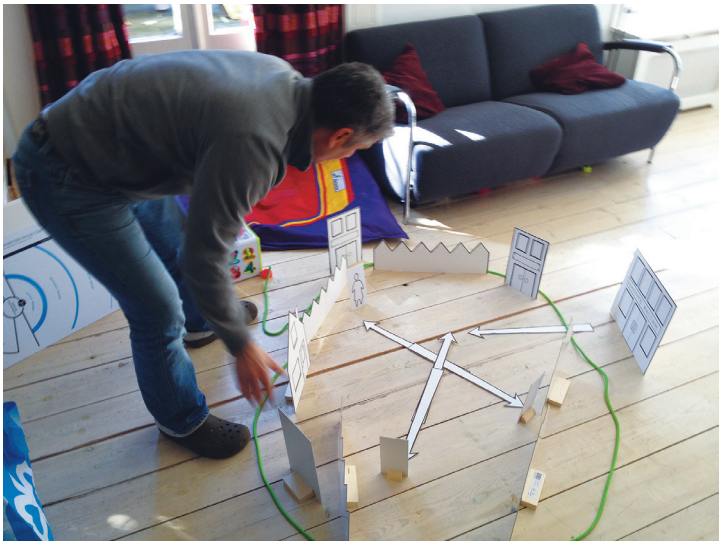

Figure 32: Dry run with the Value Network Mapping Tool to get Behzad acquainted with the tangible tools.

ping Tool was conducted, helping Behzad to get acquainted with the materials (see figure 32).

6.1.2 Observations

Meetings before the workshop

The meetings that took place before the workshop were explorative in nature. They focused primarily on establishing common ground and investigating the project scope.

In the first meeting with Gerard-V visuals and drawings seemed to be particularly helpful to bridge communication. For example, Behzad made a drawing of an iceberg to explain how motives are related to decisions and actions. It helped Gerard-V recognize the importance of research activities that elicit these motives. In the meeting that followed with Martin-K and Gerard-V, diagrams were printed on paper to support conversational interactions. Excerpt 1 shows an example how participants signified meaning to the features of the Value Canvas diagram.

Excerpt 1

Martin-K:	*What are these? (points at a ripple)*
Behzad:	*Ripples, after you drop a pebble...*
Martin-K:	*Ahhhh... these are ripples!*

Consequently, when "the ripples" were discussed, the discussion prompted Gerard-V to draw connections with another project and reflect on it. It helped him understand why the desired effect was not achieved: *"Now I see, it doesn't move beyond social value."* Martin-K got curious and asked Behzad to provide some more examples. Also, he repeatedly asked: *"How do you start all this? How do you make these waves?"*

Figure 33: Participants were enticed to use and modify the materials.

Figure 34: Participants take ownership of the stage: adding elements and building "the streets".

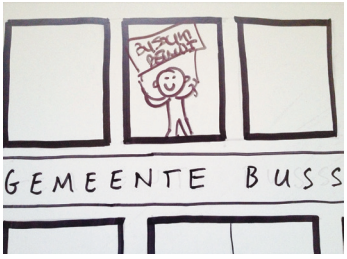

Figure 35: Gerard-B portrayed himself as a happy alderman.

The workshop

After Behzad introduced the aim of the session, Behzad invited participants to engage with the materials (see figure 33) and build a map of the neighborhood (see figure 34). However, participants needed some encouragement to actually use it. They seemed hesitant to modify materials and needed reassurance and stimulation to make it their own by attributing their meaning to it. This meaning was shared with other participants by uttering comments like: *"This represents a school, right?"* or *"This is Gerard the green one."* Excerpt 2 shows how this conversation developed.

Excerpt 2

Behzad:	*We thought, let's build a street. So when you take these houses. And, put your city hall... and this is a school.*
Gerard-B:	*This is a housing association.*
Bas:	*You may write on the materials with a marker, to indicate what it is. You can do anything you like with it.*
Gerard-B:	*I can do anything I like?*
Bas:	*Yes, you can do anything you like.*
Gerard-B:	*The first thing I'll do is to draw an enthusiastic alderman! (see figure 35)*
Behzad:	*Look at that!*
Gerard-V:	*Do you have one of these houses? Another one with a roof?*
Gerard-B:	*This represents a school, right?*
Gerard-V:	*Oh, I was supposed to do the housing association.*
Behzad:	*No problem, here is another one. So, put it somewhere in the street, or neighborhood. This is the neighborhood right?*
Gerard-B:	*So this is a neighborhood? I am living next to a school you know. It's a real... but I'll do it anyway, because I am responsible for education as well.*
Behzad:	*Great!*
Gerard-V:	*Where do you live?*
Gerard-B:	*I live next to that school over there.*
Behzad:	*Great. What we can see, from the organization there is a relation with the school... relation... relation. Then we add some more actors. This is Gerard the green one.*

In general the conversational interactions showed to be question intensive. Behzad, as the moderator, continuously asked questions to stimulate the participants' thinking and to keep them engaged in the conversation. But questions were also promoted by the configuration or reconfiguration of the toolkit. Changes in the configuration of the value map triggered Gerard-B and Gerard-V to ask for clarification, test their assumptions, or reflect on certain issues (see excerpt 3).

Excerpt 3

Gerard-B:	*Can you go back to the previous stage? When you just reversed the relations, I started thinking, that's a massive number of relations. […] So, that's where I got stuck. As a council member I am connected to various people in different ways. Is that what you are trying to tell with these arrows?*
Behzad:	*No, it's the step before that one. It will limit us to focus merely on energy reduction.*
Gerard-B:	*Ok.*
Behzad:	*So we now have one street. We pick one theme to see how it works. And can we…*
Gerard-B:	*So the arrows related to the sustainable energy domain refer to: we want you to do so something?*
Behzad:	*Indeed, we want you to do so something.*
Gerard-B:	*Ok.*
Gerard-V:	*There is one question that is pondering me. Behzad, it's clear how you reverse the direction. But isn't there an arrow or line pointing towards the town hall?*
Behzad:	*That's right! Very good!*
Gerard-B:	*I think that's why we initiated Bussum Aware or the community evenings on sustainable energy. […] Is it correct? I am just asking questions, right? But is it correct, that we started for this reason the community evenings on sustainable energy?*

Such discussions in conjunction with the representation of the map apparently prompted Gerard-B to take a different approach: *"Behzad, I am concerned about something. Usually I think about possible solutions immediately. Now, I am not trying to do it that way."* Moreover, the discussion helped Gerard-B understand that he had to focus: *"You are right about that. My mind says that you're right, so does my heart. Until now, I used to look at it in a different way. I used to think, just let it happen. But now I understand I have to focus."* Gerard-B even expressed his appreciation a number of times for helping him *to look at it with new eyes*. It helped him recognize the organization's need to search for novelty (i.e. new knowledge) that is hidden outside the organization. He concluded that these dynamics not only apply to sustainability, but may apply to other social issues as well (see excerpt 4).

Excerpt 4

Gerard-B:	*I think it's at a higher level. I don't think we should do it, but… It is as a matter of fact a compliment to you, what you are causing here at this moment. Because, looking at elderly*

we think we have already gained a lot of knowledge. But I think we, as the city council, should regard it as a mystery instead. Do you know what I mean? So we can look at it with new eyes; that motivates you and others, to look at it with new eyes. And I think that may initiate new processes, it is beneficial for us as municipality of Bussum to deal with new issues, like social vulnerable groups. And usually we go for the one-dimensional solutions: do we have enough money? Is this what we are supposed to do as a local government? They are vulnerable as a group; we should help them, because they need care, right? I am interested in the paradigm of the inclusive society that's good for everyone. That's what this session has triggered. And it is even more exciting.

Bas: *You are triggered by the fact that this applies to other domains as well?*

Gerard-B: *Yes, that's the dynamics. You're, like you said, looking for novelty, I will not find it while sitting behind my desk. It is social, so it's there where I think it is important.*

To make sense of the dynamics of the proposition, Behzad and the participants regularly referred to example cases or made connections between personal experiences and issues addressed in the discussion. For example, when Behzad discussed the principles of stakeholder engagement, it immediately evoked memories for Gerard-V: *"This reminds me of, when I was a member of the eco team. That's also something like, what you're presenting over there. That's within a community?"* Some more general examples of causal dynamics in social networks were used as well. Behzad for instance referred to the Project X riots that recently had happened in Haren[126] (The Netherlands): *"Currently, we slowly start to understand social networks, which also include social media. People tend to gather around a certain subject. Take for example Project X, it's utter madness. People instantly organize a riot and the next day it's gone!"* Gerard-B, in addition, reflected for example on the startup of a cooperative for sustainable energy, which was recognized by other participants. Such experiences and particularly the commonly known example cases appeared to be helpful for participants to grasp the dynamics of social innovation.

[126] See en.wikipedia.org/wiki/Project_X_Haren

Throughout the workshop Gerard-B and Gerard-V seemed immersed in the interaction with Behzad and the valuenetwork m. They frequently uttered: "yes, yes" or nodded "yes" to signal acknowledgement.

Although, sometimes participants seemed to struggle with the complexity of Behzad's story. Excerpt 5 shows how Gerard-V tries to grasp the concept of weak ties[127]. Note that Gerard-B holds a degree in sociology.

[127] See Granovetter (1973).

Excerpt 5	
Behzad:	*Weak ties stimulate innovation. Social cohesion yields from strong ties... Now we want to...*
Gerard-V:	*Say that again?*
Behzad:	*Strong ties are important for social cohesion, communality. Your concern is also my concern. Weak ties are the friends of your son's friends.*
Gerard-V:	*And what is he bringing to the table?*
Behzad:	*He brings innovation to the...*
Gerard-B:	*For innovation you need to look at the weak ties.*
Behzad:	*Correct, you have to look at the weak ties. Now, we want our weak ties, like your neighbor to tell the other neighbor, or to say to you: "Hey are you joining us to save energy?" These neighbors are the strong ties. Who are the weak ties?*
Gerard-V:	*Like the acquaintances?*
Behzad:	*The children...*

Consequently, Behzad tried to explain it in a different way: he animated the attributes (representing children) to illustrate the dynamics of weak ties. It seemed that animating the Value Network Map augmented his verbal explanation. Also other observations show how the physicality stimulated participants to animate their thoughts. For example, the spatial set up allowed Gerard-V to illustrate his idea of broadcasting information; he indicated the direction by gesturing with his hands from left to right, while he commented: *"But the community meetings on sustainability are like a broadcasting model. From here, to this area."* Another example shows how the participants, as well as Behzad, used the materials to embody their thinking. See figure 36 where Gerard-V adds a colored rope to the map, in this situation the colored rope indicates the boundaries of a network of small business enterprises.

The physicality also allowed participants to emphasize certain opinions, or to present an argument more convincingly. Behzad for example exaggerated the distance between one specific stakeholder, Alliander an energy network operator, and the neighborhood that was mapped: *"That's Alliander's problem. There is no link to the town hall. No one knows what they are actually doing"* (see figure 37). Also Gerard-B used some of the attributes to strengthen his argument. While Gerard-B was holding an attribute representing a human figure (see figure 38) he said: *"With these people in the neighborhood you mean the people who are unemployed, or the people who are living in Bussum?"* It seemed he was trying to get attention from Behzad and Gerard-V. Later on he continued: *"So what if... it's not about the unemployed, but about the elderly. They are at home, retired and inactive. They are no longer involved in society anymore. Whereas they may have*

Figure 36: Participants used the materials to embody their thinking. While Gerard-V laid down a string to indicate the boundaries of a network, he mumbled: "Then there is a connection between..."

Figure 37: The distance between Alliander and the neighborhood is exaggerated to represent the gap.

Figure 38: Gerard-B is waving with an attribute to attract attention of the participants for presenting his argument.

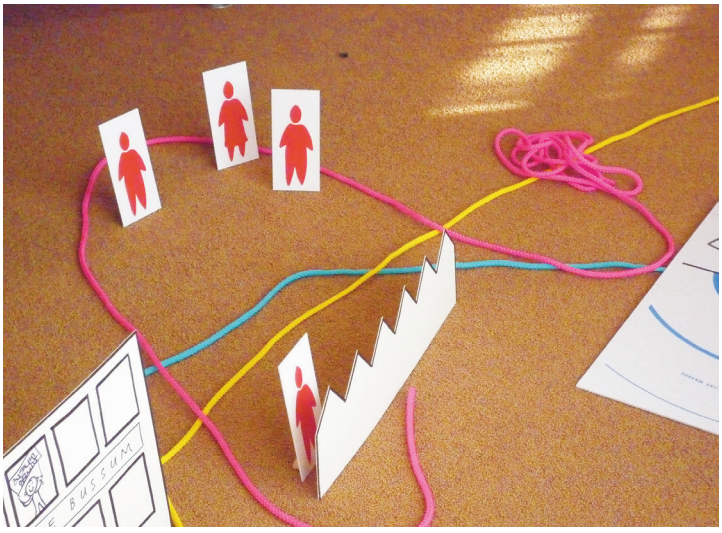

Figure 39: Gerard-B placed a human figure, representing the retired and inactive elderly to augment his argument. In this way, he expressed his implicit interests.

valuable experience as an engineer for example." To emphasize his viewpoint, he then put down the attribute behind one of the houses (figure 39). The issue with the elderly was in fact his hidden agenda as it turned out later.

After the set up of the neighborhood was completed, Behzad used the Value Canvas diagram to reflect on the session. He used this diagram to illustrate the overall picture and discuss the underlying principles at a more conceptual level (see figures 40 and 41). Gerard-B's summary of the model shows that he fairly well grasped its essence: *"You are not going to commit yourself to such a job when there isn't a certain societal value involved, like up here. It's about allocating money and allocation of operational value. You want to achieve something. So this is where you aim for when throwing a pebble into the pond, not here."* One question, however, that seemed to puzzle Gerard-B after discussing the value canvas: *"How do you start? Perhaps I should take smaller steps. But I think it is important. As you might have understood, it corresponds with our plans here in Bussum. And then... how to start? How to entice five kids to..."*

After Gerard-B left for another meeting the session was briefly evaluated with Gerard-V (see excerpt 6).

Figure 40: Discussing the Value Canvas diagram, providing the big picture.

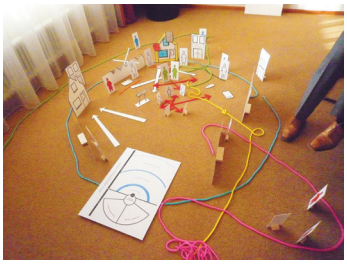

Figure 41: The Value Canvas positioned in the Value Network Map to illustrate the linkages across the tools.

Excerpt 6

Behzad:	*So when did you think the penny dropped for Gerard-B?*
Gerard-V:	*Right at the beginning. When he said: nice, interesting. That was right at the beginning. Like he said – I am not sure if you noticed – he liked it. For Martin-K and me this means that we are more sensitive, when Gerard-B is getting involved. How does he talk about it? How does he perceive it? And is he interested? For us it is important to sense if he is involved and committed. That helps us to move forward. And he wasn't just listening; he kept on asking questions.*
	[...]
Gerard-V:	*This is so much better than a PowerPoint presentation, a Prezi or anything like that.*
Bas:	*Why is it so much better?*
Gerard-V:	*Because it is three-dimensional it involves more activity and movement. It allows me to walk around the set up and take a different view of the situation. It allows me to create my own images; it's better than a two-dimensional image on a projection screen. You can move back and forth. I can create my own, I can add my own things if I want to. I create my own story, my own social circles like here. When it is projected on a screen, it is predetermined.*

This excerpt illustrates how the spatial set up of the value-mapping tool helped Gerard-V to take different perspectives on the situation and how it helped him to create his own mental images. Moreover the open-endedness allowed him to create his own stories.

Meetings after the workshop

The meetings after the workshop focused on negotiating the project scope and budget. It seemed that the previous meetings and the workshop were effective in establishing a common ground. For example, the colored strings from the workshop were used as a point of reference for the grouping of individuals with a common goal. Also when Behzad showed the Value Canvas, Martin-K prompted: *"Ah, there are the waves again"*, when referring to the waves of the ripple effect. The underlying principles of the diagram needed no further explanation. Moreover, Gerard-B once even interrupted Behzad: *"You don't need to explain it again, I know what you mean."*

However, initially it seemed there was little common ground in the first meeting with Henke and Geert-Jan, as it was their first encounter with Behzad. But surprisingly Henke and Geert-Jan seemed familiar with Behzad's story. When Behzad was explaining the second step of the process (exploring the neighborhood to identify common problems), Henke suddenly said: *"Did you talk to Gerard about this? Because you're telling the exact same story as he is telling"*. As if Behzad was retelling Gerard-B's story. Seemingly, Gerard-B already shared Behzad's story with other organizational members.

Another notable observation was how the diagrams directed the conversation. The diagrams were printed and fixed on a board and positioned in the center of the conversation within reach of the partici-

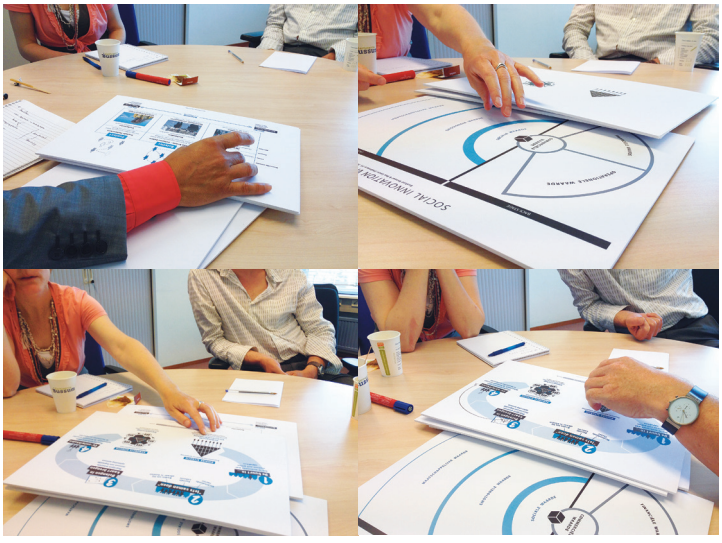

Figure 42: The physicality of the material stimulated participants to use gestures to support their utterances.

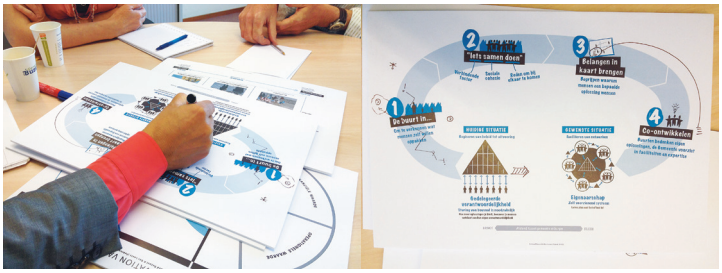

Figure 43: The materiality enabled Behzad to add markings and arrows to the diagram, indicating directions and emphasizing process steps.

pants. The physicality of the material stimulated participants to point at specific areas to indicate what they were talking about, or to animate process steps and transitions with gestures (see figure 42). Moreover, the physicality allowed participants to direct the conversation: for example, Henke put another diagram on top and subsequently stated her question: *"And how does that relate to this?"* Also the materiality enabled Behzad to draw and write on it, marking or highlighting specific parts (see figure 43). Evidently, the physicality of the material and the use of gestures sparked lively discussion and engaging interactions. Participants were actively involved in the conversation. Questions asked during the meeting indicate how they were trying to make sense of it.

