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The development of entrepreneurial opportunities: Understanding the nexus between founding teams, opportunity beliefs, and communities of inquiry

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Abbreviations

3D	Three-dimensional
ABV	Attention-based view of the firm
Approx.	Approximately
AR	Augmented Reality
BM	Business model
e.g.	Exempli gratia (for example)
Et al.	Et alii (and others)
Etc.	Et cetera
i.e.	Id est (that is)
n/a	Not applicable
USP	Unique Selling Proposition

Abstract

Opportunity development is the central part of the entrepreneurial process. Since entrepreneurial teams' prior knowledge is often insufficient for making important decisions during the opportunity development process, they try to gain new insights through social interactions with a community of inquiry and collectively develop opportunity beliefs. Yet, limited research addresses the interplay between entrepreneurial teams, opportunity beliefs, the community of inquiry, and entrepreneurial opportunity development over time. Through a qualitative, inductive study of twelve entrepreneurial teams which I closely monitored over a period of nine months, I found that teams' attentional focus during opportunity development varies by the type of uncertainty that is primarily addressed in opportunity belief development. Teams' attentional foci triggered the engagement of different micro-practices to acquire new information from the community of inquiry and interpret gathered information, ultimately shaping the effectiveness of the teams' opportunity development decisions as well as the development of the team itself over time. Based on my findings I propose a dynamic, conceptual model that provides novel insights for the literatures on opportunity development, entrepreneurial social capital, and entrepreneurial teams.

1 Introduction

Entrepreneurship research at its core is the study of "how, by whom, and with what consequence opportunities to produce future goods and services are discovered, evaluated, and exploited" (Shane & Venkataraman, 2000, p. 220), and aims to unravel the dynamic processes involved in the emergence and pursuit of entrepreneurial opportunities. Since the pursuit of entrepreneurial opportunities by aspiring entrepreneurs represents a significant driver of economic well-being and growth (e.g. Kirzner, 1973; Schumpeter, 1934), researchers are concerned with the characteristics that explain why some individuals are more likely than others to pursue possible opportunities for profit (e.g. Corbett, 2007; Grégoire & Shepherd, 2012; Shane, 2000; Shaver & Scott, 1992), and how they make judgmental decisions about the coordination of scarce resources in light of significant levels of uncertainty (McMullen & Shepherd, 2006; Shepherd, Williams, & Patzelt, 2015).

The entrepreneurial actor, defined as "someone who specializes in taking responsibility for and making judgmental decisions that affect the location, the form, and the use of goods, resources or institutions" (Hébert & Link, 1988, p. 155), reacts to and creates change by engaging in an ongoing process of information evaluation and entrepreneurial action (McMullen & Dimov, 2013; McMullen & Shepherd, 2006). As the pursuit of entrepreneurial opportunities exposes entrepreneurial actors (individuals or teams) to a perpetual influx of new external stimuli, this process essentially becomes "a stream of continuously developed ideas, driven and shaped by one's social interaction, creative insights, and action at each stage" (Dimov, 2007a, p. 714). The particular elements of action and their form determine whether and how entrepreneurs implement their abstract representations of an imagined future into reality (Dimov, 2007a, 2011), as they construct the means and ends to their potential entrepreneurial opportunities (Eckhardt & Shane, 2003).

Throughout this process, entrepreneurs accumulate information and evidence to re-assess their conviction regarding their potential opportunity's commercial viability (Dimov, 2007a; Ravasi & Turati, 2005). Since the latter can only be truthfully confirmed once sustainable market relationships have been successfully established (Dimov, 2011; Eckhardt & Shane, 2003), the pursuit of potential opportunities depends on entrepreneurial actors' future-oriented beliefs regarding what is feasible and desirable in the market space, which provide the foundation from which ideas, judgements and decisions are drawn (Hastie, 2001; McMullen & Shepherd, 2006). New information and learning, then, facilitate entrepreneurial actors' continuous judgement – that is, their judgement evolves as they develop more comprehensive and nuanced belief systems regarding the final form that their opportunity should take, and regarding the development pathway that is most promising to yield envisioned results (Ardichvili, Cardozo, & Ray, 2003; Dimov, 2010; McCann & Vroom, 2015).

However, the commercialization of a potential opportunity depends on the establishment of not just a product but an entire business (Pavia, 1991) which entrepreneurs are required to manage concurrently. At the same time, particularly nascent entrepreneurs or individuals in the early stages of developing a potential opportunity (Reynolds & White, 1997) typically experience numerous incremental and radical changes to their initial beliefs as they develop their initial ideas toward a final, marketable form, involving the possibility of terminating opportunity development altogether (Dimov, 2010). In the realm of their immediate problem space, they gradually replace beliefs with facts (Dimov, 2011; Newell & Simon, 1972), which in turn informs their perceived uncertainty and subsequent actions (McMullen & Shepherd, 2006). New, opportunity-related external information stems from entrepreneurial actors' social environments, as entrepreneurs interact with stakeholders such as advisors, potential customers, or investors (Autio, Dahlander, & Frederiksen, 2013; Davidsson & Honig, 2003; Grimes, 2018; Ozgen & Baron, 2007) to produce new ideas or to test their conjectures by exposing it to the critique of a community whose opinion is perceived to be the most accurate representation of the truth (Seixas, 1993; Shepherd, 2015). Gathering, processing, and interpreting information from this community of inquiry (Pardales & Girod, 2006), then, represents another fundamental building block related to the development of entrepreneurial opportunities. This takes a range of possible forms and outcomes in

terms of the interactions taking place, as well as in terms of how entrepreneurial actors integrate new information into existing belief systems (Dimov, 2007b), which taken together subsequently informs entrepreneurial action.

Therefore, as McCann and Vroom (2015) succinctly summarize, "nascent entrepreneurship is fundamentally an experience of change" (p. 613), i.e. change to both opportunity beliefs and to entrepreneurial opportunities, that is socially negotiated. As the development of potential entrepreneurial opportunities requires resources that are typically distributed among numerous actors, and as most ventures are formed by entrepreneurial teams (Klotz, Hmieleski, Bradley, & Busenitz, 2014), this ongoing negotiation process involves the thought worlds of not just opportunity-related stakeholders but of individual team members that need to reach a consensus threshold to be able to take collective action as a team (West, 2007), without however lacking constructive conflict that allows individual perspectives to develop and converge (Ensley & Pearce, 2001). At the same time, entrepreneurial teams require organizing to be able to successfully emerge as an operating entity, i.e. managing the increasingly complex organization of actors, resources, and stakeholders (Dimov, 2010). To fully understand the experience of entrepreneurial opportunity development and related outcomes, then, it is necessary to expand the exploration of belief and opportunity development to the team level, to situate it at the nascent-venturing unit of analysis (Davidsson & Wiklund, 2001) and to take a holistic approach by exploring contextually situated cases over time (Dimov, 2011).

The purpose of this thesis is to contribute to the research on entrepreneurial opportunity development by exploring the process by which entrepreneurial teams negotiate and develop opportunity beliefs with communities of inquiry to develop opportunities from initial ideas to their final form, which to date is still poorly understood in entrepreneurship research (McMullen & Dimov, 2013). This is astonishing, since the development of the opportunity is central to the entrepreneurial experience and realized profit (Shane & Venkataraman, 2000). Thus, in my research I will specifically explore how entrepreneurial teams plan, execute, and utilize social interactions to develop their collective opportunity belief systems, how this relates to opportunity development outcomes, and ultimately, organizing. This involves

collecting rich and longitudinal data on nascent entrepreneurial teams' immediate problem space, their beliefs and goals throughout the course of opportunity development, as well as on their available information at each point in time, to systematically understand the drivers and outcomes of entrepreneurial action.

In the following, I will first provide a brief overview of the entrepreneurship research domain and the role that opportunity beliefs play within this field (Chapter 1.1). Then, I will explore the role of information from social knowledge sources (Chapter 1.2) and the social negotiation of opportunity beliefs (Chapter 1.3), to subsequently derive the research questions that guide this thesis (Chapter 1.4). Thereafter, I will provide an overview of the data set and the methodology of this thesis in Chapter 1.5, and finally, describe this thesis' structure in Chapter 1.6.

1.1 Opportunity beliefs in the context of entrepreneurial opportunity development

Developing a novel idea into a successful business is a key aspect of the entrepreneurial process (Gartner, 1985). During this process, actors draw on their prior knowledge and cognitive capabilities to develop and update beliefs about potential opportunities and decide about possible development pathways or termination (Dencker, Gruber, & Shah, 2009; Dimov, 2010; Grégoire, Barr, & Shepherd, 2010). However, developing a potential opportunity into a new organization is complex and involves considerable uncertainty (McMullen & Shepherd, 2006; Sarasvathy, 2001), as well as a variety of expertise that entrepreneurs rarely possess themselves (Felin & Zenger, 2009).

Extant research on opportunity development has largely conceptualized entrepreneurial opportunities in their final form at a single point in time (Dimov, 2011; McMullen & Dimov, 2013), describing them as "situations in which new goods, services, raw materials, markets, and organizational methods can be introduced through the formation of new means, ends, or means-ends relationships" (Eckhardt & Shane, 2003, p. 336). However, to complement our understanding of how opportunities are transformed into viable products (or services), scholars have called for more research on the role of time in the process of opportunity development (Dimov, 2007a; McMullen & Dimov, 2013; Shepherd, 2015). Therefore, I

conceptualize opportunity beliefs as a dynamic stream of ideas for new products or services, which are informed by entrepreneurs' actions and social interactions at each stage (Dimov, 2007a). That is, potential opportunities unfold as entrepreneurial actors (individuals or teams) engage with stakeholders (Grimes, 2018; Shepherd, 2015), take actions to learn (Corbett, 2005; Dimov, 2010; Sarasvathy, 2001), and generate creative insights (Dimov, 2011; Grégoire et al., 2010).

As opportunities are uncertain ex-ante and dynamic in nature, entrepreneurial action is, at each point in time, inherently driven by entrepreneurs' conjectures about the potential opportunity's future possibilities (Autio et al., 2013; Felin & Zenger, 2009; Shepherd, Haynie, & McMullen, 2012). Specifically, entrepreneurial actors form beliefs about the desirability and feasibility of the potential opportunity, including desired end states and preferred courses of action (Krueger & Carsrud, 1993; McMullen & Shepherd, 2006). Opportunity beliefs are future-focused "mental images or 'theories' about the potential reward for a particular action versus the cost of that action" (Wood, McKelvie, & Haynie, 2014, p. 253). Opportunity beliefs are formed through cognitive processes drawing from entrepreneurial actors' knowledge, motivation, and external information (Autio et al., 2013; Grégoire & Shepherd, 2012; McMullen & Shepherd, 2006), and guide entrepreneurial action by organizing knowledge and giving new information form and meaning (Hill & Levenhagen, 1995; Wood et al., 2014; Wood & McKinley, 2010). In particular, scholars have highlighted the importance of entrepreneurs' prior knowledge in belief formation (Autio et al., 2013; Grégoire et al., 2010; Shane, 2000).

1.2 Social capital and the development of opportunity beliefs

Although most nascent entrepreneurs begin opportunity exploitation with little more than their human and social capital (Hite & Hesterly, 2001; Maurer & Ebers, 2006) and must form new relationships to meet information demands (Greve & Salaff, 2003; Hayter, 2016; McFadyen & Cannella, 2004), there is little theory that explains how entrepreneurial actors use external knowledge sources in developing opportunity beliefs over time. From a social capital perspective, entrepreneurs engage with and build social capital during opportunity development to access new information and tacit knowledge on the

availability and characteristics of markets, technologies, and resources (Burt, 2000; Davidsson & Honig, 2003; De Carolis & Saparito, 2006). Entrepreneurs can generate new insights about potential opportunities through social interactions with a community of inquiry, that is, interactions with potential stakeholders such as potential customers, mentors, investors, or technological experts (Autio et al., 2013; Davidsson & Honig, 2003; Grimes, 2018; Ozgen & Baron, 2007) that are able to provide information on the veracity of the potential opportunity (Shepherd, 2015). Entrepreneurs use the community of inquiry to present, test, and discuss beliefs for opportunity development. This exchange potentially enhances the quality, relevance, and timeliness of new opportunity-related information (Adler & Kwon, 2002; Chrisman & McMullan, 2000; Gemmell, Boland, & Kolb, 2012), and promotes knowledge creation by providing stimuli that challenge existing goals and orientations (Maurer & Ebers, 2006). New, opportunity-related information from social knowledge sources can further enhance "shared representations, interpretations, and systems of meaning among parties" (Nahapiet & Ghoshal, 1998, p. 244), which then improve information exchange and the ability to make sense of new information (De Carolis & Saparito, 2006). Based on the new knowledge created, entrepreneurs reduce the uncertainty inherent in potential opportunities they identify (Autio et al., 2013; Choi & Shepherd, 2004; Dimov, 2007b) to update their current opportunity beliefs (Dutta & Crossan, 2005; Wood et al., 2014) about what future actions in opportunity development are possible, desirable, and valuable (Felin & Zenger, 2009; Shepherd, 2015).

That is, opportunities begin as a simple concept that can change and become more elaborate (Ardichvili et al., 2003) as entrepreneurs seek to achieve a greater "fit" between the potential opportunity and its external environment. The type of information that entrepreneurs seek from stakeholders, as well as the sources they consult and their way of interaction, then, are likely to affect the process and outcomes of opportunity development. The outcome of this process not only depends on the contacts making up the entrepreneurial actors' social capital and their mutual relationships, but also on actors' strategies for developing collective meaning from these social interactions (Autio et al., 2013; Felin & Zenger, 2009; Vissa & Chacar, 2009). Yet, there is little theorizing that explains how founders engage with and learn from a community of inquiry during opportunity development over time. Investigating opportunity

development is important because the development path of a potential opportunity affects the future development of the venture (Grimes, 2018; Milanov & Shepherd, 2013). Without a clear grasp on entrepreneurial actors' engagement with communities of inquiry over time, we cannot fully understand how potential opportunities develop and thus, we are limited in our understanding of a central element of organizational emergence.

The micro-processes of social information generation and interpretation and their subsequent impact on belief development, however, remain poorly understood (Shepherd, 2015). The little work that explores entrepreneurs' re-evaluations of potential opportunities i.e. evolution of opportunity beliefs in light of new, opportunity-related information mostly takes an entrepreneurial learning approach (Andries, Debackere, & Van Looy, 2013; Dutta & Crossan, 2005; Ravasi & Turati, 2005). Learning is defined as a social process by which new knowledge is derived from previous knowledge, perception, cognition, and experience (Kolb, 1984), producing differing outcomes as individuals acquire and transform information in different manners (Corbett, 2005). Social processes of learning unfold both within the internal (to an entrepreneurial team) and external environment of entrepreneurial actors and include the transformation of new knowledge from personal experience to the shared meaning of a larger collective (Dutta & Crossan, 2005). This learning approach is guided by entrepreneurs' limited attention and, more specifically, attentional engagement modes that facilitate noticing, interpreting, and using environmental signals to develop knowledge and opportunity beliefs (Shepherd, McMullen, & Ocasio, 2017). Specifically, entrepreneurs either engage in top-down information processing by using existing knowledge structures to direct attention to aspects of the opportunity environment that are expected to be relevant (Kaplan & Tripsas, 2008; Nadkarni & Narayanan, 2007; Tripsas & Gavetti, 2000); or use bottom-up processes to rely on the gestalt properties of their environment to inductively identify patterns and make sense of unfolding events (Rindova, Ferrier, & Wiltbank, 2010; Shepherd, McMullen, & Jennings, 2007).

In the context of nascent entrepreneurial opportunities, the choice of entrepreneurs' attentional modes and their subsequent allocation of attention to environmental cues have been researched in the context

of *noticing* and *evaluating* potential opportunities (Shepherd et al., 2017), yet are still underrepresented in research on the *development* of potential opportunities. How entrepreneurial actors gather and process new opportunity-related information from social sources over time has most notably been researched in the context of creative work, shedding light on the micro-processes of giving and receiving creative feedback (Harrison & Rouse, 2015), as well as in the context of entrepreneurial identities (Grimes, 2018), according to which feedback-related changes (or lack thereof) to potential opportunities are contingent upon entrepreneurs' self-concepts: entrepreneurs' revisions to their potential opportunities depend on founders' psychological ownership of their ideas and the extent to which they understand opportunity development as an iterative process. Further, research on product innovation teams has explored the role of shared vision on innovation effectiveness, finding that teams with shared vision generate greater levels of innovation which in turn reinforces teams' shared cognition in a cyclical function (Pearce & Ensley, 2004). However, we still lack a comprehensive understanding of the behavioral and cognitive processes of belief development that unfold in entrepreneurs' social interactions, as well as their implications on developing potential opportunities over time.

1.3 Entrepreneurial teams and the development of opportunity beliefs

As most entrepreneurial ventures are founded in teams (Klotz et al., 2014), it is crucial to better understand the "tensions that exist in team deliberations – new possibilities versus existing direction, cohesion versus conflict" (West, 2007, p. 78) – that stem from similarities and differences between team members' underlying beliefs about the nature of emerging opportunities. To be able to collectively progress through opportunity development, entrepreneurial teams must translate team members' perspectives into a collective understanding of strategic issues and opportunities, or team mental models (Weick & Roberts, 1993; West, 2007), that allow entrepreneurial teams to engage in collective sensemaking and action (Klimoski & Mohammed, 1994). Team mental models are "team members' shared, organized understanding and mental representation of knowledge about key elements of the team's relevant environment" (Mohammed & Dumville, 2001, p. 90), a group-level intellectual product that is significantly shaped by individual team members' belief structures (Klimoski & Mohammed,

1994) and emerges as a result of social processes such as information acquisition, interpretation, and negotiation (Larson & Christensen, 1993). Team mental models concern both task-related and team-related features of the situation and environment (Mohammed, Ferzandi, & Hamilton, 2010), and allow team members to interpret information in a similar manner (description), share expectations concerning future events (prediction), and develop similar causal accounts for a situation (explanation) (Mohammed et al., 2010; Rouse, Cannon-Bowers, & Salas, 1992).

A collective sharing of particular beliefs is the prerequisite for entrepreneurial teams to act on and test the veracity of their team mental models, since it is often not feasible to pursue multiple courses of action at the same time (Felin & Zenger, 2009). Moreover, incompatible dominant logics and disagreements concerning fundamental organizational priorities impede entrepreneurial teams' ability to focus consistently in their activities, allocate limited resources, and proactively and effectively meet continuously changing circumstances, which ultimately spurs affective conflict (West, 2007; Wooldridge & Floyd, 1989). However, it is not primarily the degree of sharedness, but the level of cognitive consensus that yields beneficial outcomes for the development of opportunity beliefs. Cognitive consensus relies on "a delicate balance between both overlapping and complementary sharing perspectives" (Mohammed & Dumville, 2001, p. 103) that creates a "cognitive tug and pull" (Ensley & Pearce, 2001, p. 146) as entrepreneurial teams integrate information and resources, adapt to changing task demands, and coordinate action (Rouse et al., 1992). This balance is delicate to achieve as neither completely divergent belief structures nor too great an overlap in team member interpretations have been found to enhance collective opportunity belief development (Mohammed & Dumville, 2001). Allowing for divergent perspectives and permitting conflict enables entrepreneurial teams to frame various perspectives in a manner that will contribute to effective outcomes (Mohammed & Dumville, 2001), so that even if individual team members' opportunity beliefs are inaccurate, group communication and coordination processes improve the accuracy of representations (Lim & Klein, 2006; Mathieu, Heffner, Goodwin, Salas, & Cannon-Bowers, 2000; Puranam & Swamy, 2010). Beyond their degree of accuracy and sharedness, managers' opportunity beliefs have been found to vary by their degree of complexity (the breadth and variety of knowledge embedded), centrality (the extent to which belief structures are

centralized around a limited number of core concepts), and causal logics (the extent to which actions are peceived to potentially control the competitive environment, or vice versa) (Kiss & Barr, 2015; Nadkarni & Barr, 2008; Weick, 1979a). These dimensions increase the diversity, frequency, and speed of firm actions in refining competitive beliefs (Kiss & Barr, 2015), and enable entrepreneurial teams to successfully utilize their social ties in opportunity development (Vissa & Chacar, 2009), thereby increasing the chances of firm survival.

The development of effective mental models has been shown to depend on the cross-functional coordination of roles, the design of decision rules, as well as on the level of internal cohesion and strategic consensus (Foss, Lyngsie, & Zahra, 2013; Maurer & Ebers, 2006; Mohammed & Ringseis, 2001). Furthermore, whether entrepreneurial teams are able to correct dysfunctional aspects in developing belief systems and maintain effective belief systems over time depends on their collective metacognition, or cognitive learning ability (Haynie, Shepherd, & Patzelt, 2012) which affects teams' capacity to fundamentally change their assumptions and strategies for effective action (Argyris & Schön, 1978). The successful negotiation and implementation of opportunity-related team mental models (or collective opportunity belief systems) in opportunity development therefore represents a challenging and important aspect of nascent entrepreneurial teams' experience throughout the entrepreneurial process. However, our understanding of this experience and how it affects nascent venturing outcomes is underdeveloped (West, 2007). In this dissertation, I will thus attempt to contribute to filling this gap. In the following section, I will derive the research questions of this thesis.

1.4 Research questions

As outlined in the previous section, we know little about how entrepreneurial teams develop opportunity beliefs and negotiate opportunity development decisions along the nascent opportunity development process. Importantly, we lack understanding about the role of opportunity-specific information exchange and sensemaking processes with communities of inquiry, and the subsequent within-team negotiation processes that affect the emergence of opportunities and of new ventures over time. To understand the

lived entrepreneurial experience of nascent venturing and the process of collectively developing opportunities, researchers have called for an event-based process-perspective that provides an event-driven explanation of the temporal order and sequence of change events, narrating how change unfolds over time to produce a given outcome (McMullen & Dimov, 2013; Van de Ven & Engleman, 2004). While the positivist, variance-driven process approach has dominated entrepreneurship research, demonstrating for instance how human capital affects the formation of beliefs, this approach is not able to develop explanations of entrepreneurial dynamics. Event-driven qualitative research, however, (1) can trace processes as they unfold over time (Van de Ven & Engleman, 2004), (2) is holistic, i.e. sensitive to the broader context and the perspectives of involved actors (Lee, 1999; Miles & Huberman, 1994), and (3) captures the "specific path – in terms of a sequence of events or concrete experiences – that observed cases follow from one state to another" (Dimov, 2011, p. 70). This approach allows capturing multiple levels and units of analysis that often involve ambiguous boundaries and varying levels of temporal embeddedness (Langley, 1999), which applies to opportunity development research where the very nature of the unit of analysis may transform from one form (e.g. idea) into another (e.g. product, firm, etc.) (McMullen & Dimov, 2013).

Such a dynamic perspective is important because opportunity development poses different task and resource requirements at different stages (Greve & Salaff, 2003; Kazanjian, 1988), and entrepreneurs likely develop and use their social networks, relationships, and interactions over time to meet these requirements (Grandi & Grimaldi, 2003; Greve & Salaff, 2003; Hayter, 2016; Maurer & Ebers, 2006; Prashantham & Dhanaraj, 2010). Furthermore, current knowledge stocks shape the scope and direction of the search for new knowledge, so in light of the contingency of belief development on prior knowledge (Grégoire et al., 2010), knowledge creation in opportunity development can become a path-dependent process (Dosi, 1982; McFadyen & Cannella, 2004). To understand the process and outcomes of opportunity development, then, we need to incorporate and consider the mechanisms and dynamism of entrepreneurial actors' social interactions, by which they (1) gather and interpret new opportunity-related information, and (2) collectively negotiate opportunity development decisions over time. Therefore, the research questions for this dissertation are:

(1) *How do entrepreneurial teams interact with communities of inquiry to develop opportunity beliefs and reduce uncertainty?*

(2) *How are opportunity beliefs collectively developed in light of a variety of meanings and objectives?*

(3) *How does the development of opportunity beliefs affect the emergence of entrepreneurial opportunities and the emergence of nascent ventures over time?*

1.5 Data set and methodology of this thesis

My study on entrepreneurial opportunity development with communities of inquiry follows a qualitative, inductive, exploratory and process-oriented research methodology. My longitudinal multiple case study is firmly grounded in rich and contemporaneous empirical data, and captures multiple units and levels of analysis, their contextual conditions, and development over time. I combine several sensemaking strategies from the event-driven and outcome-driven perspectives (Langley, 1999) to go beyond surface descriptions and uncover the logic behind the observed temporal progressions, i.e. patterns that are observed to be associated with significant opportunity development outcomes. Research approaches designed to investigate such processes must be non-intrusive, longitudinal, and capable of tracing unfolding changes (Gioia & Chittipeddi, 1991), providing thick descriptions of data on comparable events that are closely connected with empirical reality, and – in line with the constructivist/interpretivist tradition – help understand how entrepreneurial teams construct and understand their experiences in nascent opportunity development (Gioia, Corley, & Hamilton, 2013).

The research setting of this study is an entrepreneurship incubator of a large technical university in a European metropolitan area, hosting nascent technology-oriented entrepreneurial teams whose belief systems about their potential opportunity and how it should be developed are still at an early stage and in flux. Taking a purposive sampling approach, I followed twelve entrepreneurial teams over the period of nine months (twelve months incl. pre- and post-data collection) and collected in-depth real-time and historical data on teams' opportunity development strategies, interactions with communities of inquiry, opportunity belief developments, and progress through the opportunity development process.

Conducting multiple rounds of semi-structured interviews with entrepreneurial teams and members of their communities of inquiry, observing interactions between teams and communities of inquiry, and collecting secondary data allowed me to triangulate my findings, which is imperative in an inductive approach to theory building. I created thorough descriptive and visual case histories that served as the basis for my within-case and cross-comparative case analyses, iterating between the data and my emerging theory until reaching theoretical saturation in my first-order categories, second-order themes and overarching theoretical process dimensions that form the emerging model (Gioia et al., 2013). Finally, I integrated categories, themes, and process steps into a theory of the micro-practices that underpin interactions with communities of inquiry for opportunity belief development, teams' navigation efforts through opportunity development pathways, as well as the antecedents and the outcomes related to those pathways. Chapter 3 of this thesis provides more detail on the research setting and methodology of this study. The next section contains an overview of this thesis' structure.

1.6 Structure of this thesis

This thesis is divided into six chapters. After the introduction presented in this chapter, I proceed to the theoretical context of this study in Chapter 2, introducing the literature on entrepreneurial opportunity beliefs (Chapter 2.1), entrepreneurial action under uncertainty (Chapter 2.2), and the social context of opportunity belief development (Chapter 2.3) which I used to help sensitize my investigation of nascent entrepreneurship.

Subsequently, I will present the research methodology used in this study in Chapter 3, elaborating on the nature of my research strategy (Chapter 3.1), and on the exploratory case study design used in this research (Chapter 3.2). Chapter 3.3 provides an illustration of my data sources and data collection; while in Chapter 3.4, I will outline the approach employed for coding and analyzing the data. Finally, in Chapter 3.5, I will elaborate how I ensure validity and reliability of my analysis.

I will then present my findings. Chapter 4 provides descriptive and visual case histories of individual case teams. For each team, I further provide a corporate profile as a brief introduction to the team and

venture context. The analysis across the cases follows in Chapter 5, in which I will present the most remarkable patterns that have emerged out of the data. Specifically, I will explore entrepreneurial teams' foci of attention in interacting with communities of inquiry to develop opportunity beliefs (Chapter 5.1), the micro-practices that affect entrepreneurial teams' gathering and interpreting of opportunity-related information with communities of inquiry (Chapter 5.2), and the patterns that emerge throughout their collective development of opportunity beliefs and development of opportunities over time (Chapter 5.3). In a final step, I will incorporate my findings into a dynamic model of nascent entrepreneurial teams' opportunity development with communities of inquiry that depicts my theory of the antecedents, processes, and outcomes with regard to the development of opportunities and of nascent entrepreneurial teams (Chapter 5.4).

Chapter 6 concludes this thesis. I will describe my contributions to the literature in Chapter 6.1, presenting the implications for practice in Chapter 6.2. Finally, Chapter 6.3 describes the limitations of this study and discusses avenues for future research.

2 Theoretical foundations

2.1 The nature and formation of entrepreneurial opportunity beliefs

The concept of opportunity beliefs is linked to the "essence of entrepreneurship" (Casson, 1982, p. 14) and is central to strategy and entrepreneurship studies, yet we possess a limited understanding of the influence of opportunity beliefs on the development of entrepreneurial opportunities. As Felin and Zenger (2009) note, opportunity beliefs are the "upstream antecedent" (p. 128) of decision making, action and behavior, and, thus, competitive advantage. And while there is a plethora of research that explores the relationship between opportunity characteristics and outcomes ex post (Eckhardt & Shane, 2003), it is the study of opportunity beliefs that is central in allowing us to understand the true nature of the entrepreneurial experience, which is forward-looking in the face of uncertainty (Dimov, 2007b).

2.1.1 The nature of entrepreneurial opportunity beliefs

A common definition of entrepreneurial opportunities describes them as situations in which new goods, services, raw materials, markets and organizing methods can be introduced through the formation of new means, ends, or means-ends relationships, and sold at greater return than their cost of production (Casson, 1982; Shane & Venkataraman, 2000). This objectivist description of the entrepreneurial opportunity as a stand-alone entity serves to conceptualize an otherwise abstract and fluid phenomenon, the existence of which can only be determined ex post once it has been successfully exploited (Dimov, 2011; Eckhardt & Shane, 2003). As such, to someone aspiring to exploit it, an entrepreneurial opportunity represents a "future situation deemed both desirable and feasible" (Stevenson & Jarillo, 1990, p. 23) despite the unknown range and consequences of actions involved in exploiting it (Shane & Venkataraman, 2000).

To assess whether an opportunity exists, individuals must form future-focused cognitive representations, or opportunity beliefs, about the nature of the potential opportunity and about the involved actions and outcomes if they were to exploit it (Haynie, Shepherd, & McMullen, 2009). These beliefs inform the level of uncertainty that individuals perceive about a potential opportunity as well as their willingness to bear this uncertainty, which ultimately regulates entrepreneurial action (McMullen & Shepherd, 2006). As opportunities are distinguished from mere ideas by requiring action in the face of uncertainty (Dimov, 2007b), and as opportunity beliefs facilitate and inhibit action, individuals' beliefs, then, determine the manifestation of entrepreneurial opportunities over time (Dimov, 2011). Studying entrepreneurial opportunities in the context of opportunity beliefs can help explaining why and how opportunities take shape among the abundance of possible ideas and courses of action, from their conception and along the process of their pursuit.

Yet, whereas the concept of belief is quite simply defined as the "conviction that certain things are true" (Neufeldt & Sparks, 1995, p. 55), opportunity beliefs are embedded within contexts of particularly high uncertainty and concern information that doesn't yet exist (Barreto, 2012; Dimov, 2007b), which represents both the appeal and the challenge of their study. Opportunity beliefs can be understood as mental models by which individuals make sense of their surroundings (Klimoski & Mohammed, 1994). A plethora of cognitive terminology has been employed to concepts relating to mental models, such as cognitive maps (e.g. Dimov, 2007b; Fiol & Huff, 1992), frames of reference (e.g. Huber, 1991; Huff, 1982), schemas (e.g. Corbett & Hmieleski, 2007; Haynie et al., 2009), scripts (e.g. Gioia & Poole, 1984; Smith, Mitchell, & Mitchell, 2009), templates (Barreto, 2012) and prototypes (Baron & Ensley, 2006). Essentially, mental models are simplified representations of the world, or frameworks of organized knowledge about the attributes of concepts and about the relationships among their attributes (Fiske & Taylor, 1984). They are cognitive constructs developed from existing stocks of knowledge and provide a framework for recognizing and evaluating new information (Shane, 2000).

Individuals form different mental models due to differences in both their knowledge and cognitive abilities for combining information into new ideas (Shane & Venkataraman, 2000), and although mental

models are considered relatively stable, they evolve and vary in accuracy as individuals internalize new experiences and knowledge (Lim & Klein, 2006). Individuals apply mental models to their environment to give it form and meaning (Walsh, 1995) in light of the overwhelming amounts of information and levels of complexity involved in making sense of and navigating uncertain and ill-structured landscapes (Busenitz & Lau, 1996; Mathieu et al., 2000; Walsh, 1988). By forming mental models, individuals generate descriptions of a system's form and purpose, explanations of system functioning, and predictions of future states (Rouse & Morris, 1986; Walsh, 1995). These serve as prototypes against which incoming information is compared (Gioia & Poole, 1984), which reduces the information processing demands of giving the world meaning, as mental models structure existing and new information, screen out information, provide a basis for inference, and act as a guide to an information domain (Klimoski & Mohammed, 1994; Walsh, 1988).

Opportunity beliefs, then, represent mental models about the nature of a potential opportunity, e.g. about the value and cost of resources and resource combinations, the nature and expectations of market participants, about financial returns and the envisioned pathways by which they are obtained, and about the value and cost of alternatives (Felin & Zenger, 2009; McCann & Vroom, 2015; Shane & Venkataraman, 2000; Wood & McKelvie, 2015). Based on these subjective representations of the environment (Dutton & Jackson, 1987; Lim & Klein, 2006), aspiring entrepreneurs make judgements and assess courses of action (McMullen & Shepherd, 2006) which affects their behaviors, decisions, and strategy (Walsh, 1988).

A number of frameworks attempt to explain the process of opportunity emergence, discussing beliefs to the extent of their role within broader theories of the opportunity construct (see table 1). These vary by the ontological perspectives taken and frameworks used to describe the stages and mechanisms driving the conception and pursuit of entrepreneurial opportunities. The two ontological accounts of the nature of entrepreneurial opportunities argue that opportunities either exist independently in the environment, "waiting" to be discovered and being so as a function of individuals' prior knowledge and alertness, which represents an objectivist or social realist perspective (e.g. Baron, 2007; Kirzner, 1997; Shane

& Venkataraman, 2000), or that opportunities are created on the basis of the entrepreneur's enactment and social sensemaking, taking an interpretive or social constructionist perspective (e.g. Sarasvathy, 2001; Wood & McKinley, 2010). Table 2 summarizes the fundamental premises and main differences between these two contrasting ontological positions. The processual implications of different opportunity conceptualizations are that the social realist view understands opportunity emergence as distinctive phases of discovery, evaluation, and exploitation (Shane & Venkataraman, 2000), while entrepreneurs in the social constructionist view (intentionally or unintentionally) act, which triggers sensemaking processes between them and their social environment, the outcomes of which inform their subsequent actions (Alvarez & Barney, 2007). Most importantly, between the perspectives the role of opportunity beliefs in opportunity emergence differs along three dimensions: (1) the existence of an objective reality that discerns whether beliefs are true or not; (2) the order of belief formation and action; and (3) the extent to which the mental models of entrepreneurs' social ties and shifts therein are involved in the processes of belief formation.