But Behzad's story sometimes seemed to confuse the participants. Especially Geert-Jan was struggling with the new governance models: networked bottom-up facilitation instead of a directive top-down approach. Although these concepts are represented in the Social Innovation Process diagram and explained by Behzad, for Geert-Jan it was apparently a paradigm shift. What helped solve the confusion were examples of comparable cases they were dealing with. For instance, Behzad explained the case of Amsterdam West, where a group of young people from a minority ethnic background formed a menace to the neighborhood. When Behzad explained how he empowered this group to develop their own solutions, the participants got enthused. As Henke stated: *"I am trying to transfer these ideas to my own observations here in Bussum, how can we do that?"* These example cases seemed helpful for Henke and Geert-Jan to understand the principle of Behzad's proposition. Whereby the diagrams served as an aid to indicate process steps or illuminate the underlying principles.

At the end of the meeting, Henke and Geert-Jan asked if they could take the materials to discuss it with one of the council members (another alderman than Gerard-B).

6.1.3 Evaluation

The observations above illustrate how participants interacted with the toolkit and how the toolkit enhances their interactions. A review of these observations presents the following insights.

Initially participants seemed a little hesitant to use and modify the Value Network Mapping tool. But once they got used to it, they started acting through the material rather than just with it. In that sense, the diagrams seemed to be more transparent in their use, they instantly supported a natural interaction. Particularly in first encounters, diagrams helped Behzad to bridge gaps in communication. It stimulated participants to share examples and discuss comparable cases.

The materials helped Behzad explain intricate concepts and focus conversations. In their use, the diagrams and tangibles formed the center of conversations, stimulating and facilitating discussion. The materiality encouraged participants to augment their thinking and talking with gestures, making the conversational interactions vivid and engaging. Particularly the tangibility of the Value Network Mapping tool seemed effective in animating complex notions (e.g. weak ties).

Because the Value Network Mapping tool was initially designed for tabletop use. The size of the material seemed to be too small: participants had to kneel down in order to add or reposition attributes (see figure 34), which sometimes hampered the interaction with the material. Also, because of the carpet flooring, some of the attributes – particularly human figures – easily tipped. The spatial setup of the material, however, enabled participants to change their perspective, allowing them to create their own story.

Notably, the tinkering materials (figure 30) were hardly used, participants seemed to focus on the discussion, not on creating new attributes. The participants primarily used the materials that were at the center of the conversational interaction. Apparently these materials already had a distinct meaning to them, whereas tinkering materials require the active creation of meaning.

6.2 Study 2: HZCP

HZCP is a world leader in the marketing of seed potatoes. HZCP includes 230 employees, 10 branch offices and a global network of growers and breeders. The value chain comprises activities from research and development to the final delivery of potato products to consumers. HZCP is looking for ways to directly engage with consumer groups, particularly with the generation known as Generation Y. Behzad was invited for a workshop to help the strategy team of HZCP comprehend the social dynamics of value networks and the principles of community building.

6.2.1 Methods and materials

The study encompasses observations during one workshop in March 2013. Observations were captured as photographs and on video. The workshop included six participants. The key participant is Robert, man-

ager of the research and development department and member of the senior management team. The workshop took place in one of the meeting rooms at the head quarters of HZCP. The tools used in this workshop include: Value Canvas, a hand drawn version of the Iceberg and the Value Network Mapping tool (first iteration). The standard attributes of the Value Network Mapping tool were supplemented with case specific attributes, such as photographs (see figure 44) of several food categories (e.g. vegetables, seafood, meat, potatoes) and social events (e.g. street fair, concert, birthday party). Behzad prepared a script for the session, which included an introduction to social innovation, enactment of a social network, demonstrating value network configurations and wrap up. The duration of the workshop was 2.5 hours.

Figure 44: Case specific attributes include photographs of food categories and social events.

6.2.2 Observations

After Behzad introduced the essentials of social innovation, participants were invited to enact a social network. Aim of the enactment was to explain the concept of strong and weak ties. The participants were holding colored strings, which represented the strong (blue) and weak (white) ties of a social network (figure 45). The tangibility of the connections apparently stimulated participants to discuss personal experiences and several examples of social media use and misuse. One such example included Project X. Through questioning Behzad stimulated participants to reflect on the state of the network they embodied (excerpt 7).

Excerpt 7

Behzad:	*What happens in social networks? You can analyze these lines. Who is the most popular person in this group?*
Robert:	*Steven.*
Annemarie:	*Steven.*
Behzad:	*Why?*
Robert:	*Because he is holding the largest number of strings.*
Behzad:	*Many lines end at Steven. If you want HZCP to connect with young people? Who would you select as an ambassador?*
Robert:	*Steven, he is broadcasting on many channels.*
Behzad:	*He is indeed really popular!*

Figure 45: Participants enacting a social network.

Throughout the workshop participants referred to this notion of strong and weak ties as the blue strings or white strings. For participants this seemed to make perfect sense and helped them create a common term to discuss this rather abstract notion. Particularly the embodiment of social connections seemed effective for participants to comprehend the strength of weak ties and power distribution.

After this activity, Behzad invited participants to build a value network of potential stakeholders (e.g. Hotel Management School, Catering College, festivals) that may help HZCP engage with Generation Y. However, initially participants seemed hesitant to use the material. Behzad therefore actively stimulated participants to make alterations: *"The next one is? Robert... take this one, this is HZCP, write down..."* Interestingly, after Robert wrote the company name on one of the attributes, he walked across the table and placed the item – almost as a provocation – in a detached position on a projector stand in the middle of the meeting room (see excerpt 8 and figure 48).

Figure 46: Robert places the attribute that represents HZCP in a detached position.

Excerpt 8

Robert:	*It cannot be in control. It is an outsider, a receiver.*
Behzad:	*Just put it somewhere. But it also has something to do with food. HZCP is interested in it, because it has something to do with potatoes. What else?*
Robert:	*It's a bit out of reach now.*

Figure 47: Attribute representing Lowlands festival with its typical striped landmarks.

While the session progressed participants got more confident and readily used the materials. For example, when Annemarie suggested Lowlands (a music festival) as a possible stakeholder, she rendered – on the chimney of an attribute that represents a factory – the typical red white stripes that resemble the landmarks of the festival (see figure 47). Another crucial stakeholder was introduced by Douwe (see excerpt 9).

Excerpt 9

Behzad:	*Is it clear?*
Douwe:	*There is another one I'd like to add.*
Behzad:	*Oh, a supermarket. Ah great!*
Douwe:	*Unfortunately we cannot do business without them.*
Behzad:	*Where should they be placed? When you want to collaborate with these colleges? What was the theme again?*
Douwe:	*Social moments.*
Behzad:	*So, they are right at this intersection. Like this is going to affect our business.*
Douwe:	*They are very powerful. I mean you have to keep them in mind, cause you're going to need them one day.*

The supermarket attribute was positioned at the intersection of two strings (see figure 48). In this session, strings were primarily used to indicate relations between stakeholders, not to indicate boundaries of networks or groups of stakeholders.

Because of the arrangement of the meeting room, the space to build the value network map and interact with it was limited. Participants barely moved and did not take different perspectives on the map and tables appeared to hamper them to move freely. Also, the layout of

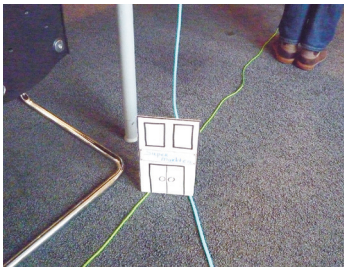

Figure 48: Attribute representing a supermarket at the junction of two relations.

Figure 49: Behzad deploys the Value Canvas to summarize the session and reflect on the activities from a more conceptual level. Participants attentively listened to his reflections.

the value network map seemed to have lost its focus. Attributes were located on the floor, tables and a projector stand, between other materials, notebooks and empty coffee cups.

To conclude the session Behzad introduced the Value Canvas to reflect on the configuration from a conceptual level (see figure 49). The participants listened attentively to Behzad's reflection and once they grasped the concept it seemed to "trigger light bulbs in their heads". It got Robert enthused: *"Can I take a picture of this diagram? Or is it on the website? I want to show to my colleagues in the other room across the hall!"* In addition to Behzad's closing words participants responded:

Excerpt 10

Robert:	*Inspiring!*
Douwe:	*We have to adapt to a new way of thinking.*
Sita:	*I agree, I find it very interesting. It's a whole new world to me that just opened up. That may sound odd, I know.*

In conclusion, Annemarie noted that especially the example of Hewlett Packard was an aha-experience to her (see excerpt 11).

Excerpt 11

Bas:	*What was especially helpful to grasp the dynamics of social innovation?*
Annemarie:	*Examples. HP for example, it's similar to our business. We know about the market. Yes indeed, you deliver something, you add value. Not necessarily products, but think of services. That also works. You're aware of it, but once you listen to the story and learn about the other company, then you think, ok... we're heading in the right direction.*

6.2.3 Evaluation

Similarly to the Bussum case, the review of the results aims to answer two questions: how participants interacted with the toolkit and how the toolkit enhances their interactions?

The enactment of a social network seemed surprisingly effective to illuminate the innovation capacity that is hidden in weak ties. It helped participants to actually experience the network dynamics themselves. Moreover, it stimulated participants to discuss personal experiences and example cases. Particularly these example cases seemed helpful for participants to comprehend the dynamics of networks.

The construction of the Value Network Map, however, was less successful. It appeared that the arrangement of the meeting room was inappropriate for the workshop. Insufficient space impeded participants

to take different perspectives and use the materials. So, the workshop space, its arrangement and the number of participants are important conditions to take into account in order to make effective use of the Value Network Mapping tool.

The introduction of the Value Canvas appeared to be helpful to reflect on the value network map; it helped participants to consider the value network map configuration from a more conceptual level, it made sense to them.

6.3 Study 3: C2I Network

In contrast to the previous studies, this study does not concern interactions with senior decision makers. As a matter of fact, it primarily involves interactions among actors from the Service Design Network. Behzad invited partners and colleagues from his network to advance his proposition to the next level. The aim of the workshop was therefore different from the other studies. The primary aim of the workshop was to discuss Behzad's refined proposition for public and social challenges. Secondly the workshop intends to evaluate the second iteration of the Value Network Mapping tool, which is for the current work of prime concern.

6.3.1 Methods and materials

The study encompasses observations of one workshop in June 2013. Observations were captured as photographs and on video. Participants included partners and colleagues from Behzad's network: Bart (copy writer), Jan (designer, illustrator), Jeroen (software engineer), Björn (service innovation consultant) and Gerard-H (business consultant). Björn and Gerard-H had worked with Behzad at Achmea. The workshop took place in Amsterdam. For this occasion a rehearsal room for acting classes was booked. This room provided enough space for building the value network map. The tools used in this workshop include: Innovation Mindsets diagram, Value Canvas diagram and the Value Network Mapping tool (second iteration). The generic attributes of the Value Network Mapping tool were supplemented with case specific attributes. These attributes include a pistol and a dog and were used to support an example case on customer care at insurance company Achmea. The case involved the story of Martin, a restaurant owner, whose restaurant was robbed. It served as an example to illustrate the dynamics of value networks and service innovation. Björn and Gerard-H were both involved in this case during their time at Achmea. The session comprised several activities: introduction to the principles of the proposition, building the value network and discussing the possible role of each participant in the proposition.

Figure 50: Participant is using gestures to animate his story.

6.3.2 Observations

The workshop started with an introduction by Behzad. After that Behzad presented the Innovation Mindsets diagram to illustrate the process of his proposition briefly. Subsequently he introduced the Value Canvas. Björn, an experienced change manager, seemed to recognize the dichotomy presented in the Innovation Mindsets diagram. While he alternately pointed at the *operations* and *context* (see figure 50) he reflected: *"That's one of the problems with the large arrow (points at the large arrow). That's exactly what we observed at Achmea. In everyday practice, employees are concerned with operations (pointing at the operations-column). In the boardroom they are concerned with this (pointing at the context-column). Anything in between builds on traditional logic, hampering innovation and change."*

This reflection triggered participants to share their experiences and stories on organizational development and change management. This discussion intensified when Behzad presented a movie on the concept of a mini-company (i.e. a prototype of a cross-departmental business unit). The sharing of personal experiences and stories apparently served a purpose: it was the first time that these participants met as group. Each participant had a different background and held different professional experiences. Seemingly, with this story telling participants were probing for common ground.

Figure 51: Participants assigning meaning to materials.

Following this introduction, Behzad invited the participants to build the value network map. The stage was divided in a *back stage*, representing the internal organization and a *front stage*, representing the business ecosystem. Initially, participants seemed a little shy to use the material (see excerpt 12 and figure 51).

Excerpt 12

Behzad:	*Let's consider this as the organization, this is the backstage. And here we enter the external world (while he stepped into the front stage). I want to discuss Martin's case. Gerard, can you get Martin?*
Gerard-H:	*This is Martin (picks up one of the figures).*
Behzad:	*Yes, and can you write his name Martin on it, with a marker?*

Gerard-H:	*Marker... (goes fetch a marker).*
Behzad:	*Can you please take Martin's spouse. And can someone get his dog?*
Jan:	*Did he have a name?*
Behzad:	*Best was his name.*

However, Jan seemed hesitant to write on the material (see excerpt 13).

Excerpt 13

Jan:	*Are you going to erase this afterwards? Or do I need to use sticky notes?*
Bas:	*No problem, you can write on it.*
Jan:	*Yes?*
Bas:	*It is designed to be used like that.*

Björn and Jan finished positioning their attributes. When Behzad asked participants to add Martin's employees to the stage, the flow of the session picked up speed. Participants, especially Jan, seemed to enjoy the materials (see excerpt 14).

Excerpt 14

Behzad:	*So, a robbery just happened. The restaurant employs nine employees. Can you help and get me some employees?*
Jan:	*How many employees?*
Behzad:	*Nine employees. It doesn't need to be precisely nine... This is Martin, this is his restaurant. Martin also needs a house, by the way.*
Jan:	*This material really feels great to use.*

Subsequently, as shown in excerpt 15 and figure 52, participants started attributing meaning to the configuration and its attributes.

Excerpt 15

Behzad:	*Look at that! We're among creatives!*
Jan:	*Look swimming trousers!*
Björn:	*No that's his apron. (laughter)*
Gerard-H:	*This is how you draw an apron! (showing it to the other participants)*
Jan:	*Chez Martin.*
Behzad:	*This is the restaurant, this is Martin's home I reckon?*
Jan:	*Yes.*
	(Behzad repositions the restaurant, making a clear distinction between Martin's business and private context)

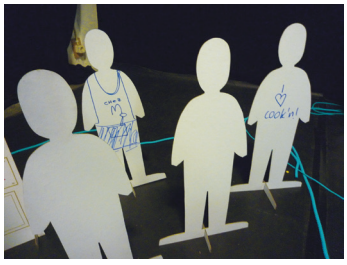

Figure 52: Participants assigned meaning to the attributes by labeling them with text or featuring them with drawings.

Behzad:	*What I wanted to show you: what is it that an insurance company can do in this context?*
Jan:	*You're not going to use this one right? (while Jan takes the pistol from the stage)*
Behzad:	*A robbery just happened.*
Jan:	*Ok. (puts back the pistol on the stage)*
Björn:	*It happened over there (pointing at the restaurant)? Or at home?*
Behzad:	*No, it happened at his restaurant.*
	(Behzad then animates the scene by moving Martin's figure away from the restaurant)
Behzad:	*When Martin's wife was at the restaurant, he was out to do some shopping.*

As this observation shows, the tangibility of the material allowed participants to resolve misunderstanding and animate the conversation. Particularly the size of the material makes it easy to pick up attributes and reposition them. As excerpt 16 and figure 53 illustrate, the size of the material also allowed participants to enact their opinions.

Figure 53: Gerard-H used an attribute to smash a number of actors, demonstrating how insurance companies use to act.

Excerpt 16

Behzad:	*Gerard, can you please get an insurance company.*
	(Gerard-H picks a building, walks to a group of human figures)
Gerard-H:	*Insurance company traditionally are like this (and hits a number of customers)...*
	(laughter)
Gerard-H:	*That's what I call an inappropriate solution!*

Colored strings were added to the scene to indicate boundaries of the business and private context (see excerpt 17 and figure 54).

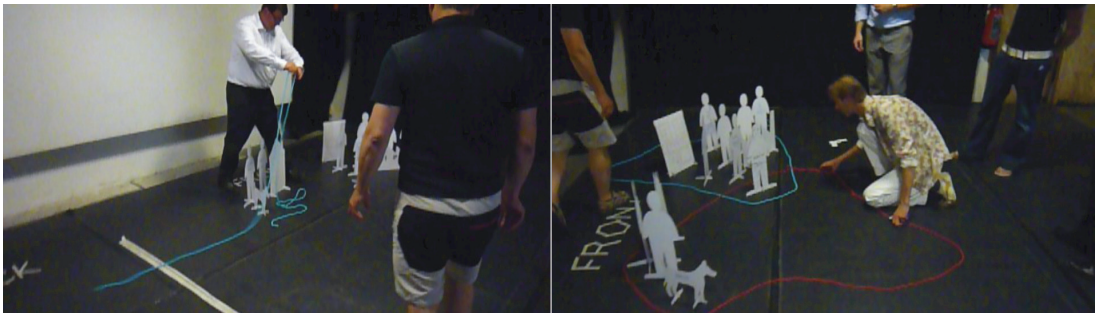

Figure 54: Participants add colored strings to the value network to indicate the boundaries business and private contexts.

Excerpt 17

Behzad:	*Gerard, can you please put down a blue string over here. We're going to extend the stage.*
Bart:	*When there is replacement, Martin can go to his restaurant. (Gerard-H adds a blue line to the stage)*
Behzad:	*Probably there is also a private line. (Björn and Bart add a red line to indicate the boundaries of the private network)*
Björn:	*Martin's replacement does that belong to his private context?*
Behzad:	*That's his private context.*
Björn:	*How far does this private context reach?*
Behzad:	*Well look (while he places Martin in between the private and business context). What do you think?*
Björn:	*Well, he should be with his wife (and puts Martin back into the private context).*

Behzad frequently asked questions to reflect on the state of network configuration. See for example excerpt 18.

Excerpt 18

Behzad:	*What is the meaning of insurances in such a context? This is the current state. In this situation, what is going to help Martin? Martin's wife, can she still run the restaurant? He is to stay at home with his wife (figures of Martin and his spouse are moved to the house)*
Jan:	*He has to walk the dog.*
Behzad:	*She is too traumatized to stay at home alone.*

Interestingly, when Behzad asked the participants to reflect on the configuration through the eyes of the insurance company, they identified an extra layer of meaning, which they momentarily materialized with a sticky note (see excerpt 19; see figure 55).

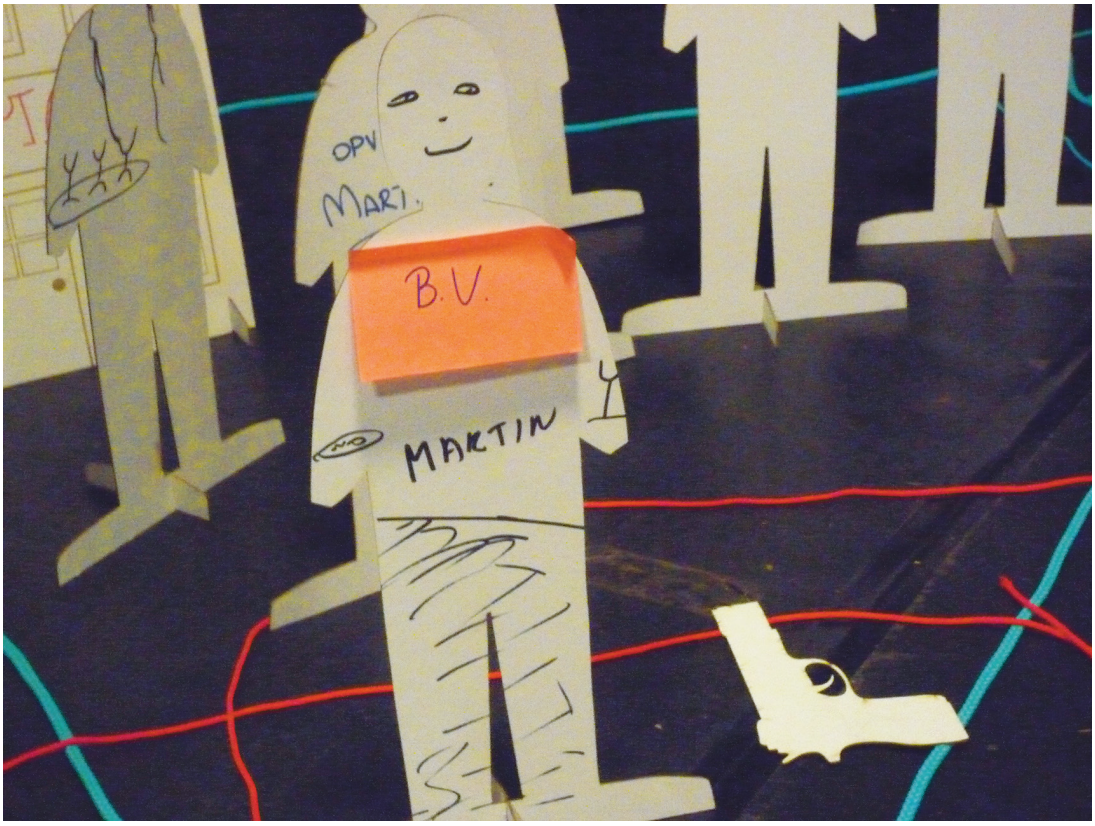

Figure 55: Martin B.V. represents the key actor as a business entity. The extra layer of meaning is attributed and indicated with a sticky note.

Excerpt 19

Behzad:	*The robbery had just happened. My question is. If you look at the situation as an insurance company would do. What does the insurance company see?*
Gerard-H:	*The one who is paying the insurance fee, like the entrepreneur Martin B.V.*[128]
Behzad:	*Martin B.V. I like that one! So it's not Martin but Martin B.V.*
Bart:	*So, without the rest of the context! (waving his arms to indicate the wholeness).*
	(Björn puts a sticky note "B.V." on Martin)
Björn:	*Martin B.V.*

[128] The abbreviation "B.V" refers to the legal status of a company. It corresponds with the private limited company (Ltd.) in the United Kingdom or incorporation (Inc.) in the United States.

A few moments later Behzad reflects on it and explains: *"When you look at this situation, Martin represents a metaphor for what insurance companies do not know about their clients. It is also not known what possible results market research may produce."*

When almost all actors had been added to the stage, Behzad started drawing relations across actors, for example between Martin and another restaurant owner: *"Wait a minute, when this has happened, this colleague may help Martin."* These actions triggered a lively discussion on

value and unforeseen stakeholder configurations. Participants discovered that latent value might generate innovative propositions when activated. To enrich the discussion, other comparable cases were added to the conversation, like one of Björn's current consultancy projects for the municipality of Amsterdam that also concerns a complex network of stakeholders.

After this discussion, Bart evaluated the use of the Value Network Mapping tool (see excerpt 20 and figure 56).

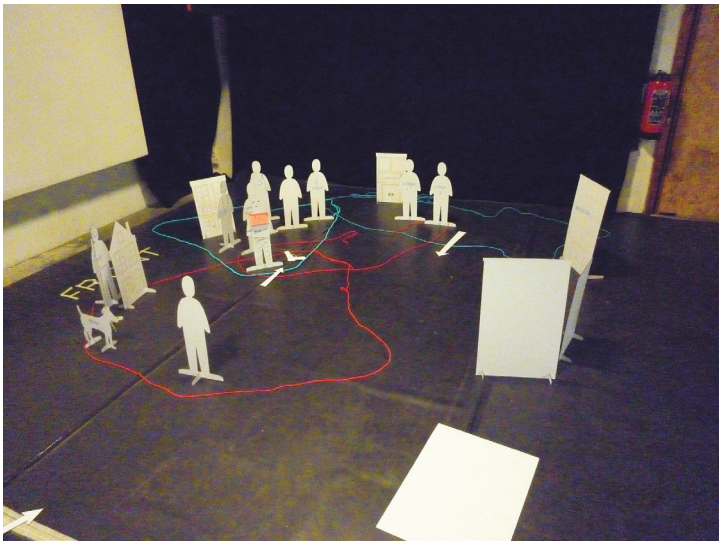

Figure 56: Overview of the final state of the value network map.

Excerpt 20

Bart:	*It makes sense to me, more and more. Recently, we have had a few long conversations. It seemed to be clear to me. But now, I am here this afternoon, and now it really makes sense. Thanks to this physical set up. I believe when you want to convince those old school thinkers, that you have to take them on a journey. This definitely helps them see it.*
Bas:	*What do you mean with journey?*
Bart:	*I mean this journey (making gestures to embrace the value network). Because it's tangible, with these attributes and the explanation of each step. It started with Martin very simple... a pistol. A restaurant was added, colleagues. It develops right in front of your eyes. When I came in I noticed all the materials and wondered how we were going to use it. And now I see it! (snaps his fingers) And the surprise!*
Gerard-H:	*For senior management you need to spend an afternoon on this, which is valuable time for them. But the key is to let them experience it. Showing a movie is not going to be effective.*

To conclude the session, each participant addressed his added value to the social innovation process. Gerard-H used the stage and materials to indicate his position. He walked over to the back stage and dropped an arrow pointing from the front stage to the back stage: *"I'd put myself right here in this position. I am good at implementing this vision into organizational contexts."* While the participants discussed their contribution, Björn was sitting on a bench deeply absorbed in thought for several minutes. Later on he commented: *"I have worked with you on this project for a year. Until now I didn't realize it was this complex."* Apparently, building the value network map stimulated Björn to reflect on the work he did at Achmea. In retrospect he attempted to attribute meaning to his experiences, it made him aware of the complexity of the case.

6.3.3 Evaluation

The size of the material seemed to have a positive impact on the interaction with the materials. The large size allowed participants to pick up attributes and easily move them around the stage. Also it is shown that the large size serves as a canvas, allowing participants to draw freely on the materials, for example by drawing an apron on a human attribute turned the unattributed symbol into a chef. The size and arrangement of the rehearsal room also contributed to the embodied interaction, enabling participants to move freely and making the map accessible. However, the setup of the value map appeared to be fairly small compared to the space available. A more distributed layout of the attributes would perhaps help to make the map more accessible.

Specific reconfigurations (e.g. when unrelated actors were connected) of the value network effectively embody hidden value propositions. As such, materiality stimulates participants to reflect on the presented state and contribute to the discussion by sharing stories, experiences and example cases. Moreover, materiality also stimulates participants to embody their thinking. See for example how participants used gestures or how Gerard-H smashed a number of actors like he was hitting them with a bat.

All the participants were actively involved in the discussion. Moreover, the animated presentation of Martin's story appeared to stimulate participants to empathize with him.

6.4 Interview

The previous sections present a rich collection of observations. In this section a semi-structured interview with Behzad is presented. The aim of this interview was twofold.

First, the interview intended to elicit insights from interactions between Behzad and senior decision makers that were not directly ob-

served. This includes interactions with Annemieke the deputy of Province of Gelderland, and Peter (program manager) and Jerry (innovation manager) of Achmea. Behzad usually reported his experiences with the toolkit shortly after his meetings. Notes of his feedback were taken, but a connection between these notes seemed to be missing. Therefore the interview intended to reflect on these interactions in a more structured fashion and draw connections between these experiences. The findings of this inquiry are reported in section 6.4.2.

Second, the interview aimed to evaluate the deployment of the toolkit in general and concatenate its results. This evaluation concentrates on the actor-relations as delineated in the conceptual model (see chapter 4); it encompasses the interaction between strategic designers and senior decision makers, and the interaction between senior decision makers and their external reality (i.e. surrounding business ecosystem). So briefly, what effects were observed concerning these interactions? The results of this conclusive evaluation are reported in section 6.5.

6.4.1 Methods & materials

Two days before the interview – to sensitize Behzad and refresh his memories – an outline of the interview questions[129] and a series of visuals that included the complete toolkit were sent to Behzad. The interview itself took place in July 2013 and was recorded on video and transcribed for further analyses.

[129] See appendix I.

At the time of the interview, prints of the diagrams and photographs of the tangible tools were readily available to support the conversation. Each print was numbered to serve as reference (see figure 57).

Figure 57: Prints of the diagrams and photographs of the tangible tools to support the evaluative interview.

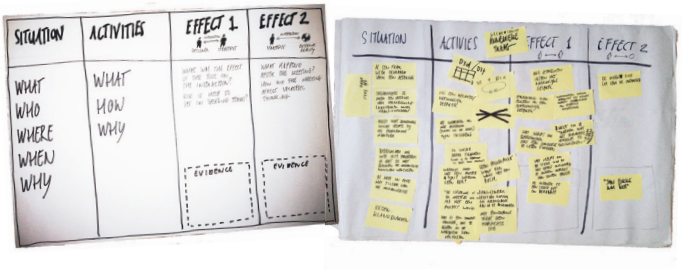

Figure 58: Case-sheets served as a guideline for the interview. It helped map the answers and focus the conversation.

For each case (Bussum, HZCP, Province of Gelderland and Achmea) a case-sheet served as a guideline for the interview and helped map the answers (see figure 58). The case-sheet included four columns: *Situation, Activities, Effect-1* and *Effect-2*. Each column comprised a number of questions. Situation focused on the context of the interaction. Activities concerned the interactions. *Effect-1* holds questions like: how did the toolkit affect your interaction with executives and other senior

managers? Did the tool help to get nearer? *Effect-2* included questions like: what happened after the meeting? Did you notice any differences in perception? Did the interactions have an impact on their strategic thinking?

6.4.2 Results

Province of Gelderland

For the Province of Gelderland Behzad was involved as a project manager and moderator of a series of forums – dubbed arenas – on sustainable energy. After the series were completed, Annemieke invited Behzad to discuss his observations. For this meeting Behzad aimed to serve as a sounding board, he wanted Annemieke to take a fresh perspective on her organization: *"I wanted to reframe her perception, so make her see what actually had happened at the arenas."* For this occasion Behzad used prints of the Value Canvas and Innovation Mindsets diagrams to stimulate a natural conversation and stimulated her curiousity.

It was especially the Innovation Mindsets diagram that got her attention; it helped her realize that she holds a tendency to towards exploitation and not towards exploration. As Behzad repeated her words: *"It's so recognizable [...] I usually tend towards (points at operations). Sometimes I find myself in this situation where I am actually exploring. But once the idea is implemented it becomes a project, and then all the fun and charm is gone."* According to Behzad it was notable how her fingertips were stroking the paper, while she said: *"Yes, this is it. This is what we actually do. Every time I try to do this (points at exploration), then someone suggests to do a project."* The diagrams seemed effective in helping her understand Behzad's ideas, as Behzad repeated her words: *"This is what it is, I can share this story with others."* At the end of the conversation Annemieke asked if she could keep the diagrams, which Behzad gave to her.

Not only did the diagrams help Behzad convey his story effectively. Also the diagrams helped him to deliver the story more efficiently, it took him less time: *"I was even finished 20 minutes earlier than expected. Usually I run out of time."*

Achmea

Two years ago, one of Behzad's projects for Achmea on service innovation was unexpectedly canceled because of the economical downturn. Since then there had been no communication between Achmea and Behzad. After more than two years of silence, Achmea contacted Behzad again to consult him on strategic network collaboration. One of Achmea's board members had ordered Peter and Jerry to consult Behzad. Peter and Jerry are responsible for the implementation of a customer protection policy. When they contacted Behzad they had just

initiated a Request for Proposal process and had invited a number of consultancy firms for a bid. The interactions included several meetings with Peter and Jerry, and a strategic session with other consultants (professors, trend watchers).

In the first – and also most important – meeting Behzad introduced the Innovation Mindsets and the Value Canvas to Peter and Jerry. They were readily able to relate the diagrams to their own business. It was, according to Behzad striking to see how the Innovation Mindsets diagram resonated with the actual dilemma's of Peter and Jerry, as Behzad repeated their words: *"This is what we do. Lots of operations and finances."* The diagrams also seemed to have triggered their curiosity: *"How does it work? How do we make it happen?"*

As a consequence of this meeting Peter and Jerry decided to re-evaluate the proposals. For that reason two renowned consultancy firms were no longer short-listed. Their focus was too much on optimization of current business, whereas Achmea Peter and Jerry had learned they needed help with exploration.

For the strategic session that followed, Behzad was given a wild card; together with five other consultants they discussed a number of strategic issues for two days (e.g. governance models, open innovation). For these interactions with senior managers of Achmea and other consultants, the Value Canvas and Innovation Mindsets diagrams provided a framework that helped the participants to get on speaking terms. Moreover, after this session Behzad frequently conversed with the consultants of consultancy firm, and the creative directors of an advertising agency. It seems that the tools also help bridge communication between actors within Service Design Network.

6.5 Conclusive evaluation

This part of the evaluative interview reports on Behzad's experiences with the tools. From this evaluation some qualities emerge that illustrate how the toolkit helps facilitate a natural conversation promoting senior decision makers to reframe their business activities. These findings are reported in section 6.5.1

Furthermore, to determine the toolkit's significance, its effects are evaluated. The results of this evaluation are reported in section 6.5.2.

6.5.1 The toolkit in use

According to Behzad, one of the key qualities of the toolkit is that it helped establish a natural conversation with an executive: *"Complex issues, require proximity, you need to discuss it in one-to-one conversations."* PowerPoint, however, seemed ineffective in establishing such a conversation: *"then it becomes a sales pitch"*. As Behzad emphasized: *"PowerPoint pursues to*

inform executives", whereas Behzad aimed *"to activate them"*. PowerPoint is also too linear, unlike the non-linear characteristics of a natural conversation that often takes unforeseen turns. It seems that diagrammatic tools support such non-linearity in conversations. As Behzad explained, the toolkit provided a framework to *"connect the dots"* in a non-linear way, it helped discuss *"the intangible"*.

Moreover, as Behzad made clear: *"For reframing, I need a natural conversation."* Such natural conversations are essential to reframe the current business. Particularly the Innovation Mindsets diagram appeared to be an effective tool that provides senior decision makers with *new eyes*. It helps them identify their current frames, addresses their biases and ultimately provides them with new frames. It allows senior decision makers to take a step back and consider their actual operations and activities; it stimulates them to reflect on the organization's modus operandi. Moreover, as Behzad explained: *"So, that's what I do. I help them identify the organizational routines that stop them from innovating."* It is, according to Behzad, crucial in such reflective conversations that senior decision makers draw conclusions themselves. The open-endedness of the diagrams allowed them to do so.

It should be mentioned that Behzad frequently collaborates with visualizers who help him create visuals to support his presentations and conversations. So, prior to the existence of the current toolkit, Behzad already deployed visuals and metaphors to bridge communication and collaboration. These visuals are, however, narrative by nature, whereas the diagrams of the toolkit predominantly represent models of systems, processes and concepts. The toolkit does not make these visuals redundant, in practice these two types of visuals may complement one another.

6.5.2 Effects

Design is not just about the product, moreover, it is about the effect it causes (Jones, 1970/1992). Therefore the key question for this evaluation is: what are the actual effects generated by the tools? Below, the cases of Bussum, HZCP, Achmea and Gelderland are evaluated.

Bussum

In Bussum a number of effects are observed. Most prominently is that, according to Behzad: *"Martin has become a sponsor, and Gerard a believer."* These actors started, as a matter of fact, instilling Behzad's story in the members of their organization. See for example Henke's remark: *"Did you talk to Gerard about this? Because you're telling the exact same story as he is telling."* If Behzad and Gerard-B are telling the same story, then it can be argued that their mental models have a commonality.

After the last observation in Bussum (the meeting with Henke and Geert-Jan) Behzad frequently visited the town hall for follow-up meetings. During these visits he noticed how the diagrams, that were left behind to show to one of the council members, circulated through the organization. People had copies of the diagrams near their desks or had put on pin boards; ready-at-hand to support spontaneous conversations on the topic. Also, when a local energy cooperative contacted Bussum for support, Martin advised them to contact Behzad. This illustrates how actors have become ambassadors of the story. As ambassadors Martin and Gerard-B diligently attempted to allocate budget for a pilot project.

HZCP

After the workshop Annemarie contacted Behzad a few times. In one of their phone conversations she reported that the workshop had energized the R&D team. During the weeks after the workshop, the R&D team frequently referred to the *"workshop with the colored strings"* in their discussions on innovation and community building. The workshop had given them some new directions (*"increase proximity"*) to deal with the dynamics of social networks, but the workshop had led to many new questions as well. As a result of the workshop HZCP initiated a number of studies to map stakeholders and their interests. They planned to allocate budgets for a follow-up workshop, but at the end no real action was taken by HZCP.

Province of Gelderland

Behzad's interactions with the Province of Gelderland mainly involve meetings with the program director of sustainable energy; his interactions with Annemieke, the deputy, were few. Behzad seemed, with the help of the diagrams, successful in establishing a common ground. Their natural conversation had increased their proximity as Behzad explains: *"It was the way she shook my hand when I left and the way she thanked me for the valuable insights I'd given her."*

Achmea

As Behzad reported in the interview, Peter and Jerry were excited by the dilemma represented in the diagrams. These abstract representations seemed to contrast with their internal models. This discrepancy seemed to prompt them to aptly adopt the new models to resolve this conflict. Moreover, with these new insights they took a radical decision and aborted the negotiation process with two renowned consultancy firms.

Case	Key actors	Key activities	Tools	Effect-1 	Effect-2 
Bussum	Gerard-B, Gerard-V, Martin-K, Henke, Geert-Jan	Five meetings, one workshop	Value Network Mapping Tool, Value Canvas, Iceberg, Innovation Mindsets,	*"Martin has become a sponsor, and Gerard a believer."*	"Did you talk to Gerard about this?" Behzad's story traversed through Bussum's organization. Martin and Gerard-B diligently attempted to allocate budget for a pilot project.
HZCP	Robert and Annemarie	One workshop	Value Network Mapping Tool, Value Canvas, Iceberg	The Value Canvas *"triggered light bulbs in their heads"*.	Initiated a number of studies to map stakeholders and their interests
Province of Gelderland	Annemieke	One meeting	Value Canvas, Innovation Mindsets, Social Innovation Process	*"the way she shook my hand"* and *"I can share this story with others"* and *"It's so recognizable"*.	Annemieke detached herself from her organization; it enabled her to look at her organization from a different perspective and helped her identify innovation barriers.
Achmea	Peter and Jerry	Two meetings, and one strategic session with other consultants.	Value Canvas, Innovation Mindsets	Peter and Jerry instantly recognized the diagrams as models of their situation.	Peter and Jerry aborted the negotiation process with two renowned consultancy firms after initiating an RFP process.
C2I Network	Gerard, Jan, Bart, Björn and Jeroen	One workshop	Value Network Mapping Tool, Value Canvas, Innovation Mindsets	Bart concluded: *"[...] now it really makes sense. Thanks to this physical set up."*	Björn stated: "Until now I didn't realize it was this complex."