2.1.2 The formation of entrepreneurial opportunity beliefs

While the ontology of opportunities has sparked an ongoing philosophical debate (Dimov, 2011), the formation of opportunity beliefs and particularly their heterogeneity among individuals has drawn much less attention in the entrepreneurship literature (Felin & Zenger, 2009). For instance, Shepherd et al. (2007) write that "although (opportunity) beliefs are becoming increasingly recognized as fundamental to understanding entrepreneurial cognition and strategic action, little is understood about the mechanisms that are responsible for the formation and evolution of these beliefs" (p. 75). For this reason, scholars have called for research taking a position of epistemological relativism (Mir & Watson, 2000), i.e. the micro level study of how individuals perceive their environment, create interpretations and meaning from it, conceive of future possibilities within it, and form heterogeneous beliefs about the future (Dimov, 2007a). This represents a relatively new research stream considering that traditionally, research on opportunity beliefs almost exclusively took the perspective of managers

TABLE 1: Conceptualizations of opportunity emergence

Author(s)	Ontological perspective	Stages of opportunity emergence	Antecedents and mechanisms affecting opportunity emergence	Role of opportunity beliefs in entrepreneurial action	Role of the entrepreneur in opportunity emergence
Ardichvili et al. (2003)	Objectivist / realist (discovery)	Opportunity **recognition** from perceived market needs and underemployed resources, discovering a fit between them, and creating a fit in form of a **business concept**; which is iteratively developed into a **business plan**, up to **business formation**.	Opportunity recognition and development affected by **personality traits** (including optimism, self-efficacy, and creativity), **prior knowledge**, **social networks**, **entrepreneurial alertness**, and **opportunity type**.	Opportunity beliefs conceptualized as **business concepts** and **business plans**, **self-efficacy beliefs** increase entrepreneurial optimism and the propensity to identify opportunities.	Entrepreneurs **continuously evaluate** the opportunity i.e. make predictions and adjust vision if necessary.
Shane & Venkataraman (2000)	Objectivist / realist (discovery)	Opportunities emerge through the processes of **opportunity discovery, opportunity evaluation,** and **opportunity exploitation**.	Opportunity discovery as a function of **asymmetries in prior beliefs, prior knowledge, and cognitive mechanisms**; **individual differences** (in perceptions, optimism, self-efficacy, locus of control, and need for achievement) as well as the **nature of the opportunity** influence exploitation.	Beliefs about the **value of resources** as a basis of opportunity discovery, beliefs about **opportunity costs** as a basis of opportunity exploitation.	**Individual differences** in knowledge, cognition and personality affect why, when, and how some people and not others discover and exploit opportunities.
Sarasvathy (2001)	Social constructivist (creation)	Opportunities are **effectuated** i.e. individuals' given **means** allow them to identify contingencies for potential opportunities for profit, that involve **creating new markets** through **social interactions** among decision makers.	Opportunity creation is affected by individuals' **given means** (traits, knowledge, social capital), by **heuristics** applied to overcome true uncertainty, by the **strategic alliances** being sought, by the **controllable aspects** of the environment being focused on (affordable loss), and by the **surprises** being leveraged (or not).	Decision makers' underlying beliefs about the **uncertainty of future phenomena** impact their decision making strategies.	Entrepreneurs engage in an **iterative learning process** that might ultimately lead to the formation of an opportunity.
Wood & McKinley (2010)	Social constructivist (creation)	**Conceptualization** of an idea (envisioned futures); followed by the **objectification** of the idea (choice among potential futures triggers cognitive shift that commits to action, represents the initiation of an opportunity); and leading to iterative opportunity **enactment** (between a coalition of stakeholders).	**Social sensemaking** and consensus among knowledgeable and trustworthy peers determine opportunity objectification or abandonment; objectified opportunity **channels behavior** aimed at **reducing ambiguity**; **social ties** and **reputation** facilitate **social consensus building** during opportunity enactment.	Opportunities defined as **objectively institutionalized belief systems**; entrepreneurs' beliefs conceptualized as a "**viability cognition**" that **determines agency**, subsequently **agency determines social construction**.	Entrepreneurs do not predict the future but focus on the elements of the **social structure** and **environment** that they can **control**.
Dutta & Crossan (2005)	Consolidation and extension (learning)	Opportunities **dynamically emerge** as entrepreneurs engage with them and learn; starting by **intuiting** patterns and possibilities, **interpreting** these with a social audience, and **integrating** individual mental models into shared belief systems, which are **institutionalized** as the opportunity emerges.	Opportunity emergence has both a **positivist/realist** (or cognitive) side and an **interpretive** (or situated) side; learning outcomes depend on **expert intuition** (past-oriented, cognitive, i.e. Kirznerian) and **entrepreneurial intuition** (future-oriented, creative, Schumpeterian), as well as on **feedback-learning and feedforward-learning** (individual and organizational)	Moving from intuiting to interpreting (and subsequent stages) involves the belief that an **idea holds promise**; individual beliefs are integrated into **shared belief systems**.	Entrepreneurs engage with opportunities via **individual and social learning processes**.
Barreto (2012)	Consolidation and extension (interpretation)	**Exogenous or endogenous shocks** draw cognitive attention without search or via undirected search; **interpretation** of new information is done via existing opportunity templates and triggers different **types of entrepreneurial action (interpretative absorption, directed search, or directed action),** depending on level of perceived ignorance (equivocal, unknown missing or unknowable missing information).	**Limited attention** determines which shocks are tended to; **existing opportunity templates** and **cognitive mechanisms** (selective attention, gap filling) affect the interpretation of opportunities amidst equivocality and missing information; **level of perceived ignorance** and **interpretative resolution** (i.e. fit between new information and existing opportunity templates) determine whether and which action is taken.	Opportunity beliefs conceptualized as **opportunity interpretations** regarding **feasibility** and **desirability**; level of interpretative resolution determines **perceived ignorance and confidence**, and thus determines action (i.e. exploitation).	**Individual cognition**, i.e. issue interpretation and attention, drives entrepreneurial action; opportunities are **constructed** by a balancing act between **passive perceptions** and **active development**.

TABLE 2: Ontological perspectives on the nature of entrepreneurial opportunities

	Sources of opportunities	Relationship between belief formation and entrepreneurial action	Role of social ties
Discovery perspective **(objectivist / (social) realist)**	• Opportunities **exist independently** in the environment, waiting to be discovered (e.g. Baron, 2007; Kirzner, 1997; Shane & Venkataraman, 2000) • Entrepreneurs form beliefs about the **value of resources** or **resource combinations** (Kirzner, 1997), the **cost of obtaining** these resources (Shane & Venkataraman, 2000), about other **market participants' expectations**, and about the **premiums for bearing uncertainty** (Kirzner, 1973) • **Exogenous shocks** (Alvarez & Barney, 2007), i.e. **technological, regulatory, political, social, or demographic changes** (Kirzner, 1973; Shane, 2003) create opportunities • Opportunities also emerge out of entrepreneurial actors' **internal creative disposition** by which they innovate and disturb the economic equilibrium during times of uncertainty and technological change (Schumpeter, 1934) • New information generated by exogenous shocks enables the **estimation of the opportunity's expected value** (Shane & Venkataraman, 2000) • The predictability of outcomes is not entirely opaque (i.e. not entirely uncertain), i.e. **risky decision-making context** (Alvarez & Barney, 2007; Dimov, 2011)	• **Belief formation** precedes and determines **entrepreneurial action** (McMullen & Shepherd, 2006) • **Idiosyncratic prior knowledge** and **individual differences in cognition** affect the beliefs that are formed from new information (McMullen & Shepherd, 2006; Shepherd et al., 2007) • New information is obtained through **search** or **recognition** (Barreto, 2012) • Theories of recognition: **alertness** leads entrepreneurs to recognize the value of new information (Kirzner, 1997) since one is not able to search for something one doesn't know exists (Kaish & Gilad, 1991) • Theories of search: discovery is caused by **superior information processing ability**, **search techniques**, or **scanning behavior** (e.g. Fiet, 2007; Ozgen & Baron, 2007; Shaver & Scott, 1992) • After discovery, entrepreneurs **evaluate** opportunities (and adjust beliefs) by collecting new information to decide whether to **exploit or discard** it (Shane & Venkataraman, 2000)	• Channel through which **information** about a dormant or detected opportunity **flows toward the entrepreneur** (Greve & Salaff, 2003; Shane, 2000) • Provide information that potentially **shapes entrepreneurs' mental models** (Wood & McKinley, 2010) • **Facilitate the discovery and evaluation** of opportunities (Ozgen & Baron, 2007; Shane, 2003) • **Facilitate exploitation** by shaping individuals' cognition and behavior, specifically enhancing **illusion of control** which is directly related to the progress of new venture creation (De Carolis, Litzky, & Eddleston, 2009)
Creation perspective **(interpretive / social constructivist)**	• Opportunities are created on the basis of the entrepreneur's **situated interpretations and enactment** (e.g. Weick, 1979b; Wood & McKinley, 2010) • **Endogenous shocks** (Alvarez & Barney, 2007), i.e. **socially constructed** by the focal actor and other relevant peers through a chain of action and reaction (Weick, 1979b) create opportunities • Entrepreneurs' **actions become part of the truth** (Baker & Nelson, 2005; Sarasvathy, 2001)	• **Action and social sensemaking** precede and determine **belief formation** (Sanz-Velasco, 2006) • Individuals **act without having formed clear or coherent, or any, beliefs** about a possible opportunity at hand (Dimov, 2007a; Dutta & Crossan, 2005) • **No search** is involved, since opportunities do not objectively exist; opportunities might even stem from **blind variation** as entrepreneurs instead **act and observe market responses to form beliefs** (Alvarez & Barney, 2007) • **Beliefs** regarding the **uncertainty of future phenomena** determines the **decision making strategies** applied (Sarasvathy, 2001)	• **Flow of information** from the entrepreneur **toward social ties** (Wood & McKinley, 2010) • **Uncertainty reduction** primarily takes place on the **stakeholders' side**, rather than the entrepreneur's (Dimov, 2007b) • **Social ties' mental models** are shaped by entrepreneurs' actions (Wood & McKinley, 2010) • **Congruence of mental models** helps persuade entrepreneurs of the feasibility of an opportunity and thus support the **entrepreneur's confidence** (Dimov, 2010)

in established organizations categorizing environmental stimuli as opportunities vs. threats (Wood & McKelvie, 2015). In the following, I build on frameworks of action, cognitive search, learning and creativity to shed light on the formation of opportunity beliefs as a multi-stage process involving both objective and subjective elements of discovery and enactment. Whether and which opportunity beliefs are formed is a function of knowledge-related (experience, observation, and information), cognition-related (attention, creativity, and learning style), and motivation-related factors, as well as the opportunity idea type (divergent or convergent), and sensemaking processes (i.e. dialogue by which thoughts are made explicit). The variety of involved elements and processes explains the highly heterogeneous nature of opportunity beliefs that two individuals will form, even when resembling each other in a number of factors.

The formation of opportunity beliefs in the context of action

As McMullen and Shepherd (2006) explain, "many economic theories of the entrepreneur that are so influential to management theory today are, at their core, theories of action that are laden with ontological assumptions" (p. 146). Emphasizing the role that opportunity beliefs play in regulating action in the face of uncertainty, the authors formulate a two-stage conceptual model of the emergence of entrepreneurial opportunities. Uncertainty, according to their framework, "prevents action by obfuscating (1) the need or possibility for action, (2) the knowledge of what to do, and (3) whether the potential reward of action is worth the potential cost" (McMullen & Shepherd, 2006, p. 139). Radical uncertainty is overcome in the attention stage where individuals' unique stocks of knowledge and their motivation, attitude and self-efficacy toward an entrepreneurial career allow them to detect cues from the environment and form third-person opportunity beliefs, or the belief that a possible opportunity exists for someone in the marketplace. After the discovery of this third-person opportunity, individuals engage in an evaluation stage in which their available stock of knowledge and information informs their beliefs about the feasibility of the potential opportunity, regulating the amount of uncertainty they perceive. At the same time, their motivation, attitude and self-efficacy affect their beliefs about the desirability of the potential opportunity, regulating their willingness to bear uncertainty and act. If

individuals' beliefs reduce the level of perceived uncertainty below a threshold they are willing to bear, they form first-person opportunity beliefs, i.e. the belief that an opportunity exists for the individual and the intention to personally exploit it (McMullen & Shepherd, 2006).

In their subsequent work, Shepherd et al. (2007) elaborate on the cognitive processes of belief formation and argue that in both the attention and the evaluation stage, individuals allocate their limited attentional capacity toward the environment in different ways. The same knowledge stocks and levels of motivation could lead to differing opportunity beliefs among individuals, as they incorporate new information from the environment into their existing belief systems in a way that creates a new "seamless, 'coherent' whole" (p. 79). In assessing whether they will act on a potential opportunity, the authors postulate, individuals allocate attention by one of two cognitive strategies: they either focus attention on drawing inferences from new environmental information, and extensively match these with their existing knowledge structures to inform opportunity beliefs (bottom-up allocation of attention), or extensively draw on their existing knowledge structures to build representations of the environment, which for the purpose of informing beliefs are then only distantly matched with the inferences made from raw data (top-down allocation of attention). Not only does the choice of attention allocation mechanism affect the content of resulting opportunity beliefs, but also the speed and cognitive effort of developing them. For instance, forming beliefs by means of top-down attention allocation increases the speed and reduces the effort of belief formation, yet increases the risk of blindness toward environmental complexity, volatility and risk (Shepherd et al., 2007). The formation of beliefs in the context of entrepreneurial action is therefore discussed in terms of the antecedents, stages, and cognitive processes of belief formation.

The formation of opportunity beliefs in the context of cognitive search

Another framework, and to the best of my knowledge the only other framework, that conceptualizes belief formation directly, is the concept of entrepreneurial theorizing (Felin & Zenger, 2009). In contrast to the action model, it emphasizes the need to view belief formation as an abductive process, arguing that opportunity beliefs typically "extend beyond one's experience and observations" (p. 130) and are

bootstrapped from fragmented information. Experience and perception provide the "raw material" for belief formation, but do not play a causal role in it; instead, they trigger the imagination of possibilities, where individuals engage in cognitive search i.e. in creative ideational processes such as cognitive trial and error experiments (Gavetti & Levinthal, 2000) or mental simulations (Gaglio, 2004; Haynie et al., 2009). According to the framework, the imagination of possibilities provides individuals with learning opportunities and guidance, effectively enabling them to create an entrepreneurial possibility space. The elements within this possibility space are then assessed during the stage of reasoning and justification, where individuals assess, weigh, discard and select from imagined elements, form opportunity beliefs, and develop the intention to act (Felin & Zenger, 2009). The entrepreneurial theorizing framework therefore adds to the action theory by introducing the importance of forward-looking, abductive cognitive mechanisms in belief development.

The emergence of opportunities in the context of learning and creativity, and implications for the formation of opportunity beliefs

To overcome the scarcity of scholarly theorizing, it is useful to draw on broader models of opportunity emergence to further understand the elements and processes involved in opportunity belief formation. These models build on the notion of opportunity ideas, which are defined as envisioned futures (Shackle, 1979) that contain a collection of specific beliefs (Dimov, 2011) and are, in themselves, creative end products (Dimov, 2007a). In this sense, they are comparable to the notion of third-person opportunity beliefs (McMullen & Shepherd, 2006), inherently implying an intention to act, although they do not capture the tension to make that future envisioned reality come true (Dimov, 2007a).

A number of frameworks describe the formation of opportunity ideas as a social learning process, in which ideas are formed from individuals' experience, environmental stimuli that provide a basis for learning, and social sensemaking activities (e.g. Corbett, 2005; Dutta & Crossan, 2005; Gemmell et al., 2012). Learning, in these frameworks, is understood as a "combination of stocks and flows of knowledge" that occurs at the intersection of cognition and action (Dutta & Crossan, 2005, p. 433). After an initial insight is intuited by the recognition of patterns or possibilities at a preconscious level within

the mind (the intuition stage), individuals begin interpreting the insight by engaging in a process of sensemaking and enactment to bring this understanding to the conscious level (the interpretation stage) (Dutta & Crossan, 2005). Interpreting, more specifically, entails developing a shared understanding with the world outside of the entrepreneur, on the basis of social interactions in which the entrepreneur explains and defends the idea and sharpens the interpretation. This sensemaking activity, being highly subjective, inevitably varies among individuals since "small differences in the metaphors employed and the ways in which conversations unfold and language develops may ultimately result in great differences in where the company ends up" (Crossan, Lane, & White, 1999, pp. 527–528). The learning framework therefore highlights the dynamic nature of opportunity belief formation, unfolding as entrepreneurs engage with their social environment (Dutta & Crossan, 2005). Individuals then interpret the same stimulus differently on the basis of the complexity of knowledge that they hold about a domain, and their cognitive capabilities in forming new connections. The latter involves both the recognition of patterns from existing knowledge (expert intuition), primarily shaping the formation of initial insights, as well as the creative capacity to recognize gaps and to identify future possibilities (entrepreneurial intuition), which primarily determines the way that individuals engage in social sensemaking during the interpretation stage (Dutta & Crossan, 2005).

Dimov (2007b) draws on Kolb's (1984) experiental learning theory to postulate that the shift from the intuition stage to the interpretation stage is essentially an intentions-driven process. The author introduces the necessity of a situation-learning match, for individuals to form opportunity ideas and intentions to act from their initial creative insights. This match involves the type of insight situation, which is typically either convergent (having to make sense out of apparently disconnected facts) or divergent (having to generate possibilities that one might not ordinarily consider), and which needs to fit the individuals' idiosyncratic learning style to facilitate action (Dimov, 2007b). Since opportunity recognition is inherently a creative process (Lumpkin, Hills, & Shrader, 2004), a number of frameworks trace the formation of heterogeneous opportunity ideas to the sub-processes of creativity and how they relate to learning asymmetries. For instance, Corbett (2005) builds on Lumpkin et al.'s (2004) creativity-based model of opportunity recognition and maps the creative sub-processes of preparation, incubation

and evaluation against Kolb's (1984) experiental learning styles. According to the model, individuals' idiosyncratic learning styles and subsequent learning asymmetries provide multiple leverage points along the creative sub-processes for heterogeneous ideas and beliefs to emerge. For instance, individuals with a convergent learning style (primarily learning by doing and thinking) should be better equipped (and therefore achieve different results) when conceiving initial opportunity ideas during the preparation stage, while those with a divergent learning preference (primarily learning by watching and feeling) should be better equipped to test the feasibility of ideas by engaging stakeholders in the evaluation stage (Corbett, 2005).

Hence, whereas the action framework focuses on the cognitive process of incorporating new information into existing knowledge structures under limited attentional capacity, the learning framework of opportunity emergence places particular emphasis on individuals' learning asymmetries, which produce different types of new knowledge from experience (Corbett, 2007), and different intentions to act depending on the context in which new knowledge is formed (i.e. the type of insight situation and social sensemaking interactions).

2.1.3 The heterogeneity of entrepreneurial opportunity beliefs

Within the entrepreneurship literature, the heterogeneity of opportunity beliefs between individuals has been associated with differences in prior knowledge, particularly with regard to the specificity of their human capital i.e. the relatedness of their education, experience, knowledge and skills to potential opportunities (Unger, Rauch, Frese, & Rosenbusch, 2011). Essentially, possessing prior knowledge that is specific to a potential opportunity has been found to enhance the richness and accuracy of mental maps (Baron, 2006; Baron & Ensley, 2006), facilitating individuals' capability to make sense of problems (Ravasi & Turati, 2005), and to increase the divergence within the entrepreneurial possibility space (Chi, Feltovich, & Glaser, 1981), which provides individuals with a greater opportunity set (Gimeno, Folta, Cooper, & Woo, 1997). Individuals with specific prior knowledge are therefore more likely to conceive of both creative and pragmatic solutions, affecting their capacity to form third-person

opportunity beliefs, as well as their ideas and judgements when contemplating first-person entrepreneurial action (Colombo & Grilli, 2005; Dimov, 2010; Shepherd & DeTienne, 2005).

How different types of knowledge affect individuals' opportunity beliefs has, for example, been explored by Shane (2000) who conducted in-depth case studies on the relationship between different dimensions of individuals' prior knowledge and their entrepreneurial efforts, and found that prior knowledge establishes a knowledge corridor or cognitive pathway (Venkataraman, 1997) through which individuals perceive and imagine reality when observing technological innovations. In particular, their prior knowledge of markets, of ways to serve markets, and of customer problems shape the opportunity beliefs they form, whether they are actively searching for opportunities or not (Kirzner, 1997). Moreover, Shepherd and DeTienne (2005) employ an experimental study to show that knowledge of customer problems leads individuals to form opportunity beliefs that are likely to demonstrate higher levels of creativity and innovativeness, and argue that prior knowledge allows individuals to focus on the most important dimensions of the available information and to process this information in a more efficient manner. This relates to the finding that market knowledge allows individuals to draw meaningful parallels or connect the dots between causes and effects of problems in markets and the structurally relevant capabilities of new technologies, as shown by Grégoire et al.'s (2010) examination of entrepreneurs' think-aloud protocols. Similarly, Prandelli, Pasquini, and Verona (2016) found that market knowledge facilitates user perspective-taking, a cognitive skill which enhances a bisociative mode of thinking and thereby helps individuals leverage technical knowledge by allowing to make connections among previously not related ideas and produce creative solutions.

Distinguishing between the formation of third-person and first-person opportunity beliefs, Autio et al. (2013) explore potential entrepreneurs' exposure to different information domains and found that technological and demand-related knowledge influence different stages of the belief formation process. By exploring 19 potential entrepreneurs' participation in several information communities, their study revealed that technological knowledge primarily facilitates the formation of third-person opportunity beliefs, while demand-related knowledge facilitates the formation of first-person opportunity beliefs

and, thus, entrepreneurial action. Hence, while people with specific technical knowledge are generally better equipped to discover initial technical ideas (Corbett, 2002), market-related knowledge specifically shapes the nature of the opportunity beliefs that are formed, and affects whether they lead individuals to overcome uncertainty and act.

How prior knowledge influences perceived uncertainty in general is corroborated by a number of studies that have established the effect of knowledge relatedness on opportunity attractiveness, i.e. forming more positive opportunity beliefs (e.g. Gemmell et al., 2012; Mitchell & Shepherd, 2010; Wood et al., 2014). For instance, Haynie et al. (2009) analyze more than 2300 opportunity evaluation decisions in a sample of 73 entrepreneurs, finding that entrepreneurs are attracted to opportunities that are complementary to their existing knowledge resources. Further, building on a 2x2 within-subject experiment with 149 entrepreneurs, Grégoire and Shepherd (2012) shed light on the role of both knowledge and motivation in entrepreneurial action. Their study provides evidence that prior knowledge of technologies and markets as well as higher levels of entrepreneurial intent lead individuals to form more positive beliefs about nonobvious opportunities, i.e. those where target technologies and target markets demonstrate low superficial similarity but high structural similarity. Studying individuals' decisions to exploit potential opportunities, Choi and Shepherd (2004) found knowledge of customer demands to be one of several factors increasing the attractiveness of opportunities, especially if the product is believed to have a long lead time. Their survey of 68 incubator entrepreneurs further showed that opportunities were believed to be more attractive when individuals perceived enabling technologies to be sufficiently evolved, themselves to possess high managerial capabilities, and stakeholders to strongly support full-scale operations.

The role of prior knowledge has also been explored in terms of learning, such as Dimov's (2007b) experimental study of 95 MBA students judging opportunity scenarios. The author found evidence that prior knowledge promotes the formation of first-person opportunity beliefs i.e. intentions to act, particularly when individuals' learning style (divergent vs. convergent) matches the type of insight situation (divergent or demand-driven vs. convergent or supply-driven). In these cases, individuals'

mental maps can help reveal informational gaps that require attention and, more importantly, help conceive of solutions to fill these gaps, which increases perceived control of the situation, and positively affects feasibility and desirability assessments. Further underlining the role of learning styles, Corbett (2007) performed quasi-experiments with 380 technology-based founders, top management team members, engineers, and researchers to study learning mechanisms in opportunity recognition, revealing that in a supply-driven scenario, prior knowledge combined with a convergent learning style facilitates the formation of third-person opportunity beliefs. The impact of learning style on belief formation also emerges within research on creativity and problem solving, where it has been shown that prior knowledge might equally create mental ruts and impede creativity in opportunity recognition if not matched with appropriate learning styles (Larrañeta, Zahra, & González, 2012; Shepherd & DeTienne, 2005; Ward, 2004).

Furthermore, research on heuristics and biases helps understand how differences in thinking affect belief formation. Bias and the use of heuristics are an integral part of entrepreneurial cognition which is defined as "the knowledge structures that people use to make assessments, judgments, or decisions involving opportunity evaluation, venture creation, and growth" (Mitchell et al., 2002, p. 97). Due to the condition of uncertainty, entrepreneurial action itself relies on the use of heuristics and cognitive biases i.e. mental shortcuts that can potentially lead to fundamental errors in judgment (Simon, Houghton, & Lumpkin, 2007). For example, where a forecasting event is novel and uncertain, entrepreneurs typically employ limited evaluation criteria, and exhibit greater illusion of control, greater overconfidence in prediction, and higher risk propensity (Busenitz & Barney, 1997; Cassar, 2010; Keh, Der Foo, & Lim, 2002; Simon, Houghton, & Aquino, 2000). While entrepreneurs are more likely to demonstrate cognitive biases and apply heuristics in general (Busenitz & Barney, 1997; Holcomb, Ireland, Holmes Jr., & Hitt, 2009), particular individuals might be more or less prone to fall victim to them during belief formation. For instance, Ozgen and Baron (2007) find that the more information about a particular domain individuals possess, the greater will be their confidence that they can operate successfully in it. This seems to be mitigated by knowledge of industries, which has been found to actually increase forecast accuracy by lowering overoptimism bias, particularly in highly uncertain environments (Cassar, 2014). On another

note, hindsight bias has been shown to impede learning from prior experience (Cassar & Craig, 2009), which implies that the success rate of prior entrepreneurial endeavors might affect how potential entrepreneurs form new opportunity beliefs. Specifically, evidence suggests that the returns from prior entrepreneurial endeavors influence judgments and beliefs about new opportunities, by anchoring individuals' expectations about potential returns to those that were experienced in previous efforts (Lévesque & Schade, 2005).

Regardless of bias, individuals' coping mechanisms have also been found to affect how they learn from prior entrepreneurial experiences and form new beliefs, as well as the amount of time passed since failure occurred (Shepherd, Patzelt, & Wolfe, 2011). To further explore the role of time in the formation of opportunity beliefs, Tumasjan, Welpe, and Spörrle (2013) take a forward-looking instead of backward-looking perspective, and find that feasibility and desirability assessments of opportunity exploitation carry varying levels of weight in overall belief formation, depending on the perceived temporal distance between evaluation and exploitation. While other experimental studies have found that feasibility and desirability exert about the same levels of influence on decision makers to act on entrepreneurial opportunities (Haynie et al., 2009; Mitchell & Shepherd, 2010), their experimental study of 88 entrepreneurs showed that when exploitation is expected in the near rather than the distant future, entrepreneurs' first-person opportunity beliefs are influenced more strongly by their feasibility characteristics than by their desirability characteristics, and vice versa. To conclude the investigation of the reasons that individuals form heterogeneous opportunity beliefs, research on the role of emotion in opportunity evaluation has found that fear reduces potential opportunities' perceived attractiveness (Mitchell & Shepherd, 2010; Welpe, Spörrle, Grichnik, Michl, & Audretsch, 2012), while joy, passion and anger increase its attractiveness and the likelihood of entrepreneurial action (Klaukien, Shepherd, & Patzelt, 2013; Welpe et al., 2012).

So far, I have explored the ontological conceptualizations of opportunity beliefs and the epistemological models of the antecedents and mechanisms involved in their formation process, when individuals assess whether a potential opportunity is at hand for them to exploit. By considering the empirical findings

presented in this section, I have now been able to draw insights about specific levers within this process that contribute to further variation among individuals when making sense of the same stimuli.

2.2 Opportunity emergence and the development of opportunity beliefs

The emergence of entrepreneurial opportunities relies on the "shift from cognitions to actions" (Wood & McKelvie, 2015, p. 258), which describes the milestone when enough information has been accumulated to inform individuals' feasibility and desirability beliefs in such a way that individuals can overcome an ignorance threshold, so that their intention to act is translated into actual entrepreneurial action in the pursuit to exploit a potential opportunity (Choi, Lévesque, & Shepherd, 2008). Opportunity exploitation refers to the activities and investments committed to achieve returns from the new product arising from the opportunity (Choi & Shepherd, 2004), including the mobilization of resources (Foss et al., 2013; Wood & McKelvie, 2015), gaining stakeholder support (Rasmussen, Mosey, & Wright, 2011), building full-scale operations for new products or services (Choi et al., 2008), and establishing market transactions (Dimov, 2011).

The exploitation process itself, however, involves an ongoing tension between cognition and action, since opportunities are essentially "a stream of continuously developed ideas, driven and shaped by one's social interaction, creative insights, and action at each stage" (Dimov, 2007a, p. 718), in which ideas are constantly "elaborated, refined, changed, or even discarded' (p. 714). Entrepreneurs must translate ill-defined concepts based on poorly understood demand contexts into viable business models (Amit & Zott, 2001; Rasmussen et al., 2011), which requires producing new knowledge to reduce uncertainty (McCann & Vroom, 2015). This concerns the variety of issues in establishing technical and market feasibility, e.g. understanding contexts of use and the functional implications of alternative solutions (Anderson & Tushman, 1990; Ravasi & Turati, 2005), and further understanding the motivations, expectations and likely behaviors of external actors (McCann & Vroom, 2015). For this purpose, entrepreneurs search for additional information (Dimov, 2007a; Ravasi & Turati, 2005) and engage and organize other social actors (Dutta & Crossan, 2005) to gradually make sense of connections

between domains (Ravasi & Turati, 2005). By carrying out these gestation activities (Davidsson & Honig, 2003) entrepreneurs iteratively shape and refine opportunity beliefs (Dimov, 2007b; Shepherd, 2015), which prompts them to continuously evaluate and adjust courses of action (Ardichvili et al., 2003; Dimov, 2010; Frese, 2009). This eventually defines the final contours of the opportunity (Dimov, 2007a).

Studying opportunity belief development (or refinement) in the context of nascent entrepreneurship represents a distinct unit of analysis (Davidsson & Wiklund, 2001), pertaining to the activities of individuals considering starting their own businesses that lead to and influence the process of venture emergence (Carter, Gartner, & Reynolds, 1996; Ucbasaran, Wright, Westhead, & Busenitz, 2003). While opportunity exploitation research mainly focuses on the antecedents that increase the likelihood for achieving commercialization and profits (McCann & Vroom, 2015), the concept of nascent entrepreneurship captures the journey from idea inception toward opportunity exploitation, a stream of research that is still emerging (Davidsson & Honig, 2003; Rasmussen et al., 2011). Nascent entrepreneurship is characterized by significant levels of uncertainty (Dimov, 2007b; McCann & Vroom, 2015), and the fact that entrepreneurs cannot possess all information necessary to exploit opportunities (Mosey & Wright, 2007; Rasmussen et al., 2011; Ravasi & Turati, 2005), which is why they involve a range of stakeholders whose knowledge and skills are complementary to the entrepreneurs' (Ravasi & Turati, 2005). They also typically assemble a team (Klotz et al., 2014) that usually operates without shared experience regarding the specific opportunity, only current information (Brush, Greene, & Hart, 2001). Beyond the fact that nascent entrepreneurs operate under scarcity of time, money and attention (Ravasi & Turati, 2005), they often pursue opportunities in parallel to other endeavors (Dimov, 2010), understandably so as their actions throughout exploitation might very well lead to the development of beliefs that venturing efforts should be terminated (Dimov, 2010; Ravasi & Turati, 2005). In case of intensifying commitment, however, entrepreneurs gradually create a "more complex organization of actors, resources, and stakeholders [that is] intertwined with the experience, judgment, and actions of the nascent entrepreneur" (Dimov, 2010, pp. 1126–1127). The nascent entrepreneurship phase therefore encompasses both the processes of creating products and organizations

(Pavia, 1991) and is widely understood to conclude in the establishment of market transactions in form of sales or pilot customers (Eckhardt & Shane, 2003). This has also been conceptualized as the pre-launch phase (vs. the subsequent launch and post-launch phases) (Baron & Shane, 2007).

2.2.1 Nascent entrepreneurship and uncertainty

Understanding opportunity belief development in nascent entrepreneurship requires understanding the role of uncertainty, as it affects the nascent entrepreneurial context on the industry level, firm level, and personal level (Gelderen, Frese, & Thurik, 2000) and is what separates entrepreneurial action from mere action (McKelvie, Haynie, & Gustavsson, 2011). Essentially, uncertainty describes a state in which the probability of future outcomes is unknowable (Alvarez & Barney, 2005; Knight, 1921), and is defined on the individual level by Milliken (1987) as "an individual's perceived inability to predict something accurately" (p. 136) depending on the perceived lack of sufficient information. Uncertainty represents a belief in its own right, since it represents a subjective experience instead of an objective state (Milliken, 1987).

Like the majority of scholars (McKelvie et al., 2011; Song & Montoya-Weiss, 2001), Milliken focuses on environmental uncertainty, or the perceived inability to predict environmental conditions (Miles & Snow, 1978), and differentiates between three types (state, effect, and response uncertainty), suggesting that each type may have different implications for sensemaking and, ultimately, behavior (McKelvie et al., 2011). Accordingly, state uncertainty describes individuals' perceived inability to predict environmental states and particularly to understand how the components of the environment are changing. Effect uncertainty describes the perceived inability to predict how changes in the environment will influence the individual. Lastly, response uncertainty describes the perceived range of response options when facing a changing environment, and the perceived inability to predict the consequences of these response choices (Milliken, 1987). Response uncertainty has been described as the central inhibitor of action by some studies (Autio et al., 2013; McKelvie et al., 2011), while most focus on state

uncertainty (Delmar & Shane, 2003; Liao & Gartner, 2006; McCann & Vroom, 2015). Yet others emphasize that all forms delay or bock action (McMullen & Shepherd, 2006).

In exploring the role of state uncertainty, a number of studies (Choi & Shepherd, 2004; Song & Montoya-Weiss, 2001) distinguish between uncertainty regarding changes in technologies and changes in user preferences, which are traditionally either addressed by the innovation literature or the opportunity discovery literature (McKelvie et al., 2011). Uncertainty regarding user preferences, more broadly termed market uncertainty, specifically consists of three dimensions: demand uncertainty (relating to the perceived market demand for the envisioned solution), product uncertainty (relating to the perceived attractiveness of the solution in comparison to other solutions in potential customers' eyes), and supplier uncertainty (representing the perceived legitimacy of an individual as the supplier of a solution in potential customers' eyes) (Autio et al., 2013). Technological uncertainty, on the other hand, stems from the perceived maturity or applicability of technologies for providing solutions, the perceived necessity for trial-and-error research in their development, and the perceived pace of change (Choi & Shepherd, 2004; Song & Montoya-Weiss, 2001). On a micro level, this relates to the question how and whether "the product can be produced to meet quality (e.g., reliability, durability, etc.) and efficiency (e.g., cost per unit) expectations" (Choi & Shepherd, 2004, p. 380). Entrepreneurs further experience differing degrees of supply uncertainty (not to be mistaken with supplier uncertainty) which involves the operational dimensions necessary to develop solutions (Wernerfelt & Karnani, 1987), as well as task uncertainty, competitive and resource uncertainty (Song & Montoya-Weiss, 2001), and uncertainty regarding the behavior of potential stakeholders (McCann & Vroom, 2015). Further, state uncertainty can arise from externalities such as social pressure or government interventions (Wernerfelt & Karnani, 1987), as well as macroeconomic trends (McCann & Vroom, 2015) and the economic environment (Wood & Pearson, 2009).

Proceeding to effect uncertainty, this can be understood in terms of when, whether and what effects will be evoked by aforementioned uncertainties about environmental states and changes (Miller, 1981): 'when' pertaining to the timing of the effects, 'whether' to the insecurity whether effects will occur at

all, and ‘what’ to the insecurity regarding what other effects will unfold. Finally, these uncertainties about changing environmental states and their associated effects are linked to entrepreneurial action by evoking and increasing response uncertainty, impeding entrepreneurial actors’ ability to understand the range and nature of their response options and the likely consequences associated with these options (Milliken, 1987). Environmental uncertainty therefore offers a plethora of industry- and firm-level occasions for individuals to form opportunity beliefs that, in turn, inform entrepreneurial action during nascent entrepreneurship. This is added to and regulated by factors on the personal level, such as individuals’ standards and goals, as well as their own perceived competency (self-efficacy) (Frese, 2009; Gelderen et al., 2000), and tolerance for ambiguity (McKelvie et al., 2011).

As McKelvie et al. (2011) write, “despite the theoretical significance of uncertainty in entrepreneurship, robust and generalizable findings that explain the conditions under which uncertainty may impede [or promote] entrepreneurial action remain elusive” (p. 273). The authors argue that this is due to the common operationalization of uncertainty as a one-dimensional construct, and apply Milliken's (1987) three types of uncertainty to explore 2800 exploitation decision policies of product designers per conjoint analysis. Investigating how uncertainty is reflected in decision policies based on the heterogeneity of individuals’ perceptions, they find that response uncertainty represents the largest impediment on individuals’ willingness to act, and that the prevailing type of perceived uncertainty (technological vs. demand-related) affects which course of action is chosen for exploitation (large-scale vs. small-scale launch). Further, their study finds that prior opportunity-specific knowledge only mitigates the impediment of effect uncertainty on action, without being able to discern whether this is because individuals trust their own skills in effectuation or because of overconfidence (McKelvie et al., 2011).

In general, empirical findings relating uncertainty to entrepreneurial behaviors have been equivocal (O'Brien, Folta, & Johnson, 2003). For instance, as discussed before, Autio et al.'s (2013) study found demand uncertainty (a type of state uncertainty) to be the main regulator of entrepreneurial action, albeit having conceptually built on McMullen and Shepherd's (2006) belief formation model which primarily

attributes the transition from third person to first person opportunity beliefs (i.e. developing entrepreneurial intent) to overcoming response uncertainty. Gelderen et al. (2000) find that entrepreneurs' choice of exploitation strategies (opportunistic, reactive, complete planning or critical point) depends on their perceived levels of overall state uncertainty, i.e. the degrees of complexity and change that they perceive in their environment in general, as well as competitive and resource uncertainty in specific. It is noteworthy that the authors used longitudinal data and derived the process characteristics of the four exploitation strategies from cognitive and action theories. In contrast, a study of 553 new product development projects by Song and Montoya-Weiss (2001) found that it is the level of perceived technological uncertainty (specifically, uncertainty regarding the perceived rate of technological change and regarding the predictability of its impact) that determines the focus on and choice of development activities that are carried out. Similarly, McKelvie (2007) employed a longitudinal research design on over 300 new ventures' opportunity exploitation activities and observed that knowledge reducing technological uncertainty is a stronger predictor of entrepreneurial action than knowledge reducing market uncertainty. Contrasting the prior findings, Choi and Shepherd (2004) found that *both* market-related and technological uncertainty regulate entrepreneurial action related with opportunity exploitation.

In conclusion, how different types of uncertainty and associated types of knowledge and information regulate entrepreneurial action throughout the development of opportunities, and to what effect, remains poorly understood, and empirical literature on the role of uncertainty in nascent opportunity development is equivocal. Therefore, to understand action in the context of this iterative and social process, it is necessary to draw on literatures that operationalize uncertainty and/or opportunities as the dependent instead of the independent variable, and to draw inferences about the associated belief development processes by way of abductive reasoning.

2.2.2 The development of opportunity beliefs in the context of nascent entrepreneurship

The development (or refinement) of opportunity beliefs is central to opportunity development, not only

because of the centrality of uncertainty in nascent entrepreneurship, but also because "the idea that becomes the foundation for a successful venture can be quite different from the idea the firm initiation was originally founded around" (Davidsson, Hunter, & Klofsten, 2004, p. 334). Although opportunity beliefs are an emotion-laden subject and deeply linked with entrepreneurs' identities (Grimes, 2018), being able to refine and adapt them is critical to new venture creation as it increases the chances of venture survival (Dencker et al., 2009). The degrees to which entrepreneurs might find it necessary to revise beliefs and (facets of) opportunities range from incremental to radical. Radical changes to opportunities, increasingly referred to as 'pivots' when triggered by interactions with external stakeholders, describe complete re-definitions of significant aspects of the product and/or business model (Crilly, 2018; Grimes, 2018; Ries, 2011). The process of belief development in nascent entrepreneurship is characterized by a tension between efforts to achieve feasible and desirable outcomes, satisfy stakeholder demands, and maintain an entrepreneurial identity (Grimes, 2018). Entrepreneurs further have to decide whether to bet on one or on multiple scenarios during opportunity development, which is characteristic of uncertain environments, and described in the strategic literature as the trade-off between focus of resources and flexibility (Wernerfelt & Karnani, 1987). To resolve this tension and decide on courses of action, nascent entrepreneurs seek feedback on their opportunity beliefs from various external knowledge sources, which provides the micro-foundations of entrepreneurial action (Shepherd, 2015).

In their lived day-to-day experience, nascent entrepreneurs carry out a multitude of feedback interactions as the belief development process unfolds over time, which can be best captured by conceptualizing feedback interactions on the micro-level, i.e. differentiating between the focus, structure, and sequence of actions (Frese, 2009). Since all actions are situationally embedded, the focus of action can be the task, the social context in which the task is done, and the self. These actions are controlled by conscious or subconscious regulatory structures, opportunity beliefs representing conscious structures that require active information processing to run mental simulations and form expectations about the world. Finally, actions unfold in a particular sequence, consisting of goal setting, understanding the situation, planning, and feedback seeking – elements that entrepreneurs carry out with differing degrees of proactivity

(Frese, 2009). The uncertainty and tension that entrepreneurs experience during belief development on the macro-level, as described before, affect their actions on the micro-level, i.e. they direct their focus of action, impact how it is regulated on both conscious and subconscious levels, and impact their degree of proactivity in action. This, in turn, determines the outcomes of feedback interactions, i.e. how entrepreneurs collect new information, engage in sensemaking by thinking-through-talking, reduce uncertainty, and develop opportunity beliefs (De Koning, 2003).

Since opportunity exploitation usually requires many tasks for which entrepreneurs have no or little experience or training, action is highly affected by cognitive capabilities (Frese, 2009). In general, higher cognitive capabilities not only allow for a better understanding and anticipation of the action environment and action parameters; but specifically, they enhance the conscious and subconscious cognitive structures that regulate action, which means that higher levels of regulation are freed up to produce more creative ideas, and to critically self-reflect about one's thinking and acting while navigating through the opportunity development process (Frese, 2009).

To summarize, entrepreneurial action in nascent entrepreneurship evokes a continuous development of insights and ideas, both within entrepreneurs' immediate task environment and within the social context in which they interact and make sense of the opportunity (Dimov, 2011). This turns the development of opportunities into a learning process that evokes a constant, iterative evaluation and (incremental or radical) development of opportunity beliefs (McCann & Vroom, 2015; Shepherd, 2015). As beliefs are the fundamental building blocks of individuals' intentions (Fishbein & Ajzen, 1975; McCann & Vroom, 2015), their development is the basis for the reduction of uncertainty and evolution of intent over time: informing entrepreneurial actions in opportunity development both on the micro-level and in terms of larger strategy, as nascent entrepreneurs continuously navigate between – possibly conflicting and certainly competing – market demands, technological demands, and stakeholder demands (McMullen & Dimov, 2013). Entrepreneurial actions then become the "empirical footprints of opportunities" (Dimov, 2011, p. 66), often not known in the beginning and only emerging as an opportunity develops over time (Van de Ven & Polley, 1992).

2.2.3 Perspectives on entrepreneurial action and belief development

Several literature streams contribute to our understanding of belief development in nascent entrepreneurship, taking a variety of perspectives from the fields of information search, planning, learning and experimentation, cognition, and creative revision. In the following, I review the most important findings in an effort to shed light on the factors that shape the characteristics of action, as nascent entrepreneurs constantly produce new pieces of knowledge and iteratively reduce uncertainty during opportunity exploitation.

Belief development in the context of information search and planning

Studies on information search have examined the effort entrepreneurs spend on searching information from social and written sources, i.e. search intensity, in developing entrepreneurial opportunities and developing their beliefs. Examining the information search practices of 1176 entrepreneurs, Cooper, Folta, and Woo (1995) found that entrepreneurs' search intensity in opportunity exploitation is related to their prior entrepreneurial experience, related to the extent that their prior knowledge is opportunity-specific, and to their confidence. While inexperienced entrepreneurs search more information in opportunity development than experienced entrepreneurs in general, those operating in unfamiliar domains i.e. demonstrating low levels of opportunity-specific knowledge, seek less information, just as entrepreneurs with high levels of confidence. Limited opportunity-specific knowledge and confidence evoke boundedly rational behavior, i.e. decision makers work with limited conceptualizations of problems, which results in the process of information gathering being characterized more by satisfying than by optimizing (Cooper et al., 1995). This reduces the perceived uncertainty in entrepreneurs' eyes, since it blinds them to the need to acquire more information. Prior knowledge, however, provides entrepreneurs with more elaborate, detailed and meaningful cognitive schemas, evoking a higher awareness of the need for new information to reduce uncertainty, and thus increases the levels of proactivity in information search activities (Cooper et al., 1995). Beyond search intensity, prior knowledge has also been found to affect entrepreneurs' search strategies: it facilitates more directed and less sequential search, as it helps entrepreneurs to discriminate between relevant and irrelevant

information, and increases their ability to locate relevant information for decision making (Barrick & Spilker, 2003).

The focus of entrepreneurs' information search activities further differs in terms of search scope, or the degree of novelty in the new information that is explored (local vs. distant search), as well as search depth or the degree of existing knowledge that is revisited within search (Foss et al., 2013; Katila & Ahuja, 2002). Search depth and scope contain trade-offs that affect how uncertainty is reduced through information search activities: a high degree of search depth enhances familiarity with existing knowledge and entrepreneurs' ability to craft new solutions from it, yet it might confound the view on alternative scenarios; meanwhile, a high search scope (i.e. distant search) enriches the knowledge pool by adding distinctive new variations and choices, yet it can reduce the efficiency in uncertainty reduction through the dynamically increasing costs of integrating new knowledge (Katila & Ahuja, 2002; Phelps, 2010).

From a broader perspective, the concept of local vs. distant search can also be understood as more than just the degree of novelty of the new information that is sought, but as backward (i.e. learning-based or 'on-line') vs. forward-looking (i.e. cognition-based or 'off-line') search (Gavetti & Levinthal, 2000). Entrepreneurs produce new knowledge and develop beliefs through both experiental and cognitive activities (Wood & McKelvie, 2015), the former being more prominently addressed by the organizational learning literature while the latter takes a more prominent stage in the entrepreneurship literature (Felin & Zenger, 2009). Experiental (local) search represents active experimentation and learning, which requires the investment of resources and therefore prompts the exploration of information that is rather close to existing knowledge, while cognitive (distant) search represents mental simulations that allow for high variety and novelty in the scenarios that are explored (Gavetti & Levinthal, 2000; Levinthal & March, 1981).

In this regard, business planning is a form of cognitive search, representing a "process by which the entrepreneur, in exploiting an opportunity, creates a vision of the future and develops the necessary objectives, resources, and procedures to achieve that vision" (Sexton & Bowman-Upton, 1991, p. 118).

Business plans allow entrepreneurs to develop and experiment with beliefs about the linkage between the choice of actions, and the subsequent impact of those actions on outcomes (Gavetti & Levinthal, 2000), and provide a tool for nascent entrepreneurs to convince potential employees, customers, suppliers, and investors of the value of the venture idea in order to gain legitimacy (McCann & Vroom, 2015). Although it is often expected that business plans facilitate information search and learning as entrepreneurs attempt to discover causal relationships prior to acting (e.g. Delmar & Shane, 2003; Liao & Gartner, 2006), empirical evidence with regard to their usefulness in nascent entrepreneurship has been equivocal: in their survey of 436 entrepreneurs, Dencker et al. (2009) found that early-stage business planning decreases the likelihood of venture survival and even more so for entrepreneurs lacking opportunity-specific prior knowledge, suggesting that this form of distant search increases the risk of superstitious learning i.e. wrong inferences prompting an erroneous path-dependent process. A possible explanation for this might be provided by McCann and Vroom (2015), who employed PSED data including cohorts of over 2000 entrepreneurs to examine the links between specific actions of nascent entrepreneurs and changes in their opportunity beliefs. The authors found that planning activities decrease perceptions of environmental uncertainty, increase perceived individual self-efficacy and generate changes in performance expectations, which might be argued to act detrimentally by increasing entrepreneurs' illusion of control. Similarly, Dimov (2010) found early stage business planning to increase the likelihood of venture survival only indirectly by its effect on opportunity confidence, i.e. maintaining the belief in the feasibility and desirability of an opportunity in light of new information, while the effectiveness of belief development (i.e. actual survival) was found to be directly related to industry experience.

To summarize, information search in the context of opportunity belief development is a double-edged sword, yielding both benefits and risks that affect the outcomes of search activities. The information search activities that entrepreneurs carry out to produce new knowledge and develop opportunity beliefs vary on the basis of their intensity (amount of information sought), scope (novelty as well as nature of information sought (experiental vs. cognitive)), depth (degree of existing knowledge revisited), and strategy (directed vs. sequential search). These parameters affect the focus and proactivity in

entrepreneurs' search activities, determining the nature of information that is found, and thus informing opportunity beliefs.

Belief development in the context of learning and experimentation

Not just the nature of information that is sought affects the outcomes in belief development, but also how information is used to enhance existing knowledge structures. Learning occurs when new informational cues from search influence the choice between competing beliefs and action, allowing for a sequence of choices to unfold, the outcomes of which then inform underlying opportunity beliefs (Minniti & Bygrave, 2001). Learning can take a variety of forms, such as experiental, vicarious or cognitive learning, involving a variety of stakeholders (Bergmann Lichtenstein, Lumpkin, & Shrader, 2003; Cope, 2003), and entrepreneurs combine several forms of learning to inform action over time (Bingham & Davis, 2012). In nascent entrepreneurship, this entails both learning about characteristics of opportunities and learning about the entrepreneurial process in general (Minniti & Bygrave, 2001), which is usually characterized by a high degree of novelty and has therefore inspired research particularly in terms of behavioral learning, i.e. the lived experience of learning by doing (Bergmann Lichtenstein et al., 2003), or 'local search' as previously described. For instance, in their real-time longitudinal study of the development of a biomedical innovation, Van de Ven and Polley (1992) show that innovating requires trial-and-error learning, a form of behavioral learning that requires entrepreneurs to focus action sequences around smaller issues, define clear goals and expected outcomes for information acquisition, and adapt goals based on the elicited feedback. This avoids that attention is distorted by what the authors call "noise" – the stream of continuous information that entrepreneurs receive – and by the proliferation of activities into complex interdependent paths. The authors further argue that the degree to which entrepreneurs can elicit positive feedback from stakeholders will have the most impact on belief development, since positive feedback involves a sense of direction toward success, while negative feedback only informs which direction not to take.

The need for trial-and-error learning in belief development is corroborated in the strategic experimentation literature, where experimentation is understood as a process whereby entrepreneurs

build mental models which enable them to make sense of their competitive environments (Nicholls-Nixon, Cooper, & Woo, 2000). In a three-year study of over 400 young businesses, Nicholls-Nixon et al. (2000) found that entrepreneurs who focus on specified informational inputs from the environment and make rapid adjustments according to this feedback are better able to distinguish promising from fruitless paths, although their study also found strategic changes arising from experimentation to be rather peripheral than central in nature (i.e. changes of competitive emphasis and time allocation, instead of changes in core products), as these are more easily changeable. Thus, as trial-and-error learning takes a local search perspective, it runs the risk of path-deepening instead of path-creating learning (Andries et al., 2013).

Accordingly, authors have demonstrated the benefits of simultaneous experimentation instead of focused commitment in belief development, which represents a portfolio of related but diverging search paths that are aimed at learning about specified belief scenarios, or alternative business models. By employing a longitudinal case study design, Andries et al. (2013) found that distant (cognitive) search is not the only method by which entrepreneurs can increase the variety of their informational base, but that if carried out in a resource-efficient manner, simultaneous experimentation allows reducing uncertainty with regard to a variety of factors and producing more choices. This notion is supported by research on strategic variety in opportunity exploitation (Larrañeta et al., 2012) which shows that diversity and novelty of new knowledge increase strategic variety in new ventures, suggesting however that this relies on the extent to which their existing knowledge is opportunity-specific and on their associated absorptive capacity. Opportunity-specific knowledge, it is argued, allows entrepreneurial decision makers to draw meaning and form relevant connections from novel and diverse information, instead of being overwhelmed and mislead by its breadth, complexity, and sheer volume (Larrañeta et al., 2012).

Behavioral learning may therefore take a variety of forms from local search to simultaneous experimentation, yet nevertheless become a path-dependent process when small events accumulate and push the process into one among all possible patterns, eventually locking in the structure (Holcomb et

al., 2009; Minniti & Bygrave, 2001). In fact, Ravasi and Turati (2005) found entrepreneurs to enter self-enforcing learning cycles in opportunity development, bringing them to dedicate more and more time, attention and resources to particular development paths the more deeply they are involved in them and the more control over them they perceive. Hence, beyond behavioral or first-degree learning (Bergmann Lichtenstein et al., 2003), belief development also relies on cognitive learning or second-degree learning for entrepreneurs to use new information effectively. In this sense Cope (2003) distinguishes between the acquisition of 'know-how', i.e. what people learn, as opposed to the acquisition of 'know-why', i.e. how individuals develop a conceptual understanding of an experience and subsequently apply this learning. The latter affects entrepreneurs' mental models about their own strategies and behaviors in belief development, i.e. evokes changes in theories for action (Cope, 2003). For instance, it is responsible for a shift that makes entrepreneurs aware of their use of certain biases and heuristics and allows them to correct their actions (Bergmann Lichtenstein et al., 2003). While behavioral learning focuses action on the task, cognitive learning involves self-awareness and therefore shifts the focus of action onto the self. Cognitive learning not only increases the quality of information processing in strategic adaptation, by helping identify and correct erroneous beliefs and development behaviors (Frese, 2009), but subsequently improves entrepreneurs' capability to notice relevant information (Simon et al., 2007).

From this perspective, entrepreneurs with opportunity-specific knowledge are at advantage since they already possess a complex system of causal relationships within their cognitive knowledge structures, which frees up cognitive space to notice more signals, develop more possibilities for interpretation, process information more quickly, and conduct more learning iterations (Simon et al., 2007). Cognitive learning can also occur as a reaction to discontinuous events that "require heightened attention and experimentation, forcing individuals to question their taken-for-granted beliefs and assumptions and reframe their understanding of the situation at hand" (Cope, 2003, p. 431). Other scholars have conceptualized cognitive learning as a mental ability, defined as metacognition (Haynie et al., 2012). By modeling 10,000 entrepreneurial decisions nested within 217 individuals, Haynie et al. (2012) provide evidence that metacognition facilitates entrepreneurs' ability to revisit their decision policies in

light of new information i.e. that metacognition enhances cognitive adaptability and helps them make the most of feedback. Metacognitive ability is independent of prior knowledge; although both are said to increase cognitive adaptability, metacognition allows to make up for missing opportunity-specific knowledge because it "promotes the ability to relate knowledge learned in one context to problem-solving in another context" (Haynie et al., 2012, p. 256). To conclude, behavioral and cognitive learning mechanisms that vary among entrepreneurs evoke different foci of action in their belief development activities, ranging between the task and the self, which leads to different learning outcomes and shapes both beliefs and actions.

Belief development in the context of cognition

Despite entrepreneurs' increased potential for cognitive learning due to the lack of already established routines and belief systems in nascent entrepreneurship (Bergmann Lichtenstein et al., 2003), the degree to which entrepreneurs adapt beliefs about opportunities and about their own exploitation strategies is, apparently, limited. For instance, Parker (2006) showed that entrepreneurs adjust opportunity beliefs by only 16% in light of new information and learning, giving much greater weight to their prior beliefs when forming expectations in opportunity exploitation. Recalling the study by Van de Ven and Polley (1992) on biomedical innovation, erroneous beliefs often persist among entrepreneurial actors and are justified as long as possible until failure and market pressures eventually induce a shift in goals. The reason for this may lie in several factors that impede entrepreneurs' cognitive and metacognitive abilities for belief development.

First, while a high degree of psychological ownership has been shown to increase entrepreneurs' commitment to a venture, it impedes their cognitive learning ability since it evokes a sense of personal loss and negative affect in entrepreneurs when confronted with suggestions for subtractive change to their ideas (Baer & Brown, 2012). Second, cognitive biases such as confirmation bias lead entrepreneurs to gather information in ways that are skewed toward confirming the correctness of their initial interpretations, rather than acknowledging contradictory or discrediting information (Anderson & Nichols, 2007; Shepherd et al., 2012). On a similar note, escalation bias describes decision makers'

tendency to increase commitment to a failing course of action as a psychological defense against a perceived error in judgement or to make a previous choice appear rational (Nicholls-Nixon et al., 2000) – as shown in McCarthy, Schoorman, and Cooper's (1993) longitudinal study of 1112 entrepreneurial firms, which found evidence of an escalation bias in entrepreneurs' reinvestment decisions, especially in response to negative feedback. These phenomena imply that higher amounts of information don't necessarily increase the quality of information processing, but on the contrary: they have been found to increase the risk of information overload, or increase the illusion of control if information is readily available (Kuvaas, 2002). Equally, higher information processing capabilities don't necessarily increase the quality of information processing outcomes, as the conviction to possess such capabilities induces entrepreneurs to perceive lower levels of uncertainty and higher levels of control, and therefore induces them to search for less information (Kuvaas, 2002).

Lastly, entrepreneurs' attention represents another link between search and decision making: for instance, Koput (1997) argues that since feedback is the "cornerstone of chaos" (p. 530), positive feedback induces entrepreneurs to allocate more attention on associated beliefs and development pathways, and that attention in general needs to be divided between search, idea selection, and testing. Sullivan (2010) finds that problems from different domains compete for attention, with attention paid to the domain with the greatest number of problems (urgency effect), and that new problems and the solution of old problems compete for attention (distraction effect). Interestingly, attention is not only constrained by the characteristics of the problem space, but also by the concept of time: depending on whether entrepreneurs have a time-based or event-based orientation, they yield different expectations to the opportunity development process and therefore perceive and evaluate the same reality differently (Gersick, 1994). The processes of information search, learning, and developing beliefs from new information are therefore compounded by psychological ownership, biases, and limited attention, all cognitive elements affecting the regulatory structures of entrepreneurial action on subconscious level.

Belief development in the context of creativity

Another perspective through which the cognitive processes and actions involved in belief development

have been explored is creativity. These perspectives emphasize the balance between persistence and flexibility that entrepreneurs must strike (e.g. Crilly, 2018; Grimes, 2018; Harrison & Rouse, 2015), i.e. "they must exhibit persistence in the face of skepticism, criticism and adversity as they strive to make their new business ideas work; on the other hand, they must also exhibit flexibility, remaining open to new interpretations of what they are doing and what they should be doing" (Crilly, 2018, p. 57). In his study of technology entrepreneurs, Crilly (2018) found evidence of design fixation impeding creativity in opportunity development, when the knowledge of prior solutions increases entrepreneurs' over-commitment, confirmation bias and product orientation, which then unintentionally constrains their exploration of the solution space. Instead, the adoption of a market orientation is advised, which essentially represents effectuation since "the venture is not defined in terms of what the entrepreneur does but in terms of how the market responds to what the entrepreneur does" (Crilly, 2018, p. 59).

In contrast, in his inductive and longitudinal study on entrepreneurs' creative revision behaviors, Grimes (2018) found that it is the entrepreneurial identity (either visionary or scientific) that determines the degree to which entrepreneurs are able to relinquish psychological ownership over ideas, or whether their constrained attention and intentions lead them to overlook or dismiss much of the criticism they receive. Consequently, entrepreneurs demonstrate more or less flexible belief development strategies i.e. are more or less willing to radically change beliefs in light of new information (Grimes, 2018). To understand belief development on the interaction level, it is helpful to draw on research on creative revision which has exposed several different practices used by feedback seekers (backgrounding, forecasting, and opening) and feedback providers (personalizing, puzzling, measuring, and prescribing) to co-construct problem spaces (Harrison & Rouse, 2015). These feedback practices lead to different idea revision outcomes which are attributed to time, in that creative workers show an increased willingness to radically change beliefs and pursue adjusted opportunity ideas early in the development process, while rather responding with incremental adjustments to later feedback interactions.

My review of the literatures directly or indirectly related to opportunity belief development has produced a clearer picture of the range of factors that influence entrepreneurial actions in the context of uncertainty

reduction, and thereby influence belief development outcomes over time. Most importantly, it has laid open the trade-offs that nascent entrepreneurs have to overcome in each of these dimensions, such as the trade-off between local and distant search, between the benefits as well as risks associated with prior knowledge, and the trade-off between commitment and flexibility. Moreover, as information search (Leonard-Barton, 1992), learning (McFadyen & Cannella, 2004) and resource development (Brush et al., 2001) have all shown to be path-dependent processes, the development of opportunity beliefs (which both underlies and is affected by these concepts) inherently becomes path-dependent, too. Belief development therefore also differs by the degree and nature of cognitive and metacognitive mechanisms that entrepreneurs apply, the latter affecting how entrepreneurs monitor themselves throughout the opportunity development process.

2.3 The social context of opportunity belief development

The social context of opportunity belief development inspires research at the nexus of social capital, social cognition, and opportunity development. This involves exploring both the characteristics and benefits of engaging social knowledge sources within entrepreneurial networks, as well as the situational and social influences emerging from this knowledge exchange that direct entrepreneurs' attention in opportunity belief development (Dimov, 2007a).

2.3.1 The community of inquiry and opportunity belief development

The social audiences to whom entrepreneurs explain and defend their business concepts range from stakeholders such as potential customers, suppliers, experts or financiers, to private social circles as well as other entrepreneurs, start-up advisors, mentors and so on (e.g. Chrisman & McMullan, 2000; Greve & Salaff, 2003; Hoang & Antoncic, 2003; Vissa & Chacar, 2009), all of which differ by the type of relationship and information exchanged. These relationships have indisputably shown to benefit opportunity development, for instance by facilitating access to resources and brokering relationships (e.g. Brown & Butler, 1995; Shane & Cable, 2002; Vissa & Chacar, 2009).

The development of beliefs in particular involves not only gathering information, but most importantly creating a diversity of perspectives and meanings, which may yield differing results based on selected conversants, interaction design, entrepreneurs' information processing, and so on (Aldrich & Fiol, 1994; Busenitz et al., 2003; Dimov, 2007a). Specifically, nascent entrepreneurs engage a wider network of social ties to create meaning with, learn from, and develop opportunity beliefs. This network exists independently of the existence of a social relationship prior to and after information is exchanged (e.g. gathering anonymous feedback), and even independently of whether there is any two-directional information exchange at all, e.g. advising strategy-related books or blogs to overcome certain challenges and incorporating this information into opportunity beliefs. This social group of knowledge sources has been defined as an entrepreneur's community of inquiry (Pardales & Girod, 2006; Seixas, 1993; Shepherd, 2015), or an intellectual community within which knowledge is generated (Seixas, 1993), engaged to reduce uncertainty and make up for lacking competencies (Rasmussen et al., 2011), and providing not only information but shaping entrepreneurs' cognition, and thereby, behaviors (De Carolis et al., 2009).

Most often, nascent entrepreneurs seek feedback by way of dyadic interactions in which opportunity beliefs are presented in verbal, written and/or tangible forms and critically discussed to varying degrees, either focusing on experiential learning (e.g. testing prototypes) or on closing informational gaps (e.g. exploring further technical solutions) (Volery, Mueller, & Siemens, 2015). Entrepreneurs' interactions with communities of inquiry unfold in interactive, non-linear, and multi-stage processes (Foss et al., 2013) and affect entrepreneurial actions both on the micro-level and in terms of higher-level constructs such as strategic variety and venture creation (Larrañeta et al., 2012). Opportunity belief development in the context of communities of inquiry takes a perspective of pragmatism, in that truth lies in the consensus within a community of inquiry which represents warrantability rather than certainty, but nevertheless allows for knowledge to be grounded in the eyes of entrepreneurs (Levine, Resnick, & Higgins, 1993; Seixas, 1993). This allows entrepreneurs to enact opportunities i.e. perform root sensemaking, congruence-seeking and identity-building activities (Brown & Duguid, 1991).

Communities of inquiry can be classified in terms of similar dimensions as social capital, defining social relationships and interactions by a structural, relational, and cognitive dimension (Nahapiet & Ghoshal, 1998). However, the meanings of the involved dimensions are distinct with regard to the development of opportunity beliefs. While the structural dimension usually describes entrepreneurs' position within and between networks in relation to how network members are connected overall (Burt, 1992), the structural dimension of communities of inquiry must be understood in terms of the position of community members within an opportunity's larger possibility space, i.e. the domains that members of entrepreneurs' communities of inquiry span and their centrality or relevance to their particular domain and to the opportunity. This affects the nature of information exchanged as well as the legitimacy gains from social ties that can help reduce uncertainty for nascent entrepreneurs (Hoang & Antoncic, 2003). The relational dimension describes the strength of ties and associated levels of trust, communication, possible emotional support, and necessary network governance (Hoang & Antoncic, 2003; Nahapiet & Ghoshal, 1998; Perry-Smith & Mannucci, 2015). While in social capital research, the relational dimension is typically assessed for the quality of information it allows to be exchanged versus the cost of maintaining the relationship (McFadyen & Cannella, 2004), the relational dimension of belief development interactions must be understood in terms of its impact on the nature and salience of meanings that are generated from interactions. The third, cognitive dimension of social capital refers to "shared representations, interpretations, and systems of meaning among parties" (Nahapiet & Ghoshal, 1998, p. 244), and enables entrepreneurs to make sense of new information by allowing them and their community of inquiry members to share each other's thinking processes, thereby facilitating the exchange of information, learning and knowledge creation (De Carolis & Saparito, 2006). In opportunity belief development, as was previously the case with the relational dimension, the concept of sharedness within the cognitive dimension doesn't only matter with regard to the quality of information exchange it fosters, but sharedness further describes something that is mutually created, or a forward-looking view on how new and profitable means-ends-relationships could come into existence.

Insights from social capital research in the context of opportunity development allow to draw some inferences regarding the design of the community of inquiry as well as the social interactions and their

outcomes for opportunity belief development. For instance, Crilly's (2018) aforementioned study on design fixation built on interviews with both entrepreneurs and their impartial advisors, and found that advisors play a central role in supporting entrepreneurs overcome cognitive biases that otherwise increase resistance against information gathering. Similarly, in a survey of 169 new ventures that have undergone early-stage entrepreneurship counseling, Chrisman and McMullan (2000) found that having advisors as part of their community of inquiry is associated with higher than expected rates of survival, growth, and innovation. Further studies have corroborated the positive impact of start-up advisors on new venture success, all emphasizing their importance in fostering entrepreneurs' metacognitive abilities to remain non-biased despite tendencies toward cognitive inflexibility in light of challenging advice (Duchesneau & Gartner, 1990).