Table 3: Mapping effects of the toolkit with corresponding actors, activities and tools.

These effects are summarized in table 3. *Effect-1* shows how the tools affected the interaction between Behzad and senior decision makers. Interestingly, the participants recognized the diagrams as representations of their dilemma; it indicates a first step in the process of alignment. *Effect-2* shows the effects in terms of perception and strategic action. Note that this evaluation has limitations. There are no observations indicating that the mental models of the actors have become more accurate. There was, however, one effect that was not expected: the tools seemed to stimulate and facilitate interactions between senior decision makers and other organizational members.

6.6 Key insights

The observations and evaluation results described in the previous sections reveal some key insights:

- The Bussum study, that includes multiple interactions, shows significant effects, in contrast to studies that comprise only one or few interactions. Seemingly, frequent interactions are needed to accelerate common ground development.
- The open-endedness of the Value Network Mapping tool allows participants to create their own story. Such ownership empowers them to share it with other organizational members.
- Initially participants are hesitant to use and modify attributes of the Value Network Mapping Tool. They need encouragement from workshop moderators. But once participants feel confident, they freely use and modify materials.
- The physicality of the materials stimulates gesturing; it enhances the dynamics of conversations, making them lively and engaging.
- Physicality helps focus the conversation. The materials become the center of the interaction.
- The spatial setup enables participants to take different perspectives on the given situation and create their own stories.
- In the workshops participants used the material to convincingly convey their visions, opinions and thoughts. In a sense, they used the material as rhetorical devices to intensify their argument by physically enacting their vision or thoughts.
- The size of materials and workshop space are important factors to boost sessions with an energetic flow. A workshop space with too many obstacles or limited space inhibits participants to change perspective or alter the configuration of the value map. Large attributes offer a good deal of space to draw on; as such large attributes serve as a canvas.
- Personal experiences and in particular examples of comparable cases, spark inspiration and help participants comprehend complex concepts.
- Diagrams are communication bridges supporting initial interactions; they help establish a common language and establish a foundation to develop shared understanding.
- The configuration or (re)configurations of the toolkit frequently triggered questioning, which seems crucial for reflective discussions.
- The toolkit stimulates senior decision makers to reflect on their current business. Particularly the Innovation Mindsets diagram offers a frame to look at their organization from a different perspective. It helps senior decision makers identify organizational habits, routines, or attitudes that obstruct or frustrate innovation.

- Reframing needs a natural conversation, diagrams enable such conversations, PowerPoint does not.
- The toolkit is useful for different network interactions. It does not only support interactions between networks (e.g. actors of the Service Design Network and Service Organization Network), it also supports interactions between actors within these networks.
- The toolkit prompts participants to become ambassadors. In this role, they promote the story within and outside their organization.

6.6.1 Recommendations for tool use

The key insights and the observations show that the use of the toolkit is essentially situated and bounded by its context (e.g. client, type of interaction, space). However, a number of recommendations can be formulated. These recommendations apply in particular to the tools presented in this thesis and may perhaps be helpful for similar tools that concern networked innovation as well. The diagrams seem to be most effective in one-to-one meetings or small group meetings. The tangible Value Network Mapping Tool is most effective for presenting the complexity of a networked value proposition, but may be suitable for exploring the dynamics of novel propositions as well.

Using diagrams

- Mount diagrams on foam board, rather than presenting them with PowerPoint and a projector. Physicality helps direct the conversation; it stimulates a more natural conversation.
- Allow participants to attribute their own meaning to the diagrams. Their meaning may serve as a bridge to establish a shared language.

Using tangibles

- Prepare scripts or storylines illustrating the principles of the proposition. Preferably use real stories. It is easier for participants to empathize with real characters or personas than abstract characters.
- Actively invite participants to use the materials. Non-designers may be hesitant to modify them.
- The attributes can be used to animate transitions, conflicts or gaps in the value network. Animations stimulate reflective dialogue.
- There should be enough space to accommodate the group and the set up of the value space. A room with little furniture is recommended, allowing participant to move freely.
- Diagrams may be used at the end of a session for abstract conceptualization. It augments understanding and helps participants to draw linkages between the narrative and the bigger picture.

Part 3: Learnings

Extracting principles, drawing conclusions and reflection on action.

Chapter 7

Discussion

The previous section described the design of the toolkit and reported on its application in several case studies. In this chapter an analysis of the research findings is presented. Its aim is to extract principles, linkages, or generalizations. What do the findings in chapter 6 mean? And how do these findings relate to the literature study?

7.1 Analysis of the toolkit in use

In achieving the general aim of the toolkit, the observations and evaluation in chapter 6 show how the toolkit fulfilled several roles in supporting strategic designers and senior decision makers to become more proximate and how the toolkit provided senior decision makers with new frames that stimulated them to reconceptualize their business environment. The roles that emerged from the results are discussed below.

First, in initial communications with senior decision makers, the toolkit helps strategic designers to bridge communication and develop a shared language. The tangibility and ludic qualities of the toolkit help establish a natural conversation.

Second, the toolkit helps senior decision makers address the nature of their strategic challenges and grasp the complexity of their business ecosystem; it demonstrates how Behzad's proposition exploits this complexity. For example, the Innovation Mindsets diagram seemed particularly valuable in identifying the nature of the strategic issue and helps senior decision makers to articulate their strategic question. During conversations senior decision makers often showed a tendency towards optimization, rather than exploration. In this way, they treated a "wicked problem" in terms of a "tame problem"[130] (see Rittel & Webber, 1973; Camillus, 2008).

But there is more to it. In contrast to the traditional emphasis on rational problem solving[131], there is an alternative view on design as Dorst (2006a) points out[132]. In his approach Dorst (2006a) describes design as "the resolution of paradoxes between discourses[133] in a design situation" (p. 17). Such an approach is observed in Behzad's activities. In his practice Behzad swiftly identifies patterns of conflicting interests, goals and constraints. In correspondence with Dorst's (2006a) description, Behzad subsequently develops a creative redefinition of the design situation (i.e. reframing), which allows him to transcend or

[130] Treating a wicked problem as a tame problem may generate adverse effects and as a consequence create more difficulty (Nelson & Stolterman, 2002, p. 14). However, the given design situations presented in chapter 6 are generally wicked problems. The social dimension of Behzad's approach on the business ecosystems, underlines the open-ended, dynamic and networked nature of the situation, which makes it essentially a wicked problem (see Camillus, 2008).

[131] See the work of Dorst (2003), Restrepo and Christiaans (2004), and Simon (1969/1996) for a description of this traditional approach. Dorst (2006a), however, takes the approach of considering design problems as situated problems (in keeping with Suchman, 1985), and criticizes Simon's (1969/1996) rational approach.

[132] See also Hansen, Dorst and Andreasen (2009).

[133] Discourses are the underlying views, standpoints, or requirements that form a paradox (Dorst, 2006a).

rearrange incongruent discourses in order to forge alliances and collaborations between stakeholders. In this process of frame (re)creation, Behzad demonstrated traits of abductive reasoning (see § 2.4.2; see also Kolko, 2010a, 2010b). Particularly the use of the Value Network Mapping Tool showed how this logic works in practice. With the tool Behzad was able to illuminate the paradoxes of the given design situation and animate its resolution. It offered senior decision makers, as well as partners from the Service Design Network (see figure 2), new frames on the situation.

Third, it seems, that especially the physicality of the Value Network Mapping tool stimulated participants to take a new perspective on their business ecosystem. Taking a different perspective acts as an incentive for sensemaking. See for example the response of Björn or Gerard-V at the end of the session. Starbuck and Milliken (1988) mark this activity of "placing stimuli into a framework" (p. 52) as central for sensemaking. Evidently, the embodiment of the design paradoxes supported participants in taking new perspectives. Shifting their perspective, stimulated participants to identify discontinuities in their business environment, which as a consequence prompts sensemaking (see Weick, 1995).

Additionally, observations show that the conversations echo Weick's et al. (2005) sensemaking process fairly precise. Initially the toolkit helped participants develop an understanding of "what's going on". It was observed in several occasions that at a certain moment in time one of the participants subsequently raised the question: "How?... How do we do it? What does the first step look like?" This question demonstrated the urge to enact, which accords with the second key question of sensemaking "What do I do next?" (see Weick, et al., 2005, p. 412; see also § 3.4.2.).

Fourth, with the support of the toolkit – and the diagrams in particular – senior decision makers were, after a meeting or session, able to share Behzad's vision with others (e.g. colleagues, peers, stakeholders). The diagrams served as vehicles to promote ideas; they helped senior decision makers repeat the story for building acceptance from internal and external stakeholders. Consequently, it stimulated and facilitated these stakeholders to become ambassadors themselves (see how Martin-K and Gerard-B activated other organizational members). It seems crucial that the tools, in terms of sensegiving (see § 3.5.1), help senior decision makers accomplish the "job to be done" (see Christensen, Anthony, Berstell, & Nitterhouse, 2007). It was striking to see how Behzad's story and the diagrams traversed through the organization of Bussum.

In sum, in achieving its general aim the toolkit fulfilled several roles, serving a variety of purposes: it facilitates communication, supports

frame creation, initiates sensemaking, develops understanding and stimulates sensegiving. This apparently does not only increase proximity between strategic designers and senior decision makers. Moreover once senior decision makers succeed in their sensegiving attempts, they amplify the proximity between strategic designers and other organizational members as well. Figure 59 portrays these interactions of strategic meaning making across strategic designers, senior decision makers, other organizational members and their business environment. It extends the conceptual model presented in chapter 4 (see figure 12).

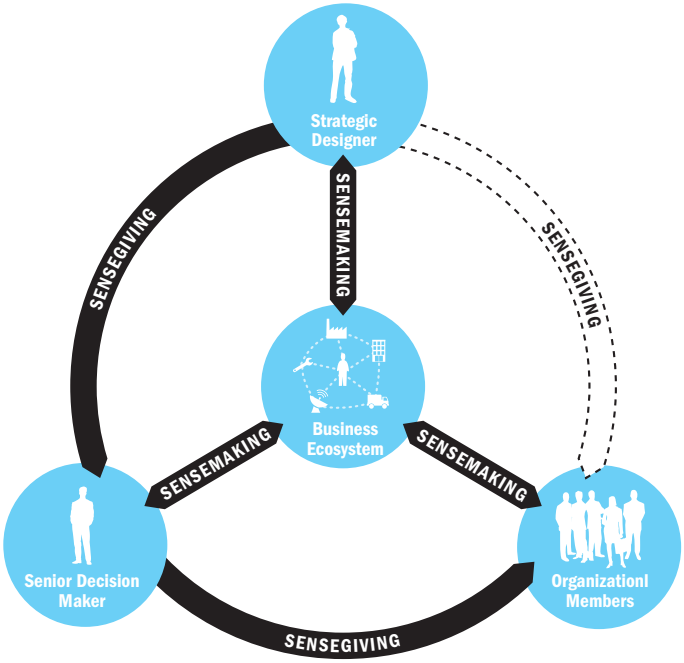

Figure 59: The toolkit stimulates and supports a variety of interactions between strategic designers, seniors decision makers, other organizational members and their business environment, augmenting strategic meaning-making processes like sensemaking and sensegiving.

7.2 Three dimensions for analysis

The above discussion and the results point out some specific qualities of the toolkit that stimulate participants to actively engage with the material, discuss new perspectives, grasp the underlying principles of Behzad's proposition and share their insights with others. Three qualities are paramount in achieving this; they are situated in the cognitive, physical and socio-material dimension (see figure 60).

The first quality involves the metaphorical nature of the materials and encompasses the cognitive realm. This is of course not a surprise, given the fact that the notion of metaphor is the key design guideline of the toolkit (see § 4.2). It is however, a specific class of metaphor, termed "analogy", that allowed participants to draw similarities between two systems. The second quality concerns the embodiment of metaphors and mental models. The physicality of the tools and tangibility of the materials seemed to augment communication, foster par-

ticipation and stimulate reflection among participants. The third quality is labeled as "boundary objects". It relates to the interplay between the cognitive and physical dimension situated in the social realm, as such it encompasses the socio-material dimension. In this dimension artifacts acted as boundary objects allowing participants to cross their network boundaries. Such artifacts enable heterogeneous network actors to establish a shared understanding and language.

The cognitive, physical and socio-material dimension serve as a lens through which the use of the toolkit and the interactions between actors are analyzed. Each dimension and their corresponding qualities will be elaborated upon in more detail below.

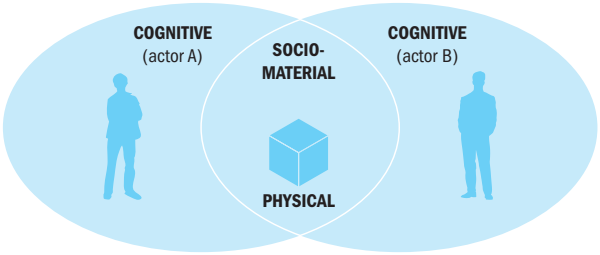

Figure 60: Cognitive, physical and socio-cognitive dimensions constitute a framework for the analysis of the research findings and provide guidance for extracting principles.

7.2.1 Cognitive dimension: analogy

Various classes of similarity fall under the label *metaphor* (see Gentner, 1983, p. 161; Gentner, Bowdle, Wolff & Boronat, 2001; Vosniadou, 1989; see also figure 61). One of particular concern for the current work is "analogy". However, no clear distinction is made in the literature study between metaphors and analogies (see § 3.5). Although analogy and metaphor share a variety of meanings, they are also partly incompatible (Schön, 1963, p. 35). Both notions express some sort of similarity in comparison processes and for that reason are often used interchangeably; they are nevertheless not the same.

Metaphors pursue a semantic change, by "giving a thing a name that belongs to something else" (Schön, 1963, p. 40). For example, a pedestrian crossing, marked with alternating black and white stripes on the pavement, is called a *zebra crossing*, as it resembles the patterned skin of a Zebra. Such resemblance constitutes a "mere-appearance match".

Analogies on the other hand, are in a sense the opposite of mere-appearance matches. Analogies indicate a similarity of relations, and little attribute similarity (Gentner & Markman, 1983, p. 48; Schön, 1963, p. 35). Thus, the strength of an analogical match depends on the degree of structural overlap, not its featural overlap[134] (Gentner, 1983).

Analogies are mappings, just like metaphors (see figure 10), between two domains. Yet, analogies concern in particular structure mappings between two systems[135], which allows people to transfer

[134] More precisely, the strength of the analogical match is determined by three constraints: (1) structural consistency, the systems' structures must show resemblances in connectivity; (2) relational focus, relations are promoted over features; (3) systematicity, both systems must be of the same order (Gentner & Markman, 1997).

[135] Gentner and Gentner (1983) give a classic example of analogies used in teaching physics. To explain the principles of electric current: electrical wires are presented as analogues to water pipes, to explain the concept of electrons, being analogues to water.

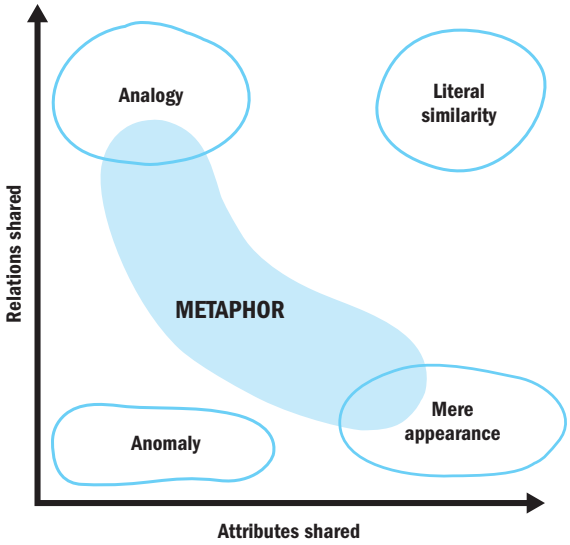

Figure 61: Classes of similarities (adapted from Gentner & Markman, 1997; see also Gentner, 1989).

knowledge from comparable systems (i.e. base domain) to the given problem space (i.e. target domain) (Gentner & Gentner, 1983). The structure-mapping theory posits that the relations among system objects are mapped from one domain into another, rather than mapping the system's attributes or its features[136] (Gentner & Markman, 1997; Gentner, 1983; Vosniadou, 1989). To put it briefly: "Common relations are essential to analogy; common objects are not" (Gentner & Markman, 1997, p. 46). A carefully selected analogical match may therefore act as a powerful vehicle for learning and may have profound effects on people's understanding of complex systems (Gentner & Gentner, 1983; Genter & Landers, 1985).

[136] For example, a flower and sun share similarity in object attributes, whereas a solar system and an atom share similarity in structure. To explain the working of an atom it would be sensible to use the solar system as a base concept, but it would be senseless to draw an analogy with a flower.

Consequently, for senior decision makers analogical reasoning serves several purposes. First, analogical reasoning helps in situations where deductive reasoning fails. Strategy making usually entails uncertainty, to deal with such situations analogical reasoning helps senior decision makers to transfer knowledge from past lessons or comparable cases[137] to the actual problem space (Ball & Christensen, 2009; Courtney, Lovallo & Clarke, 2013; Gavetti, Levinthal & Rivkin, 2005). Second, it promotes new ways of interpreting situations and draw inferences from mental simulation (Ball & Christensen, 2009; Gentner & Markman, 1997, see § 3.3.6). As such it helps strategic decision makers abstracting from existing frames and develop new ones (Paton & Dorst, 2010, 2011).

[137] See approaches like Case Based Reasoning that help senior decision makers to learn from comparable cases through analogical reasoning (see e.g. Kolodner, 1992)

The studies illustrate how metaphors with mere appearance attributes may initially served as bridges allowing heterogeneous actors to communicate (see e.g. excerpt 1). In subsequent communications they

served as reference points; see for example Martin-K's comment: *"Ah, there are the waves again"*, when referring to the ripple effect; its meaning needed no further explanation.

The use of analogies, in contrast to mere-appearance metaphors, is more pervasive. Many observations illustrate how analogies are expressed through different means of communication: diagrams, tangibles and most prominently verbal communication. In meetings or sessions, the diagrams and tangibles stimulated discussions and reflections as natural conversations. The following three situations illustrate how analogies were expressed through (1) verbal, (2) diagrammatic and (3) tangible means.

(1) Verbal

The studies show how Behzad and participants frequently employed analogies in their conversational interactions. These analogies were conveyed as linguistic artifacts such as examples of comparable cases and narratives of personal experiences. For example, during the HZCP session Behzad described several illustrative cases to clarify the underlying principles of social innovation. By explaining these cases he attempted, by using an existing company (e.g. Hewlett Packard) as a base domain, to illuminate the underlying structure of architectural innovation. This category of innovation focuses on the reconfiguration of the architecture (i.e. structure) of a system, not by altering its components (see Henderson & Clark, 1990). Although these explanations were not supported with diagrams or tangible artifacts, participants were able to grasp the underlying structure of the comparable cases easily. Drawing analogies with such examples allows senior decision makers to take a new perspective on their situation; it helps them to engage with complexity (Battram, 1998, p.56; Courtney, et al., 2013). Moreover, the session in Bussum, as well as the session with the C2I Network, show how participants also actively provided analogues example cases, or referred to personal experience. With these efforts participants aimed to probe for common ground and build a framework of shared references (i.e. example cases).

(2) Diagrammatic

The Value Canvas diagram represents a structure of cause and effect. As such its base concept refers to a natural phenomena; whereas its target concept, an interactive system of value mechanisms, is essentially abstract. The Value Canvas diagram was used in one-on-one conversations, group meetings and sessions. Observations show that the Value Canvas diagram seemed effective in conjunction with the Value Network Mapping tool. Especially at the end of a session, it triggered

new understanding when deployed as a tool for reflection that supports the conceptualization of the underlying value system. The Value Canvas diagram seemed helpful in mapping the dynamics and structure of the Value Network Mapping tool to the actual organization of the participants. But also without the use of the Value Network Mapping tool it seemed that diagrams performed effectively in mapping future states to current states (see e.g. §6.4.1, Achmea).

(3) Tangibles

In addition to the previous paragraph, for the workshops the Value Network Mapping Tool was used to represent intricate structures of cause and effect and as such animate emerging value constellations (see for example the C2I Network session). The observable stakeholder network of a restaurant represents the base concept. Its underlying target concepts involve value constellations and social networks demonstrating the strength of weak ties. These weak ties materialize with the use of the Value Network Mapping tool. It allows participants to draw analogies with comparable cases, just like Björn did in the session. The enactment of the social network as performed for HZCP shows similar qualities.

One of the qualities of tangible representations, as well as the diagrammatic representations, builds on the capacity to preserve explicit information about relations between entities and spatial organization. In that sense diagrams and tangibles have, in their permanence, an advantage over spoken word (Larkin & Simon, 1987). Moreover, pictorial and tangible representations seem to augment the representation of some state of affairs that go beyond the capacity to verbalize it[138] (Rickheit, & Sichelschmidt, 1999, p. 27). Additionally, in conjunction, sentential information and diagrammatic information seem to enhance mental model development, especially when it concerns highly complex and uncertain situations (Glenberg & Langston, 1992; Mengis & Eppler, 2006). This concurs with the analogical characteristics of the material, which seems to stimulate analogical reasoning through interpreting physical or diagrammatic analogs (see also Heracleous & Jacobs, 2011, p. 90).

But visualizations can also have disadvantages. For example, they may be ambiguous because of over-simplification or over-abstraction, information may be encoded in an esoteric visual language, they may need high levels of visual literacy for interpretation, require familiarity with the subject, or can be costly to create in terms of time and effort (Bresciani & Eppler, 2008). Nevertheless, reality is always more complex than the ways in which it can be represented (Bürgi & Roos, 2003).

[138] This statement is usually expressed as: "A picture is worth a thousand words".

In general the observations uncover a process of social meaning-making that coheres with Bethanis' (2006) transformation process. In this process Bethanis (2006) identifies three types of metaphors: root, bridge and generative. Root metaphors represent existing assumptions and concepts that may serve as base concepts. Bridging metaphors provide a shared language to arrive at a mutual understanding in conversations. They are therefore particularly useful in the early stages of client-consultant relationships. Generative metaphors intend to spark new understanding and create new meaning (see § 3.5). Potentially this may drive organizational change. Observations show how metaphors initially serve as bridges and subsequently progress towards generative metaphors (i.e. analogies) that foster a more structural and systemic understanding of Behzad's proposition. Various authors describe similar patterns (see Heracleous & Jacobs, 2011, p. 98; Nonaka, 1991, p. 101; see also Tsoukas, 1991).

Given the dominant role of metaphor in language and the dominant role of analogy in reasoning (Schön, 1963, p. 44), the above discussion helps construct the claim that on one hand metaphors establish a shared language and as such develop the initial framework for shared understanding. Analogies on the other hand, provide the impetus to create new meaning and as such intensify the common ground.

7.2.2 Physical dimension: embodiment

The diagrammatic tools and the Value Network Mapping Tool are essentially both embodiments of metaphors. The discussion in § 7.1 suggests that embodiment of metaphors contributes to the conversations and session in several ways: it (1) stimulates the surfacing and exchange of mental models, allows participant to (2) take a novel perspectives on a situation, (3) directs attention towards specific issues, which (4) fosters a natural reflective dialogue and discussion. These activities allow senior decision makers to (5) attribute meaning to their reflections (i.e. sensemaking) and (6) enhance sensegiving when disseminating their ideas and insights among other organizational members. Embodiment seemingly leverages the interplay between sensemaking and sensegiving.

(1) Surfacing and exchanging mental models

Observations, during the meetings and sessions, show how participants vividly used gestures to augment their verbal utterances. Apparently, the physicality of the tools – both tangible objects and diagrams – enticed participants to engage with the material and embody their thinking. For example, Behzad and participants pointed at specific parts of the diagram to establish focus on particular issues or they

animated transitions in organizations and causality in processes by waving their hands (see figure 42). These gestures indicate that the participants were running a simulation (Stephens & Clement, 2007). In fact such spontaneous hand movements are embodied instances of mental models (Alibali, Bassok, Solomon, Syc, & Goldin-Meadow, 1999; Schwartz & Black, 1995).

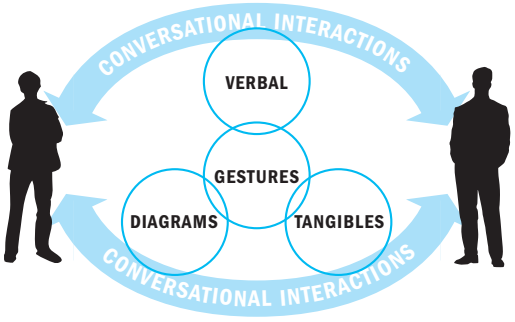

Figure 62: In conversational interactions gestures play a pivotal role augmenting other modalities (i.e. verbal, diagrammatic and tangible).

Gestures play – in conjunction with diagrams, tangibles and verbal utterances – a pivotal role in conversational interactions (see figure 62). Gestures serve, for the gesturer as well as the recipients of the gestures, a variety of means. For example, gestures help people organize and express spatial information to complement their verbalizations (Alibali, Kita, & Young, 1999), convey thoughts that are not easily verbalized or not present in words at all (Klemmer, Hartmann, & Takayama, 2006), reduce cognitive load (Goldin-Meadow, Nusbaum, Kelly, & Wagner, 2001), simulate action (Hostetter & Alibali, 2008), create or modulate meaning (Tversky, Jamalian, Giardino, Kang, & Kessell, 2013) and help people learn (Goldin-Meadow & Wagner, 2005) to name just a few. In general, gestures serve both as *thinking tools* for speakers, as well as *communication tools* for listeners (Goldin-Meadow, 1999; Tversky, et al., 2013). As such gestures may substitute speech, accompany speech, or embody unspoken thoughts (Goldin-Meadow, 1999); they can thus be part of language or can be language itself (Goldin-Meadow, 2006). In their use gestures are the embodiment of cognition, language, and mental imagery (Heiser, Tversky, & Silverman, 2004; Hostetter & Alibali, 2008).

Even so, gestures have an added dimension when used in conjunction with visualizations (e.g. diagrams, sketches, etc.), tangibles (e.g. mappings) and verbal utterances. Bürgi and Roos (2003) suggest that such a multimodal composite (verbal, visual, tangible and haptic mode) of representations constitute a powerful mix that initiates and supports conversational interactions generating understanding (see

e.g. figure 42). Gestures and visualizations complement one another so that in tandem they enhance communication, making the transmission of information much more effective (Heiser, et al., 2004; Kirsh, 2010; Tversky, 2007; Tversky, et al., 2013). Gestures and visualizations are complementary. Visualizations (i.e. diagrams) usually result from planned action, their appearance is inherently static. Gestures on the other hand are situated and inherently dynamic (Tversky, 2007; Tversky, et al., 2013). Visualizations are especially effective for conveying structure (e.g. the parts and relations of a system), whereas gestures can animate its mechanisms and performance (Tversky, 2007). Briefly put: "visualizations provide form and gestures transform" (Tversky, 2007).

Thus, gestures enable participants to effectively convey their mental models, augment their thinking and articulate the unspoken. The combination of gestures, visuals and tangibles establishes focus, promotes interactivity, helps to construct shared meaning, stimulates collaboration and improves comprehension and memory (see also Heiser, et al., 2004). Such multimodal renderings of mental models serve as resources for communicating and meaning-making, they are essential to the cognitive and social realm of human activities (Ivarsson, Linderoth, & Säljö, 2009). External representations, including gestures, visuals and tangibles, enhance individual cognitive capabilities and group cognition; they reduce cognitive costs and coordinate thought processes (Kirsh, 2010).

(2) Perspective taking

One of the participants (Gerard-V) remarked at the end the Bussum session: *"It allows me to walk around the set up and take a different view of the situation."* Evidently, the spatial configuration of the Value Network Mapping Tool acts as a large-scale map that allows participants to take different perspectives on the given strategic situation. Note that the Value Network Mapping Tool primarily expressed Behzad's mental model, in essence it was his "cognitive map"[139] (see Ambrosini & Bowman, 2001, 2002, p. 21; Eden, 1988; Pinch, Sunley, & Macmillen, 2010). According to Eden (1988) and Ivarsson, et al. (2009), such maps are effective instruments that help participants in making sense of the situation that is being discussed. Regardless of the fact that these maps are often simplified representations of the actual system. Moreover, it may be argued that simplification enhances the effectiveness of cognitive maps as it allows participant to quickly make sense of the representation (see § 3.3.5).

It is perhaps for this reason that mapping is considered as an essential technique in strategy making (see Huff, 1990; Huff & Jenkins, 2002; Kaplan & Norton, 2000; Wilson & Cummings, 2003). This sub-

[139] As a matter of fact, it is a "causal map", which is a specific type of cognitive map (Ambrosini & Bowman, 2001, 2002, p. 22; Huff, 1990, p. 28). Goodman (1978) refers to such maps as "renderings". In his view renderings are "all the ways of making and presenting worlds – in scientific theories, works of arts and versions of all sorts" (Goodman, 1978, p. 109). These renderings may go beyond language and include metaphorical, pictorial or musical expressions. For brevity and not to elaborate too much on definitions, the notion of cognitive map is used.

ject received, however, little attention in the literature study (except for Weick's story on the lost regiment, see § 3.4.2).

Strategy maps have specific qualities: they make conceptual entities visible and assumptions explicit (Huff & Jenkins, 2002, p. 1; Christensen, 1997), help to perceive causal relations between intervention and outcome (Kaplan & Norton, 2000; Montibeller & Belton, 2006), plot linkages between strategic actors and elements (Diana, Pacenti, & Tassi, 2009), stimulate enactment (Weick, 1990; Wilson & Cummings, 2003) and, in line with Gerard-V's remark, offer novel perspectives by providing a bird's eye view on the situation (Buur & Mitchel, 2011; Heracleous & Jacobs, 2008a, 2011).

Notably, this bird's eye view provided participants with an overall representation of the business ecosystem. In this sense, the Value Network Mapping Tool established a mediated relation between the participant (i.e. user of the tool) and the world. Through the map, which operates in fact as a representation technology (see Ivarsson, Schoultz, & Säljö, 2002), participants interpret the world[140] as it is (i.e. current state) or how it could be (i.e. future state). In terms of human-technology-world relationships[141], the mapping tool establishes, what Ihde (1990) refers to as a "hermeneutic relation" (see also Van den Eede, 2010; Verbeek, 2005). In this relation, technology embodies the world and through this technology the world is read and interpreted by the user (see figure 63). So perception of the real world is constituted by interpretation of its representation (Verbeek, 2008, p. 389).

[140] In general, by world is meant reality, not just the planet earth. This reality can be physical (i.e. products, buildings) or socially constructed (i.e. organizations, value networks).

[141] Ihde (1990) discerns four types of such relations: embodied, hermeneutic, alterity and background relation.

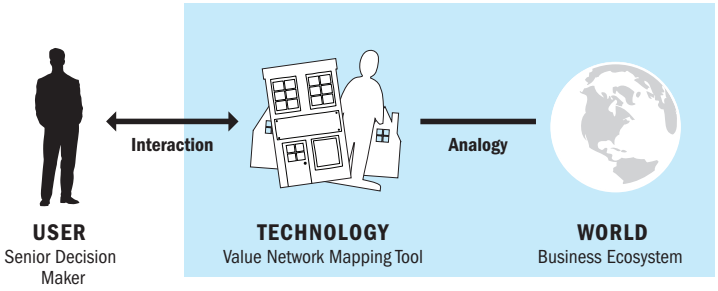

Figure 63: Hermeneutic relations, people make sense of reality through technology.

(3) Directing attention

Observations during the sessions illustrate how the tangible qualities of the toolkit directed attention towards the subject of the conversation. The diagrams, for example, were the centerpiece of the conversational interaction between Behzad and the program directors (see figure 42). The diagrams supported Behzad in emphasizing salient details of his proposition. The Value Network Mapping Tools shows similar qualities. All studies show how participants used the attributes as rhetorical devices to prompt for attention (see figures 39, 46 and 53). Participants used such artifacts to animate their ideas, reveal their hidden agen-

das, or present their views. Sometimes even with a slight touch of drama. Actually, participants used the tools as an extension of their thinking and of themselves (see also Kirsh, 2010). They acted in this sense through the material rather than on it (see also Klemmer, et al., 2006).

The way in which the tools – the diagrams and tangibles – were used, is similar to what Conklin (2006, 2009) termed as "shared display". In his work, Conklin (2006, 2009) argues that building a visual representation of the conversation enhances the group's ability to focus and make sense of what they are doing; this generates shared understanding. In addition, Mengis and Eppler (2006) suggest that shared displays stimulate and support participants to actively contribute to the conversation, resolve tensions and obtain the big picture. These activities help participants establish a common ground, as the authors maintain.

Note that the work of Conklin (2006, 2009), as well as Mengis and Eppler (2006), involves tools for computer supported cooperative work (i.e. CSCW). The phenomena they refer to as shared displays are computer projections instead of printed diagrams and tangible artifacts. However, as already noticed in the evaluation (see § 6.5.1), computer projections have some disadvantages. According to Tufte (2006), presentation tools, like PowerPoint, inhibit the interplay between presenter and audience. PowerPoint is presenter-oriented, and not content- or audience-oriented. For that reason the diagrams were printed on paper and mounted on foam boards – digital presentations tools were hardly used during meetings and sessions. Observations clearly showed how the tangibility of the tools put the subject of the meeting at the focal point of the conversation, stimulating discussion between presenter and audience. As a matter of fact, the conversation took place *through* the artifacts (see Doyle & Sims, 2002, p. 78). Visibility evidently facilitates coordination (see also Blomkvist & Segelström, 2013; Klemmer, et al., 2006).

(4) Supporting reflective dialogue

From the observations it is evident that the diagrams, as well as the tangible attributes of the toolkit, foster rich discussions and reflective dialogues. In particular the open-ended quality of the Value Network Mapping Tool stimulated participants to add or reposition attributes, assign meaning to them (e.g. "Martin B.V.", see figure 55) and discuss the implications of the altered set up. It was also observed in Behzad's active engagement with participants through continuous questioning: what is going on here? What are we looking at? Such dialogical mode of interaction is, according to Paton and Dorst (2010, 2011) key to develop shared understanding.

Moreover, in design practice, provisional sketches[142] and prototypes are often the centerpiece of vivid discussions, stimulating reflection

[142] Van der Lugt (2005, p. 105) and Ferguson (1992. p. 97) label such sketches as "talking sketches".

on the given design situation (Wikström & Jackson, 2012; Hanington, 2006; Schön, 1983). It helps designers explore options, deal with complexity and develop a notion of what could be (Houde & Hill, 1997; Jones, 1970/1992, p. 23; McKim, 1972). In a similar fashion, visualizations and tangibles are used in strategy development and management of innovation (see Bürgi & Roos, 2003; Eppler, & Platts, 2009; Heracleous & Jacobs, 2008a, 2008b, 2011; Jarzabkowski, Spee, & Smets, 2013; Wikström & Jackson, 2012). In these practices diagrams and tangibles articulate mental models (Wikström & Jackson, 2012; Heracleous & Jacobs, 2011).

Making mental models explicit is crucial for developing shared understanding (Kim, 1993). The tacit may become explicit through figurative language (Nonaka, 1991, p. 99) or embodiment (Heracleous & Jacobs, 2008a, 2008b, 2011). Embodiment stimulates the surfacing of mental models by discussion and reflective dialogue (Wikström & Jackson, 2012; Heracleous & Jacobs, 2008a, 2008b, 2011; see e.g. Barry, 1994). It is, according to Jacobs and Heracleous (2005), specifically the reflective dialogue that motivates conceptual change and that shapes mental models. Such dialogues enable strategic decision makers to critically reflect on the underlying assumptions of their existing strategy paradigms. Moreover, it is the discursive effort that allows them to socially construct meaning (Heracleous & Jacobs, 2011, p. 102; Jacobs & Heracleous, 2005). A reflective dialogue thus serves two purposes, a diagnostic purpose to critically review existing mental models and a generative purpose to shape emergent mental models[143] (see figure 64).

[143] According to Battram (1998, p. 59) dialogues help explore the possibility space; in this respect they shape emergent mental models.

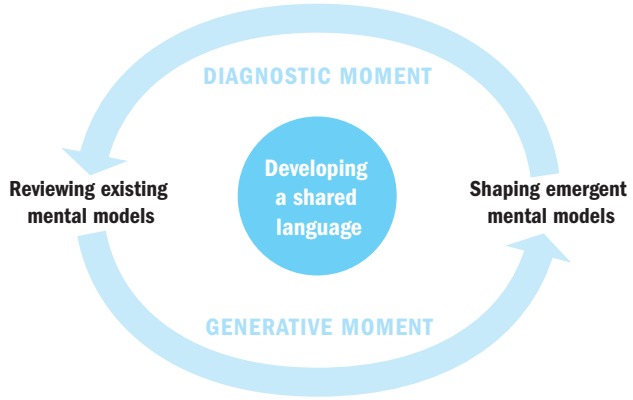

Figure 64: The dual nature of reflective conversation(adapted from Jacobs & Heracleous, 2005).

The recursive process of reviewing and shaping provides a basis for developing a shared language (Heracleous & Jacobs, 2011, p. 102; Jacobs & Heracleous, 2005). Shared language is essential in communicating and co-creating new frames, as Paton and Dorst (2010, 2011) maintain.