Further, the significance of including potential customers or users in the opportunity development process has long been established in the market orientation (e.g. Foss, Laursen, & Pedersen, 2011), co-development (e.g. Neale & Corkindale, 1998) and user innovation literature (e.g. Franke & Shah, 2003; Hippel, 1986); however, within the context of opportunity belief development, scholarly research is sparse. In one of the few studies on opportunity belief development in opportunity exploitation, Davidsson et al. (2004) conducted a survey among 167 young knowledge-intensive firms and found that the degree of change to venture ideas was increased by dependence on external financing sources, the existence of an early customer with whom entrepreneurs essentially effectuate along the venturing process, and being located within an incubator. This might imply the effectiveness of strong ties on opportunity belief development, as found by Gemmell et al. (2012). These authors interviewed 32 technology entrepreneurs and concluded that "technology entrepreneurs rely heavily on the strength of their strongest ties and maximum ideational productivity occurs when a small select "Inner Group" including a "Trusted Partner" is engaged in search of a solution" (p. 16). Similarly, McFadyen and Cannella (2004) found that knowledge creation requires the communication of tacit knowledge, and that returns to knowledge creation are increased when network members jointly experience problem-solving processes, or social sensemaking processes, by spending time together discussing, reflecting, observing, and interacting.

However, this relationship yields diminishing returns with increasing number and strength of exchange relationships, because exchange partners eventually develop homogeneous knowledge stocks and may become subject to group norms, obligations, and expectations (McFadyen & Cannella, 2004). Accordingly, knowledge breadth has been found to moderate the relationship between tie strength and creativity (Baer, 2010; Perry-Smith & Mannucci, 2015). This is picked up by studies emphasizing the importance of weak ties in opportunity development, due to the increased opportunity-relatedness, novelty and diversity of information received (Ozgen & Baron, 2007; Phelps, 2010) and due to the lack of conformity that impedes information exchange between strong ties (Perry-Smith & Mannucci, 2015). For instance, access to technologically diverse information has been shown to increase exploratory innovation (Phelps, 2010); however, this comes at a price since greater diversity reduces the odds that partners share a common understanding of technical issues, a language for discussing them, and an approach to codifying knowledge (Cohen & Levinthal, 1990). This explains Uzzi's (1996) findings that both very weak or very strong ties have a negative effect on new venture survival, and makes the case for balanced communities of inquiry consisting of both social (affective) and commercial (instrumental or calculative) relationships (Schutjens & Stam, 2003). Underpinning these findings, Davidsson and Honig (2003) observed 380 nascent entrepreneurs over the period of 18 months and found that both strong and weak ties were robust predictors for advancing through the start-up process, by increasing the frequency and number of gestation activities that nascent entrepreneurs carried out, with weak ties (being members of a business network) also demonstrating a statistically significant positive effect with regard to outcomes like first sale or showing a profit.

Taking a different view and observing not the nature of relationships, but the source characteristics of feedback providers as the determinants for their involvement in belief development, scholars have found that nascent entrepreneurs tend to engage social ties that demonstrate high levels of expertise and accessibility and enable a relationship of encouragement and trust, whilst also demonstrating high levels of challenging and powerful behavior within the relationship (Ashford, Stobbeleir, & Nujella, 2016; Drencheva, Patterson, & Topakas, 2016; Vancouver & Morrison, 1995).

With regard to the design of information exchange between entrepreneurs and their communities of inquiry, only few studies conceptualize design beyond relationship strength. For instance, in their longitudinal, qualitative, multi-case study of dynamic capability emergence in new ventures, Corner and Wu (2012) observed entrepreneurs' actions and decisions on the micro-level and found that openly sharing technological features with prospective customers allows creating a shared understanding of problems and of unarticulated, unserved customer needs. Further, the joint design of prototypes, which represents interactions that are characterized by elements of effectuation and improvisation, were found to help ensure new venture survival. Literature on co-development similarly highlights the need for potential customers' participatory involvement during the development of technologies, distinguishing between involving them in an active or consultatory role (Neale & Corkindale, 1998). This requires that potential customers are exposed to abstract representations of the technology early on, to maximize the possible applications that can be investigated through their experiences, until more specific applications become defined and prototypes are developed (Neale & Corkindale, 1998).

Interactions with social ties in general have been demonstrated to evoke processes of reflective reframing, which involve considering not only the original question, but also whether there is a better question to be asked, or viewing the relevance of past experiences in a new light (Hargadon & Bechky, 2006). This represents a form of cognitive learning and enhances entrepreneurs' metacognition. While interactions so far have been explored in terms of their effect on entrepreneurs' cognitive and metacognitive representations about opportunities, the relationship is essentially bilateral: cognitive representations about an interaction – e.g. beliefs about the usefulness of collective belief development, or the fear that revealing informational gaps might exude illegitimacy – affect the quality of the interaction, e.g. whether entrepreneurs openly share information and directly ask for help, which has been shown to impact the quality of interaction outcomes (Hargadon & Bechky, 2006).

2.3.2 The development of the community of inquiry over time

In nascent entrepreneurship, the available social capital is typically identical to that of the firm's founders (Hite & Hesterly, 2001), and it evolves as entrepreneurs continuously search for information,

gain legitimacy, and assemble resources over the course of opportunity development (McFadyen & Cannella, 2004). Therefore, the development of opportunity beliefs is a dynamic concept, that requires the observation of changes to entrepreneurs' communities of inquiry over time to understand the creation of meanings and subsequent choices of pathways toward the manifestation of market relationships. Drawing from network development research, several insights can be considered to possibly play a role in the development of communities of inquiry over time.

For instance, nascent entrepreneurs' networks have been found to evolve from path dependent to intentionally managed: early on, entrepreneurs limit their discussions to their closest relations, but subsequently enlarge their discussion network with ties that are based upon traditional exchange, until the effort invested in building and maintaining contacts reaches its highest level, after which entrepreneurs reduce network size to the most important and helpful members and spend less time networking overall (Greve & Salaff, 2003; Hite & Hesterly, 2001). Successful nascent entrepreneurs have been found to rely on their networks for boundary-spanning and connecting with market actors, constraining subsequent stages of opportunity development if they fail to develop their networks in a way that facilitates these events (Hayter, 2016; Rasmussen et al., 2011). This has been shown to be a path-dependent process, as demonstrated in Rasmussen et al.'s (2011) study of the evolution of new ventures' entrepreneurial competencies. The authors specifically emphasize the need to develop an opportunity refinement competency, defined as the ability to make creative adaptations to the venturing idea and develop the necessary competencies to bring the opportunity closer to market needs, based on the resources at hand. Their longitudinal multiple case study of four university spin-offs reveals that the evolution of opportunity refinement competency relies on the concurrent involvement of industry experts, i.e. the manner by which entrepreneurs maintain and develop a community of industry experts within their larger community of inquiry affects the development of the initial business concept (Rasmussen et al., 2011).

In contrast to the evolution of weak ties, relationally embedded ties i.e. those that influence firms' economic decision making are explored by scholars in terms of the evolutionary processes and paths

that specifically lead toward embeddedness (Hite, 2005; Larson & Starr, 1993). Based on a longitudinal case study of eight firms that were between the age of 18 and 24 months, Hite (2005) found that entrepreneurs use different combinations of primary and secondary leveraging processes (i.e. developing relationship attributes such as obligation or affect) to add new social components to the relationship, showing the tendency to do so more quickly when it concerns ties that enter the network through personal acquaintances. While the development of socially embedded ties has been shown to increase entrepreneurs' illusion of control and risk propensity, thereby facilitating progress in launching a new venture (De Carolis et al., 2009), this effect on biases and attitude might potentially impede entrepreneurs' judgement in belief development. At the very least, the development of strong ties (that are opportunity-related) has been found to increase an opportunity's perceived attractiveness in entrepreneurs' eyes, affecting the development trajectory of the venture (Domurath & Patzelt, 2016). Biases such as illusion of control might not only potentially affect the development of opportunity beliefs, but also the development of the community of inquiry itself, as entrepreneurial actors judge interactions with community members for their effectiveness ex-post, and dynamically adjust their perception of the community's usefulness and credibility across time and situations (Morrison & Vancouver, 2000).

2.3.3 Entrepreneurial teams and opportunity belief development

A further aspect of entrepreneurs' social contexts in belief formation pertains to the fact that most entrepreneurial ventures are founded in teams (Klotz et al., 2014), since particularly in high-technology firms, it is unlikely that one individual entrepreneur possesses all the competencies necessary to gain credibility for the new venture (Rasmussen et al., 2011). Entrepreneurial teams provide access to a larger external network, as well as greater repositories of knowledge resources and variations in experience that nascent entrepreneurs may draw upon as they attempt to learn more about their entrepreneurial opportunities (McCann & Vroom, 2015). In fact, compared to individual entrepreneurs, nascent start-up teams are more likely to demonstrate a comparatively rapid pace of gestation activities (Davidsson & Honig, 2003). This might be partly due to the "tensions that exist in team deliberations – new

possibilities versus existing direction, cohesion versus conflict" (West, 2007, p. 78), which stem from similarities and differences between team members' underlying belief structures about the nature of emerging opportunities and the relationship between their current actions and sustainable performance in the marketplace (West, 2007). To understand opportunity belief development in nascent entrepreneurship, it is important to understand how team members' perspectives translate into nascent entrepreneurial teams' collective understanding of strategic issues and opportunities, from which key decisions and actions flow over time (Weick & Roberts, 1993; West, 2007).

This collective understanding pertains to team mental models that allow entrepreneurial teams to engage in sensemaking and action (Klimoski & Mohammed, 1994). Team mental models, defined as "team members' shared, organized understanding and mental representation of knowledge about key elements of the team's relevant environment" (Mohammed & Dumville, 2001, p. 90), are significantly shaped by individual team members' belief structures (Klimoski & Mohammed, 1994). Yet, they rely on mechanisms of social cognition for collective beliefs to emerge, or "social processes that relate to the acquisition, storage, transmission, manipulation, and use of information for the purpose of creating a group-level intellectual product" (Larson & Christensen, 1993, p. 6). The latter allows team members to interpret information in a similar manner (description), share expectations concerning future events (prediction), and develop similar causal accounts for a situation (explanation) (Mohammed et al., 2010; Rouse et al., 1992), which affects collective strategic decision making as well as team dynamics and performance (Klimoski & Mohammed, 1994). 'Sharedness' has been conceptualized as shared or overlapping, similar or identical, compatible or complementary, and distributed (Cannon-Bowers & Salas, 2001); yet, as Cannon-Bowers, Salas, and Converse (1993) note, team mental models need not be identical across agents but rather must be compatible in terms of the expectations they generate.

Traditionally, social cognition research has focused on the role of team mental models in the coordination, i.e. synchronicity and effectiveness, of team processes (e.g. Cannon-Bowers et al., 1993; Lim & Klein, 2006; Mathieu et al., 2000), applying further concepts such as transactive memory, group learning, or strategic consensus to explain variance in strategic problem definition, strategic decision

making, team development, and team performance (Klimoski & Mohammed, 1994; Mohammed et al., 2010; Mohammed & Dumville, 2001). The differences between team mental models and these concepts lie in the fact that transactive memory and group learning concern the evolution of knowledge structures in groups, while team mental models and their degree of strategic consensus pertain to belief structures in teams (Mohammed & Dumville, 2001). Cannon-Bowers et al. (1993) described the four domains that determine the content of team mental models: "an equipment model (knowledge about tools and technology), a task model (understanding of work procedures, strategies, and contingency plans), a team interaction model (awareness of member responsibilities, role interdependencies, and communication patterns), and a team model (understanding of teammates' preferences, skills, and habits)" (Mohammed et al., 2010, p. 879). The former and latter two are typically grouped, containing either task-related or team-related features of the situation and environment (Mohammed et al., 2010), and team members are known to hold multiple mental models simultaneously (Rouse et al., 1992). The degree of sharedness of both taskwork (e.g. Cooke, Gorman, Duran, & Taylor, 2007; Lim & Klein, 2006) and teamwork (e.g. Mathieu et al., 2000; Rentsch & Klimoski, 2001) mental models has been found to predict performance, either directly, or indirectly by positively affecting team processes (e.g. Lim & Klein, 2006; Mathieu et al., 2000; Mohammed et al., 2010; Rentsch & Klimoski, 2001).

The role of sharedness in opportunity belief development can essentially be understood as a facilitating element that allows entrepreneurial teams to act and test the veracity of their team mental models, which is not possible without a collective sharing of particular theorized beliefs, since it is very often not feasible to pursue multiple courses of action at the same time (Felin & Zenger, 2009). Therefore, "if individuals cannot agree on what should come next, they cannot take collective action" (Katz & Lazarsfeld, 1955, p. 62). However, it is not primarily the degree of sharedness, but the level of cognitive consensus that yields beneficial outcomes for the development of opportunity beliefs (Walsh, Henderson, & Deighton, 1988; West, 2007). Cognitive consensus relies on "a delicate balance between both overlapping and complementary sharing perspectives" (p. 103), which is required for entrepreneurial teams to most effectively proceed along the iterative process of refining and evaluating belief structures (Mohammed & Dumville, 2001). While entrepreneurial teams integrate information

and resources, adapt to changing task demands, and coordinate action (Rouse et al., 1992), differences in individual team members' opinions and beliefs can affect the way that issues are interpreted or problems are formulated (West, 2007). The discussions and negotiation processes that arise from cognitive diversity and resulting cognitive conflict represent a "cognitive tug and pull" (Ensley & Pearce, 2001, p. 146), that allows entrepreneurial team members to arrive on shared perspectives and mutual understandings, and enables them to move forward in a more focused and unified fashion with strategic intentions and actions that are applied consistently (Ensley & Pearce, 2001).

Cognitive diversity is characterized by the levels of differentiation (i.e. the existence of diverse and novel perspectives among team members) and integration (i.e. the level of congruence that teams achieve in shared opportunity belief systems) (West, 2007). Accordingly, neither completely divergent belief structures nor too great an overlap in team member interpretations have been found to enhance collective opportunity belief development, since the former will likely involve a high degree of miscommunication and misunderstanding, while the latter increases the risk of groupthink (Mohammed & Dumville, 2001). As Mohammed and Dumville (2001, pp. 103–104) summarize succinctly,

> "group members must simultaneously agree and disagree in order to maintain both unity and diversity in equilibrium. Members of the group may even be in agreement on the need to disagree, respect divergent perspectives, and permit conflict. Furthermore, within a single group, there may be coalitions of shared beliefs, with all individuals sharing some beliefs, but only a sub-set of members sharing other beliefs. The optimal level of consensus and dissensus in framing perspectives that will contribute to effective outcomes will depend upon a number of moderating variables such as where the group is in the decision making process."

This suggests the intriguing possibility that even if individual team members' opportunity beliefs are inaccurate, as long as they are shared, they may facilitate group communication and coordination processes that help eventually improve the accuracy of representations (Puranam & Swamy, 2010). This notion is supported by studies by Mathieu et al. (2005; 2000) and (Lim & Klein, 2006), who found the similarity of team mental models to improve team performance after controlling for the accuracy of the mental models. Similarly, research from the field of managerial cognition has found strategic adaptation not to rely on the accuracy of managers' opportunity beliefs, but on their degree of complexity (the breadth and variety of knowledge embedded), centrality (the extent to which belief structures are

centralized around a limited number of core concepts), and causal logics (the extent to which actions are perceived to potentially control the competitive environment, or vice versa) (Kiss & Barr, 2015; Nadkarni & Barr, 2008). These belief system dimensions have been found to increase the diversity, frequency, and speed of firm actions in refining competitive beliefs, increasing chances of firm survival (Kiss & Barr, 2015).

Nevertheless, cognitive variance among members of nascent entrepreneurial teams might result in incompatible dominant logics and disagreements concerning fundamental organizational priorities (West, 2007; Wooldridge & Floyd, 1989). These impede entrepreneurial teams' ability to be consistent and focused in their sets of activities, to allocate limited resources, and to proactively and effectively meet continuously changing circumstances (West, 2007). Ultimately, by spurring affective conflict, dysfunctionally divergent mental models between nascent entrepreneurial team members lead them to self-select out of opportunity development, just as teams might be more prone to include members that promise a high degree of cohesion (Ensley & Pearce, 2001; Felin & Zenger, 2009; West, 2007). Changes in team member configurations, then, shift teams' foci of attention with regard to essential strategic priorities (Cho & Hambrick, 2006), which is why in a broader context, belief development plays a central role in both nascent entrepreneurial opportunity development and organizing.

The organizational structures that nascent entrepreneurial teams begin to employ, in turn, have been found to affect their ability to leverage, i.e. both to access and to integrate, new external knowledge. This ability depends on how cross-functional roles are coordinated, how decision rules are designed, and whether work is organized effectively (Brown & Eisenhardt, 1995; Foss et al., 2011; Foss et al., 2013; Maurer & Ebers, 2006; Mohammed & Ringseis, 2001; Preller, Patzelt, & Breugst, 2018; Song & Montoya-Weiss, 2001). Further, empirical research shows that entrepreneurial teams that demonstrate high levels of strategic consensus as well as internal cohesion are most successful in utilizing their social ties in opportunity development (Vissa & Chacar, 2009). The facilitating role of consensus and cohesion in collective belief development is corroborated by studies on shared vision, defined as mental models of the future state of the team or its tasks, that provide the basis for action within the team (Pearce

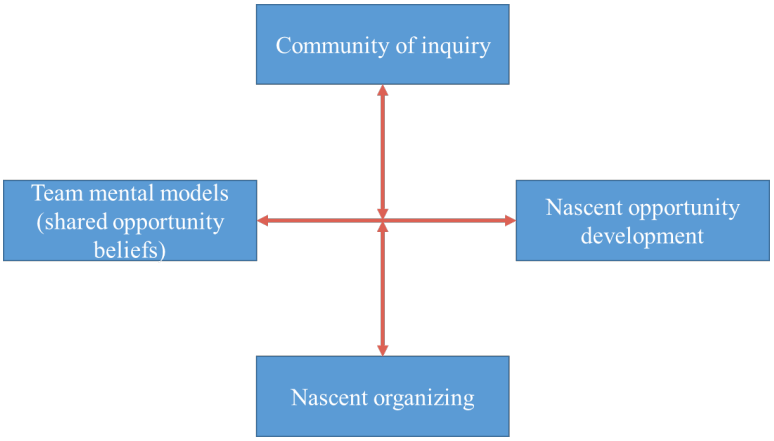
& Ensley, 2004). In their study of 71 product development teams, Pearce and Ensley (2004) found that shared vision within teams is positively influenced by perceived success in opportunity development iterations, which in turn reinforces team members' positive beliefs about the team's abilities, and thereby further increases levels of innovation in opportunity development outcomes.

In the particularly uncertain context of nascent entrepreneurship, however, this might quickly turn into a self-enforcing superstitious learning cycle, as has been elaborated in the context of opportunity belief development described in chapter 2.2.3., since collective cognition in entrepreneurial teams plays a significant role in directing organizational mindfulness and attention (Hargadon & Bechky, 2006). What can be stated is that the characteristics of entrepreneurial teams' shared opportunity beliefs and their outcomes in belief development are reciprocally related (Klimoski & Mohammed, 1994), which then by definition unfolds as an evolving process over time, and is contingent on entrepreneurial teams' collective metacognition or cognitive learning activities (or 'feedback on feedback') (Grimes, 2018). This adds yet another, team-related dimension to the development of entrepreneurial opportunity beliefs in nascent entrepreneurship.

2.4 Research Questions

Taken together, this literature review highlights the significance and the dimensions of entrepreneurial opportunity emergence in the context of collective, fuzzy, and multidimensional opportunity beliefs. It further presents the profound impact of social interactions on their development, making the case for opportunity belief development unfolding as an iterative and potentially path-dependent process. This process reciprocally affects and is affected by entrepreneurial teams' opportunity belief systems, the members of and interactions with communities of inquiry, and the development of opportunities over time. In aggregate, this literature suggests a basic framework of social opportunity belief development in the context of nascent entrepreneurial teams. This model is given in Figure 1.

FIGURE 1: An embedded view of nascent entrepreneurial teams' process of opportunity belief development with communities of inquiry as suggested by extant literature



There are a number of questions emerging from this model. First, it lacks the multidimensional context of uncertainty and the micro-actions that entrepreneurial teams perform to reduce uncertainty whilst navigating between viability, feasibility, and stakeholder demands in opportunity development. Second, it is too simplistic to take a process perspective into account, i.e. to explore variables across and events within journeys (Van de Ven & Engleman, 2004). A process orientation in empirical research on entrepreneurship may advance scholarly understanding of the entrepreneurial phenomenon, however, it has been "conspicuously absent" (McMullen & Dimov, 2013, p. 1481). The literature review presented in this chapter, therefore, lays the groundwork for this research project and further justifies the investigation of my research questions. Specifically, I define these questions in the following:

(1) *How do entrepreneurial teams interact with communities of inquiry to develop opportunity beliefs and reduce uncertainty?*

(2) *How are opportunity beliefs collectively developed in light of a variety of meanings and objectives?*

(3) *How does the development of opportunity beliefs affect the emergence of entrepreneurial opportunities and the emergence of nascent ventures over time?*

3 Research methodology

This chapter outlines the research methodology of my thesis. In Section 3.1, I will provide some background on the method applied in this study and present my research design. Sampling approach and the cases are laid out in Section 3.2, and Section 3.3 provides an overview of data collection. Section 3.4 describes my approach of coding and analyzing the data, and in Section 3.5, I outline how I ensure validity and generalizability in my research.

3.1 Research method

3.1.1 Outcome- and event-driven explanations of change

The purpose of this dissertation is to investigate the process of nascent opportunity development to uncover how entrepreneurial teams interact with communities of inquiry to make sense of and navigate through opportunity development decisions over time. Literature that takes on a process-perspective in studying change and development has defined the term "process" in two alternate forms: either as an (1) outcome-driven explanation where continuous change is driven by deterministic causation, examining the degrees to which a set of independent variables statistically explains variations in dependent variables (typically referred to as the variance explanation of change); or as an (2) event-driven explanation of the temporal order and sequence of change events, narrating how change unfolds over time to produce a given outcome (typically referred to as the process explanation of change) (McMullen & Dimov, 2013; Van de Ven, 1992; Van de Ven & Engleman, 2004).

As Dimov (2011) explains, "variance explanations focus on making inferences from the covariance patterns among particular variables without reference to the underlying generative mechanisms. Such explanations rely on specific assumptions about the replicative nature of observed cases, the invariant

nature of their attributes, and the particular form of causal relationships" (p. 69). In contrast to variables in outcome-driven process research, "events" in event-driven process research can take place on a variety of levels, such as concrete experiences, interactions, decisions, or milestones, and therefore require different means of conceptualizing to detect patterns among them (Dimov, 2011; Langley, 1999). In these models, some causal forces operate continuously, while others may influence the sequence of events only at particular points in time. The temporal ordering and probabilistic interaction between entities are key to understanding patterns in events (Poole, Van de Ven, Dooley, & Holmes, 2000).

Event patterns may take a variety of different forms, representing different perspectives on the sequences of change events (Van de Ven & Poole, 1995; 2005). For instance, life-cycle theories of change events produce unitary sequence models of cumulative and conjunctive processes, i.e. linear sequences of stages that occur over time, where each stage of development is seen as a necessary precursor of succeeding stages. Teleological models, on the other hand, assume that development processes move toward envisioned goals that are socially and individually constructed, and adaptive. Patterns unfold as repetitive sequences of goal formulation, implementation, evaluation, and modification based on what was learned or intended by the entity (Van de Ven & Poole, 1995). Organizations, in these models, socially construct goals and enact them based on past actions, and need to be "sufficiently like-minded to act as a single collective entity" (ibid, p. 516). Unlike life-cycle theory, teleological models thus do not prescribe a necessary sequence of events, but instead focus on the different pathways that emerge and how processes change, as organizational entities move toward their final end state (Van de Ven, 1992).

Event-based process explanations therefore represent narratives that seek to identify how time and sequence patterns are associated with differences between organizations, focusing on the generative mechanisms that can explain the particular sequence of events or the nature of pathways, mindful to the holistic configuration of contributing circumstances and actions (Dimov, 2011). Central questions include (1) whether and what type of sequence patterns exist, (2) what influences those patterns, and (3) what the patterns affect (Abbott, 1990; Bingham & Davis, 2012). This investigation can be distal in

nature, i.e. focusing on distal outcomes such as new venture creation or growth (and thus on the entire span of the entrepreneurial process), or proximate i.e. focusing on outcomes such as resource acquisition or team formation; a distinction that can equally be applied to outcome-based variance explanations of development and change (McMullen & Dimov, 2013).

Variance-based process methods have become a "backbone for theorizing" (Dimov, 2011, p. 70) and largely dominate the study of organizational learning, change, innovation, and entrepreneurship (Bingham & Davis, 2012; Grimes, 2018). For instance, quantitative research deduces hypotheses from existing theory against which large amounts of data are tested – representing a positivist worldview by accentuating the role of specific variables found to significantly relate to differences in objectively quantifiable outputs (Locke, 2007). Taking a longitudinal approach, Davidsson and Honig's (2003) study captures 18 months of data to develop a regression-based model of human and social capital effects on nascent opportunity development. The outcomes of interest in this study are operationalized as entry into nascent entrepreneurship, the number of gestation activities carried out to develop opportunities, and achieving a first sale or showing a profit, by which the study embeds its investigation of human and social capital into the larger context of entrepreneurship. Other distal and quantitative studies on nascent entrepreneurship make use of longitudinal PSED data to investigate the role of beliefs in opportunity evaluation and development, operationalizing and measuring beliefs as perceived levels of uncertainty (McCann & Vroom, 2015) or opportunity confidence (Dimov, 2010), to uncover how variables such as human capital or planning activities pertain to changes in beliefs which, in turn, affect venture emergence. In recent years, a growing body of research has taken a proximate variance-based view to study formation processes of opportunity beliefs through a cognitive lens, deploying quasi-experimental research designs to investigate why some individuals are more likely to come up with venture ideas than others, and why ideas are conceived in a certain form (e.g. (Grégoire et al., 2010; Grégoire & Shepherd, 2012; Shane, 2000). These settings not only help understand the role of determinants such as individual characteristics and cognitive processes in belief formation, but furthermore allow to control for contextual and circumstantial environmental conditions, such as available information, conversations, and available means (Dimov, 2011).

Yet, while variance-based theories are appropriate to answer questions of "what", the question of "how" remains elusive. For instance, despite the long-established tradition of network research, researchers have raised concerns about a lack of depth in our understanding of network development processes (e.g. Hoang & Antoncic, 2003; Slotte-Kock & Coviello, 2010). To develop explanations of entrepreneurial dynamics, researchers are therefore calling for event-driven qualitative research that (1) can trace processes as they unfold over time (Shepherd, 2015; Van de Ven & Engleman, 2004), (2) captures the "specific path – in terms of a sequence of events or concrete experiences – that observed cases follow from one state to another" (Dimov, 2011, p. 70), and that (3) is holistic, i.e. sensitive to the broader context and the perspectives of involved actors (Lee, 1999; Miles & Huberman, 1994; Miner & Mezias, 1996). The resulting stories that emerge can be seen as theoretical constructs, as they reflect deeper narrative structures about transformative processes that encompass a sequence of events and can explain the relationships between these events (McMullen & Dimov, 2013; Miles & Huberman, 1984; Pentland, 1999; Van de Ven & Engleman, 2004). In other words, emerging interactions and coevolving actions collectively explain a particular case (Dimov, 2011). However, both event-based and longitudinal process research are underrepresented in empirical entrepreneurship literature. McMullen and Dimov (2013) recently found that among the empirical work related to opportunity emergence published within a top-tier journal, only 20% reflected a process orientation since 2007, following Chandler and Lyon (2001) who reported similar levels in the entrepreneurship literature in the 1990s. The authors found that only 6,5% of the empirical entrepreneurship studies published in top-tier academic journals between 1989 and 1999 were truly longitudinal, with a mere 2,7% involving analysis of real-time data on entrepreneurial process events (Chandler & Lyon, 2001).

3.1.2 Levels of investigation, units of analysis, and integration of approaches

Several levels of investigation are relevant to my study to uncover action patterns and sequences in opportunity development and their effects on the progression toward desired end states. First, I explore the actions and interactions that lead to the sequential encounter and institution of information, which ultimately become embedded in the final product (McMullen & Dimov, 2013). The timing and nature

of actions and interactions, i.e. when entrepreneurial teams interact with communities of inquiry and how, determine the timing and nature of the information that is available to them. Available information in turn affects the knowledge structures that can be developed at any given time, which are the basis by which new information is assessed, so that sequence and nature of interactions ultimately determine what entrepreneurial teams can create at any given moment (i.e. the teleological approach of event-driven process research). Second, understanding how interactions affect the development of opportunities over time requires understanding the micro-processes and micro-practices by which interactions unfold, and how these sequence patterns differ among entrepreneurial teams and why (i.e. a micro-level life-cycle approach of event-driven process research). Third, moving from micro-level to macro-level phenomena, gaining a holistic understanding of the dynamic process of opportunity development requires taking a bird's-eye view, i.e. examining the input variables that shape the aforementioned levels (actions and interactions over time, as well as the micro-practices by which interactions are carried out), and how they relate to the outcomes of the process (i.e. outcome-driven process research).

Process phenomena in general have a fluid character that spreads out over both space and time (Pettigrew, 1992), and process data collected in real organizational contexts often involve multiple levels and units of analysis, with ambiguous boundaries and varying levels of temporal embeddedness (Langley, 1999). They often contain eclectic phenomena that are intertwined and hard to isolate, such as changing interpretations, feelings, and relationships. The sensemaking process is further complicated by the fact that the multiple levels of analysis are often made up of a continuum, lack clear classification, and are difficult to separate from one another (Langley, 1999). Moreover, the very nature of the unit of analysis may transform from one form (e.g. idea) into another (e.g. product or firm) (McMullen & Dimov, 2013). In this dissertation, the unit of analysis spans the entrepreneurial team, the opportunity, and the community of inquiry; the level of analysis spans both individuals and teams, and is ultimately captured on team-level, and the investigation of the nexus involves characteristics of states and processes as well as changes therein over time. Hence, the major challenge in pursuing this research direction lies in collecting rich contemporaneous data that allows the "induction of new theoretical constructs and

relationships that can make action and the opportunity behind it more tangible" (Dimov, 2011, p. 73).

To meet the requirements of the various units and levels of analysis, as well as the multifarious perspectives of the investigation, the integration of process- and outcome-oriented research has been advised (Hoang & Antoncic, 2003), i.e. a meaningful division of the entrepreneurial journey into necessary variables and events (McMullen & Dimov, 2013). Indeed, by focusing on events alone, qualitative entrepreneurship research often fails to go beyond simple description to propose an explanation of the observed phenomena (Gartner & Birley, 2002), in which case process theorization fails to uncover the logic behind observed temporal progressions (Van de Ven, 1992). A comprehension of a temporal sequence of events requires understanding the starting (input) conditions and ending (outcome) of entrepreneurship (Pettigrew, 1992; Van de Ven & Engleman, 2004). Furthermore, "process data are not composed only of descriptions of discrete events [but] also incorporate a variety of other types of qualitative and quantitative information" (Langley, 1999, p. 693), which can be combined to describe and explain both qualitative and quantitative aspects of development and change (Van de Ven & Engleman, 2004; Van de Ven & Poole, 1995). This enables the researcher to not only describe a process but also to build new theory by identifying causal relationships within that process – how variation in entrepreneurial teams' practices might predict variation in organizational outcomes (Grimes, 2012). Ultimately, an integrated process approach employs narrative explanations regarding the contribution of actions and events to particular outcomes, and then configures these parts into episodes (Polkinghorne, 1988).

Measuring outcomes, however, requires specifying which outcomes are pragmatic and appropriate proxies for capturing the conclusion of the nascent entrepreneurial journey. Nascent entrepreneurial opportunity development may not produce positive cash flows or profits for years, or even during shorter periods that are more feasible to investigate in real-time. One may choose the legal registration of the business, the first cash infusion from an investor, or success or failure in developing target technologies as discriminating variables to measure the emergence and value of outcomes (McMullen & Dimov, 2013; Ravasi & Turati, 2005). Alternatively, it can be appropriate to focus on customer creation

episodes, since securing initial customers is a milestone separating potential from emerged ventures (Liao, Welsch, & Tan, 2005), and since the first sale is a reliable and objective performance metric across samples (Bingham & Davis, 2012). One might argue that "the outcome in question – as marker for the end of the entrepreneurial process for the purpose of giving meaning to prior events – is artificially contrived. Business activities would normally continue after that outcome and, as a result, new ends will emerge that will give new meanings to the same events" (McMullen & Dimov, 2013, p. 1494). Despite the truth that lies within this statement, which implies that no proxy replaces the milestone of establishing profitable and sustainable market transactions, I argue that the latter effectively represents the reduction of uncertainty, more specifically uncertainty regarding demand for a particular solution and the ability to provide it.

To evaluate earlier examples under this perspective, first, the legal registration of a business is not an appropriate measure since it does not relate to the reduction of market and technology-related uncertainty. Second, investment-based cash flows represent indirect rather than direct commitments to ventures, and therefore trail behind measures that capture direct commitments i.e. cash flows which stakeholders provide in return for the very products that entrepreneurial teams develop, choosing them at high opportunity costs to create value for themselves. Third, the success or failure in developing target technologies implies resources that nascent entrepreneurial teams might not have yet attained, similar to the measure of first sales which implies and requires the establishment of a full value chain. I argue that the outcome that provides the earliest yet most meaningful representation of reduced uncertainty in nascent entrepreneurship is establishing market interactions that produce cash flows by engaging either (pilot) customers or manufacturers in co-creation, since it requires neither technologies nor value chains to be fully developed. Although these cash flows might not produce positive balance sheets overall, they represent significant milestones after which demand uncertainty and other types of uncertainty are diminished substantively (McMullen & Dimov, 2013).

3.1.3 Inductive theory building

In contrast to quantitative research and its positivist assumption that only one objective reality exists,

qualitative research takes a constructivist perspective and assumes that reality is individually perceived yet socially created (Morgan, 1980). To reconstruct reality, the researcher interacts with the object of study, as opposed to the positivist inquiry of distantly observing (Guba & Lincoln, 1994). Further, qualitative research is typically performed inductively, i.e. it starts with data collection and allows theory to emerge from data (Glaser & Strauss, 2008). Denzin and Lincoln (2011) therefore characterize qualitative research as an interpretative approach which explores phenomena in the environment in which they naturally occur.

Given the lack of inductive existing research at the nexus of opportunities, nascent entrepreneurial teams, and social capital, the goal of my study isn't testing detailed a priori hypotheses but learning how entrepreneurial teams (inter-)act and consequently proceed along the opportunity development process. This calls for an exploratory, longitudinal study using a post-positivist and open-ended design, to develop new theory about processes in which the interactions between the phenomena and context are unclear (Yin, 1993). Research approaches designed to investigate such processes must be non-intrusive and capable of tracing unfolding changes (Gioia & Chittipeddi, 1991), providing thick descriptions of data on comparable events that are closely connected with empirical reality, and – in line with the constructivist/interpretivist tradition – help understand how entrepreneurial teams construct and understand their experiences in nascent opportunity development (Gioia et al., 2013). Since exploratory inductive research and analysis captures experiences in process terms and is particularly useful for studying nascent theory, it seems suitable for capturing the dynamics of nascent opportunity development over time, i.e. how sequences of events, activities, and choices happen and why they happen this way (Langley, 1999; Strauss & Corbin, 1990). It thereby allows to uncover the steps that comprise the opportunity development process, as well as the meaningful variation that occurs as actors move through the process. This demands a variety of data collection approaches and data triangulation, and requires that researchers "plunge [themselves] deeply into the processes […], collecting fine-grained qualitative data – often, but not always, in real time" (Langley, 1999, p. 691). The goal is to observe and capture changes as well as qualitative differences and similarities first-hand, to be able to extract theory from the ground up (Pettigrew, 1992; Van de Ven, 1992).

Importantly, my research design refrains from immersing myself in prior literature before data analysis, to avoid tunnel vision and prior hypothesis bias and to instead allow the data to speak for itself in an organic fashion, as informants construct and describe their experience of the world in their own terms (Gioia et al., 2013). An inductive research design therefore allows to develop an initial grounding framework of the initial phases of the venturing process, integrating multiple perspectives and units of analysis, measuring actions, outcomes, and the context in which they occur, and taking into account how the process evolves over time (cf. Corley & Gioia, 2004; Rasmussen et al., 2011). Such an initial grounding framework provides relevant concepts that can guide the creation and validation of constructs for the purpose of building theory (Gioia et al., 2013).

3.1.4 Case study design

As has been advised for nascent theory development, a longitudinal multiple case-study approach was adopted to gain fine-grained insights into how venture processes unfold over time (Weick, 2007; Yin, 1994). The use of comparative case studies is appropriate to gain insight into dynamic organizational phenomena that occur across different levels of analysis (Eisenhardt, 1989; Pentland, 1999), due to the fact that it follows a system of replication logic wherein each case is treated as an independent experiment (Yin, 1993) whilst allowing the researcher to keep an open mind in following the data (Suddaby, 2006). This way, relevant concepts and themes can be discovered inductively, meaningful patterns identified, and findings situated in relation to the current literature for the purpose of building nascent theory. Findings are illustrated in a cross-comparative, case-based reporting style (Langley, 1999) and accentuate discriminating variables that appear to influence the outcome of an observed process (Eisenhardt, 1989).

Case studies, according to Yin (2009), encompass three different dimensions: first, the type of research purpose (explanatory, descriptive, or exploratory); second, the number of cases (single or multiple); and third, the number of analysis units (single-holistic or multiple-embedded). In my dissertation, I make use of an exploratory, multiple and embedded case study design. Scholars have intensely debated the

appropriateness of case studies as a method to develop robust theory (Dyer & Wilkins, 1991; Gibbert, Ruigrok, & Wicki, 2008), voicing concerns that case studies lack methodological rigor, provide little basis for scientific generalization, and feature lengthy and cumbersome designs (Yin, 2009). I address these concerns in Chapter 3.5, elaborating on the multiple measures taken along the processes of data collection and analysis to counteract potential methodological drawbacks.

3.2 Sampling and cases

In this dissertation, I took a purposive sampling approach choosing insightful contexts where the dynamics of interest are more transparent (Patton, 2002; Yin, 2009), in an attempt to find nascent entrepreneurial cases that (1) provide rich enough data on all process steps, relevant units and relevant levels of analysis, (2) allow to obtain enough variation to uncover deviations from and gaps in existing concepts, but also (3) narrow down the possible sources of variation to manage the boundary conditions of the findings and increase the explanatory power of the framework. As per the stated research questions, I was looking to understand the process steps related to opportunity development and related to interacting with communities of inquiry in the context of nascent entrepreneurship. I was primarily concerned with identifying sites and study participants most likely to reveal instances wherein (1) opportunity development decisions were instigated by external sources, and (2) the external sources obtained a close perspective of teams' opportunity development reactions and actions overall.

I initially identified contexts that offered the most efficient access to frequent feedback interactions between nascent founders and members of their community of inquiry. Entrepreneurial incubators provided an ideal setting for fulfilling my objectives in purposive sampling. Specifically, I chose an entrepreneurship incubator of a large technical university in a European metropolitan area specialized in accommodating a concentrated pool of nascent-stage entrepreneurial teams, who are attempting to gather information about their opportunities for the purpose of developing them. The incubator is embedded within an institutional eco-system offering resources and programs designed to facilitate entrepreneurship in terms of technical, business, and team development. Incubatee teams share office

facilities and equipment, have access to counseling and networking, and receive one year of strategic and operative support with a limited option to extend their stay. The incubator typically hosts 20-30 technology-oriented entrepreneurial teams that have yet to achieve a level of concept and prototype maturity that would allow them to consider large-scale commercialization. This setting is ideal for my study since the teams' beliefs about the potential opportunity and how it should be developed are still at an early stage and in flux, and all teams are faced with considerable levels of market and technological uncertainty. It therefore allows to investigate the interactions undertaken to build knowledge, inform beliefs, and reduce uncertainty over time, and how these influence opportunity development.

That said, unique contexts such as incubators pose potential limitations to the generalizability of findings. Since the focus of my study primarily lies on the process of opportunity development, and correspondingly, on uncovering the nature, sequences and effects of process steps, I strive for homogeneity regarding the entities that move through the process (entrepreneurial opportunities, entrepreneurial teams, and communities of inquiry). Although one might argue that a diverse set of cases is more likely to result in robust insights (Eisenhardt & Graebner, 2007), prompting researchers to include non-incubator-related teams to control for the incubator's influence and thereby increase transferability of findings, I argue that homogeneity of cases facilitates the goal of my study: it decreases variation around uncovered processes and the steps they contain, making the differences between teams more expressive of what affects underlying process dynamics. Better said, within a context that is controlled for in terms of key boundary conditions, I focus on vivid cases within a smaller sample to accentuate salient examples of the phenomenon being explored (cf. Weick, 1993). By providing this vicarious experience of a real setting in all its richness and complexity and contextual detail, the reader can judge the transferability of the ideas to other situations (Guba & Lincoln, 1994; Langley, 1999).

The incubator in my study for example hosts teams from all industries as long as they develop opportunities that demand sophistication in production, i.e. are not purely service-based. Furthermore, the teams are homogenous in terms of the technological sophistication of their opportunities which has to meet a threshold for admission by the incubator management (a relatively common practice in high-

tech incubators). Specifically, this incubator serves as an intermediary toward a government funding program that supports potential technological innovations that have been recognized within an academic context, and thus preferably selects teams based on their projected passing of the program's due diligence. The latter ensures that an opportunity demonstrates a high degree of technological novelty, while still being feasible and realistic for the particular team to exploit, given its human capital pool and the strategic concept presented in the program application. This adds to the homogeneity of opportunities submitted to the incubator in terms of their technicality and complexity.

Furthermore, teams admitted to the incubator are homogeneous in several aspects that facilitate a comparative study of the development of their opportunity beliefs: first, they are homogenous in terms of their demographic age and education level; second, they are homogenous in terms of the representation of technical as well as business knowledge among team members (a prerequisite of acceptance into the incubator); and third, the teams are homogeneous in that neither team member has founded their own venture as part of an entrepreneurial team before. Teams may however contain team members with varying levels of prior entrepreneurial experience, such as having undertaken entrepreneurship education programs or coming from a family business background, or they may have no prior entrepreneurship experience whatsoever. Regarding prior technical or business related knowledge, this may take a range of forms from internships to full-time work. To summarize, the overall homogeneity in teams' human capital allows to rule out major alternative explanations for differences in gathering and interpreting information for belief development, such as imprinting by prior team-level founding experience, while the homogeneity in opportunities rules out major differences that would simplify or respectively exacerbate the information gathering and processing context.

At the same time, the chosen incubator actively facilitates the engagement of a community of inquiry: in this setting, each incubatee entrepreneurial team is assigned one start-up coach to help identify and address knowledge gaps within the team, encourage knowledge building interactions, and enhance the team's potential to successfully commercialize opportunities. These start-up coaches provide procedural knowledge, drawing from their own entrepreneurship experience and from the comparison to other

incubatees' activities. More importantly, they bridge the gap toward the incubator's network of technical and business experts which it maintains for entrepreneurial teams to use as a source of knowledge. Start-up coaches are also brokers of specialized opportunity-specific knowledge by introducing contacts from their personal business networks to the entrepreneurial teams. Thus, the incubatee teams are quite homogeneous in terms of their work environment and access to knowledge resources. This research setting provides a rich breeding ground for interactions to occur and opportunities to be developed, yet it is up to the entrepreneurial teams to exploit these available resources and build a community of inquiry for opportunity development.

At the beginning of my study, the incubator hosted twenty entrepreneurial teams, which I contacted either in person or via e-mail. To qualify for participation, the ventures had to have developed at least one prototypic representation of their product idea, but must not yet have committed to a commercial product offering to be launched to the market, i.e. potential participants had to be engaged in opportunity development. From the twenty entrepreneurial teams, sixteen qualified for my sample. Since my inductive approach demanded that the teams share substantial, in-depth information with me, I focused on those that would provide the richest data source and access to community of inquiry members they deemed important for opportunity development. Three teams were unwilling to share sensitive data, were unable to participate in all interview rounds, and/or unwilling to provide contact information for community of inquiry members. I dropped these teams from my sample, leaving thirteen teams for further investigation. During the course of data collection, one team proved unwilling to provide contact information for important community of inquiry members, and was hence also removed from the sample. The remaining twelve teams had an average size of 3.5 members and pursued opportunities in information technology, medical technology, renewable energy, consumer products, and life sciences amongst others. To protect anonymity, I created fictitious team names. Tables 3 and 4 provide further information on the case teams and their opportunities that comprised the sample for this dissertation.

3.3 Data sources and data collection

I conducted five conversations with entrepreneurial team members from three incubatee teams during a

TABLE 3: Overview of sample cases and their characteristics

Team name	Year of founding	Number of team members	Team member background	Team member work experience	Team member entrepreneurship experience	Year of moving into incubator	External funding
Medicup	2014	3	Nursing care, medical engineering, business and patents	Professional full-time, internships	None	2015	Government funding from 10/2015 to 09/2016
Digihub	2015	3	Marketing, finance, programming, user experience design	Semi-professional, Internships	Entrepreneurship education (theoretical & practical), internships	2015	External funding starting July 2016
Smartchat	2013	3	Manufacturing and maintenance, programming, business	Professional full-time, internships	Entrepreneurship education (theoretical & practical)	2015	Government funding from 11/2015 to 10/2016
Smartlab	2014	4	Laboratory monitoring, medical engineering, programming	Ph.D., internships	None	2015	Government funding from 10/2015 to 09/2016
Smartbox	2015	7	Product design, business, programming, philosophy, sustainability	Internships	Entrepreneurship education (theoretical & practical), family business	2015	Government funding from 11/2015 to 10/2016
Digilamp	2013	3	Programming, product design, business	Professional full-time, internships	Entrepreneurship education	2015	Government funding from 11/2015 to 10/2016
Biowing	2011	2	Programming, business	Professional full-time	Prior venture founded on individual level	2014	External funding from 12/2014 to 11/2015
Rotowheel	2013	5	Arts, marketing, engineering	Professional full-time, internships	Entrepreneurship education (theoretical & practical)	2015	Government funding from 10/2015 to 09/2016
Babylab	2013	3	Business, consulting, physics, programming	Professional full-time, Ph.D.	Prior venture founded on individual level	2015	Government funding from 11/2015 to 10/2016
Smartseat	2015	3	Engineering, business	Internships	None	2015	Government funding from 01/2016 to 12/2016
Nutriheal	2014	4	Nutrition science, business, marketing, finance	Internships	Entrepreneurship education (theoretical & practical)	2015	Government funding from 09/2015 to 08/2016
Smartstock	2015	2	Programming	Internships	None	2015	Private funding

TABLE 4: Overview of opportunities and their characteristics

Team name	Industry	Business segment	Product in October 2016	User and customer in October 2016	Business model in October 2016	Technological means	Uncertainty at founding	Status in October 2016
Medicup	Healthcare	Nursing care	Cup / inlay to optimize intensive and geriatric patient care	User: Nurses; customer: clinic buyers	Business-to-business, contractually negotiated purchase volumes	Novel configuration of materials, functioning, and production methods	Demand uncertainty, product uncertainty, technological uncertainty, supply uncertainty	Negotiating co-creation and investment with a potential manufacturer
Digihub	Knowledge management and project communi-cation	Within-project collaboration	Digital application for project communication that serves as a knowledge management tool	User: members of project teams; customer: individual(s) responsible for organizational budgeting and purchasing	Business-to-business, subscription-based revenue model	Technical implementation of digital platform (reliability, speed and user friendliness)	Demand uncertainty, product uncertainty, technological uncertainty	First paid pilot project with business customer, external investment
Smartchat	Service maintenance	Large-scale manufactu-ring	Digital application for knowledge management that serves as a communication tool	User: maintenance service workers, workers in large-scale manufacturing; customer: individual(s) responsible for organizational budgeting and purchasing	Business-to-business, once-off sale with following subscription-based software-as-a-service revenue model	Technical implementation of digital platform (real-time provision of knowledge and user-friendliness)	Demand uncertainty, product uncertainty, technological uncertainty, supply uncertainty	Paid pilot projects with customers, preparation to begin negotiating external investment
Smartlab	Laboratory equipment	Production laboratories	Hardware with smart software integration to monitor laboratory experiments	User: laboratory researchers, customer: individual(s) responsible for organizational budgeting and purchasing	Business-to-business, once-off sale with following subscription-based software-as-a-service revenue model	Technical implementation of sensor, monitoring system and digital platform (user-friendliness)	Demand uncertainty, product uncertainty, technological uncertainty	Paid pilot projects with customers
Smartbox	Cloud storage	Data security	Hardware and software to secure and flexibly access big data	User / customer: small business owners	Business-to-business, once-off sale with following subscription-based software-as-a-service revenue model	Technical implementation of hardware and digital platform (security and synchronization)	Technological uncertainty, supplier uncertainty, supply uncertainty	Team members exits, new opportunity development cycle with an adjusted opportunity and a new configuration of team members

Digilamp	Lighting	Ergonomic work environ-ments	Smart hardware and corresponding software	User: office workers, small business owners; customer: individual(s) responsible for organizational budgeting and purchasing	Business-to-business, once-off sale revenue model with additional subscription-based maintenance agreement	Technical implementation of hardware (ergonomics) and of digital platform	Technological uncertainty, supplier uncertainty, supply uncertainty	Team members exits, new opportunity development cycle with an adjusted opportunity and a new configuration of team members
Biowing	Energy production	Wind energy	Bionic energy-saving hardware	User / customers: owners of wind turbine parks or individual(s) responsible for organizational budgeting and purchasing	Business-to-business once-off sale with additional subscription-based maintenance agreement	Technical implementation of hardware	Technological uncertainty, supplier uncertainty	Team split and end of opportunity development activities
Rotowheel	Energy production	Third-world countries	Water turbine built of disposable materials	User / customer: small business owners, individuals	Business-to-business once-off sale, business-to-customer once-off sale	Technical implementation of hardware	Technological uncertainty, supplier uncertainty, supply uncertainty	Team split and end of opportunity development activities
Babylab	Fertility management	Fertility tracking	App that photographs and analyses test stripes	User / customer: private consumers	Business-to-customer subscription-based revenue model	Technical implementation of software (recognition and analysis)	Demand uncertainty, technological uncertainty	Joined accelerator, further external funding
Smartseat	Public transport	Seating and passenger management	Ergonomically designed seat, that is efficient in terms of space and smart	User: passengers in public transport; customer: bus manufacturers, public transport companies	Business-to-customer, once-off sale	Technical implementation of hardware (ergonomics), smart functionalities	Technological uncertainty, demand uncertainty, product uncertainty	Negotiating pilot co-production project
Nutriheal	Dietary supplements	Post-surgical care	Dietary supplement to support post-surgical recovery	User / customer: private consumers; customer: surgeons (revenue share)	Business-to-customer, once-off sale; additional business-to-business revenue-share	Novel configuration of ingredients and components	Demand uncertainty, product uncertainty, technological uncertainty	Preparing large-scale study, negotiating partnerships with medical professionals
Smartstock	Stock management	Supermarket stock, loose goods	Camera capturing stock movement and software-based analysis	User / customer: supermarkets	Business-to-business with software-as-a-service revenue model	Technical implementation of hardware (recognition) and of digital platform	Technological uncertainty, supplier uncertainty	Team split and end of opportunity development activities

one-month sampling and preparation period, in which team members briefly summarized the team's history and signaled their willingness to share data and contacts. This helped me sensitize myself to indicators regarding the suitability of incubatee teams for my sample. I further carried out one exemplary interview with a team member who was not suitable for my study, to test the duration as well as the comprehensibility of my interview questions. My primary data collection spanned nine months beginning in January 2016 as well as a subsequent secondary data collection period of three months. Data collection included three interview rounds with the twelve entrepreneurial teams in my sample, two interview rounds with the most important members of their community of inquiry in terms of opportunity development, as well as taking field notes and collecting secondary data throughout the nine-month period. I used multiple overlapping sources of data for the purpose of triangulation, to capture and map critical events during opportunity development and obtain multiple alternate perspectives on the factors that shape interactions and their outcomes. I combined and triangulated these sources to develop theory and to maintain the integrity of my analysis (Jick, 1979; Miles & Huberman, 1994).

3.3.1 Interviews with entrepreneurial team members

I chose semi-structured interviews to explore potentially relevant topics of interest, but remained alert and flexible during interviewing to also capture emergent concepts and gather both retrospective and real-time accounts of informants (Edmondson & Mcmanus, 2007). My nondirective questions were designed to elicit open-ended descriptions of past accounts and current expectations. Interviewees included at least two co-founders per team. To sample founders, I focused on entrepreneurial team members who were originally (and still) involved in technical and business related development aspects and able to give detailed information on processes and important decisions. I conducted 70 interviews with entrepreneurial team members in total i.e. across three rounds (excluding preparatory conversations), either in person in or around the informants' working environment or, if not possible otherwise, via telephone (16 interviews), ensuring an atmosphere of privacy when discussing sensitive issues. The interviews with founders encompassed 24 open-ended questions and were semi-structured

into sections including (1) the potential opportunity, (2) history of opportunity recognition and team formation, (3) opportunity development decisions, (4) identification and development of the community of inquiry, (5) interactions and their effects on opportunity development, (6) the evaluation of these interactions as well as (7) changes in this evaluation over time. After each interview, I transcribed the recorded audiotape and prepared a summary to serve as a basis for follow-up questions in the following interview rounds. The first interview round with entrepreneurial team members comprised of 22 interviews. For every founder, I conducted two follow-up interviews—three (24 interviews) and six (24 interviews) months after the initial data collection effort, which captured both the engagement of the community of inquiry and development of the opportunity since the last interview. In the last interview, I also asked founders to give recommendations on best practices for the selection of, and interaction with, a community of inquiry for the purpose of opportunity development. As is advised for collecting process data (Van de Ven & Engleman, 2004), I attempted to document as completely as possible the sequence of events pertinent to opportunity development processes as well as their context.

3.3.2 Interviews with members from entrepreneurial teams' communities of inquiry

To triangulate entrepreneurial team members' interview data and thereby improve accuracy and completeness (Jick, 1979), I interviewed at least three members of each team's respective community of inquiry, which were identified by the entrepreneurial team members to have offered relevant new information relating to their potential opportunities. These members of the communities of inquiry included mentors, potential customers, and start-up coaches, the latter providing particularly close and comparative external perspectives on teams' opportunity development activities. The identification of communities of inquiry unfolded over the first five months of data collection. To sample informants from each team's community of inquiry, I compared data from the first and second founder interviews to identify those members that the entrepreneurial team had repeatedly asked to contribute valuable knowledge, and who might be most suitable to provide additional perspectives in each case. As it emerged, all teams emphasized certain sources of technical and business knowledge as well as sources for market information as most influential on opportunity development. Gaining access to community

members outside the incubator environment proved to be a matter of building trust with the entrepreneurial teams, upon which I contacted potential informants by e-mail to inquire their participation. All invitations to participate in the study were accepted, with one exception.

Similar to interviews with co-founders, interviews with the community of inquiry comprised 25 open-ended questions and covered (1) the potential opportunity, (2) the relationship history and (3) specific interactions for opportunity development, (4) the effects of given advice, (5) the evaluation of the interaction, and (6) changes therein over time. Following a narrative approach, i.e. "a scheme by means of which human beings give meaning to their experience of temporality and personal action" (Polkinghorne, 1988, p. 11), interviewees were asked to describe their involvement in and knowledge of teams' opportunity development activities from inception to date, with a minimum of interruption by the interviewer. Interviewees openly described their actions and the key events and interaction characteristics. I conducted 33 interviews with community of inquiry members during the first interview round. To gain more detailed information about the critical events and involved actors during the opportunity development process, I conducted follow-up interviews with these informants after a period of three months (32 interviews), using open follow-up questions to capture additional data on possible changes in their interactions with the entrepreneurial team and the potential opportunity. Similar to the last round of founder interviews, I asked community of inquiry members for best practices in the interaction with entrepreneurial teams. Finally, I conducted five additional interviews throughout the data collection period with incubator staff who had insights on both the teams and their communities of inquiry (e.g. individuals responsible for matching teams and mentors, and therefore communicating with both parties), to gain a more nuanced understanding of the circumstances that the teams and some members of their community of inquiry operated within, as well as to gain yet another perspective on the behaviors demonstrated by both parties.

In total, I conducted 140 interviews, which ranged from 35 to 104 minutes. I conducted 70 interviews with founders, 24 with mentors, 17 with potential customers, 24 with start-up coaches, and five with incubator staff. I audio recorded and transcribed all interviews, which resulted in 128 hours of recorded

material and 2.011 pages of transcripts (single spaced).

3.3.3 Field notes and observation data

Wherever possible, I visited teams on site to engage and observe them in the same environment that hosted their opportunity development decisions and actions. These on-site visits allowed me to observe prototypes of the current status of the potential opportunity, and capture them by taking photos if allowed by the team. I took field notes after each visit on observations of the office environment and the behaviors of the interviewees that were possibly relevant to opportunity development. I also observed presentations of the teams' planned milestones and business models. I followed a strict same-day rule to capture immediate impressions. These field notes represented a total of 136 pages (single-spaced).

3.3.4 Secondary data

I included data from secondary sources (Yin, 2009) to further enhance my understanding of teams' opportunity development decisions by regularly reviewing the teams' websites, introductory videos on the team and product, and collecting press releases. Furthermore, I captured presentation decks of the opportunity or meeting notes from interactions with the community of inquiry provided by the team whenever possible. I used this secondary data to validate interviewees' statements and create opportunity development timelines for each of the teams. For example, although one team had described very comprehensive use cases for both private and corporate customers during the first and second interview rounds, I discovered that their presentation materials for a networking event offered a more limited application of their technology for the private consumer market. Upon inquiry, the team members explained that they would develop the technical foundation of their product (enabling all described use cases) regardless of the customer type, but that their indecisiveness as to which features to prioritize in the private consumer market held them back from communicating more details. This indecisiveness resulted in development delays that the team had not yet communicated to me, and further was an indicator of emerging conflict within the team as team members could not collectively agree which

development path to take. Finally, I informally exchanged emails or conducted personal conversations with interviewees to follow-up on emerging thoughts, clarify open questions, and validate the emerging model. This data resulted in 244 pages of single spaced text. An overview of my data collection is given in tables 5 and 6 as well as in figure 2.

Overall, I documented the period from the emergence of the opportunity ideas to the end of the year 2016, a time when all teams in my sample had to have moved out of the incubator at the latest and ran out of funding, so that cash flows from customers, manufacturers or investors became pivotal to survive. By combining the different sources of information and by collecting information over a period of time through repeated interviews with central actors, I obtained in-depth descriptions of opportunity development activities, interactions and outcomes. For confidentiality reasons the cases are anonymized.

TABLE 5: Data inventory

	Number	Average duration (hh:mm)	Audio material (hh:mm)	Transcribed pages
Interviews with team members	70	1:14	68:45	1032
Interviews with mentors	24	0:47	20:10	359
Interviews with start-up coaches and incubator staff	29	0:51	24:38	395
Interviews with potential customers	17	0:48	14:33	225
Observations	-	-	-	136
Secondary data	-	-	-	244

TABLE 6: Overview of data sources

Team name	Informants – entrepreneurial team members			Informants – community of inquiry		Triangulation material
Medicup	Round 1 Founder 1 (F1-1); Founder 2 (F2-1)	Round 2 Founder 1 (F1-2); Founder 2 (F2-2)	Round 3 Founder 1 (F1-3); Founder 2 (F2-3)	Round 1 Start-up coach (C-1)**; Mentor (M-1); Potential customer PC-1)	Round 2 Start-up coach (C-2)**; Mentor (M-2); Potential customer (PC-2)	Company homepage (15 snapshots between January and December 2016), company social media profiles and feeds (Facebook, LinkedIn; 9 posts), news articles (4), videos (2), prototype documentation (4 pictures)

Digihub	Round 1 Founder 1 (F1-1); Founder 2 (F2-1)	Round 2 Founder 1 (F1-2); Founder 2 (F2-2)	Round 3 Founder 1 (F1-3); Founder 2 (F2-3)	Round 1 Start-up coach (C-1)**; Mentor (M-1); Potential customer (PC-1)	Round 2 Start-up coach (C-2)**; Mentor (M-2); Potential customer (PC-2)	Company homepage (20 snapshots between January and December 2016), company social media profiles and feeds (Facebook, Google+, Twitter; LinkedIn; 169 posts), news articles (16), videos (15), prototype documentation (22 pictures)
Smart-chat	Round 1 Founder 1 (F1-1)	Round 2 Founder 1 (F1-2); Founder 2 (F2-2)*	Round 3 Founder 1 (F1-3); Founder 2 (F2-3)	Round 1 Start-up coach (C-1)**; Mentor (M-1); potential customer (PC-1)*	Round 2 Start-up coach (C-2)**; Mentor (M-2)	Company homepage (10 snapshots between January and December 2016), company social media profiles and feeds (Facebook, Twitter; LinkedIn, 51 posts), news articles (23), videos (4), prototype documentation (8 pictures)
Smartlab	Round 1 Founder 1 (F1-1); Founder 2 (F2-1)	Round 2 Founder 1 (F1-2); Founder 2 (F2-2)	Round 3 Founder 1 (F1-3); Founder 2 (F2-3)	Round 1 Start-up coach (C-1)**; Mentor (M-1)	Round 2 Start-up coach (C-2)**; Mentor (M-2); Potential customer (PC-2)*	Company homepage (7 snapshots between January and December 2016), company social media profiles and feeds (LinkedIn; 1 posts), news articles (4), videos (2), prototype documentation (12 pictures)
Smart-box	Round 1 Founder 1 (F1-1); Founder 2 (F2-1)	Round 2 Founder 1 (F1-2); Founder 2 (F2-2)	Round 3 Founder 1 (F1-3); Founder 2 (F2-3); Founder 3 (F3-3)	Round 1 Start-up coach (C-1)**; Mentor (M-1); Potential customer (PC-1)	Round 2 Start-up coach (C-2)**; Mentor (M-2); Potential customer (PC-2)	Company homepage (16 snapshots between January and December 2016), company social media profiles and feeds (Facebook, Twitter, LinkedIn; 54 posts), news articles (4), videos (1), prototype documentation (15 pictures)
Digilamp	Round 1 Founder 1 (F1-1); Founder 2 (F2-1)	Round 2 Founder 1 (F1-2); Founder 3 (F3-2)*	Round 3 Founder 1 (F1-3); Founder 2 (F2-3)*	Round 1 Start-up coach (C-1)**; Mentor (M-1)	Round 2 Start-up coach (C-2)**; Mentor (M-2); Potential customer (PC-2)*	Company homepage (7 snapshots between January and December 2016), company social media profiles and feeds (Facebook, LinkedIn; 10 posts), news articles (7), videos (12), prototype documentation (16 pictures)
Biowing	Round 1 Founder 1 (F1-1); Founder 2 (F2-1)	Round 2 Founder 1 (F1-2); Founder 2 (F2-2)	Round 3 Founder 1 (F1-3); Founder 2 (F2-3)	Round 1 Start-up coach (C-1)**; Mentor (M-1);	Round 2 Start-up coach (C-2)**; Mentor (M-2); Potential customer (PC-2)*	Company homepage (9 snapshots between January and December 2016), company social media profiles and feeds (Facebook, Twitter, LinkedIn; 91 posts), news articles (14), videos (1), prototype documentation (18 pictures)
Roto-wheel	Round 1 Founder 1 (F1-1)	Round 2 Founder 1 (F1-2); Founder 2 (F2-2)*	Round 3 Founder 1 (F1-3); Founder 2 (F2-3)	Round 1 Start-up coach (C-1) **; Mentor (M-1); Potential customer (PC-1)*	Round 2 Start-up coach (C-2) **; Mentor (M-2)	Company homepage (5 snapshots between January and December 2016), company social media profiles and feeds (Facebook, Twitter, LinkedIn; 76 posts), news articles (14), videos (2), prototype documentation (7 pictures)
Babylab	Round 1 Founder 1 (F1-1); Founder 2 (F2-1)	Round 2 Founder 1 (F1-2); Founder 2 (F2-2)*	Round 3 Founder 1 (F1-3)	Round 1 Start-up coach (C-1) **; Mentor (M-1); Potential customer (PC-1)*	Round 2 Start-up coach (C-2) **; Mentor (M-2)	Company homepage (8 snapshots between January and December 2016), company social media profiles and feeds (LinkedIn, 20 posts), news articles (5), videos (2), prototype documentation (12 pictures)
Smart-seat	Round 1 Founder 1 (F1-1); Founder 2 (F2-1)	Round 2 Founder 1 (F1-2); Founder 2 (F2-2)	Round 3 Founder 1 (F1-3); Founder 2 (F2-3)	Round 1 Start-up coach (C-1) **; Mentor (M-1); Potential customer (PC-1)	Round 2 Start-up coach (C-2)**; Mentor (M-2); Potential customer (PC-2)	Company homepage (8 snapshots between January and December 2016), company social media profiles and feeds (Facebook, 21 posts), news articles (3), videos (1), prototype documentation (10 pictures)

Smart-heal	Round 1 Founder 1 (F1-1); Founder 2 (F2-1)	Round 2 Founder 1 (F1-2); Founder 2 (F2-2)	Round 3 Founder 1 (F1-3); Founder 2 (F2-3)	Round 1 Start-up coach (C-1) **; Mentor (M-1); Potential customer (PC-1)	Round 2 Start-up coach (C-2)**; Mentor (M-2); Potential customer (PC-2)	Company homepage (12 snapshots between January and December 2016), company social media profiles and feeds (Twitter, LinkedIn, Facebook, 78 posts), news articles (7), videos (2), prototype documentation (15 pictures)
Digistock	Round 1 Founder 1 (F1-1); Founder 2 (F2-1)	Round 2 Founder 1 (F1-2); Founder 2 (F2-2)	Round 3 Founder 1 (F1-3); Founder 2 (F2-3)	Round 1 Start-up coach (C-1) **; Mentor (M-1); Potential customer (PC-1)*	Round 2 Start-up coach (C-2)**; Mentor (M-2)	Company homepage (6 snapshots between January and December 2016), company social media profiles and feeds (Facebook, 14 posts), news articles (0), videos (0), prototype documentation (3 pictures)
Further incubator advisors	Round 1: Mentoring Network Coordinator 1 (MNC-1-1); Mentoring Network Coordinator 2 (MNC-2-1); Hardware construction coach (HCC-1-1)** Round 2: Mentoring Network Coordinator 1 (MNC-1-2); Mentoring Network Coordinator 2 (MNC-2-2)					* *Informant was not available for a prior or later interview round* ** *Informant worked with several teams of my sample*

FIGURE 2: Timings of data collection

	Pre-study period (Dec 2015)	Study period phase 1 (Jan-Mar 2016)	Study period phase 2 (Apr-Jun 2016)	Study period phase 3 (Jul-Sep 2016)	Post-study period (Oct-Dec 2016)
Sampling and preparation	■				
Founder interviews		■	■	■	
Field notes from site visits		■	■	■	
Documentation of prototypes		■	■	■	
Community interviews			■	■	
Correspondence with participants (email, informal discussions)	■	■	■	■	
Public media coverage	■	■	■	■	■
Website data	■	■	■	■	■
Informal follow-up correspondence with founders		■	■	■	■
Informal follow-up correspondence with community of inquiry members			■	■	■

3.4 Data analysis and coding

3.4.1 Sensemaking strategies

Data analysis followed established procedures for iteratively analyzing, comparing, and refining data during the data collection process, and guiding data analysis through several phases which ensure that derived ideas are plausible and defensible to the reader (Corbin & Strauss, 2008). Fundamentally, my approach combines several sensemaking strategies as defined by Langley (1999), which provide (1) different levels of accuracy (or closeness to the data), which compete with their generality (or the potential range of situations in which theory will hold true) and simplicity (i.e. the number of elements and/or relationships in a theory) (Thorngate, 1976; Weick, 1979b), (2) come with different relative data needs in terms of depth (process detail) and breadth (number of cases), and (3) are either appropriate for the detection of patterns in processes or to explore their driving mechanisms. Combining strategies enables researchers to customize their approach to fit each individual study's needs, yet it is paramount to manage the trade-off between the explanatory power and complexity of emerging theory.