.(5) Sensemaking

Sensemaking is not easy to observe, it does not manifest itself in a concrete form. Rather it is a black box. Stimuli that trigger some cognitive processes may result in some output, behavior, activities or utterances. Björn's moment of contemplation clearly indicates how the Value Network Mapping Tool deviated from his representation and stimulated sensemaking. It was essentially the map that prompted sensemaking. This is in line with the work of Weick (1990, p. 6) who points out to the similarities of mapmaking and sensemaking. As Weick (1990) states, both processes involve a search for explanation. Furthermore, observations indicate that the open-ended quality of the mapping tool allowed participants to interpret the map at the same time as they were authoring it. This is consistent with the work of Heracleous and Jacobs (2008a, 2011). Such simultaneous interpreting and authoring in concert with social meaning-making is essential for sensemaking (Weick, 1995, p. 8; see also § 3.4.1). Some tools, such as tangibles support such processes; they are apparently "things-to-think-with" (Brandt, 2007).

It seems, however, that embodiment in sensemaking research is largely ignored (Cunliffe & Coupland, 2012; Maitlis & Sonenshein, 2010). The prime focus of sensemaking research is on cognitive activities (Gärtner, 2011), regardless of the fact that the human body appears to be a crucial instrument in sensemaking (Maitlis & Sonenshein, 2010). Nevertheless, interacting with the physical world can be seen as an innate sensemaking mechanism that helps us understand the world (Klemmer, et al., 2006). Yet, a steadily growing number of scholars is shifting their attention to the material practices that support conversational interaction in support of collective sensemaking (Stigliani & Ravasi, 2012). Their research posits that physical artifacts are effective devices for senior decision makers that support them in their joint efforts to make sense of their strategic situation (Bürgi & Roos, 2003; Doyle & Sims, 2002; Eden, 1988; Heinemann, et al., 2011; Heracleous & Jacobs, 2008a, 2008b, 2011; Jacobs & Heracleous, 2004, p. 12).

(6) Enhance sensegiving

One of the most striking observations was how Behzad's vision traversed through the organization of Bussum as a meme (see § 4.2). The physicality evidently made the tools "transparent in use"[144] (Van den Eede, 2010). The diagrams on board are easily retrieved from behind a desk supporting small group meetings or hallway conversations[145]. Digital files, however, need to be retrieved from a computer system (e.g. intranet, cloud service, or mail inbox), which usually impedes the flow of communication. Moreover, the physicality allows people to easily pass specific diagrams on to other stakeholders. In this sense, tangible

[144] Heidegger (1962, p. 98) refers to this principle as "ready-to-hand".

[145] See Dixon (1996, 1997) who investigated the role of hallway conversations in organizational learning.

artifacts mediate and enhance strategic sensegiving. Yet, in research the role of tangible artifacts in association with sensegiving has received little attention.

For senior decision makers, however, it is of utmost importance to achieve stakeholder buy-in to bring their strategic vision to life (Fiss & Zajac, 2006; Stevens, 2012, 2013). Moreover, sharing their frames, in terms of a *captivating vision* provides "a symbolic foundation for stakeholders to develop an alternative interpretive scheme" (Gioia & Chittipeddi, 1991, p. 446). Thus, in this sense, metaphors act as symbolic frames that allow senior decision makers to articulate their (new) version of reality and disseminate their strategic vision to the organization's constituent members (see Fiss & Zajac, 2006; Stevens, 2012, 2013). Seemingly, the embodiment of these symbols enhances strategic sensegiving (see Stevens, 2012, 2013; Gioia & Chittipeddi, 1991, p. 434).

7.2.3 Socio-material dimension: boundary objects

As illustrated in the above discussion, it appears that the value of these materialized symbols is in their capacity to capture tacit beliefs, allow knowledge transfers between different domains, help develop a shared language and transform mental models in order to establish shared cognition. One such class of artifacts[146] is generally referred to as "boundary objects" (Stevens, 2012, 2013; see also Carlile, 2004; Akkerman & Bakker, 2011). Many authors have recognized the importance of boundary objects in cross-disciplinary collaboration (e.g. Akkerman & Bakker, 2011; Nicolini, Mengis, & Swan, 2012; Star, 2010; Star & Griesemer, 1989) and innovation (e.g. Carlile, 2002, 2004; Henze, et al., 2013; Koskinen, 2005; Spee & Jarzabkowski, 2009; Stevens, 2012, 2013). In the latter, boundary objects are often conceptually linked with strategy tools (see e.g. Spee & Jarzabkowski, 2009; Stenfors, Tanner, & Haapalinna, 2004)

[146] The term "artifacts" is used here to refer to a product of human action that is intentionally made to serve a purpose (e.g. solving problems, satisfying needs) and that can be perceived by the senses (Gagliardi, 1990, p. 3). It thus encompasses a very large category of "things" that may include physical as well as social constructs (Pratt & Rafaeli, 2006). See Rafaeli and Pratt (2006) for an elaborate study of artifacts in organizational practice.

One of the prime qualities of boundary objects is that such artifacts inhabit intersecting domains or practices (Star & Griesemer, 1989). In the current work it concerns the interaction between the Service Organization Network and the Service Design Network (see figure 2). But also within these networks, artifacts allow actors to cross their disciplinary boundaries (e.g. communication designers collaborating with strategic designers). Thus, socially constructing meaning among actors who hold different values, objectives, assumptions, understandings or knowledge frameworks is – in line with the objectives of the current work – at the heart of boundary crossing.

In terms of boundary crossing, a boundary is defined as a socio-cultural difference causing discontinuity in action or interaction (Akkerman & Bakker, 2011). It denotes a shared space where "here and there" (Star,

2010) or "us and them" (Wenger, 2000) converge. In that sense, boundary crossing refers to the interactions[147] between actors across domains (Akkerman & Bakker, 2011). Through these activities objects turn into boundary objects when they are meaningfully and usefully incorporated into the practices of the collaborating actors (Star, 2010; Star & Griesemer, 1989; Spee & Jarzabkowski, 2009). As such, they may be abstract or concrete, and can be physical, virtual or social (Eckert & Boujut, 2003; Pratt & Rafaeli, 2006; Star & Griesemer, 1989). In practice boundary objects may take the appearance[148] of: tangible objects, forms, repositories, (cognitive) maps, images, sketches, models, prototypes, documents, contracts, or vocabularies (see Carlile, 2002, 2004; Eckert & Boujut, 2003; Ivarsson, et al., 2002, p. 96; Koskinen, 2005; Koskinen & Mäkinen, 2009; Star & Griesemer, 1989; Stevens, 2012, 2013; Stompff, et al., 2011).

[147] For example "boundary-spanning activities" (see Nicolini, et al., 2012, p. 616)

[148] See Carlile (2002, p. 449) for examples.

At the boundary, these artifacts serve an array of purposes. Generally, in their application, boundary objects are means to an end (Carlile, 2006). They bridge intersecting domains by satisfying the informational needs and work requirements of two practices (Star, 2010; Star & Griesemer, 1989). In that sense they serve as mediating artifacts that coordinate the interaction between incongruent social realms (Akkerman & Bakker, 2011; Nicolini, et al., 2012). Stated differently: boundary objects function as the "tuning forks" orchestrating the uncommon ground among disparate practices (Nevejan, 2007, p. 142).

The studies in chapter 6 show how the tools operated in their role as boundary objects. As boundary objects the tools (1) served a variety of unforeseen purposes (2) stimulated reflective dialogue, (3) fostered strategic sensemaking and sensegiving, and (4) coordinated the alignment of mental models. Below follows an elaborate explanation of the role of the tools in boundary interactions, much of it accords with the discussion in the previous section (see § 7.2.2).

(1) Serving multiple purposes

A key feature of boundary objects is that they are open and malleable (Nicolini, et al., 2012). This means that they are plastic enough to adapt to local use, yet robust enough to maintain a common identity across domains (Star & Griesemer, 1989). Malleability allows participants to create their own story (see excerpt 6). Moreover, different actors may use the same tool not only in different ways but also for different reasons (Spee & Jarzabkowski, 2009), see for example how the tools allowed senior decision makers to switch roles between sensemaker and sensegiver (see figure 59). Therefore, they are weakly structured in common use, and become strongly structured when knowledge is contextualized to the task at hand (Star & Griesemer, 1989). For this reason artifacts

should be transparent, simple to use and open-ended to serve a variety of unforeseen purposes (Spee & Jarzabkowski, 2009).

(2) Stimulating reflective dialogue

The studies show that artifacts stimulate vivid conversational interactions and reflection. Pratt and Rafaeli (2006, p. 286) have labeled such boundary objects as "talking artifacts". Moreover, in conversational interactions boundary objects stimulate perspective taking and perspective making (Boland & Tenkasi, 1995). Note, in such activities boundary objects may not only enable interaction but may also reveal boundaries between actors (Spee & Jarzabkowski, 2009). In particular when actors encounter friction at the boundaries, they may be stimulated to reflect upon the situation (Akkerman & Bakker, 2011). Thus, in their role as talking artifacts, boundary objects foster reflective dialogue that may bring actors together (Akkerman & Bakker, 2011; Pratt & Rafaeli, 2006).

(3) Fostering sensemaking and sensegiving

Artifacts, particularly symbolic artifacts, seem to play a prominent role in strategic sensemaking and sensegiving (Gioia & Chittipeddi, 1991, p. 434; Pratt & Rafaeli, 2006, p. 284; Stevens, 2012, 2013). Stevens (2012, 2013) claims that such artifacts are effective in strategic sensemaking and sensegiving. In his work, Stevens concentrates in particular on the role and contribution of designers in strategy making. In this context Stevens identifies a significant role for boundary objects as mediating artifacts[149] between designers and senior decision makers. In the interaction between these actors, boundary objects stimulate and support strategic sensemaking and sensegiving, as Stevens (2012, 2013) concludes. This is in line with the observations in Bussum, where boundary objects allowed senior decision makers (e.g. Martin-K and Gerard-B) to switch roles between sensemaker and sensegiver (see figure 59; see also Pratt & Rafaeli, 2006, p. 284).

[149] These artifacts, created by designers, include representations of complex or intangible systems (e.g. value networks, ecosystems), presentations of qualitative research findings or proposals for new products or services (Stevens, 2013).

(4) Coordinating cognitive proximity

In terms of shared cognition, the interactions between designers and other actors illustrate how boundary objects, as tangibles or visual representations, provide a common language, coordinate shared meaning-making and create shared understanding (see Black, 2013; Blomkvist & Segelström, 2013; Carlile 2002, 2004; Nicolini, et al., 2012; Koskinen, 2005). Particularly metaphoric boundary objects seem effective as coordinating mechanisms for enhancing innovation capacity of participants; these observations correspond with the work of Koskinen (2005). Yet, it should be noted that boundary objects enable communication and collaboration, without requiring consensus[150] (Star, 2010).

[150] Disagreement is a form of understanding. It requires acknowledgement of opposing views.

This means that employing boundary objects in boundary interactions may increase cognitive proximity, while institutional proximity[151] remains unchanged.

In short, when the tools operate as boundary objects, they serve as coordinating artifacts that help actors from different domains to cross boundaries, align their mental models and as a consequence increase cognitive proximity.

[151] See Boschma (2005).

7.3 Summary

As outlined in the beginning of this chapter, the aim of this discussion is to extract guidelines, linkages and generalizations from the results reported in chapter 6. An analysis of the actual roles and purposes achieved by the toolkit uncovers a number of qualities that include: analogy, embodiment and boundary objects. These qualities encompass respectively the cognitive, physical and socio-material dimensions in cross network collaboration and communication. From the analysis a number of principles emerge that enhance the interaction between actors (i.e. strategic designers and senior decision makers, and senior decision makers and their organizational members) and their hermeneutic interaction with the world (i.e. business ecosystem). Table 4 summarizes these principles by mapping the linkages between dimensions and interactions, inferring possible effects in terms of shared language and understanding, mental model development and strategic action. These effects show the potential of the toolkit in helping heterogeneous network actors to establish a common ground and becoming more proximate. Consequently allowing senior decision makers to develop more accurate representations of their business environment.

Furthermore, the overview in table 4 includes principles that can be traced back to the design guidelines described in chapter 5, such as: embodiment, transferability (i.e. memetic), generative, open-endedness and causality. Additions in respect to the central notion of metaphors include analogical reasoning and the distinction between bridging and generative metaphors. However, from the overview the prominence of other principles becomes apparent, which indicates that the notion of metaphor is complemented with principles like multimodality, mapping[152] and malleability. These three principles seem fundamental for stimulating and facilitating activities like perspective taking and making, reflective conversational interactions, boundary crossing, strategic sensemaking and sensegiving. Consequently these activities promote the development and alignment of mental models in such a way that they help actors to establish a common ground

[152] This includes c oncepts like cognitive mapping as well as structure mapping.

interactions / dimensions			
COGNITIVE	**Bridging metaphors** Mere appearance metaphors bridge communication gaps by providing common terms. ↳ **Establishing shared language** The mapping tool demonstrates how abductive reasoning is used in practice to resolve design paradoxes. ↳ **Developing congruency in cognitive style**	**Generative metaphors/Analogies** Generative metaphors (i.e. analogies) offer new frames that spark new understanding. ↳ **Shaping mental models** Drawing analogies with comparable and recognizable cases allows senior decision makers to take a new perspective on the situation (i.e. reframing). ↳ **Shaping mental models**	**Memes** Both appearance and generative metaphors act as memes that serve as vehicles of new frames, allowing actors to efficiently and effectively instill their vision in the mind of other organizational members. ↳ **Initiating strategic action and organizational change**
PHYSICAL	**Shared display/Multimodality** Tangibles, diagrams and gestures (e.g. animating causality) stimulate the surfacing and sharing of mental models. ↳ **Developing shared understanding** Shared display (e.g. diagrams, tangible maps) help direct attention in conversational interactions. They stimulate reflective dialogue. ↳ **Developing shared language and understanding** Multimodality (verbal, tangible, diagrammatic and gestural) enables surfacing and exchange of mental models (e.g. by animating causality) and supports the coordination of group cognition. ↳ **Developing shared understanding**	**Shared display/Mapping** Mapping provides a bird's eye view fostering sensemaking. Mapping helps establish a mediated relation with reality. ↳ **Shaping mental models** Shared displays help obtain the big picture. E.g. embodiment of design paradoxes supports participants in taking new perspectives. ↳ **Shaping mental models** Open-endedness allows for concurrent interpreting and authoring stimulating sensemaking. ↳ **Shaping mental models**	**Transparency** The transparency in use of the material (e.g. diagrams) allows senior decision makers to get their job done in retelling the story and the propagating their vision. It enhances sensegiving. ↳ **Developing shared understanding**
SOCIO-MATERIAL	**Coordination** Boundary objects coordinate interactions across incongruent social realms and allow actors to cross boundaries. ↳ **Developing shared understanding** Boundary objects allow strategic sensemaking and sensegiving. ↳ **Developing shared understanding**	**Reflection** Perspective taking and making stimulates reflective dialogue. ↳ **Developing shared language and understanding** As talking artifacts, boundary objects foster reflective conversation that may prompt sensemaking questions. ↳ **Developing shared understanding**	**Malleability** Malleability or plasticity of boundary objects, particularly symbolic artifacts, allows actors to switch roles between sensemaker and sensegiver, increasing the effectiveness of strategic sensemaking and sensegiving. ↳ **Developing shared understanding**

Table 4: Overview of the principles that help actors to establish a common ground or develop more accurate representations of the business environment.

Chapter 8
Conclusion

This chapter aims to answer the key questions addressed in this thesis. How to support strategic designers in their interaction with senior decision makers? And how can strategic designers help senior decision makers to make sense of their business environment that is becoming increasingly unintelligible? In addition, the limitations of these conclusions are discussed. This chapter concludes with recommendations for designers, a word of advice for design education and suggestions for further research.

8.1 Answers to the main questions

As described in the introduction and portrayed in chapter 3, designers and senior decision makers inhabit disparate thought worlds. For PSS development these actors need a certain level of sharedness among their mental models to successfully collaborate and communicate. The challenge of this research was to get actors on speaking terms, increase cognitive proximity and establish a shared understanding. For strategic designers this shared understanding is necessary to prompt senior decision makers to make sense of discontinuities in their business environment and support them in developing new propositions.

The research set out with two questions: (1) how can (strategic) designers be supported in their interaction with senior decision makers to establish a common ground in terms of a shared language and shared understanding? And (2) how can strategic designers help senior decision makers reconceptualize their current business environment?

The principles presented in the previous chapter uncover two processes that form the answer to these key questions. The first process involves the alignment of mental models to create an overlap, it corresponds with the first question. The second process relates to the second question, it concerns the shaping or development of mental models to increase their accuracy. It should be noted that this second process can complement the first process: shaping may enhance mental model congruence and as a consequence increase cognitive proximity. Each process will be further explained below.

8.1.1 Alignment

In order to establish a common ground, actors need to align their mental models. The toolkit supports designers in two ways to achieve this.

First, symbolic artifacts (i.e. metaphors) help designers coordinate the alignment process; such mediating artifacts help bridge communication in initial interactions. They provide, for example, a shared language that supports actors to cross boundaries and communicate with actors from other networks, disciplines or domains.

Second, embodiment seems to stimulate and facilitate actors to explicate and exchange their mental models. Mapping, shared displays and especially multimodality boost such interactions; they help direct attention, focus conversations, animate causality and stimulate reflective dialogue. For example, observations show how the rich use of gestures augments thinking and talking, stimulating actors to render their thoughts that go beyond their capacity to verbalize them.

8.1.2 Shaping

Shaping mental models of external reality entails the creation of new perceptions and explanations. The toolkit stimulates and facilitates social meaning-making that promotes the reconceptualization or formation of new mental models. There are three key activities that enhance social and strategic meaning-making: (re)framing, sensemaking and reflective conversation.

The first activity involves (re)framing. (Re)framing stimulates senior decision makers to take a novel perspective on their business ecosystem, it helps them perceive reality in a different way. Such frames largely build on a specific class of metaphor termed analogies. Such analogies materialize in diagrams and in linguistic or symbolic artifacts, representing cases or systems that are comparable to the issue discussed. These frames are most effective when deployed in natural conversations. For example, actors use analogies to probe for common ground, spark new understanding and augment cognitive mapping.

A second activity concerns sensemaking. Sensemaking allows senior decision makers to attribute meaning to discontinuous peripheral signals or discrepant events. Designers may prompt sensemaking by actively putting stimuli into the framework of success models, causing discrepancies in representations. Such stimuli may include frames, like metaphors, diagrams, or the concurrent authoring and interpreting of tangible representations. For example, disruptive (re)configurations of the Value Network Mapping tool generates such discrepancies. It prompts senior decision makers to evaluate and correct their causal models.

The third activity involves reflective conversational interactions. Reflective conversations shift between two modes of discourse: diagnostic and generative. The diagnostic mode (i.e. questioning) aims to review existing mental models, the generative mode on the other hand

intends to shape mental models. The toolkit stimulates and facilitates such reflective conversational interactions; it makes these interactions vivid and engaging. For example, the spatial setup of the Value Network Mapping tool helps obtain the big picture and stimulates perspective taking and perspective making.

8.1.3 Additional remarks

However, in addition to these answers two complementary comments, which emerge from the studies, need to be made.

First, strategic thinking involves more than reconceptualizing just the external business environment; it also involves reconceptualizing the internal organization. Observations show how the toolkit stimulates senior decision makers to reflect on their current organization. Particularly the Innovation Mindsets diagram provides an effective frame helping senior decision makers perceive their organization through a different lens. This new view helps them reflect on their organizations' modus operandi and address internal innovation barriers.