For example, a narrative sensemaking strategy in data analysis involves constructing detailed and realistic stories from raw data, a strategy which is used by almost all process research as a preliminary step preparing a chronology for subsequent analysis, and/or to present the different viewpoints on the process studied as completely as possible, and/or to incorporate an analytical element and "clarify sequences across levels of analysis, suggest causal linkages between levels, and establish early analytical themes" (Pettigrew, 1990, p. 280). As Langley (1999) explains, its strength lies first in the variety, richness and authenticity of the incidents described, second in its tolerance for a lack of clear definitions when boundaries are not clear, and third in its accommodation of variable temporal embeddedness and eclectic data. Since the narrative strategy communicates the richness of context, the accuracy of emerging theory is expected to be high, yet it does not lead to either simple or general theory on its own (Langley, 1999).

The visual mapping strategy requires researchers to transform many observations of similar processes into visual graphical representations of data, and is particularly attractive for the analysis of processes

since it allows to more easily depict sequences and the passage of time, and allows the simultaneous representation of a large number of dimensions in relatively little space (Langley, 1999; Miles & Huberman, 1994). Chronologies of events can be visually coded in multiple ways, representing decisions, activities, events, or effects, and their character and domain can be indicated, with further descriptive textual elements added to provide links to the data. Visual graphical representations are a useful theory development tool and intermediary step between raw data and more abstract conceptualizations (Langley, 1999), yet they offer moderate levels on all three dimensions of accuracy, generality, and simplicity, i.e. excel in neither dimension, and are therefore not appropriate as a stand-alone strategy.

The temporal bracketing strategy involves structuring data into successive adjacent periods, to examine alternating dynamics i.e. how actions of one period lead to changes in the context that will affect action in subsequent periods. Periods subsequently represent units of analysis for replicating theory. As Langley (1999) describes,

> "With this strategy, a shapeless mass of process data is transformed into a series of more discrete but connected blocks. Within phases, the data are used to describe the processes as fairly stable or linearly evolving patterns. Evidence is also drawn together to examine how the context affects these processes, and what the consequences of these processes are on the future context and other relevant variables of interest" (p. 703)

This approach can easily handle eclectic data and capture nonlinear dynamic organizational processes, and due to its internal replication possibilities, needs only few cases. It stands out in terms of moderate to high accuracy, depending on the quality of the temporal decomposition, and in terms of its focus on fundamental process drivers. However, it offers only moderate generality, i.e. needs to be tested on more data, and is unlikely to yield theories high in simplicity (Langley, 1999).

So far, the narrative and visual mapping strategies have described supportive tools for building theory, while the temporal bracketing strategy potentially serves as a method to develop theory on its own. Another, and the most cited method for deriving theory from data is the grounded theory methodology (Glaser & Strauss, 1967; Langley, 1999). It demands a large number of comparable incidents that are

described in all their richness, for processes to be described on micro-level and in terms of the differing interpretations of all individuals involved. The grounded theory approach involves systematically comparing small units of data (or incidents), describing the phenomena being observed by gradually constructing a system of categories, subcategories, associated dimensions, and properties, which is then gradually elaborated and refined (Strauss & Corbin, 1990). Eventually, a small number of core categories are developed that integrate all the theoretical concepts into a coherent whole, firmly grounded in the original data (Strauss & Corbin, 1990). Balancing the description of micro-processes and the explanation of larger phenomena is the challenge of the grounded theory approach. However, its strengths lie in the fact that it (1) builds theory bottom-up and is therefore high in accuracy, (2) uses specialized language and a hierarchical category structure, so that resulting models stand out in terms of low to moderate simplicity, and (3) that it provides a common structure to construct and communicate substantive theory of a specific phenomenon (Gioia et al., 2013; Langley, 1999).

Lastly, the synthetic sensemaking strategy represents a transformation of the original process stories composed of events to explanatory variables synthesizing their critical components. Critics of this approach argue that it does not reflect process theory, but rather compressing events and relating them to a single overall success assessment (Langley, 1999). This will provide moderate accuracy, as well as relatively simple theoretical formulations that are also moderate in generality. Researchers are therefore urged to draw from the entire qualitative toolkit to show how and why the variables identified lead to the consequences predicted, i.e. strongly ground the explanatory mechanisms within the data, and situate these within the literature to make the identified relationships more credible and enhance external validity (Eisenhardt, 1989). In the following, I will outline the steps and objectives of each sensemaking strategy that I applied, and position them within the stages of my data analysis.

3.4.2 Identification of first-order codes (categories)

The first step of my analysis was an open-coding approach (Strauss & Corbin, 1998). I started working with the data with an open mind and let it speak to me, considering all possible meanings to identify

concepts and keywords that seemed to stand out with respect to multiple actors' perspectives on the team's opportunity development process, actions taken to reduce uncertainties during the process, and the effects of knowledge building social interactions over time. I assigned codes to statements by capturing and grouping units of text relating to the same concepts, and labeled these to generate first-order codes (Corbin & Strauss, 1990). First-order codes covered a variety of topics such as the perception and practical execution of opportunity development, the nature of the community of inquiry, the nature and perception of social interactions carried out, the effects of latter on the potential opportunity and on the team, and changes in all aforementioned over time. Further, first-order codes covered the components and developments of the business model, product, prototype, as well as the development of the entrepreneurial team. First-order codes related to primary changes in opportunities (i.e. developments of business models, products, and/or prototypes) included words and phrases that conveyed both the degree of change (incremental vs. radical development) as well as the specific aspects requiring revision. I also coded words and phrases that deepened my understanding of the context and content of feedback interactions, as well as interactions within the teams. This step also involved comparing the community of inquiry's perspective on interactions and teams' opportunity development decisions. I triangulated my data sources to uncover similarities and dissimilarities in perspectives, to understand the underlying reasons, and thereby enrich my findings and emerging theory. For example, as I inquired how teams organized their tasks in opportunity development to identify possible relevant first-order codes, I found that none indicated problems in separating responsibilities among team members (until very late in the data collection process). However, the teams' communities of inquiry reported existing conflicts and inconsistencies among individual team members' roles, leading me to add the first-order code 'distinctiveness of roles and responsibilities among team members'.

As I analyzed more data, it became clearer how informants related differently or similarly to the initial codes identified, and I followed up on my impressions by addressing them more thoroughly during subsequent interviews and by taking field notes on the issues. For example, while all teams initially reported pursuing a customer-centric opportunity development strategy, it became clear that terms such as "customer feedback" carried different connotations among teams – while some used "customer" as a

substitute for “potential customer”, others quite literately thought of future customers who would have already purchased the product. I coded and categorized data using the NVivo software, iterating between data and coding as my understanding of underlying patterns developed (Strauss & Corbin, 1998). By comparing fragments from individual sources of data that had been labeled similarly, I was able to detect characteristics of the broader categories. During this step, I also began to combine different codes into categories to begin identifying patterns in the data. For instance, as I documented the nature of interactions and how teams utilized feedback from their communities of inquiry, I found feedback to affect opportunities differently among teams. Adopting an ‘exploratory mindset’ appeared to represent two different concepts for the teams among my sample, varying in terms of the questions being explored as well as the nature of the execution. During this process, I re-labeled first-order codes when necessary to ensure they reflected exactly what was captured, re-categorized units of text or formed new first-order codes whenever I generated a new layer of understanding from the data, and added definitions and parameters to distinguish each category within itself and across others (Strauss & Corbin, 1998). This, for example, helped me distinguish between exploratory interactions that delved into the solution space as opposed to those delving into the problem space, and to distinguish between exploratory interactions (i.e. disregarding existing opportunity beliefs) versus interactions serving to test existing beliefs in specific. An overview of first-order codes is given in table 7.

Once the transcripts were coded, the second major task in the analysis was to display the data so I could begin answering two questions: what were the key events and decisions in each entrepreneurial teams’ opportunity development? Why did they occur when they did, and what triggered them? Interview transcripts were analyzed separately for each case as a stand-alone entity, and a running record of analysis and interpretation was kept to uncover the patterns of each case before comparisons were made between cases (Eisenhardt, 1989). These notes are supplemented by a variety of exploratory codings and written summaries. I began with constructing individual case histories, or abbreviated timelines, using the data gathered from the interviews and secondary sources, isolating the time-ordered events within the process of initiation, pursuit, and modification of opportunities, as well as the configurations and effects of corresponding external relationships. Events relevant to opportunity development could,

TABLE 7: First-order codes

Categories	Subcategories
I. Entrepreneurial teams	1. Team status (opportunity development ongoing) 2. Prior entrepreneurship experience 3. Prior industry experience 4. Prior general human capital 5. Extent to which human capital is opportunity-specific 6. Prior motivation for entrepreneurship 7. Trust within team 8. Shared vision within team 9. Degree of prior personal relationships between team members 10. Degree of current personal relationships between team members 11. Completeness of opportunity-specific human capital 12. Distinctiveness of responsibilities among team members 13. Fit between human capital and responsibilities 14. Task conflict 15. Relationship conflict
II. Opportunities	16. Changes to the opportunity overall 17. Radical changes to the opportunity 18. Sophistication of prototype implementation (by the end of data collection)
III. Opportunity development strategies	19. Degree of development activities pertaining to 'means' 20. Degree of development activities pertaining to 'ends' 21. Degree of communicated customer-centricity in opportunity development 22. Consensus-based decision making in opportunity development (vs. expert-based) 23. Self-reflection concerning opportunity development strategy 24. Adaptations to opportunity development strategy over time
IV. Community of inquiry	25. Size of the community of inquiry 26. Opportunity-relatedness of community of inquiry 27. Member primarily consulted regarding 'ends' (vs. 'means') 28. Degree of personal relationship (vs. purely professional relationship) 29. Changes in the relationship over time
V. Interactions	30. Opportunity-relatedness 31. Proactivity of interaction 32. Timing of interaction (early upon registering the need vs. late upon registering the need) 33. Degree of teams' preparation before interaction 34. Interaction depth 35. Interaction frequency 36. Degree of utilizing/testing a prototype 37. Degree of dialogue before and after interaction 38. Degree of feedback relating to 'means' 39. Degree of feedback relating to 'ends' 40. Degree of the effect of feedback on opportunity development 41. Degree of positive evaluation of interaction by the team 42. Degree of positive evaluation of interaction of the community of inquiry member 43. Changes in the interaction over time 44. Changes in the evaluation over time 45. Changes in effects on opportunity development over time
VI. Opportunity development	46. Degree of problem exploration since opportunity recognition 47. Degree of problem validation since opportunity recognition 48. Degree of solution exploration since opportunity recognition 49. Degree of solution validation since opportunity recognition 50. Degree of prototype testing since opportunity recognition 51. Degree of prototype development since opportunity recognition 52. Degree of business model development since opportunity recognition 53. Degree of learning in opportunity development reported by the entrepreneurial team 54. Degree of learning in opportunity development reported by the community of inquiry

for instance, entail changing aspects of a business plan, starting to devote full- time effort to opportunity development, participating in a competition, further developing the prototype, collecting competitive information, or changing a goal, amongst many others. Relationships were captured in terms of the context and content of interactions with all community of inquiry members that teams reported engaging with or having engaged with since opportunity recognition. That is, amongst others, I documented the interaction designs (e.g. whether participants communicated in person, whether prototypes were utilized, etc.), the interaction agenda (e.g. topics discussed, whether past topics were followed-up on or new topics were introduced, etc.), and the depth of interactions (e.g. length, frequency, etc.) for each reported interaction with every community member, to ascertain averaged total values for each team once all interactions had been registered. I created a skeletal version, and a detailed version with backgrounding information on how teams regulated the opportunity's evolution. In the next step, I transformed the visual timelines into internally consistent and detailed narratives, drawing heavily from my data to provide thick descriptions of actors' experiences, beliefs and decisions along the significant events of their opportunity development journey.

3.4.3 Aggregation of first-order codes into second-order codes (theoretical themes)

The first-order findings provide a rich narrative of events, identify relevant elements of informants' meaning systems, and provide initial insights about the management of opportunity development over time. These provide the basis for reconsidering the data with a more theoretical and analytical rather than descriptive view, i.e. enable a second-order analysis or axial coding (Strauss & Corbin, 1998). The second-order analysis employs qualitative content analyses of the informants' and researcher's accounts using methods of constant comparison (Glaser & Strauss, 1967; Strauss & Corbin, 1990). Such an analysis allows to uncover possible underlying dimensions or patterns in the data and first-order findings: it explores the constructs underlying the structuring and sequencing of actions and the associated experiences and interpretations of involved informants, and discerns whether the aforementioned dimensions change in some progressive fashion as the opportunity development process evolves. It is aimed at surfacing the characteristics of broader categories of data, known as second-order

themes. I grouped the first-order codes into themes by the process of relating them to each other and segregating categories that yield a coherent whole (Strauss & Corbin, 1998), repeatedly comparing data from different sources and different times to discern the major themes or processes involved in the initiation of opportunity development. For example, after analyzing teams' interactions with their communities of inquiry, their opportunity development decisions, the consequences of these decisions, as well as teams' evaluations thereof over a period of time, the pattern emerged that some teams experienced opportunity development as an uncontrollable, unforeseeable process, despite apparently applying systematic methods (or so they believed).

Moving from description to analysis implies an iterative process consisting of within-case analysis and between-case comparison (Eisenhardt, 1989). For this purpose, I compared the development patterns between the twelve cases to identify convergence of themes and patterns across cases (Eisenhardt, 1989; Miles & Huberman, 1984; Yin, 1994), and then looked for longitudinal connections between these concepts that suggested relations of causality, or stories (Dyer & Wilkins, 1991). In this step, I engaged in temporal bracketing (Langley, 1999), whereby I segmented feedback episodes and clustered them by entrepreneurial team, which serves the purpose of theory building by improving comparison and replication. Clustering these episodes by entrepreneurial team, I was able to perceive patterns within each case as well as across cases (Eisenhardt & Graebner, 2007), and to relate episodes to the observed characteristics of teams and their observed outcomes in entrepreneurial opportunity development. For instance, I had already identified the theme that among some teams, individual team members' opportunity belief systems converged as opportunities evolved over time, while they diverged in other teams (despite all teams continuously emphasizing the sharedness of their vision). The temporal bracketing approach then revealed how diverging belief systems led to detrimental effects on team organizing, yet with some delay, so that it wasn't until the end of external funding periods that relationship conflict ensued.

According to Miles and Huberman (1984), iterating between concepts and stories is essential to the development of a good explanatory framework, which is central to my research. Comparisons were

initially made between pairs of cases, and other cases were added to develop robust theoretical concepts and patterns in how the entrepreneurial teams interacted, negotiated, and more or less successfully developed their opportunities over time. As is appropriate for inductive theory building, I moved between emerging findings and the existing literature (Eisenhardt & Graebner, 2007). Initially, broad categories were used to organize the data (Glaser & Strauss, 1967) and then gradually specified consistent with Gioia et al. (2013). To ensure that my emerging theoretical themes are firmly grounded in data, I iteratively reexamined previous assumptions and my nascent theories in light of new data, and continued this process until I accounted for the all data and no new insights were produced, i.e. additional interviews mainly confirmed, rather than supplemented, my existing data regarding the opportunity development process (Glaser & Strauss, 1967; Strauss & Corbin, 1990). Once my first-order coding efforts failed to reveal additional references of potential importance, I concluded that I had reached data saturation. For example, several teams among my sample (demonstrating both converging and diverging within-team belief systems) built close relationships with new mentors toward the end of data collection, applying the same behavioral patterns as previously observed. This process resulted in 16 second-order themes.

3.4.4 Identification of theoretical dimensions and development of an overarching framework

The last stage of my analysis involved extracting the theoretically explanatory dimensions from the emergent patterns in the data, or selective coding (Strauss & Corbin, 1998). I began the last stage of my analysis by abstracting the themes into higher-order theoretical dimensions, repeatedly iterating between my derivations and the data to ensure the former still hold. Therefore, as the analysis proceeded, the overarching logical frame shifted from exploring data, to building theoretical models, and empirically scrutinizing these models (Gioia et al., 2013). I explored themes in terms of their possible linkages and relationships to fully represent the evolution of each case through opportunity development and thus move from a static to a dynamic view of the theoretical dimensions involved. The aim of this step was to draw relationships between the different core categories and develop propositions, based on insights

concerning what causes variation within the process. After noting similarities and differences across cases, I developed tentative propositions, which evolved in the course of the analysis process. For example, while the role of opportunity-specific knowledge remained inconspicuous during earlier stages of data collection (when all teams reportedly perceived satisfactory progress in the opportunity development progress), the collective belief development and associated negotiations that unfolded within teams over time revealed how some teams mostly applied top-down information processing mechanisms for belief development, that, combined with low levels of opportunity-specific team human capital, prevented the team from making sense of the overwhelming amounts of information and options.

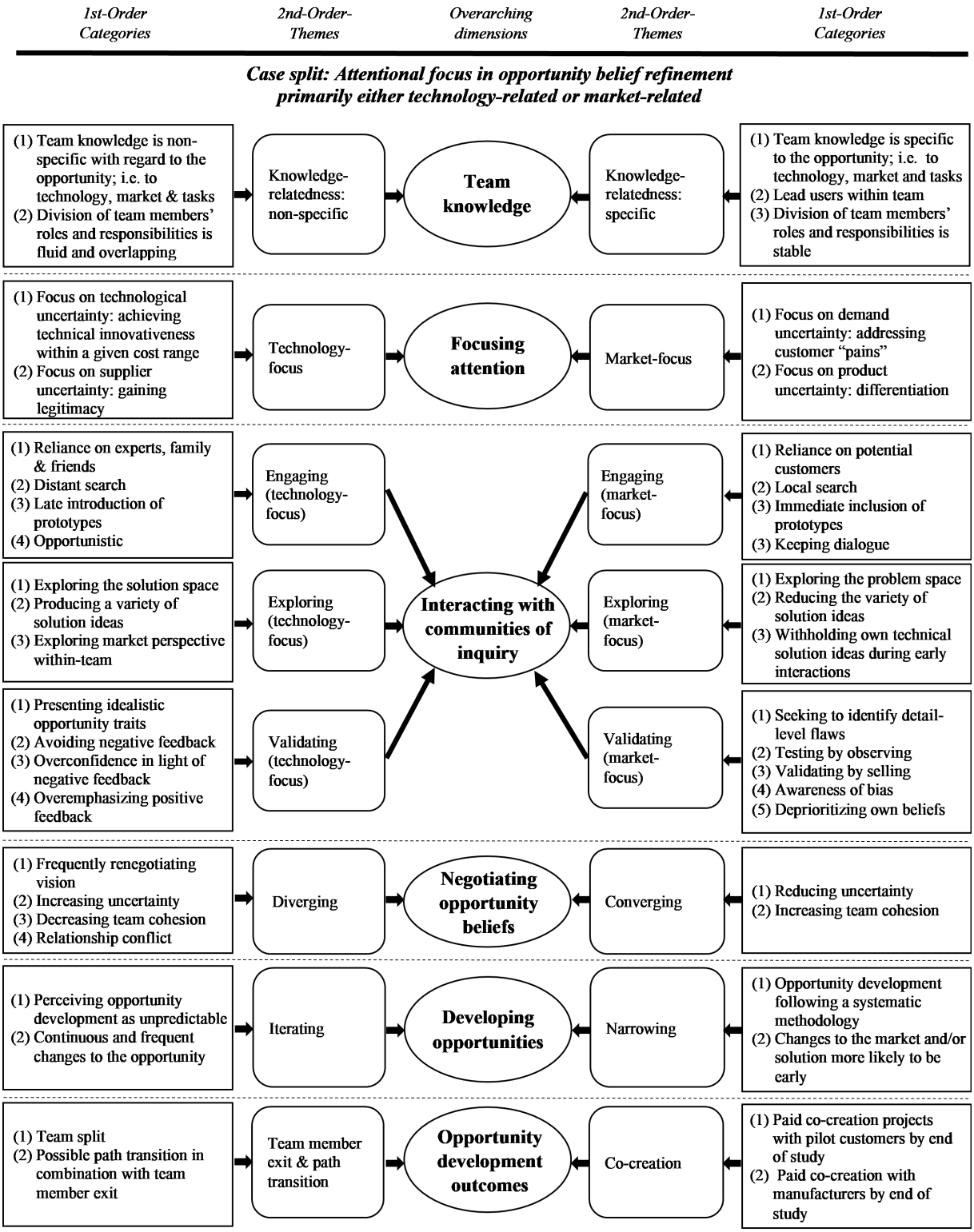
In exploring the variation across the cases, I began to uncover how differences at one step of the opportunity development process were associated with differences at later steps of the process. In particular, I investigated variation in how entrepreneurial teams interacted with communities of inquiry, the cognitive, operative and strategic differences that triggered those different practices, as well as the different outcomes of those practices. For instance, teams that primarily applied top-down information processing mechanisms perceived particular forms of uncertainty that affected how they designed interactions with their communities of inquiry, and affected the types of feedback that they were highly receptive to as opposed to other forms that they entirely disregarded. By the end of my data collection, I applied a dichotomization approach in this study as suggested by Eisenhardt (1989). Accordingly, teams with successful opportunity development outcomes as defined earlier were compared to teams that had not achieved the specified outcomes, focusing on the characteristics and relationships among constructs within either group of teams. I contrasted the eight teams which showed the highest levels of positive and negative facets of outcomes of interest (cf. Yin, 2009), allowing me to reach theoretical saturation such that the remaining four cases did not provide any justified reason to further modify the model. Eight cases further represents an appropriate sample for a multiple case study approach which has typically been advised should range across four to ten cases (Eisenhardt, 1989). The dynamic model that emerged from this step (Corbin & Strauss, 1990) is based on six overarching theoretical dimensions. Following Gioia et al.'s (2013) illustrative visualization of qualitative data structures, Figure 3 highlights the relationships between the final first-order concepts, second-order themes, and aggregate dimensions

that emerged from my analysis. Consistent with other studies utilizing a data structure (e.g. Nag & Gioia, 2012; Williams & Shepherd, 2016), I showcase how the data revealed two groups that are characterized by different conceptual and procedural interpretations of similar concepts. Finally, I integrated categories, themes, and process steps into (1) a model of the micro-practices that underpin interactions with communities of inquiry for opportunity belief development (presented in Chapter 5.2), and (2) a theory of entrepreneurial teams' navigation efforts through opportunity development pathways and the outcomes related to those pathways (presented in Chapter 5.4).

3.5 Validity and generalizability

In light of the tradeoffs between generality, simplicity, and accuracy in theory development, qualitative research provides several ways to ensure the validity of constructs, robustness of outcomes, and generalizability of process-related findings. First, in the constructivist/interpretivist approach of event-based process research, the connection with empirical reality and practice of constant revisions of raw data allows the development of robust theory (Glaser & Strauss, 2008). Second, gathering data from multiple sources within each case, i.e. the entrepreneurial team and its community of inquiry, increases construct validity because these different sources "provide for multiple measures of the same phenomenon" (Yin, 1994, p. 92). Third, including a set of multiple cases from diverse industries increases the robustness of emerging theory (Eisenhardt, 1989; Eisenhardt & Graebner, 2007). Moreover, by building my data structure by the method described by Gioia et al. (2013), I choose a holistic approach to inductive concept development that increases rigor in qualitative research by providing a graphic representation of how I progressed from raw data to theoretical dimensions in conducting the analyses (Gioia et al., 2013). With regard to generalizability, multiple case study designs ensure improved external validity (Eisenhardt, 1989; Yin, 2009), while systematic theoretical sampling allows for more conditions and variations to be discovered, increasing the generalizability, precision, and predictive capacity of the theory (Corbin & Strauss, 1990). Thus, my ultimate objective was to sample from enough cases so that the variety of information ensured that all important concepts and perspectives were represented in order to generate robust, yet bounded theory.

FIGURE 3: Data structure



An event-based process approach, however, poses considerable challenges. The sheer volume of data to be collected, organized and understood can create an overwhelming shapeless mass of information (Pettigrew, 1990), and the complexity and ambiguity of the data make it difficult to know where to start. Further, an open-ended inductive approach might tend to the postponement of decisions regarding what is relevant and what is not, aggravating these difficulties (Miles & Huberman, 1994). Compiling thorough case histories represents a tool to overcome this challenge, as they provide context and serve as frames of reference for the subsequent analysis of phenomena and influencing variables, which enables the researcher to deal with each case's complexity, and the reader to distinguish between descriptive facts and the researcher's interpretive contributions (Miles & Huberman, 1994). Further, to cross-validate my interpretation of the large amounts of raw data, the written interview transcripts and other written documents were coded anew by one other person who did not participate in the study (Denzin & Lincoln, 2011; Miles & Huberman, 1994). Initially, an intercoder agreement of 0.93 was achieved, which is consistent with extant literature (cf. Gioia, Price, Hamilton, & Thomas, 2010). Disagreements between coders were discussed and resolved to strengthen the codes and improve the trustworthiness of the interpretations.

Validity and generalizability are further addressed by my research design by way of mitigating the risk of bias confounding my results on several levels. First, inductive theory building is characterized by its strength of producing theory with less researcher bias than theory built from incremental or deductive studies (Eisenhardt, 1989). Specifically, constant comparisons against data help achieve greater precision and consistency (Corbin & Strauss, 1990). Second, by focusing on nascent rather than finally successful (or failed) entrepreneurs, my study circumvents the risk of success bias that is prevalent in entrepreneurship research where results are based solely on those cases that successfully completed i.e. survived the creation process (Aldrich & Fiol, 1994; Davidsson & Honig, 2003; McMullen & Shepherd, 2006). Third, my research is designed to mitigate retrospective bias stemming from memory decay and hindsight bias, by taking a longitudinal approach to capture changes over time, by combining historical with real-time data, and by triangulating data (Pettigrew, 1990; Yin, 1994). Specifically, historical (retrospective) data enables the efficient collection of many observations to provide a grounding, while

real-time data deepens understanding about the order of events (Leonard-Barton, 1990). Fourth, informant bias was further addressed by adopting appropriate interview techniques (e.g. establishing a "back in time" cognitive frame, nondirective questioning, and ensuring anonymity) which typically yield accurate information that is convergent among informants and with secondary data (Brown & Eisenhardt, 1997). Fifth and last, I relied on informants who were particularly knowledgeable about the relevant events surrounding opportunity development and for whom opportunity development was a responsibility in the team, thus improving memory accuracy.

To summarize, my dynamic process model of nascent opportunity development with a community of inquiry integrates a variety of sensemaking strategies, from the visual mapping and narrative strategies that provide the rich case histories presented in Chapter 4, to the grounded theory strategy that lays the basis for my three-step coding process and that, combined with the temporal bracketing and synthetic strategies, produces the dynamic model presented in Chapter 5. In the following, I will lay out the histories for each case to provide an understanding of important events, interactions with communities of inquiry, and the overall opportunity development process.

4 Case descriptions and within-case analyses

4.1 The case of team Medicup

Opportunity recognition and team formation

Team Medicup was founded in 2013, after one founder conceived of the original problem (patients in intensive and geriatric care often choking and developing infections due to a bad drinking posture) while working full-time as a nurse. He did not verbalize the problem until returning to university and meeting another founder through mutual acquaintances, who was accomplishing a course in medical engineering. The latter had been familiarized with the problem in lectures, and with the fact that a good solution was lacking, yet had not conceived of an opportunity to take further action. When both individuals discussed the problem in an informal setting, they developed the intention to act further on the opportunity i.e. explore both the problem and potential solutions. The third founder joined the team shortly afterwards by invitation of the others, having previously met within the university context and subsequently taking on business- and patenting-related responsibilities. The team's corporate profile is depicted in figure 4.

Interactions with the community of inquiry and opportunity development

The team initially engaged in academic and online research to verify that the problem occurred on a systematical level, i.e. in a significant frequency and across target groups, and that appropriate solutions were indeed lacking. Specifically, they carried out an international competitor analysis and ordered products worldwide. Whilst preparing sketches of several possibilities to technically implement the solution idea into a prototype, the team conducted surveys and interviews with potential users and customers (clinic and care home nurses) to further verify and specify the problem. After the first prototype did not fulfil its function and received negative expert feedback, the team engaged in trial-and-error material testing until the right technique and right components were found. The second proto-

Figure 4: Corporate profile of team Medicup

Industry, business segment & business model			
Industry: Medical engineering; **Business segment:** Nursing care **Original BM:** Drinking aid for bedridden patients in homecare, to be sold business-to-customer, to patients and/or their caretakers, via an online shop, and sold business-to-business to nursing homes. **BM at end of data collection:** Drinking aid for bedridden patients in intensive care and geriatric care, to be sold-business-to-business to clinics.			
Team composition			
	Founder 1	**Founder 2**	**Founder 3**
Academic background	• Nursing care and healthcare industry	• Medical engineering	Business and healthcare industry
Prior working experience	• Nursing care (full-time)	• Medical engineering (working student)	• Patenting (internship)
Prior entrepreneurship experience	• None	• None	• None
Function in venture	• User experience, product development	• Product development, manufacturing	• Finances, networks, patents

type was demonstrated to potential customers and users and the problem further explored. At the same time, the team participated in two business model development programs, in which they consolidated all problem-related information they had gathered, leading them to decide to exclude nursing homes from their target market. Once the second prototype was built, the team tested it with potential users and realized that it was lacking an important second element (a lid), which was added. After moving into the incubator and starting to work full-time on their venture (they had finished their university degrees by now), the team interacted closely with a mentor as well as their start-up coach, who convinced them to refine their market and pricing by selling to clinics via a business-to-business revenue model. Additionally, another mentor and a number of technical experts were irregularly engaged in material-related questions. The team started receiving one year of government funding which led them to incorporate several lid-types into their product concept. However, they did not prototypically implement these types, but concentrated on developing several versions of the specific lid-type that was to be launched first, to test with potential users. A cooperation with a manufacturer failed to produce a fully reusable prototype, after which the team developed a new, partly reusable prototype. This was regularly tested with potential users (nurses) and demonstrated to potential customers (clinic buyers) to scrutinize

their acceptance of the product. An accelerator associated with the incubator offered to invest in the team in return for equity shared, however the team declined at their mentor's advice. At this point, their mentor insisted they try develop a one-piece instead of a two-piece solution, which they deemed impossible yet continued working on at his request. Eventually, a one-piece solution was found (affecting pricing), built, and tested with potential users (nurses).

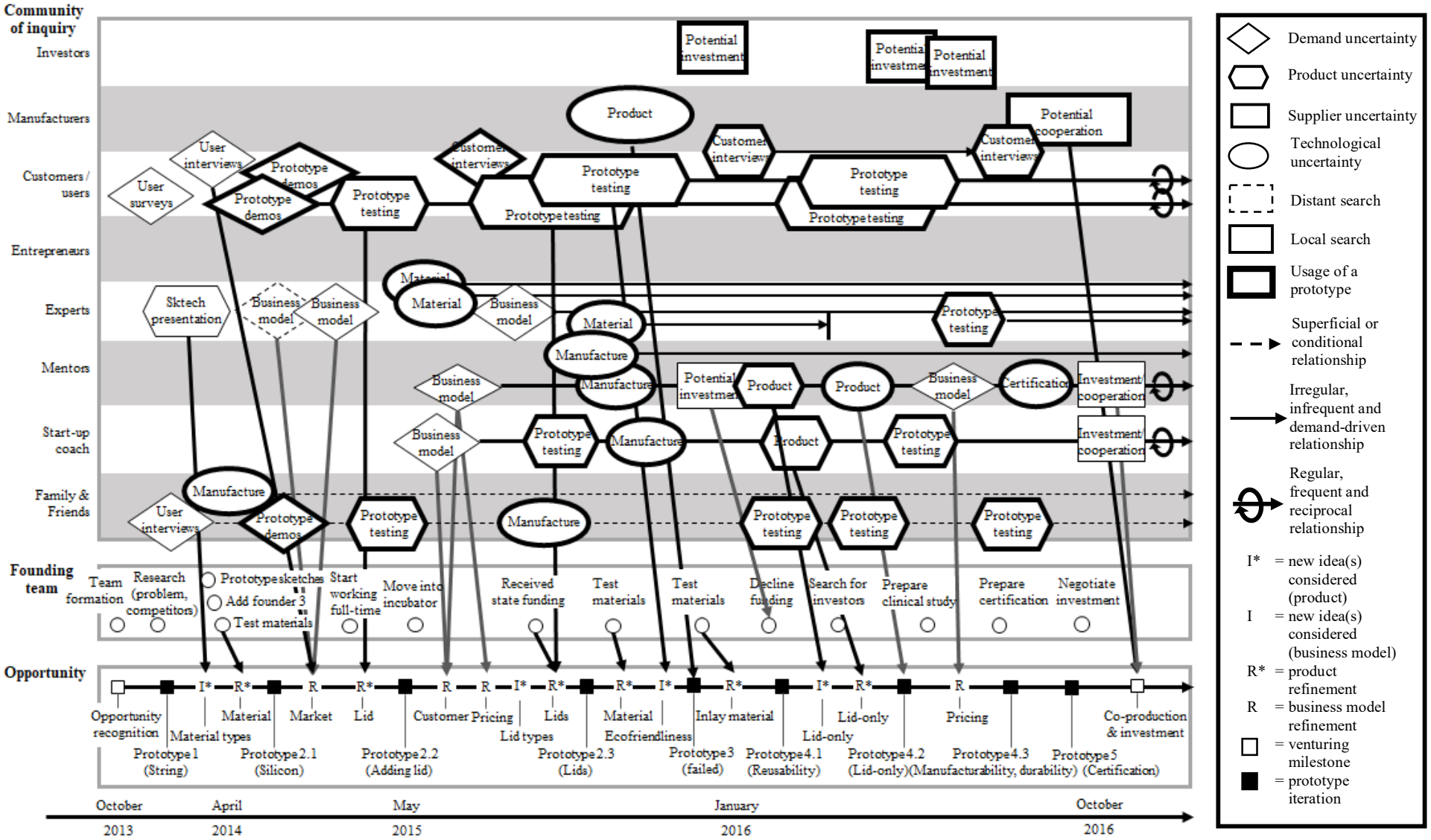
Throughout the process, they remained in close regular contact with their start-up coach, who participated in prototype testing. The new prototype was improved in terms of manufacturability and durability and prepared for the certification process. Certification was the prerequisite for the subsequent clinical study, that the team planned to carry out for the purpose of receiving legal approval for the product. At this point, the one-year government funding period was coming to its end, and the team negotiated with several potential investors whose offers they did not, however, accept, at the advice of their mentor and start-up coach. Instead, they were advised and chose to enter a co-creation agreement with a manufacturer, who also investment a large sum into the team. Team Medicup's case history is visually represented in figure 5, giving an overview of the team's opportunity development pathway, interactions with their community of inquiry, and within-team events that contributed to opportunity development.