Second, strategic sensemaking is a social process of meaning-making that reaches beyond the interaction between strategic designers and senior decision makers. Moreover, observations illustrate how senior decision makers involve other organizational members in their strategic meaning-making efforts. In these efforts they attempt to enhance their tentative mental models into more formal models. But more importantly, senior decision makers need other organizational members to bring their (new) strategic vision to life. In order to do so, senior decision makers need to instill their vision in the mind of other organizational members. In this respect, sensegiving enables senior decision makers to enhance organizational sensemaking and boost their organization's innovation capacity. Strategic sensegiving is intrinsically linked to strategic sensemaking. This implies for senior decision makers that the "job to be done" not only involves sensemaking, but also sensegiving. The plasticity of the tools allows them to switch roles between sensemaker and sensegiver and propagate their vision across other organizational members.

8.2 Limitations

It should be noted that the explorative nature of the current research has some limitations. There are a number of issues that may limit the relevance of the findings in this thesis.

First, it is important to place the findings in context. The studies presented in this thesis investigate Behzad's practice as a consultant for social innovation and public service innovation. The object of observation thus concerns the practice of only one strategic designer. During

the time of observation, Behzad was not involved in the design or development of product service systems with a distinct product component. It is believed, though, that the dynamics and complexity of social innovation correspond with the practice of PSS innovation. Both domains concentrate on systemic innovation and involve intricate value networks of heterogeneous actors. In such networks, actors experience hindrances in their communication and collaboration with actors from other domains. Therefore it is believed that the principles presented in chapter 7 are likely to be successful in PSS development as well.

Second, the primary method of data collection is observation. Cognitive processes like sensemaking and mental model development are, however, almost impossible to observe and measure. Cause and effect understandings reside in the minds of the senior decision makers. Yet, it remains unclear if the accuracy of their mental models has actually increased. Cognitive maps created by participants could have given some insights in the accuracy of their mental models.

Third, the workshop with C2I Network did not involve senior decision makers, the results of this session are however included in the analysis. It is believed though that the results are representative as some of the participants (Björn and Gerard-H) held senior management positions in the past.

Fourth, the social process of innovation, as being the premise of the current work, does not always follow consistent patterns. Also, because of the qualitative nature and constructivist stance of the research, replicability is difficult which puts constraints on generalizability and utility of findings. The principles presented in chapter 7 should therefore be considered as tentative heuristics rather than an infallible success formula.

8.3 Recommendations

The current work has explored a number of aspects that concern design communication, shared cognition, networked collaboration, strategy development and systemic innovation. Many aspects, however, still need further consideration. The uncertainty and complexity that comes with new design activities poses new demands on design practice[153], design education and design research. For each of these domains recommendations are given.

[153] A number of authors suggest that a more systemic approach is needed to deal with the complexity of contemporary social and public issues (see e.g. Banathy, 1996; Boyer, et al., 2011; Mulgan & Leadbeater, 2013; Murray, et al., 2010).

8.3.1 Recommendations for design practice

Since design is venturing into the field of systemic innovation, dealing with complexity has become one of its main concerns. Also designers have slowly expanded their areas of design activity towards a more strategic level. The first two recommendations provide guidelines for dealing with complexity. The latter two recommendations focus on tool

creation that should help designers develop common ground in networked collaboration and boost the impact of design.

(1) Embrace complexity: The systemic nature of PSS and social innovation requires a holistic approach, rather than a reductionistic approach. Complexity should, for that reason, be embraced. The role of the designers is to make complex things understandable (see also e.g. Norman, 2010a). Simplification, in the Modernist tradition[154], may easily lead to oversimplification. Focus on the dynamics and variety of sub systems, it may be necessary to take multiple perspectives on a system, perhaps even from different abstraction levels. Moreover, leveraging complexity may even enhance the richness of design solutions[155].

(2) Participate in perpetual change: Designers have to learn how to design for issues related to time. In traditional design, solutions are static and finite. For systemic innovation, however, designers may become part of a continuous process. In PSS, and social and public innovation the efficacy of solutions largely depends on their context, which may evolve over time, or which may be subject to a perpetual change. This means that designers may become part of such continuous processes rather than working on finite projects delivering finite solutions.

(3) Design for (inter)activity: Mere artifacts do not create a common ground, instead shared language and shared understanding emerge from (inter)activity. Therefore, in order to design for common ground, create artifacts that stimulate and facilitate reflective conversational interactions. Such conversational interactions may be augmented with a variety of modalities: visual, tangible and gestural. In particular gestures help surface and articulate tacit representations. Focus design efforts on creating artifacts that stimulate actors to animate their conversations. Animations help reveal the underlying structure and causal relations of a system.

(4) Design for malleability: Design for use-through-use, instead of use-through-design (see Redström, 2008). This means that solutions should be open-ended, enabling actors to appropriate them. Artifacts will be deployed for multiple purposes in many unforeseen ways; under these circumstances malleability allows actors to adapt artifacts to their local use.

8.3.2 Recommendations for design education

The advancements in design practice as discussed in section 8.3.1 pose new demands for design education. The recommendations given

[154] Take for example Sullivan's (1896) classic "Less is more", or one of its successors Dieter Rams (1989): "Good design is as little design as possible". These maxims may be relevant for complexity-levels that involve product design (e.g. products, typography or architecture) but are ill-suited for issues that involve design at a systemic level (see Doblin, 1987).

[155] According to Stropkay and Siedzik (2012) there is good and bad complexity. Bad complexity often arises within the project realm (e.g. competing agendas, disengaged stakeholders, shifting objectives). Good complexity on the other hand is inherently linked to the design situation. Good complexity builds understanding, facilitates generative thinking, provides focus and helps construct meaningful representations of the design situation by applying a variety of frames.

below are expected to be suitable for graduate programs that include elements of strategic design and systemic innovation. This may include programs on Service Design as well as MBAs that provide courses on design thinking. Note that these recommendations are considered as less appropriate for undergraduate courses because of the complexity and abstract level of thinking that is involved in the nature of the systemic challenges.

(1) Skills for DIY tool creation: Given the complexity and dynamics of systemic innovation, designers and design students need to be equipped with the skills and expertise that enable them to create their own tools and techniques. In that sense, designers need to be proficient in creating designerly tools[156] for an array of purposes and activities, like: exploration, clarification, conceptualization, communication and collaboration. Such tools may help designers and other stakeholders interface with various other actors and cope with yet unforeseen design situations.

[156] In this role, designers are essentially tool designers as described by Stappers (2009).

(2) New problem solving paradigm: Many of today's systemic challenges are highly interconnected, dynamic, underdetermined and lack precedents. For such challenges the traditional paradigm of problem and solution spaces no longer suffices (Boyer, et al., 2011). New roles of design include facilitating the alignment of disparate or conflicting discourses in the social, economic and political domain (see Dorst, 2006a; Hill, 2012). This requires a new problem solving pedagogy for design education that focuses on resolving design paradoxes (see Dorst, 2006a). Resolving such design paradoxes often requires a creative redefinition of the design situation, which is also referred to as reframing (see Dorst & Tomkin, 2011; Paton & Dorst, 2011).

(3) "The social": Design has broadened its focus from situations with one person interacting with one system in a predetermined context to situations where multiple actors, interact with multiple systems in yet unanticipated contexts (Forlizzi, 2008). Design activity as well as its outcome has become inherently social (see e.g. Dourish, 2004, p. 16; Kurvinen, Koskinen, & Battarbee, 2008; Postma, 2012; Postma, Lauche, & Stappers, 2012). However, "the social" receives little attention in design curricula (Norman 2010b; Postma, 2012, p. 256). Adding social sciences (e.g. sociology, social psychology) to design curricula may advance the practice of design in the near future. Note that such programs may be complemented with courses on system dynamics[157], complexity theory[158] and network theory to maximize its potential for systemic innovation.

[157] See Meadows (2008) for a compelling introduction on systems thinking.

[158] See Battram (1998) for a comprehensive primer on complexity theory and Byrne (1998) for a more advanced introduction.

(4) Design education in the wild: Design education should not be limited to the classroom or design studio[159]. For systemic innovation design skills and traits of design thinking[160] need to be taught to non-designers. It involves on-the-job-training enhancing the innovation capacity of professionals. For designers this may mean that they need to extend their repertoire with didactic skills helping them deliver capacity building programs for non-designers.

[159] See Dutton (1987) on the pedagogy of the design studio.

[160] See Brown and Wyatt (2010) on design thinking for social innovation.

8.3.3 Recommendations for design research

The research presented in this thesis adopts an explorative approach; its purpose is to provide insight, understanding and clarification. The current work shows that design contributes to innovation by making the tacit explicit and by making the abstract tangible. Yet, design communication for systemic innovation seems still at its infancy. More rigorous research could proceed from this point on to examine the full potential of design communication for networked collaboration and systemic innovation. The current work shows that there is a need for methods and tools that help organizations explore complex, dynamic, and networked systems to maintain their fit with their business environment and develop meaningful solutions for their customers.

Yet, subsequent research should aim for a number of longitudinal case studies (up to one to two years) that capture a variety of interactions and effects. The Bussum case, for example, illustrated how repeated observations over a longer period of time provide valuable insights in how particular tools enhance the strategic meaning-making efforts of internal stakeholders. Also, it is recommended to examine the practice of more than one (strategic) designer. Examining a variety of design practices helps identify common patterns, draw generalizations and develop heuristics.

Furthermore, the studies presented in this thesis reveal a number of aspects which merit further research. A few of these aspects are listed below.

(1) Accelerating design learning: The current work primarily concentrates on the dyadic asymmetric relation between strategic designers and senior decision makers, in which the strategic designer is the more knowledgeable other. In new fields of design, however, such roles readily switch from teacher to learner, and vice versa (see Mulgan, 2014). Developing the toolkit for its application in various organizations and different domains reveals how systemic innovation demands designers to learn fast about the context of the design situation. This observation brings on the following questions: how can designers be supported in such learning activities and how to accelerate such learning

processes? In addition, what if the senior decision maker is the more knowledgeable other? How can such interactions be supported?

(2) Designing memes: The analysis in chapter 7 (see table 4) presents a number of principles that enhance the memetic capabilities of the toolkit. Such memes accelerate organizational sensegiving. The design of these memes, however, was largely based on conjectures. It is yet not well understood how memes can purposefully and intentionally be created. Comprehensive design guidelines for the creation of memes are missing. Further research may point out guiding principles for designing memes that help enhance sensegiving capabilities in organizations. It prompts the following questions: how to design memes? What qualities determine the memetic capabilities of an artifact?

(3) Optimizing configurations: The principles presented in the discussion (see table 4) are merely ingredients that result from dissecting a number of cases. These principles may serve as a tentative set of design guidelines that help create design communication tools for networked collaboration. Thus, it now is synthesis that follows after analysis. However, no new tools have been created with these principles yet. Therefore it may be worthwhile to elaborate on these principles and use them for developing new tools that support networked collaboration and enhance cognitive proximity. Further research could focus on possible configurations of these principles for different contexts and purposes to identify patterns that help advance the design and application of tools for proximity.

Chapter 9

Reflection

This chapter concludes this thesis with a personal reflection on the research and design activities. It includes a reflection on the process, describes the challenges of this project and its break-through-moments and reports on the key learnings.

9.1 Process

I believe the explorative nature of the current work has posed a challenge throughout my process. It was predominantly a process of moving back and forth. When I stated the initial aim and research question in my graduation proposal, I recognized they were only tentative. Initially the aim of this graduation project was to translate customer insights into business values. However, while working with Behzad, it turned out that design activities in the very beginning of the fuzzy front end of PSS development and public service innovation require a common ground. The focus therefore gradually shifted towards shared cognition rather than encoding and decoding knowledge.

For establishing such a common ground I assumed that the main purpose of the project was to design boundary objects. Though, what bothered me was the vagueness that surrounded this notion. A literature study on boundary objects hardly provided any design guidelines. Moreover, after attending a workshop on boundary object creation, I was not so sure if intentional boundary object design was the right direction. Designing boundary objects seemed to be similar to designing normal artifacts: they serve a purpose, they help people to "get their job done" in their interactions with actors from other domains. However, when I stumbled upon Bill Moggridge's renowned quote: "we design verbs, not nouns", it occurred to me that focusing on the object was perhaps a mistake. This recognition concurs with Star's (2010) explanation on the embodiment of boundary objects: "Its materiality derives from action, not from a sense of prefabricated stuff or thingness." (p. 603).

Thus, initially I should have concentrated on designing for activity, rather than designing mere artifacts. While completing my analysis in a later stage, I noticed that the notion of a boundary object appeared to be very useful as an analytic concept (see also Star & Griesemer, 1989, p. 393). In other words, boundary objects are useful for analysis, but futile for synthesis[161].

[161] It should be noted however that analysis may generate guidelines for design synthesis. For example, analyzing the tools through the concept of boundary objects generated the principles listed in table 4. These principles may serve as guidelines for creating new tools or improving existing ones.

Eventually, the research got traction when I framed the problem as a lack of "cognitive proximity" (see § 3.2). It instantly helped me devise a preliminary design goal: "increasing cognitive proximity" that focuses on activity (i.e. increasing) instead of objects.

Looking back at the hours of conversations Behzad and I had, I may say that this process of knowledge creation, where tacit knowledge (see Polanyi, 1966/2009) is converted into explicit knowledge, narrowly follows the stages of Nonaka and Takeuchi's (1995) SECI model. At the "socialization" stage Behzad and I shared a variety of experiences, stories, anecdotes, primarily by talking. In the next stage we developed concepts, diagrams and metaphors[162] that helped us "externalize" the knowledge. Subsequently the "combination" of different types of knowledge allowed us to develop prototypes. By deploying these prototypes we finally "internalized" the knowledge. It took time, many hours of talking, discussing concepts, elaborating on models, reflecting on practices to convert Behzad's tacit expertise into explicit knowledge and to make it tangible. But I believe it was well worth it. Observations show that the tools supported Behzad in establishing a common ground and provided senior decision makers with new frames. It evidently helped advance Behzad's practice. And I expect that the principles and insights that are presented in chapter 7 and 8 will be useful for the members of the CRISP community to advance their practices as well.

[162] See also Nonaka (1991).

9.2 Challenges

There are a number of reasons that made this endeavor a bit more complex than I initially expected. The two most prominent challenges are discussed below.

The first challenge concerns the complexity of the design situation. Doblin (1987) posits that the complexity of a design is determined by the number of parts involved; e.g., the design of an airplane, is more complex than the design of a spoon. In his work Doblin (1987) distinguishes three levels of complexity: products, unisystems and multisystems (see figure 65). Products usually concern tangible objects; they can be touched, perceived and comprehended in their physical form. Examples include chairs, appliances and books. In general, products encompass the touchpoint level of PSSs. Unisystems consist of collections of coordinated products and involve people to manage or operate its performance. Examples are airlines, restaurants, factories and universities. Unisystems concern the organizational level of PSSs, the so called service organizations. Multisystems are the most complex. Multisystems consist of competing and collaborating unisystems[163], in this sense they are essentially ecosystems like PSS networks (see

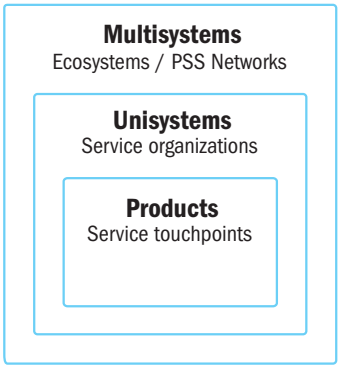

Figure 65: Three levels of complexity (based on Doblin, 1987)

[163] Competition is the essence of multisystems as Doblin (1987, p. 5) asserts. However, nowadays with PSS networks in mind, this view is rather outdated. Conversely, PSS networks are constituted by alliances or cooperatives of actors (see § 2.2.2; Henze, et al., 2012).

§ 2.2.3). It is in fact the interaction between these unisystems (i.e. stakeholders) that causes multisystems to be tremendously complex (Doblin, 1987). With the increase of stakeholders, different interests and discourses (e.g. viewpoints and paradigms; see Dorst, 2006a) amount as well. These interests and discourses may not be compatible and hence engender tension or even irresolvable conflicts.

Behzad's practice is primarily situated at the multisystem level. One of his main concerns is to explore the business ecosystem, identify its stakeholders and their relations, determine their paradoxes and align them in a way that new value is generated. So, in order to develop tools for his practice it was crucial to understand his business context. Most of my efforts therefore concentrated on unraveling the structure of Behzad's practice, comprehend his proposition and illuminate its potential. In this case it was science that helped me comprehend and model the complexity of Behzad's practice and design that helped me to interface with it and manage it. The concepts (i.e. frames) science provided me with, allowed me to navigate the complexity of the design situation.

However, science also posed a second challenge. Many of the theoretical concepts (e.g. mental models, sensemaking, frames, metaphors) discussed in this thesis are infested with terminological confusion. Take for example the multifaceted nature of mental models, the ambiguity that surrounds sensemaking or the various classes of metaphors. These concepts on their own don't offer clear guidelines for design. Moreover, it was quite a challenge to forge connections between these concepts into a comprehensive framework that explained "what's going on?"

9.3 Key learnings

Developing a toolkit that supports designers in networked collaboration and communication has given me invaluable insights in how designers may contribute to systemic issues and support key actors in decision making. This project gave me the opportunity to capitalize on my previous experiences as a communication designer, as well as an educator. Also my experience working within a large organization – with its quirks and red tape – seemed valuable in working with Behzad; it provided us with a frame of reference. Although, at times, I noticed that my former experiences also constituted a hurdle. Sometimes I tended to draw too many connections between my observations, my experiences and explanations. It took me a vast amount of time to peel of the layers to arrive at the essence of this research.

Working on this project helped me to see the bigger picture. I have learned to take a more systemic approach at a given design situation.

There is a world beyond user-product interaction. Understanding the context of the design situation at large, helps to better understand what matters most in design. I believe that central in the practice and nature of design is the configuration of fit. Design pursues the alignment of various discourses to achieve a better and sustainable fit (e.g. between the jobs to be done and their resolutions, or organizations and their business environment). To achieve such a fit in a dynamic and complex design situation, designers should create solutions that are open, malleable and allow for appropriation to adapt them to unforeseen circumstances.

Overall it has been a tremendous pleasure to work with Behzad. His perspectives on value systems, decision-making and the social dimension in innovation have provided me with valuable new frames to analyze network activity and organizational performance. Also, our frequent conversations have stimulated me to deepen my knowledge on a variety of subjects (e.g. strategic management, business modeling, knowledge management, value theory, economic behavior, network theory, stakeholder theory, systems theory) that have stretched the width of the horizontal bar of my T-shaped expertise profile. I noticed that for systemic innovation such broadness is needed to operate in networks, collaborate across disciplines and apply skills and expertise in areas other than my own.

All in all, I believe that the skills and expertise I have acquired through this project will help me design and deliver meaningful solutions for the public good in the near future and far beyond.