4.2 The case of team Digihub

Opportunity recognition and team formation

Two of the three members of team Digihub met at an entrepreneurship education program in October 2014 and agreed that there was a lack of digital tools that helped university students study efficiently and effectively. Since both team members had a technical background, they recruited a third, business-oriented team member in March 2015 (whom they had met through the same program). The team's corporate profile is depicted in figure 6.

Figure 5: Visual case history of team Medicup



A note with regard to visual case histories

The visual case history depicts an event chronology coded in multiple ways. In the upper section labeled "community of inquiry", boxes indicate interactions with community of inquiry members. The location of each box in one of the eight horizontal bands in the upper box indicates the community of inquiry member with which the event is associated. The content of boxes indicates the subject of the interaction, while the length of each box indicates the duration of interaction around the particular subject. The form of the boxes indicates the type of uncertainty the event was aimed at reducing. These fall into four categories: demand uncertainty i.e. whether demand for the solution exists (problem-oriented); product uncertainty i.e. whether the solution will be preferred over other solutions (solution- and commercialization-oriented); supplier uncertainty i.e. whether the team will be perceived as a legitimate provider of the solution (commercialization-oriented); and technological uncertainty i.e. whether the technology is mature, advanced and producible enough to be provided (solution-oriented). The type of line that the shape is made of indicates whether the interaction served the purpose of distant search (line dotted) or local search (line drawn through), and whether a prototype was utilized (thick line drawn through). The thickness and type of the horizontal lines linking the boxes, and whether there is a linking line at all, indicates the degree of the relationship between the teams and community of inquiry members: no line represents no ongoing relationships, dotted lines represent superficial or conditional relationships, lines drawn through represent irregular, infrequent and demand-driven relationships, and thick lines with circles represent regular, frequent and reciprocal relationships. The section in the lower-middle labeled "team" depicts important within-team events, i.e. decisions, activities or given facts that occur or are relevant mainly within the boundaries of the team, and that affect the team's opportunity development. Further, the bottom section labeled "opportunity" depicts important opportunity development events that are triggered by interactions with the community of inquiry or by within-team activities. These events may represent conceptual developments or actual developments to the prototype, and are depicted with the corresponding subject of change underneath. Finally, the horizontal time scale allows representation of event ordering and parallel tracks over time and provides a rough indication of their temporal duration.

Figure 6: Corporate profile of team Digihub

Industry, business segment & business model			
Industry: Knowledge management; **Business segment:** Project teams **Original BM:** Knowledge platform for students to collaborate on courses that also serves as a recruiting channel for firms, who both purchase access to the platform via a business-to customer and business-to-business revenue model, respectively. **BM at end of data collection:** Real-time project collaboration tool for corporate project teams that facilitates simultaneous communication and knowledge management, to be sold business-to-business.			
Team composition			
	Founder 1	**Founder 2**	**Founder 3**
Academic background	• Programming	• Programming	• Business, specifically marketing
Prior working experience	• Front-end programming (working student)	• Back-end programming (working student)	• Marketing (working student)
Prior entrepreneurship experience	• Entrepreneurship education (theoretical & practical)	• Entrepreneurship education (theoretical & practical)	• Entrepreneurship education (theoretical & practical)
Function in venture	• User experience, product development (front-end)	• Product development (back-end)	• Marketing, testing, distribution, finances

Interactions with the community of inquiry and opportunity development

The team immediately began sharing their idea with business experts and entrepreneurs from their networks, who inspired them to include a business-to-business revenue model (i.e. connecting skilled students with corporations that use the platform as a recruiting channel). Moreover, they consulted several university professors to learn whether they were open to providing course materials and promoting the platform. To produce ideas about the technical implementation, they consulted professors about the future of education with regard to systemic digitization. Most importantly, they conducted interviews with potential customers (students as well as businesses), and finally decided to go ahead and build a simple digital prototype with features that were mainly derived from market research and brainstorming.

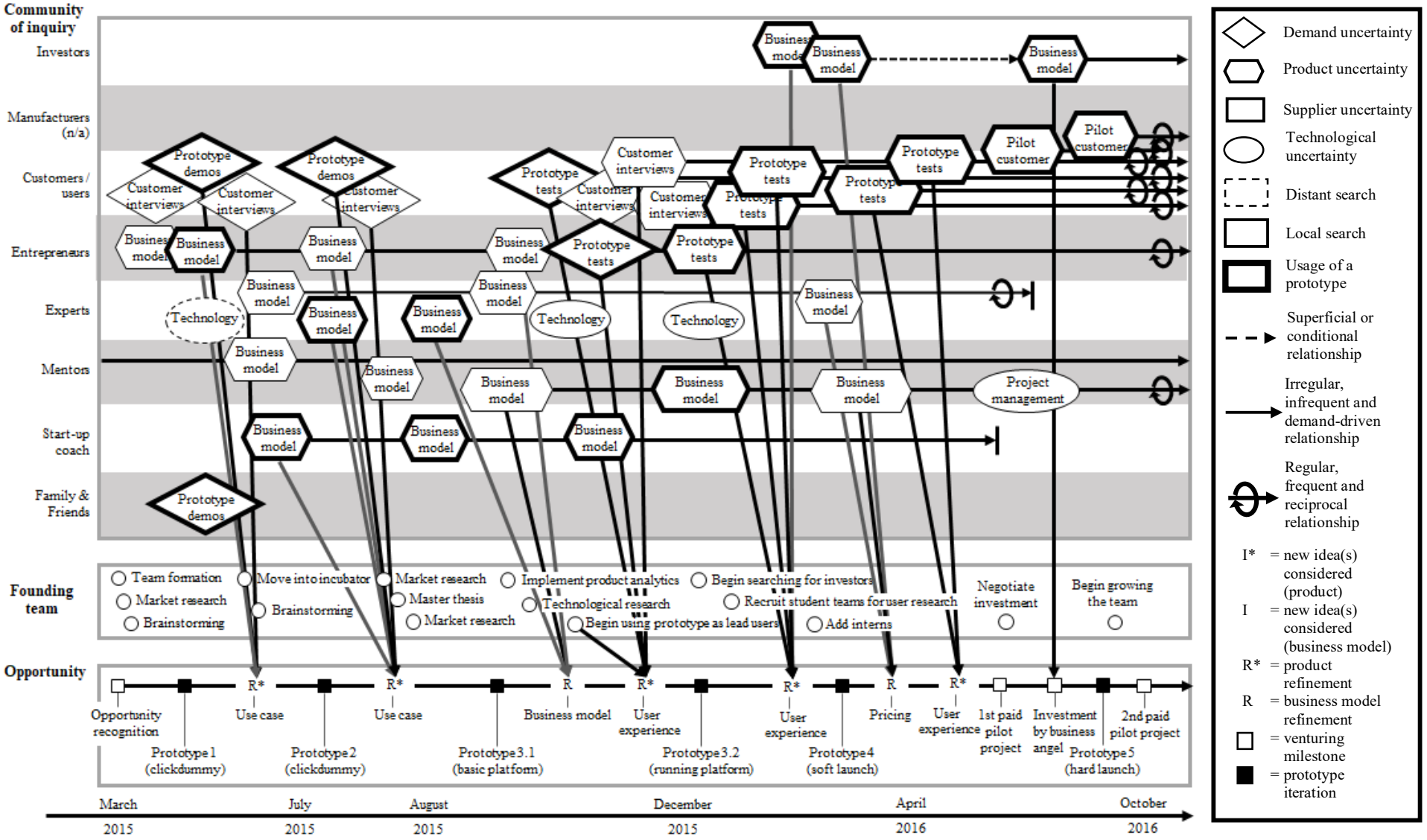
Demonstrating the prototype to students on campus, the feedback made them realize that students wouldn't pay for the product. The team therefore brainstormed a solution they believed students *would* pay for, and decided to pursue a platform that offered qualitatively enhanced course materials. Again, the team did market research and built a simple prototype, consisting of a website that presented example

materials and encouraged users to sign up, and invested a small sum in search engine marketing. Whilst collecting data during the test run of the website, they moved into the incubator and joined an accelerator program that provided them with additional mentoring. The data from their test run as well as advice from their start-up coach and several mentors led them to decide that the monetization potential of their opportunity idea was still lacking.

At this point, the team realized that there was yet another, entirely different use case in the collaboration and knowledge management sector that had not yet been appropriately addressed: real-time knowledge management within project teams. This was because during the pursuit of their opportunity, they had repeatedly run into problems managing their own data und communication. Combining this realization with prior feedback from experts that they should avoid students as a target group, the team adjusted their vision and immediately approached potential business customers and entrepreneurs from their networks to see if they might be interested in testing such a product. From that point onwards, the team simultaneously developed and used the prototype as lead users. They quickly established and continued growing a pool of test users that they regularly contacted (mostly in person) to collect feedback and discuss possible features, and additionally implemented analytics into their product so that they could evaluate larger amounts of usage data. This feedback significantly directed which technical components the team used and the order of features and platforms it planned to develop. The team further continued collecting feedback from their mentor, experts, and from other entrepreneurs to decide on the final business model. Over time, a new mentor that they were assigned through the incubator became a regular and close conversational partner, and convinced them to proactively distribute their product via direct sales instead of exclusively relying on search engine marketing.

The team continuously prioritized and developed features according to the user feedback they received, and soon opened up the platform to the public, steadily increasing the test user base. They continued to evaluate analytics data and collected in-depth feedback by conducting personal conversations, and now also conducted large-scale surveys via the platform. Additionally, they recruited student teams to further interview users with an open and objective mind, and to support them with the technical implementation

Figure 7: Visual case history of team Digihub



and evaluation of alternatives. At this point, the team was declined by the government funding program, which as their start-up coach explained was not due to a lack of potential, but due to the current opportunity's apparent lack of scope in terms of impacting whole industries or society – an important prerequisite for the funding program. Instead, they began talking to business angels who gave them valuable advice on pricing models. Thinking they were ready to approach potential corporate pilot customers with proposals, they were surprised to find out that users were increasingly requesting a feature that the team had vowed not to include. They prioritized and developed this feature despite their prior conviction, and indeed went on to successfully recruit a corporate customer for a paid pilot project. This was soon followed by a six-figure investment from a business angel. By the end of my data collection period, the team had recruited a second corporate customer, and was beginning to recruit more full-time team members. Team Digihub's case history is visually represented in figure 7.

4.3 The case of team Smartchat

Opportunity recognition and team formation

The idea for team Smartchat's product came to existence when one founder encountered inefficiencies at his working place in production machine maintenance. After returning to university to pursue a business degree, he pitched the problem in an entrepreneurship seminar in late 2014 and recruited another founder with a programming background. The team was completed when another founder with a programming background joined to meet the requirements of their technology-intensive product. They initially pursued the idea to provide offline machine maintenance manuals that were digitally enhanced with Augmented Reality (AR) and 3D technology, so that machine operators were empowered to fix problems quickly and without assistance and avoid costly production shutdowns. After conducting technological research, the team however decided that the implementation would be too cumbersome and machine-specific, and instead focused on real-time remote service whereby machine operators communicate with remote maintenance personnel using smartglasses and integrated AR and 3D technology. The team's corporate profile is depicted in figure 8.

Figure 8: Corporate profile of team Smartchat

Industry, business segment & business model			
Industry: Knowledge management; **Business segment:** Remote machine maintenance **Original BM:** Offline machine maintenance manuals that are digitally enhanced to help machine operators fix problems and avoid costly production shutdowns, to be sold business-to-business. **BM at end of data collection:** Business-to-business application to enable real-time remote machine maintenance, focusing on knowledge management and assisted communication.			
Team composition			
	Founder 1	**Founder 2**	**Founder 3**
Academic background	• Business	• Programming	• Programming
Prior working experience	• Machine maintenance (full-time)	• Front-end programming (working student)	• Back-end programming (working student)
Prior entrepreneurship experience	• Entrepreneurship education (theoretical & practical)	• Entrepreneurship education (theoretical)	• None
Function in venture	• User experience, product development (front-end)	• Product development (front-end)	• Product development (back-end)

Interactions with the community of inquiry and opportunity development

After building a basic functional prototype of their second idea, the team contacted the first founder's prior employer and other network members as potential customers to run simple usage tests, and presented the product at a trade show to gather early market feedback. From the usage tests, the team gathered that 3D visualization was not pivotal for the usage experience and de-scoped the feature, whilst sourcing various types of smartglasses and researching their preferred technical platform. Over time, the usage tests and research data made them realize that smartglasses were not necessary, since users (i.e. machine operators and maintenance personnel) usually carried and communicated with smartphones, and the team shifted the focus to developing a smartphone application.

Having moved into the incubator by this point, the team consulted a mentor and experts and conducted competitor research to adjust their business model while developing a new prototype. As they carried out more user tests with potential customers, they began realizing that they were on the path of competing with established communication tools such as Skype. At the same time, potential customers began demonstrating more interest in knowledge management features than in the real-time

communication aspect of their product, which came as a surprise to the team, as their prototype had received mostly positive feedback so far. Although real-time communication was a strong component of the team's vision, they adjusted their opportunity once more and pursued knowledge management as a unique selling proposition, following the advice of their mentor in doing so.

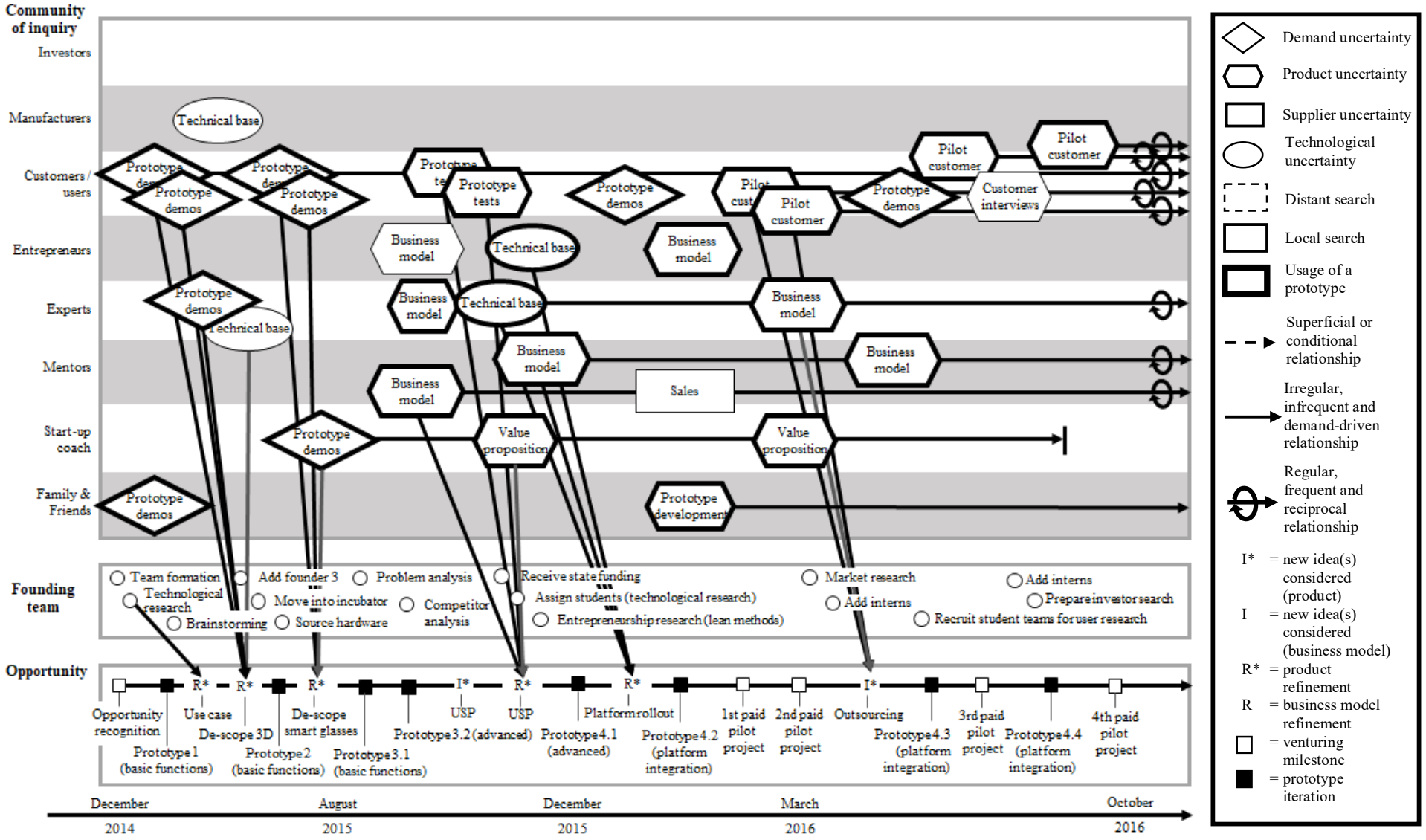
This threw the team back with respect to their progress in product development, and all resources were invested in adjusting the prototype. As they felt overwhelmed by the quantity of the work packages, they gathered feedback from experts and from entrepreneurs among their friends to prioritize and refine the steps of their development plan. They participated in an acceleration program that provided them with access to more potential customers, and they successfully recruited two corporate customers for paid pilot projects. The feedback from these customers was prioritized from this point onwards; however, as the team recruited more potential customers over time, scalability became a main criterion for the decision to implement a feature that a customer was demanding. At the same time, they continued presenting their prototype at trade shows to test market acceptance and recruit more customers. To focus even more resources on the knowledge management functionality of their product, the team considered outsourcing all features related to communication, since usage tests and expert advice indicated that it would not reduce the value of the solution. This idea was moved into the future, as it represented extra work before freeing up the team's resources. At the end of my data collection, the team had added several interns to support the development of their technical platform, and was preparing their search for investors. Also, they engaged a student team to objectively evaluate their value proposition and conduct independent customer interviews, to ensure they would not run into more surprises with respect to customer preferences. Team Smartchat's case history is visually represented in figure 9.

4.4 The case of team Smartlab

Opportunity recognition and team formation

Team Smartlab was founded in 2014 when one founder, while doing is Ph.D. degree, found no appropriate solution on the market to closely monitor the conditions in his laboratory incubator. He em-

Figure 9: Visual case history of team Smartchat



ployed a bachelor student with a background in medical engineering to custom-build a solution, and they soon realized that they had a potential entrepreneurial opportunity at hand that was worthy of pursuing together. The team's corporate profile is depicted in figure 10.

Figure 10: Corporate profile of team Smartlab

Industry, business segment & business model				
Industry: Medical technology & engineering; **Business segment:** Laboratory equipment **Original BM:** Sensor-based hardware that monitors conditions within laboratory incubators, where data is documented, evaluated and stored in a cloud, and evaluation results are displayed within an app. To be sold business-to-customer to laboratory staff in resesarch facilities. **BM at end of data collection:** Non-intrusive sensor with local connectivity so that data is documented, evaluated and stored locally, and evaluation results are displayed within an app. To be sold business-to-business to production laboratories (i.e. non-research) via direct sales.				
Team composition				
	Founder 1	**Founder 2**	**Founder 3**	**Founder 4**
Academic background	• Medical engineering	• Industrial engineering, business	• Programming	• Programming
Prior working experience	• Ph.D. level research (full-time)	• Internships	• Programming (full-time)	• Programming (full-time)
Prior entrepreneurship experience	• None	• None	• Practical (founding an agency)	• Practical (founding an agency)
Function in venture	• Business development, customer acquisition	• Product development	• Front-end and back-end development	• Front-end and back-end development

Interactions with the community of inquiry and opportunity development

The two founders contacted research facilities, laboratory staff as well as lab students from their network to see whether these showed any interest in purchasing such a product as end customers. In the meantime, they began building a second prototype that had a strong hardware-focus, i.e. was a portable device meant to execute a variety of monitoring functions, with integrated software performing cloud-based data evaluations and displaying results via an app. Since both founders did not have a background in programming, they paper-prototyped the app and outsourced it to an agency, which was run by two individuals who would later receive company shares if all parties remained satisfied with the cooperation. In addition to demonstrating their prototype to potential customers, they joined the incubator where they consulted technological experts to objectively evaluate the technical concept of

their product and of possible development pathways. At the same time, they remained closely integrated in the university chair where the first founder had obtained his Ph.D. degree and where they regularly consulted their mentor on the technical implementation of their prototype. They also sought advice from other entrepreneurs regarding the entrepreneurial process as such, by regularly taking part in networking events at the incubator.

The accumulated data from prototype demonstrations and technical experts led them to realize that customers did not care for elaborate hardware with many functionalities, but for one reliable sensor (which was also less intrusive) and for a simple and user-friendly software output, which led them to adjust their prototype accordingly. Also, potential users (i.e. laboratory staff) proved to be more old-fashioned than expected, and preferred data to be stored locally. The cloud-integration was therefore de-scoped. Once the founders received state-funding, the two programmers were integrated as share-holding team members. To develop their business plan, the team regularly updated and consulted another mentor with industry experience; however, they left important decisions such as their final distribution channels open until more data was gathered. Primarily, the team was unsure whether to sell their products to laboratories directly or to involve a distributor.

While further developing their prototype to be able to show it at trade shows and possibly sell co-creation projects, they engaged a student team to evaluate further development pathways that the founders themselves had not found the time to look into. They learnt that the technical basis of their product was more scalable when using a different technological infrastructure, but postponed all associated adjustments until important trade shows were completed. These trade shows proved to be fruitful in engaging potential customers as well as several manufacturers for feedback on their prototype. The team integrated this feedback into a university design project that they had applied for and won, where a senior product design student fully re-branded the prototype (in cooperation with the team's test users) and produced a ready-to-sell product. Simultaneously, the team engaged university students to conduct more user research with the users that were already testing the prototype as well as with new users, the

results of which (concerning the user-friendliness of the prototype) were also integrated into the re-branded prototype.

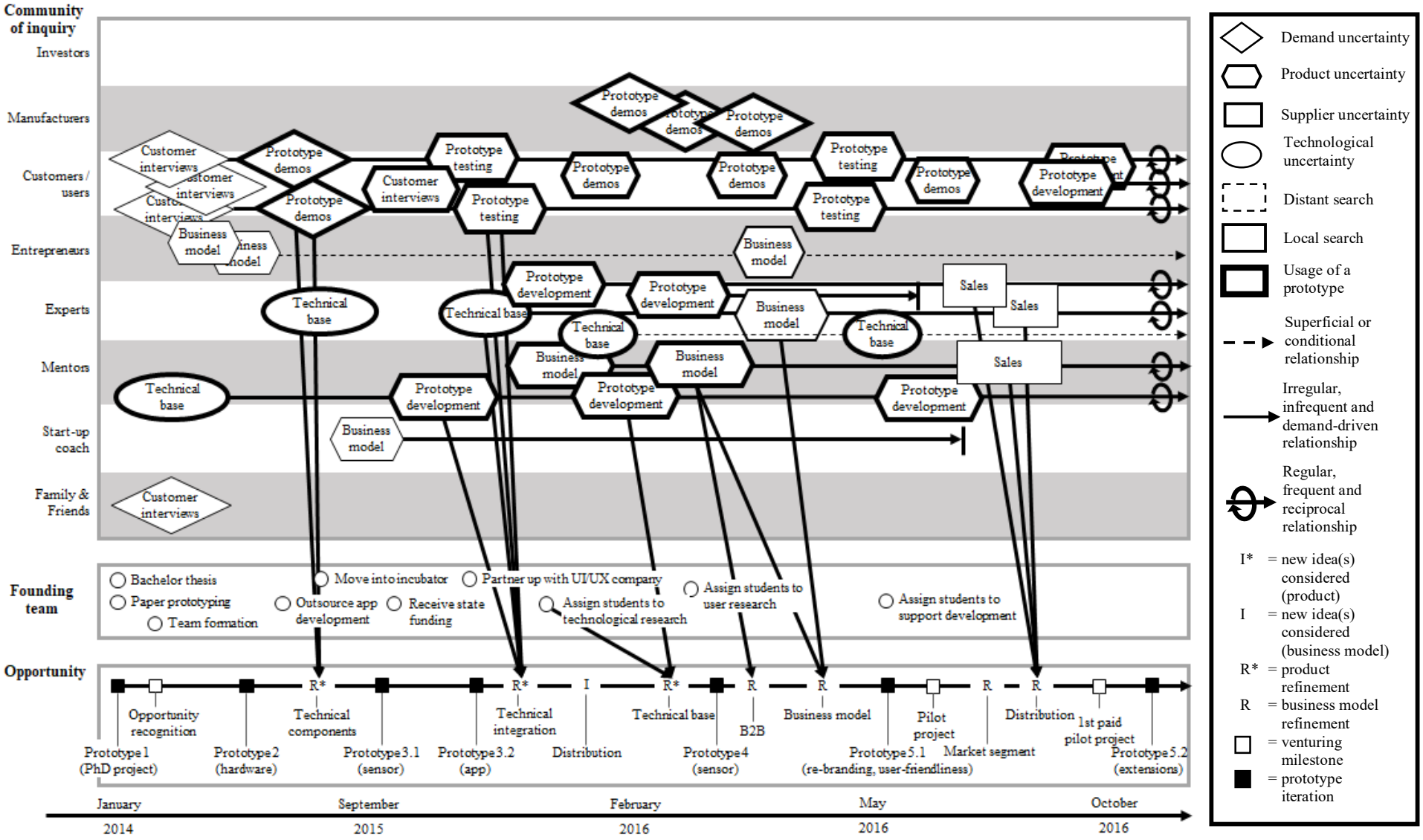
After consolidating feedback from potential customers, potential distributors, experts and their mentors, the team finally decided to sell their product business-to-business i.e. sell large quantities to laboratory buyers instead of targeting laboratory staff directly, and to charge monthly usage fees in a software-as-a-service revenue model with a medium-to-high upfront hardware payment, rather than charging a very high once-off hardware payment. Once their re-branded product was finished, the team conducted a large-scale pilot project to collect more thorough and comprehensive usage feedback. They also consulted potential distributors as well as experts and their mentor, to finally decide that they wanted to sell their product to production-oriented instead of research-oriented laboratories, since these came with more funds, less regulations and higher autonomy in decision-making. They also decided to charge less for the hardware altogether, and to sell via a distributor instead of per direct sales. Moreover, the team regularly consulted engineering students to obtain objective perspectives and took part in trade shows around the world. While this provided them with new ideas for product features, these were postponed until the survival of the venture was secured. After several further developments were made to the product due to feedback from the user tests, the team successfully recruited a corporate customer for a paid pilot project, with further projects in the pipeline by the end of my data collection. Team Smartlab's case history is visually represented in figure 11.

4.5 The case of team Smartbox

Opportunity recognition and team formation

Team Smartbox came into existence in early 2015 due to a regular brainstorming session between four of the founders who were eager to found a venture together. Two founders came from a business and product design background, while another had studied programming and the fourth held a mathematics degree. Founder three had privately encountered the problem before, lacking an external data storage device that promised ironclad security against data theft, and sought to develop a solution. This led the

Figure 11: Visual case history of team Smartlab



founders to ask amongst their family and friends if they were familiar with the problem, which was confirmed, and the founders decided it was an opportunity worth exploiting. Founders five to seven joined the team over the summer of 2015 once they finished their university degrees, after having previously been engaged as part-time team members. The team's corporate profile is depicted in figure 12.

Interactions with the community of inquiry and opportunity development

To decide on the technical foundation of the product, the team immediately sought out experts and built relationships with potential mentors that could advise them on the impact of various options on both their product and their business model. They engaged in brainstorming and market research about a variety of opportunity development pathways (covering business-to-customer as well as business-to-business models, and covering various technical concepts for the inner workings of the external storage device). The team further built a first hardware prototype for the storage device, which they believed they would offer irrespective of its inner workings or business model. However, the experience made them realize that it would be more sensible to outsource hardware and invest all resources in developing the processor and software, like a few experts had previously advised. Weighing the advantages and disadvantages of various technical concepts and their effects on possible business models with new full-time team members five and six, the team decided to expand their market to the mainstream. They refined the opportunity accordingly, exchanging a home-assembly-and-maintenance-oriented technical base for a convenient and beginner-friendly configuration. Yet, more discussions with experts, mentors, and amongst themselves led the team to refine their market once more to address specific small business owners such as lawyers or doctors, instead of private individuals. By now, the last founder had joined the team full-time, and all team members had committed themselves to the venture by privately investing. Furthermore, the team had participated in a number of business plan competitions and received much praise.

The team discussed the new configuration of their opportunity with potential customers among their families, friends and acquaintances, which made them learn that these small business owners' data came

Figure 12: Corporate profile of team Smartbox

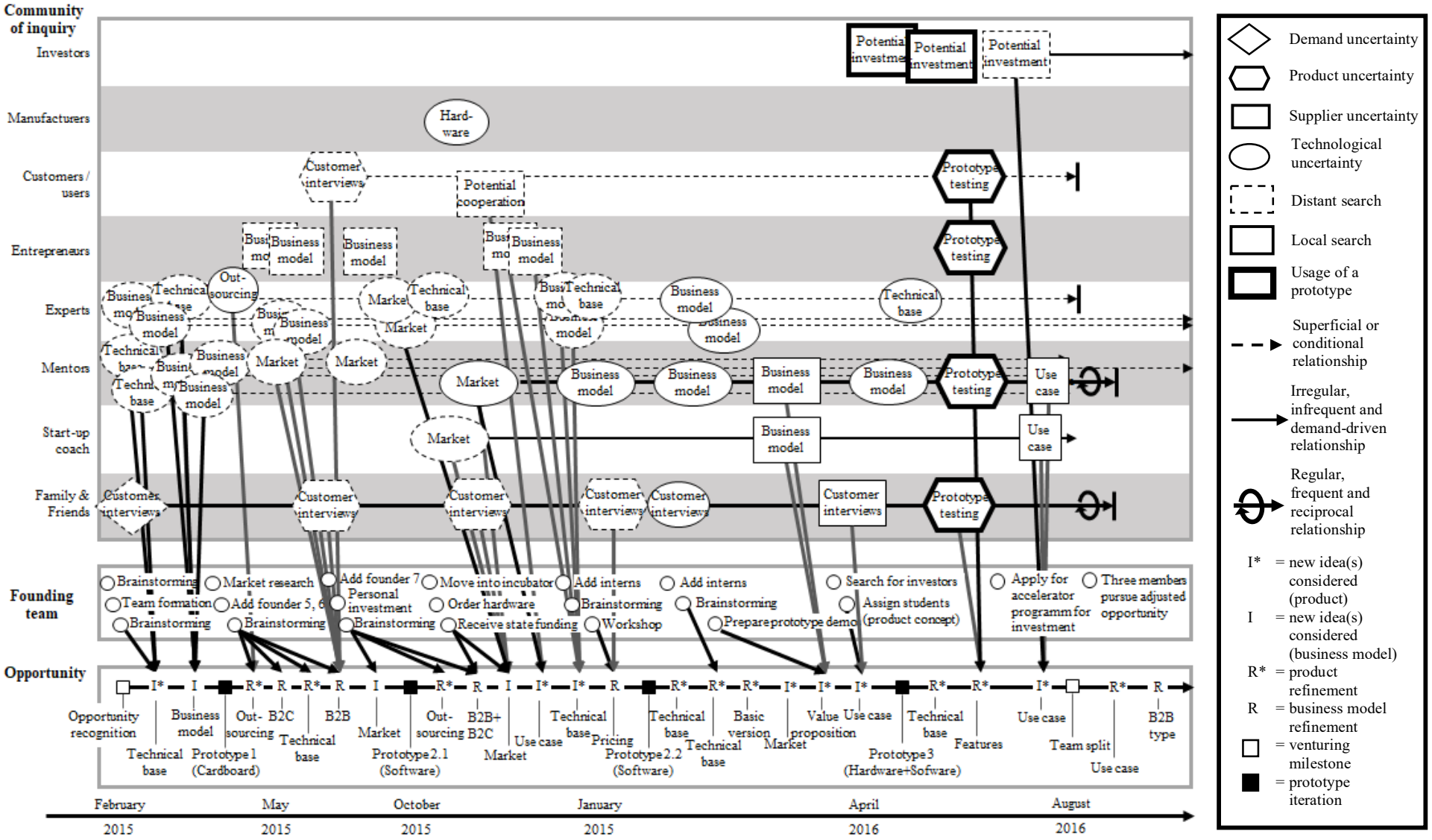
Industry, business segment & business model				
Industry: Data storage; **Business segment:** Data security **Original BM:** External storage device for large data quantities that is fully secure against data theft, home-assembled and home-maintenanced, all components produced by the team (increasing security), to be sold business-to-consumer to technology-savvy customers. **BM at end of data collection:** External storage platform for regular data quantities that is sufficiently secure against data theft, all components outsourced or made from open source software, to be sold business-to-business to small business owners.				
Team composition				
	Founder 1	**Founder 2**	**Founder 3**	**Founder 4**
Academic background	• Business and engineering	• Business and engineering	• Programming	• Mathematics
Prior working experience	• Sales (intern)	• Project management, engineering (intern, freelancer)	• Programming (full-time)	• Technology Consulting (part-time, freelance)
Prior entrepreneurship experience	• Family business, entrepreneurship education (theoretical)	• Entrepreneurship education (theoretical & practical)	• Entrepreneurship education (theoretical)	• None
Function in venture	• Business development, finance, strategic partnerships	• Business development, marketing	• Front-end and back-end development	• Data and product architect
	Founder 5	**Founder 6**	**Founder 7**	
Academic background	• Programming	• Sustainability	• Engineering	
Prior working experience	• System engineer (full-time, intern)	• Project management (volunteer)	• Engineering, project management (working student)	
Prior entrepreneurship experience	• None	• Family business, student initiative	• Family business	
Function in venture	• Front-end and back-end development	• Sustainability, corporate responsibility	• Technology scouting, network management	

in too many formats for them to technically accommodate. They subsequently collected new ideas how to best configure their technical base, to serve various possible markets and business models within the business segment, while developing their first basic software prototype. The team soon decided to outsource the processor, i.e. the inner workings of the storage device, and focus on software exclusively. When it became clear that they would receive one year of government funding, the team decided they now had the resources to expand their vision and serve both business-to-customer and business-to-business segments. Furthermore, they explored the attractiveness of future markets through discussions

with their start-up coach, their mentors, potential customers among their families, friends and acquaintances, and through discussions with a potential customer who was signaling interest in cooperating with the team. The overwhelming multitude of options led them to re-focus on their issue of most significance, the technical concept of their product, that was heavily intertwined with all other components of their business model. At this point, they started considering pricing strategies i.e. the bundles and price points that they could possibly offer, and discussed these with entrepreneurs and experts to understand what they thought would be best accepted on the market. Conversations with potential customers among their acquaintances as well as a team workshop were held, to decide which technical base could be built at a price point that customers would accept. The team went on to adjust the basic prototype accordingly. They realized that to build a fully functioning prototype, they would have to outsource twice more, using open source software and gateway technology instead of building them from the ground up, and hire a large number of interns for programming. Additionally, they added a cheaper and less resource-intensive product bundle to the offering. The team continually consulted their closest mentor and experts on their opinion on how technical feasibility would affect their business model.