References & Appendix

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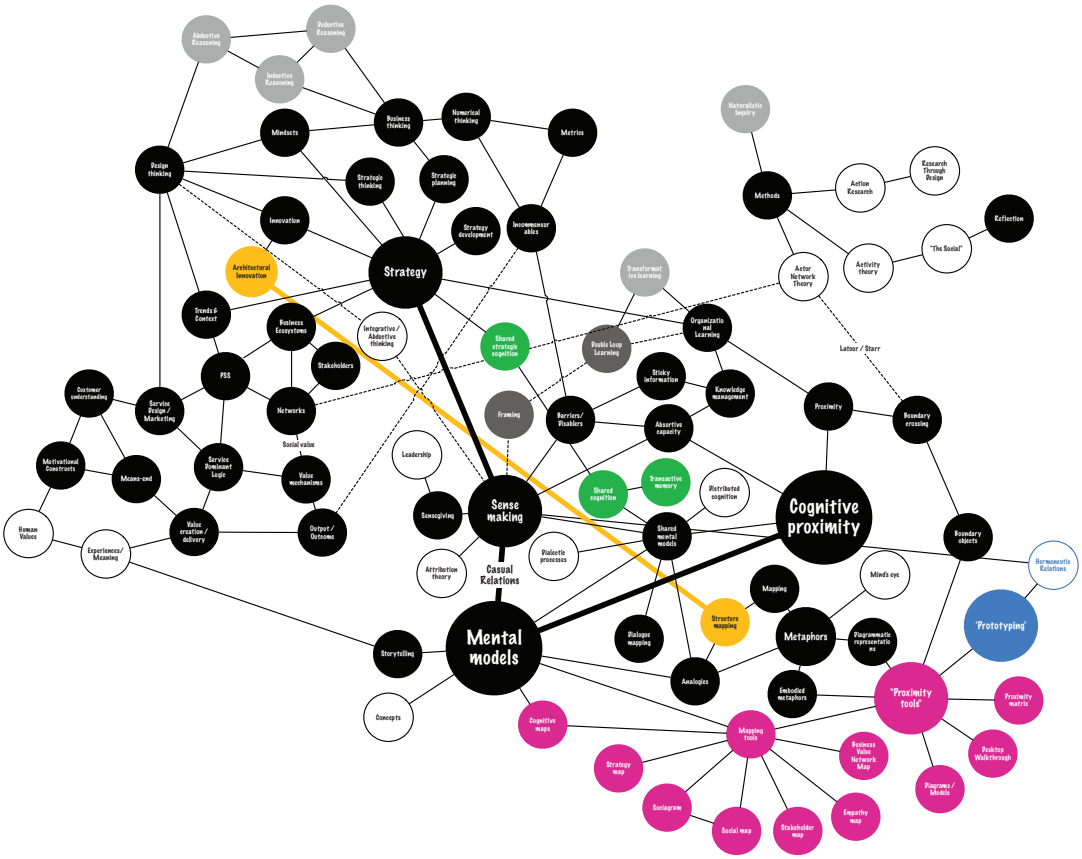
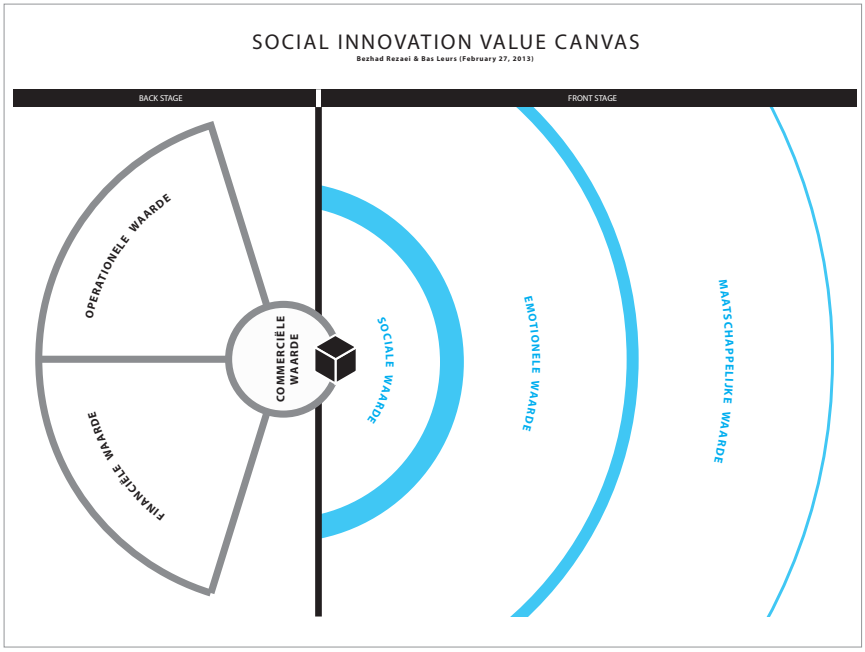
Appendices

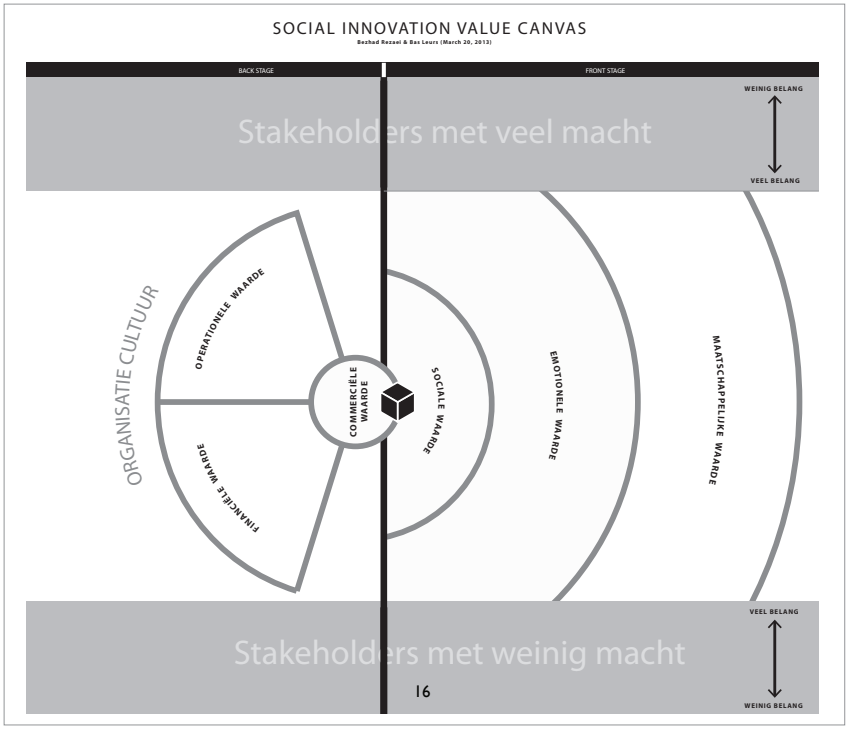
Appendix A: Concept map of literature study



Appendix B: Value Canvas (Dutch)



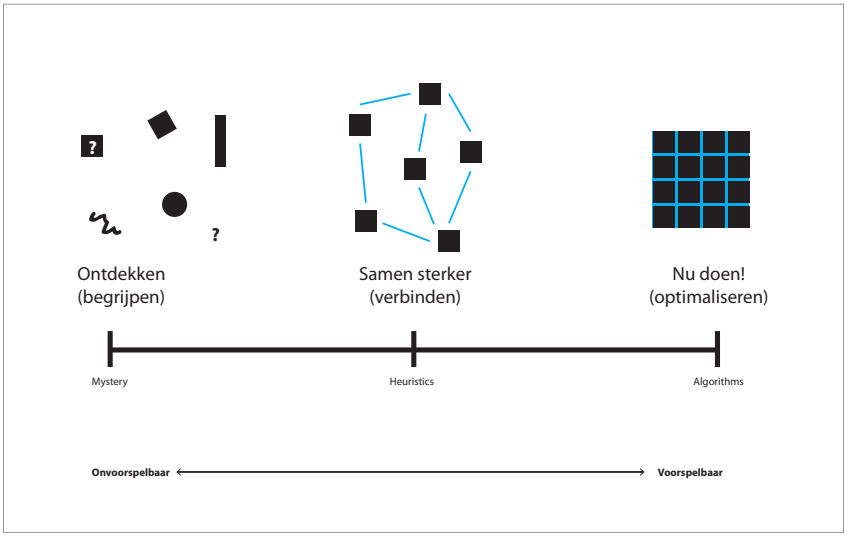
Appendix C: Value Canvas (Dutch, version 2)



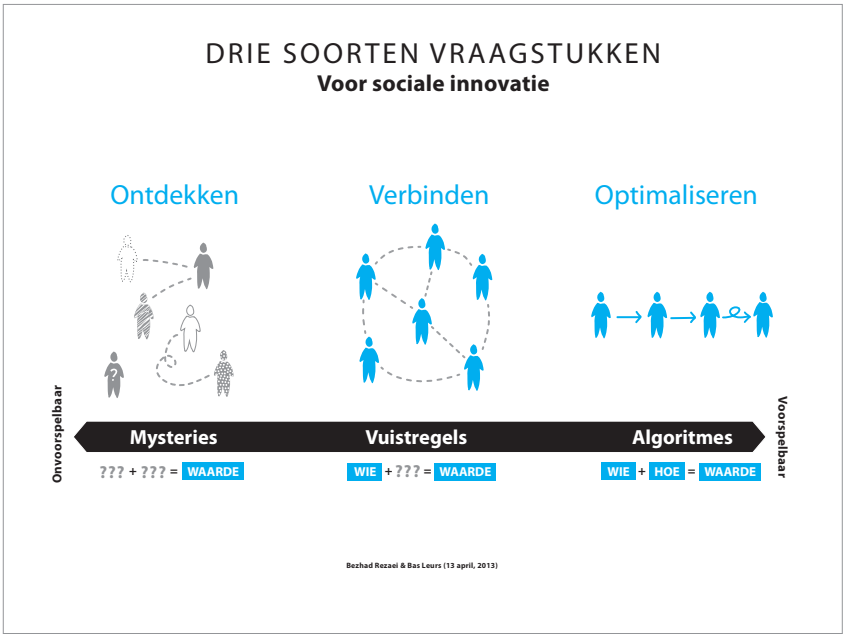
Appendix D: Description of value mechanisms

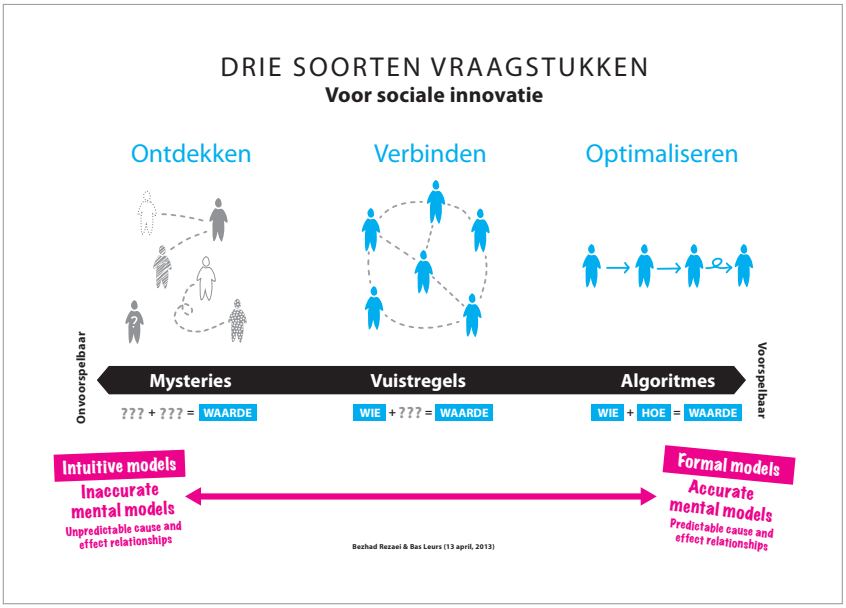
Financial Value	Financial value represents assets that help an organization to fulfill their mission, usually by developing propositions in the forms of products, services and interventions. Financial value is the essence of every organization, which creates stability for the organization.
Operational value	Operational value consists of a number of activities, which collectively deliver the organizational operations. It involves activities such as: establishing an organizational structure (divisions and units), recruitment and deployment of personnel, process design and management, the formation of alliances and setting up distribution channels with partners to add value to the market.
Commercial value	Commercial value is referred to as the translation of the organizational identity into a coherent image that is incorporated in the value delivered through products, services and interventions. So, commercial value connects the internal organization with the outside world.
Social value	Social value refers to people's fundamental "reason to connect". Connection with others enables cooperation, which allows people to pursue ambitious goals, or jointly cope with complex issues. This usually requires meaningful connections (think of friends, family) that provide safety that help build a secure future.
Emotional value	Emotional value involves a sense of belonging and ownership. It concerns human emotions that prompt cooperation and attract more members to join the initial collective. It builds on (selfless) reciprocity. Emotional value turns members of the collective into believers and ambassadors.
Societal value	Societal values is about people receive honor or respect that help both themselves and others to be successful. Societal value is concerned with how "the larger whole" (i.e. society) benefits from collective activities.

Appendix E: Innovation Mindsets (Dutch, version 1)

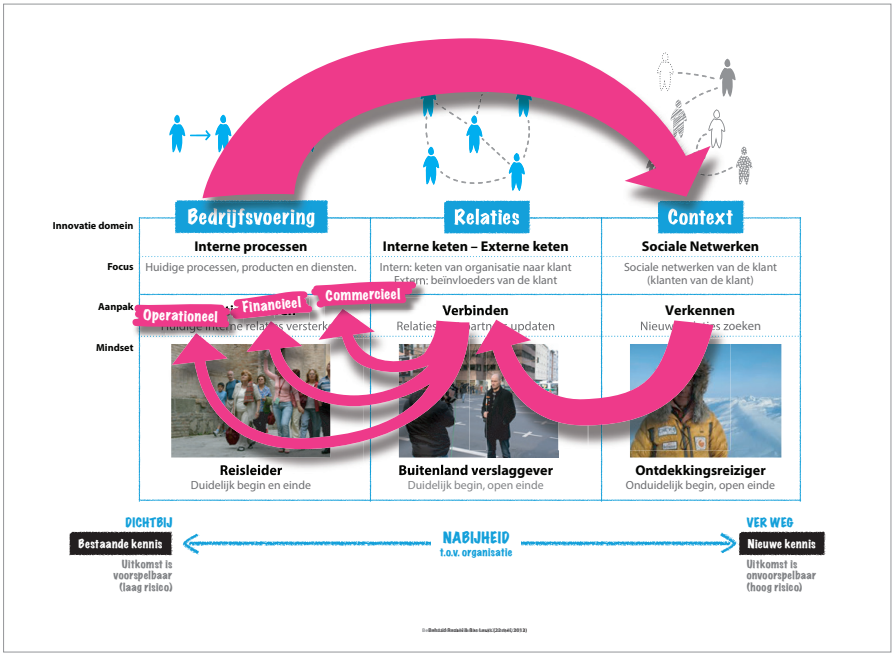


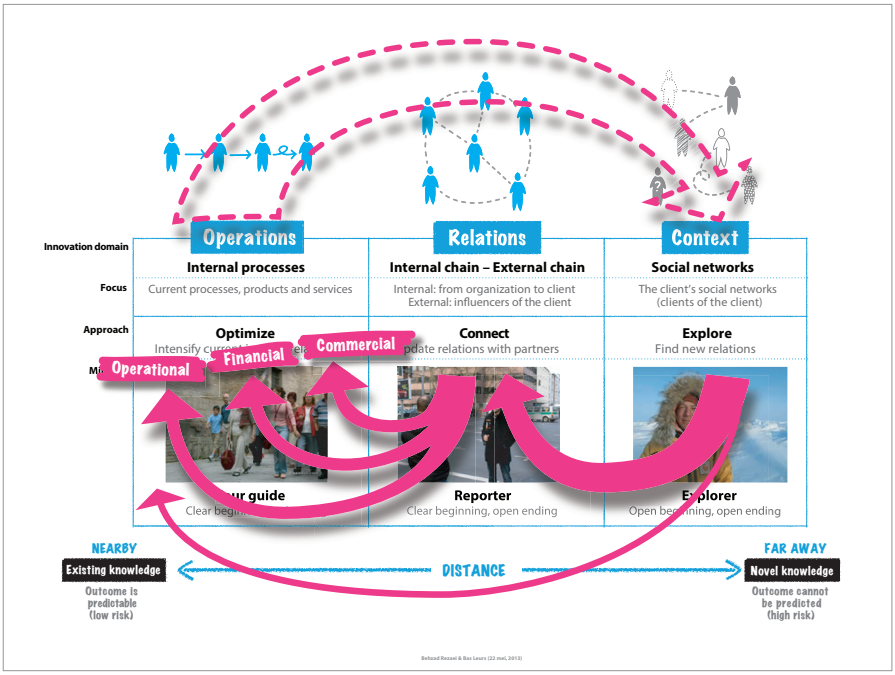
Appendix F: Innovation Mindsets (Dutch, version 2)



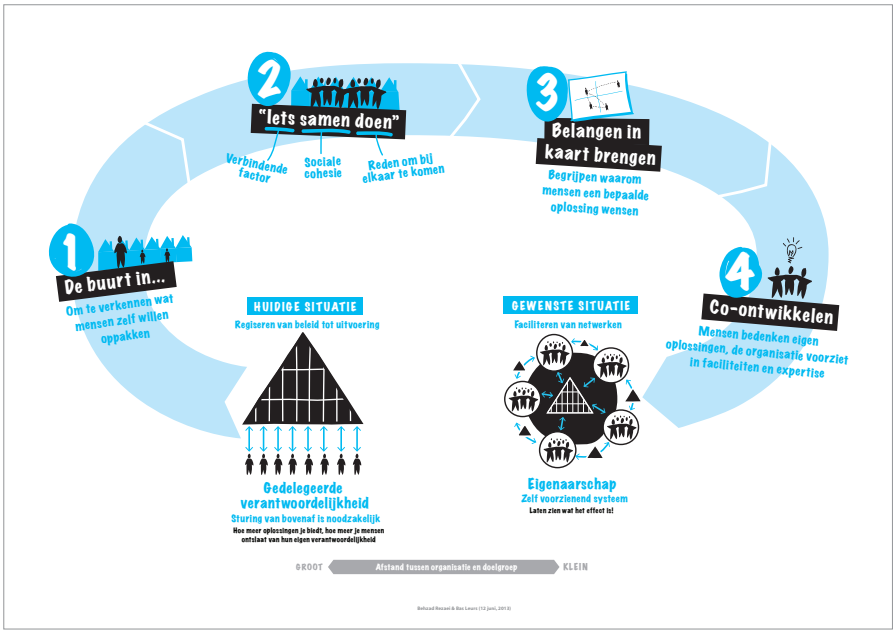


Appendix G: Innovation Mindsets (Dutch, version 3)





Appendix H: Social Innovation Process (Dutch, version 1)



Appendix I: Interview questions for final evaluation

- When we started a few months ago. What did you expect that the outcome of this project would be? When you look at the results, what do you think?
- What are the moments when the toolkit supported you in your interaction with other stakeholders?
- Who were involved?
- What was the reason to meet/talk/interact? What was the purpose of the meeting?
- Which tools did you use? Why did you choose these tools?
- How did you use them?
- What was the effect of the tool on the interaction between you and executive?
- Did the tools help you share ideas and communicate? Please provide examples.
- What happened after the interaction? What did the executive do?
- Do you think that the interaction had an impact on strategic thinking? What did change (in terms of perspective taking)?
- What was the role of the toolkit? Please provide examples.