While developing the prototype and de-scoping features, the team decided on a new future market that they found most attractive, particularly in light of the upcoming investor search. The latter induced them to critically reflect their current value proposition in general, and to adjust their prototype so that it would simulate the full user experience for demonstration purposes. Upon describing their current product and business model to potential customers amongst their families, friends, and acquaintances, they realized they might not yet have solved fundamental customer problems yet. They therefore instructed student interns to develop new concepts with an objective mind, while preparing their first user tests. One more component of the technical base was outsourced to avoid further delays in testing. Once the team received testing feedback from test customers that they had sourced from within and beyond their families and friends, they adjusted the priority of features accordingly. Since the funding period was coming to an end, they applied for an acceleration program which demanded that to invest, the team change their technical use case and the corresponding market and business model. They didn’t

Figure 13: Visual case history of team Smartbox



reach an agreement over this approach and split within a few weeks. Subsequently and until the end of my data collection, three of the founders went on to develop the suggested configuration of the opportunity within the accelerator program, while the others refrained from any further opportunity development activities. Team Smartbox's case history is visually represented in figure 13.

4.6 The case of team Digilamp

Opportunity recognition and team formation

Whilst searching for a business idea to pursue, the original founder of team Digilamp realized that artificial lighting at many workplace environments was not optimized for the human biorhythm and that possibly, work-related productivity and health gains could be achieved. After receiving positive feedback from a respected entrepreneur, the founder dedicated his master's thesis to functional research and to the development of a technical model for simulating the shades of sunlight that naturally occur throughout the day. He further joined an online incubator where he received guidance and feedback for one year to develop the first business plan for his idea. After finishing his studies, he met another founder with a background in industrial design in a hackathon where they developed the first digital prototype. They soon recruited a third team member to cover business and customer development, and founded team Digilamp. The team's corporate profile is depicted in figure 14.

Interactions with the community of inquiry and opportunity development

The team developed their first digital prototype (that went beyond sketches and the development of the technical model) during the hackathon, where they also did their first prototype demonstration in front of a panel of judges. After moving into the incubator in mid-2015, they spoke to potential customers among their families and friends, as well as to a few potential customers among the new business contacts that they were making (such as lawyers). The original founder had also spoken to a few potential customers among his family and friends while developing the first version of the business plan. From these conversations, they derived an optimal price range for their product, and began building their first

Figure 14: Corporate profile of team Digilamp

Industry, business segment & business model			
Industry: Internet of Things / Smart appliances; **Business segment:** Workplace lighting **Original BM:** Desk lamp that automatically adjusts color temperature and brightness of light to simulate natural sunlight, with integrated software that lets users control the lamp via an app, to be sold business-to-customer to design enthusiasts. **BM at end of data collection:** Desk lamp that automatically adjusts the blue-tone and the brightness of light to partly simulate natural sunlight, to be sold business-to-business to workplace designers and to mid-sized creative agencies.			
Team composition			
	Founder 1	**Founder 2**	**Founder 3**
Academic background	• Programming	• Industrial engineering	• Business
Prior working experience	• Programming (internships)	• Industrial design (working student)	• Back-end programming (working student)
Prior entrepreneurship experience	• Entrepreneurship education (theoretical)	• None	• Entrepreneurship education (theoretical and practical)
Function in venture	• User experience, product development (software)	• Product development (hardware)	• Business development, customer development

physical prototype out of wood. They also contemplated pursuing an altogether different application of their technology (not building a physical lamp at all but focusing on the digital controller components), but discarded it after discussing it within the team.

Despite receiving government funding which provided them with resources to advance prototype development, the team began experiencing development delays due to a lack of availability of production machines that they believed to depend on. They attempted to use ready-made components ordered from Asia, but weren't sufficiently convinced of them to use them for their prototype. At the same time, they ran into difficulties developing the digital controller components, particularly with regard to features that were necessary to simulate the prototype's dynamic functionalities during prototype demonstrations, and eventually shifted to using some ready-made digital parts. To find further solutions, they consulted a design expert who advised them to make use of the delay in development by experimenting with entirely new implementation designs, which they did by employing a rapid prototyping technique and producing a number of 'wild' i.e. highly experimental and rough prototypes. They finally found their preferred design due to a 'lucky shot', after every other alternative had been

evaluated to be too costly to implement with regard to customers' willingness to pay, or too inefficient in terms of features. To make these assessments, the team members personally tested the prototypes, and sought technical feedback from their circle of experts.

The team began cooperating more closely with incubator staff that had a prototyping background to advance the development of their physical prototype, and simultaneously built a first rough version of their app. Showing the app to a user experience expert, they initially decided to discard her feedback that the app was not central to the user experience, but later briefly contemplated the usefulness of this feature. At this point, they also ran a user test with an entrepreneur at the incubator, which in their eyes confirmed that they were on the right development path. They also demonstrated their prototype to several potential customers and collected feedback, which further confirmed their assumptions, and they decided to include business customers in addition to private individuals. Most importantly, they provided their prototype to a potential customer to test over a period of several weeks. This customer, however, failed to report a breakdown in the prototype's basic functionality, which the team only learnt of late in the testing period and could barely fix before another breakdown occurred.

In light of the failed user test, the team decided to instead concentrate on cooperating with a mentor who had a background in manufacturing. His feedback made them realize that their feature selection was too costly to implement, upon which they de-scoped several design-related aspects and de-scoped the app (for the time being). At this time, the team participated in a trade show, and decided to present other product ideas instead of their working prototype, since they were still experimenting with several features i.e. adding them to their feature set and then finding out whether they were too expensive. By the summer of 2016, the team realized they were running out of time, since the funding period was coming to an end. The social fundraising campaign that they had planned to carry out needed to be prepared quickly, for which purpose they prepared a marketing video. Feedback on the footage from their families and friends made them realize that the current implementation of their prototype (particularly, the dynamic adjustment of brightness and light intensity) could not be clearly seen on a screen. They decided that a blue-tone would look most impressive in the video, which at the same time

relieved the team in terms of development effort (i.e. concentrating on one tone instead of a spectrum). To finalize the pricing options of their offer, they benchmarked similar campaigns, and eventually launched a fundraising page.

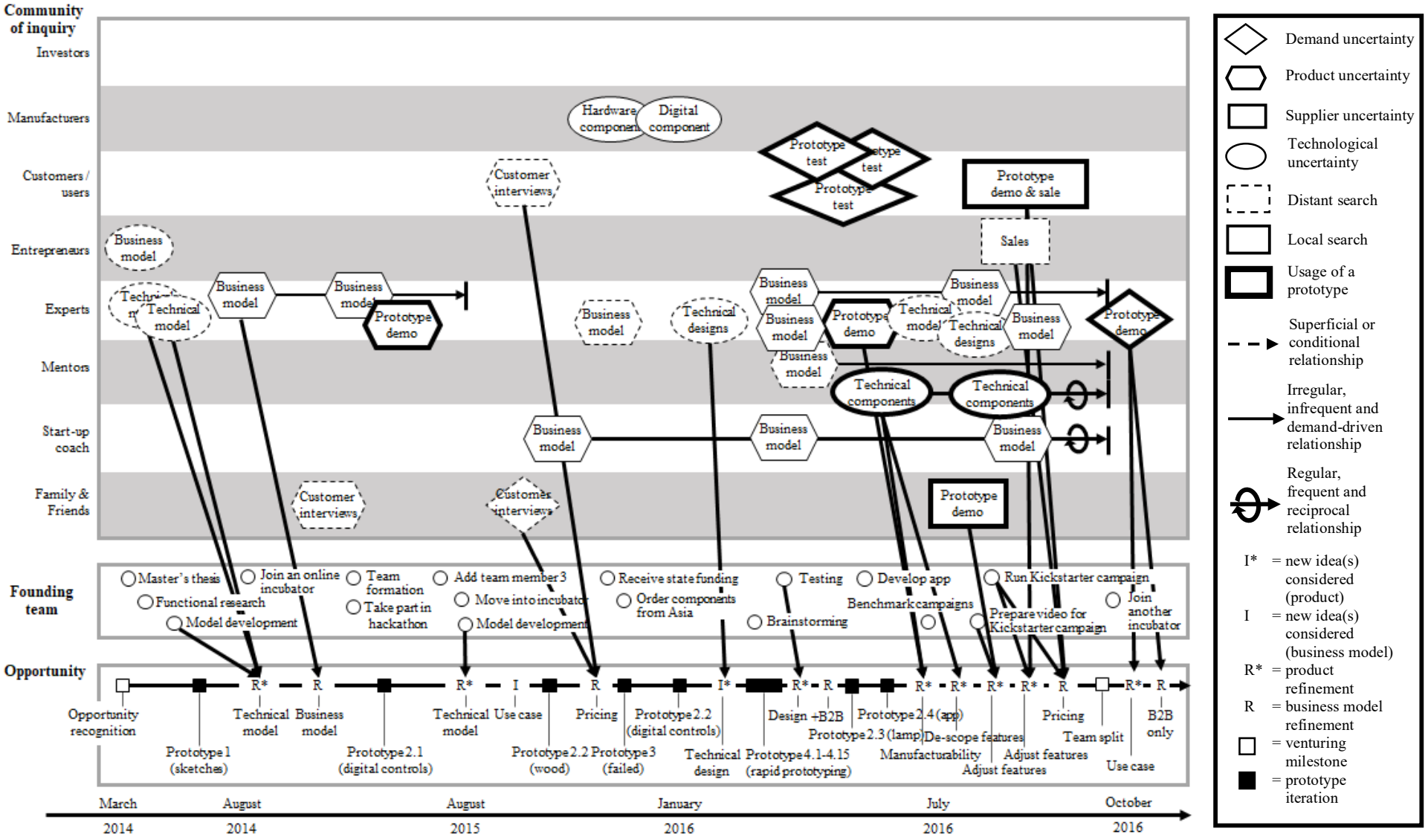
In contrast to their expectations, early feedback from potential backers was negative: customers felt that the product was too costly and that the promised value proposition regarding productivity and health benefits was not backed up by any data. The team adjusted the offer by introducing a more basic and cheaper version of the product, yet failed to reach their funding goal. This represented a breaking point for the team. Conflict had already been boiling between the team members during the development delays, and the remaining tension was so salient that their mentor had urgently advised them to focus on resolving it. Instead, the team had rather dealt with conflict by one team member 'hijacking' another founder's task, or by all team members ignoring certain tasks altogether. Now, founders began blaming each other for not foreseeing customers' point of view. Two team members decided that a new approach was necessary, while the remaining member continued to believe in their vision. The former approached an industry-specific incubator and were told that the underlying digital control system was more valuable than any associated hardware, and that they should focus on selling entirely business-to-business. This was actually equivalent to the idea they had contemplated within the team at an earlier point in time, but had discarded. The two team members therefore shifted their focus and eliminated the lamp altogether, and continued working on this adjusted version of their opportunity by the end of my data collection. It is important to note that the remaining founder also continued pursuing his vision, and reported to have recruited a potential customer to run a usage test in the near future. Team Digilamp's case history is visually represented in figure 15.

4.7 The case of team Biowing

Opportunity recognition and team formation

The opportunity behind team Biowing was conceived by one founder when he experimented with wind simulations in late 2011 and found that mathematical models mimicking surface turbulence were lacking

Figure 15: Visual case history of team Digilamp



in sophistication. Since he needed a more sophisticated calculation to complete a professional graphic design assignment, he did scientific research to advance his own model. He soon realized that unpredictable or opaque wind turbulence around moving surfaces was a source of inefficiency in a variety of industries, such as aviation, and that therefore, his model might represent an opportunity if he succeeded in translating it into a product. After making further progress with his mathematical model, he borrowed from wildlife and copied the concept behind birds' wings that are designed to minimize turbulence. He ordered several model airplanes and covered their wings in overhead transparency mimicking lamellas, to test different lamella configurations for their effects on flight trajectory. After carrying out many more prototype tests, obtaining a European patent for his idea, and publishing several articles in non-peer reviewed journals, he recruited a Ph.D. student specialized in simulations as a fellow team member in mid-2014, who however left the team to pursue an industry career in early 2015. Instead, a founder with a background in business and consulting joined the team. The team's corporate profile is depicted in figure 16.

Interactions with the community of inquiry and opportunity development

Whilst building the first prototypes in his garage, the original founder regularly consulted his father regarding technical questions. After obtaining a patent, he decided to submit his idea to several competitions and received a creativity award from a (non-specialized) professional online network, as well as a nomination at a sustainability-oriented competition in late 2012. Despite also receiving rather negative feedback from a government expert with a background in regulation and sustainability, the recognition convinced the founder that he was on the right track. He went on to build a wind canal to further test and advance his prototype on a continuous basis and to use for future prototype demos, which he put into practice by presenting his prototype at two trade shows. There, he met a technical expert who later provided the opportunity to test a newer version of the prototype in a professional wind canal, which yielded positive results.

Between the trade shows and professional wind canal tests, the founder unsuccessfully tried to acquire external investment by approaching several governmental and academic funding programs. After failing

Figure 16: Corporate profile of team Biowing

Industry, business segment & business model		
Industry: Wind power; **Business segment:** Turbine retrofitting **Original BM:** Mountable lamella layer suitable for retrofitting a variety of surfaces to increase the efficiency of movement, to be commercialized business-to-business by licensing. **BM at end of data collection:** Mountable lamella layer suitable for retrofitting wind turbines to increase the efficiency of energy production, to be commercialized business-to-business by selling hardware and providing maintenance services.		
Team composition		
	Founder 1	**Founder 2**
Academic background	• Business management	• Programming
Prior working experience	• Consulting (full-time)	• Industrial design (working student)
Prior entrepreneurship experience	• One-man drop-shipping business (passive income)	• None
Function in venture	• Business development	• Product development

to obtain licensing deals on his patent, he contacted the university incubator and was finally admitted to an associated sustainability-oriented acceleration program, where he received funding as well as team building support. By the beginning of 2015, the team briefly consisted of three team members, but the use case had not been narrowed down to a particular industry yet. While the original founder was considering a variety of industries from cargo transport to paragliding, the team members now collectively brainstormed options, came to favor wind energy and drone technology, and finally chose wind energy due to the nascency and revenue potential of the market. Following this decision, the team participated in several business plan seminars, sought expert advice within the university network, and found a mentor with a background in wind energy who advised them to refrain from contact with potential customers as long as the technology wasn't fully developed and tested. The team therefore found a wind turbine operator who they did not consider a primary customer and carried out tests on the rotor blade of an actual wind turbine.

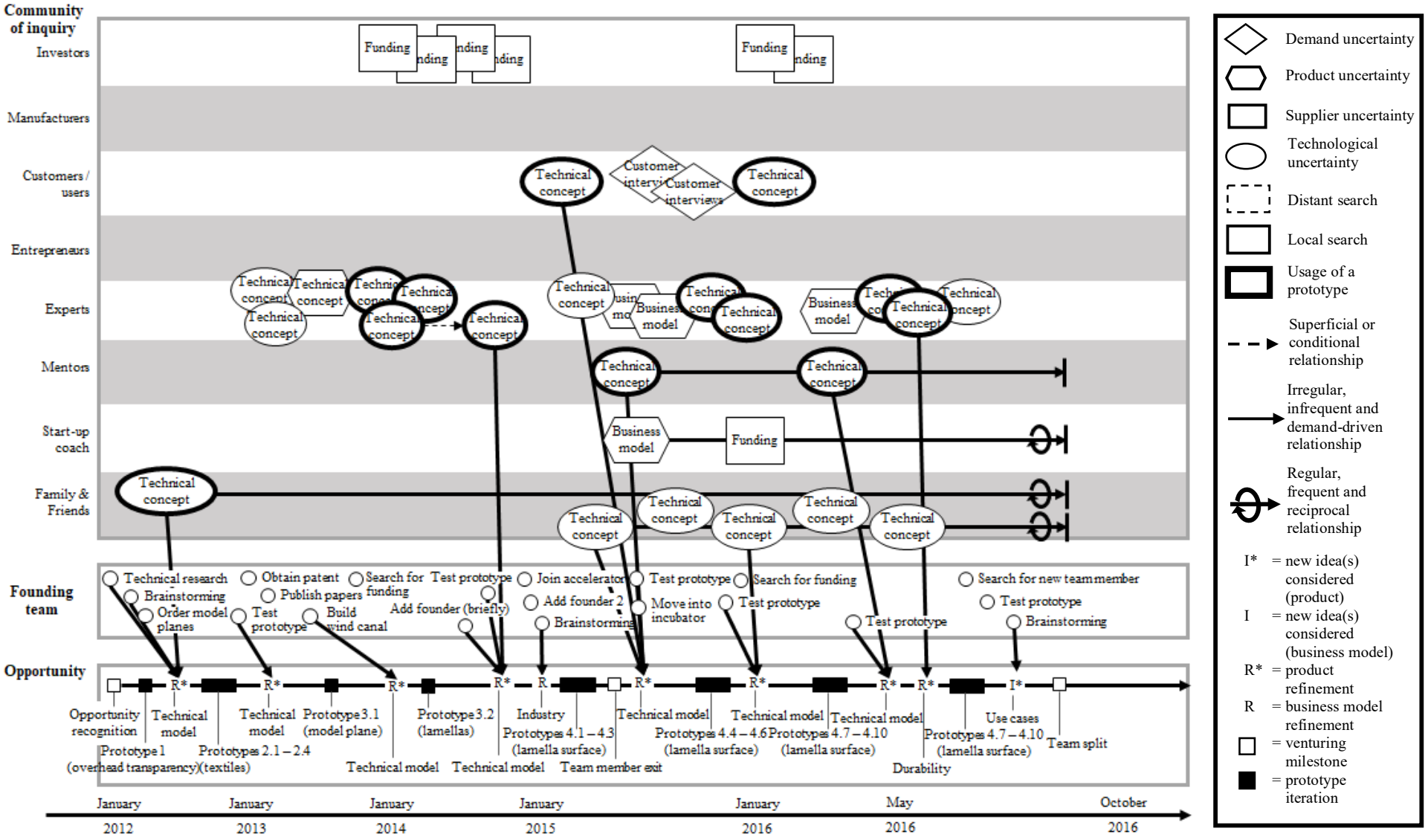
As usual, these tests contained several lamella configurations that the team iteratively applied and adjusted until they achieved satisfactory efficiency effects. However, the adjustments were chosen on a trial-and-error basis, and the team struggled to fully understand dissatisfactory results or replicate

positive effects, especially since they weren't on-site but remotely analyzed measurement data and video footage. After conducting more thorough tests until the fall of 2015 and experiencing the same issues, the team began tracking configurations and their associated effects more systematically. These tests most importantly revealed serious material durability issues, that the team then focused on solving.

During this time, they were declined by the government funding program due to the lack of opportunity-specific technical knowledge within the team. While continuing to search for a third team member, the team kept in loose touch with their mentor and technical experts (both from the incubator environment as well as the second founder's private circle), and with their start-up coach who urged them to stay in dialogue with potential customers. The team attended another trade show, and received mixed feedback from potential customers who challenged their claims and calculations. However, they accredited this to the fact that they were industry outsiders and lacked the appropriate language, and continued working on their model. When another accelerator rejected their idea due to feasibility concerns, the team again discarded the negative feedback in light of the positive feedback and funding they received elsewhere. The team also spoke to a few wind turbine operators and installation firms to see whether these voiced demand for the product, but instead primarily learnt about their concerns regarding issues such as maintenance contracts, which the team did not relate directly to their product.

The team prepared to conduct another, by now highly systematic test run in a wind canal and consulted several experts regarding the technical configuration of their next prototype versions. Among these, one material expert alerted them to the fact that the current durability of their prototype did not suffice for their product to be attractive to potential customers. While the team had so far focused on achieving satisfactory performance as the primary goal in opportunity development, their focus now shifted toward durability. When the next test run again revealed highly unsatisfactory results with regard to durability, the team decided to discard wind energy, as each prototype and lamella configuration was highly complex and time-consuming to build. They instead contemplated a large number of alternative applications, as well as having a student objectively evaluate further industries and use cases. However, by this point, their search for another team member did not seem to bear any fruit and their funds were

Figure 17: Visual case history of team Biowing



once again coming to an end, so that the team instead decided to discontinue opportunity development altogether. Team Biowing's case history is visually represented in figure 17.

4.8 The case of team Rotowheel

Opportunity recognition and team formation

Team Rotowheel came to existence in mid-2013 when the original founder, an artist, took part in a third world art project and envisioned a ready-made rotor made out of ubiquitous components to be used for private energy production in rivers. He recruited a second founder with an engineering background to translate the idea into a working prototype, who then with the help of his uncle built four prototype versions based on different physical principles. This way, the founders could test and choose the most promising version to submit to the art project. Having done so, the founders participated in a sustainability competition in mid-2014, where they reached the final round and received positive feedback from other participants and judges. This prompted them to seriously pursue the idea as an opportunity for a social venture. The team's corporate profile is depicted in figure 18.

Interactions with the community of inquiry and opportunity development

The team added another founder from the artist's private network who was specialized in marketing and frequently travelled to third world countries, who took on the responsibility of spreading the team's cause and finding suitable cooperation partners. As the second founder continued to develop and test the prototype, he assigned several student teams to develop product concepts and prototypes that were entirely independent of the team's current development pathway. However, none of the suggested proto types fulfilled the team's requirements, so that they then decided to summarize these in five succinct points. Despite their efforts, further student teams continued to produce prototypes that the team dismissed. During this time, the team participated in several accelerator programs where they received feedback from technical experts as well as expert assessments whether third world markets would accept their business model. The team extended this business-related research by assigning a team of students

Figure 18: Corporate profile of team Rotowheel

Industry, business segment & business model			
Industry: Social venturing; **Business segment:** Mobile energy production **Original BM:** Ready to use rotor that is made out of ubiquitous components (which are easily replaceable), produced in Europe, to be used for private mobile energy production in rivers; to be sold business-to-customer to third world customers living near such rivers. **BM at end of data collection:** Ready to use rotor that is made out of ubiquitous components (which are easily replaceable), produced locally, to be used for private mobile energy production in rivers; to be sold business-to-customer to third world customers living near such rivers, as well as sold business-to-business to customers who run neighborhood power stations, incl. service agreements with local manufacturers.			
Team composition			
	Founder 1	**Founder 2**	**Founder 3**
Academic background	• Arts	• Engineering	• Marketing
Prior working experience	• Artistry and gallery management (full-time)	• Engineering (working student)	• Marketing, public relations (full-time)
Prior entrepreneurship experience	• None	• None	• None
Function in venture	• Sustainability, product development (conceptual)	• Product development (hardware)	• Marketing, public relations, corporation management
	Founder 4	**Founder 5**	
Academic background	• Engineering	• Political science	
Prior working experience	• Engineering (working student)	• Journalism (internship)	
Prior entrepreneurship experience	• Entrepreneurship education (theoretical and practical)	• None	
Function in venture	• Sustainability, product development (conceptual)	• Business development, marketing	

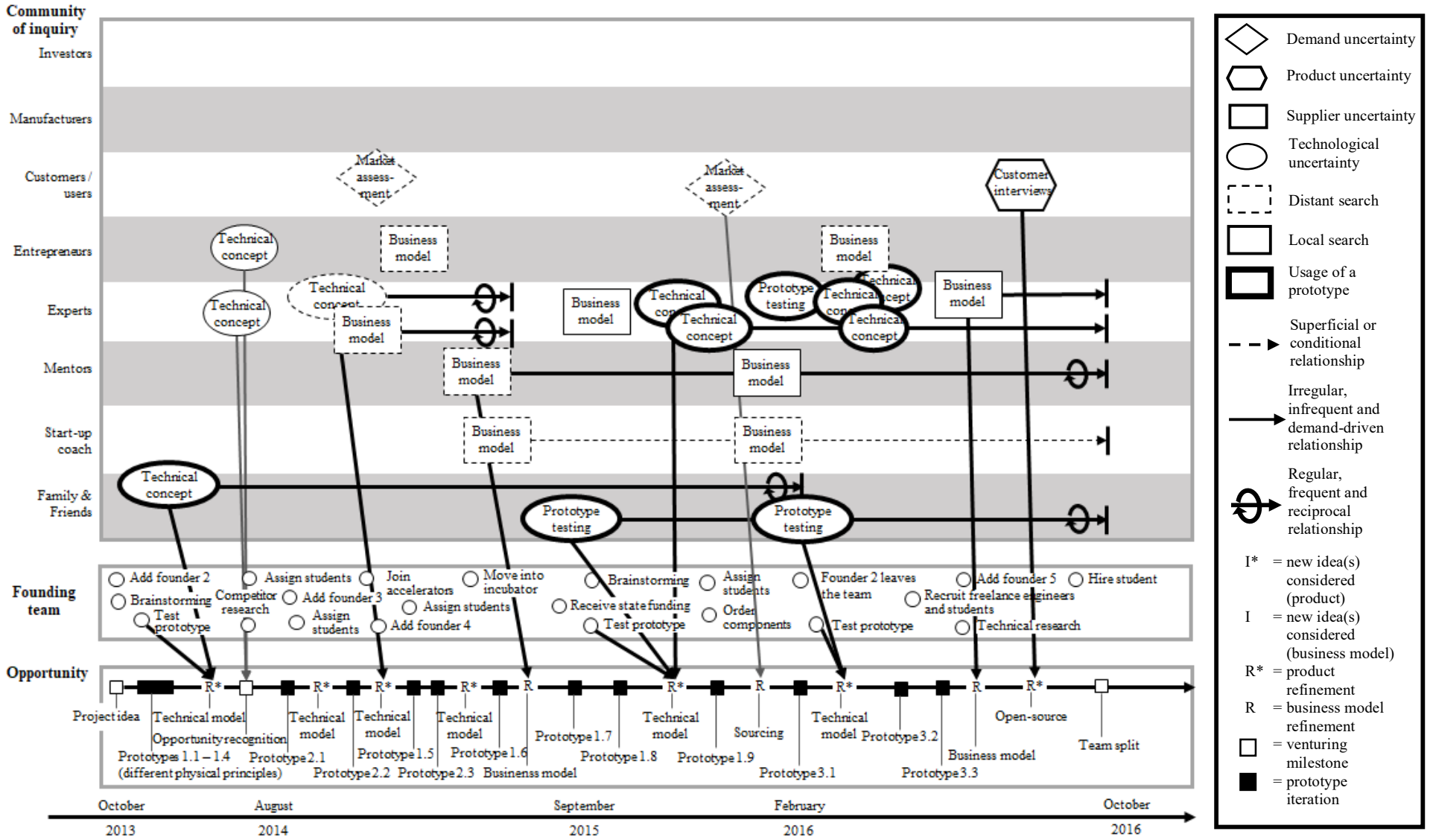
to conduct a market study, however remotely since the customers of their product were supposedly the poorest of the poor.

By this time, the team had further developed their own prototype yet still failed to achieve necessary performance parameters. They therefore added another founder with an engineering background to the team. They also moved into the incubator and entered a sustainability-oriented accelerator program, where they met their mentor who had a background in social ventures. Her feedback induced the team to introduce a business-to-business revenue stream to their business model, by offering additional packages to customers wishing to establish neighborhood power stations. Once the team received government funding, they added further experimental development pathways to opportunity development, in the hope of finding a technical configuration that would yield the necessary

performance parameters. The team had derived these parameters from competitor research, positioning themselves to be cheaper than their competition. However, any components that were cheap enough and readily available in third world countries did not yet provide sufficient energy levels with the technological principles employed by the team. They therefore ordered further components online, hoping to find a new technical solution, which failed to produce satisfactory results.

During this time, their start-up coach encouraged them to conduct on-site market research, which they put into practice by testing their prototype in local medium-sized rivers, with the help of family and friends who had a variety of backgrounds related and unrelated to engineering. A non-profit organization offered them the opportunity to test their prototype in a third world country, however they declined since they did not believe it to be sophisticated enough. They continued to consult technical experts on a regular basis, and took part in a business plan competition where they received encouraging feedback. By February 2016, however, the second founder left the team to pursue a Ph.D., and the team substituted his workforce by recruiting freelance engineers and students. At this point, the team decided to have their product sourced and assembled on-site i.e. in third world countries, upon realizing that any components that they sourced locally (i.e. in Europe) would be too difficult to replace on-site if broken. This was supported by the advice of non-profit organizations that the team consulted as potential customers, who however did not show interest in their product. As they hadn't found a solution to their performance problem, they readily accepted that they had to start technical development anew once more. Nevertheless, they now accepted an opportunity for their prototype to be tested in Bangladesh by a private acquaintance, who was carrying out similar experiments anyway. These tests revealed that local conditions and the corresponding corrosion of the prototype were harsher than expected, but the positive reactions to their prototype by locals (as reported by their acquaintance) motivated them to continue their search for solutions. The team now began working with a non-profit organization that was specialized in supporting and running social ventures on-site. They provided the team with more nuanced details regarding possible revenue streams, leading the teams to add a service-based revenue model that was targeted at local manufacturers. At the same time, they engaged in research to find new technical solutions to achieve desired performance parameters, and added a fifth team member to take

Figure 19: Visual case history of team Rotowheel



over business-related responsibilities. Up to this point, the fourth founder (and second engineer in the team) had performed these tasks in addition to prototype development. The team began planning a pilot study, while the non-profit organization conducted interviews on-site to explore the demand for the team's product in light of their competition. As it turned out, established solar panels solved potential customers' needs at a cheaper price than their prototype would ever possibly achieve, without the restriction of having to use it in a river. Potential customers simply did not show any interest in their product. As the team saw this as a result of lacking performance and a suboptimal technical concept driving their price up, they decided to publish their concept on an open-source platform and invite other creative thinkers to solve their problem. They hired a student to implement this plan, yet couldn't decide who was responsible for his supervision. Relationship conflict ensued, leading to a team split without the open-source platform having been fully built. Team Rotowheel's case history is visually represented in figure 19.

5 Pathways and micro-practices of developing entrepreneurial opportunities with communities of inquiry

As I began interviewing founders, it emerged that all teams had moved into the incubator three to nine months prior to the beginning of data collection, which represented an important milestone to them as it was associated to a full-time investment of all team members' time and effort to the venture. I found that regardless of the timing of opportunity recognition, which dated back approx. one year for three of the teams in my final sample, around two years for four of the teams, and even dated back four years in the case of one team (measured at the beginning of data collection), the teams approached the incubator at a point in time when they believed to fulfil its submission requirements. In the case of my sample, most teams consisted of individuals who had only recently concluded their studies and decided against entering full-time employment to pursue their opportunity, with the exception of two individuals who had quit their careers. This nurtured an incubator environment in which teams wanted to utilize their tenancy in the incubator to the best effect to be able to stand on their own feet once the support period was over (at the latest, support ended approx. 18 months after being admitted to the incubator).

By the beginning of my study, all teams within my sample had produced several prototypes of their product idea in forms of sketches, simulated or semi-functional software, and/or hardware components. However, they all acknowledged that they were still at a very early stage in the development process: they were not yet able to flawlessly demonstrate the fundamental functionalities of their product, both in terms of its technical foundations as well as their prototypic representation, nor had they decided what these fundamental functionalities should ultimately entail. All teams emphasized the consensual aspect in terms of their collective decision making, in that changes to the concept, prototype, or business plan were based on internal discussions until consensus was reached.

Tracking the teams' interactions with their communities of inquiry at the beginning of data collection, it became clear that all teams had already identified and established contact with a variety of community members such as coaches, consultants, technical or industry experts, potential customers, potential investors, as well as other entrepreneurs within and beyond the incubator's boundaries, and members from their private environment (founders' family and friends). The community of inquiry proved to be a fertile ground for the creation of new ideas as well as the development of existing ones, which entrepreneurial teams utilized to different degrees and effects. When asked, all entrepreneurial teams emphasized the crucial role that their communities of inquiry played in opportunity development, indicating how they "*would not have come this far*" (Medicup(M)-F1-2) without them, making them "*incredibly valuable for the development of the opportunity*" (Smartbox(T)-F1-1), and "*catapulting* [the team] *ten steps forward whereas alone, one would have circled around the same spot*" (Rotowheel(T)-F1-2).

Entrepreneurial teams navigated through a variety of development options by interacting with their community of inquiry, a process during which teams spent various amounts of time and energy on issues they deemed important and urgent, designed various types of communication channels, and deducted various types of moves from the available data. I found that moving from initial ideas to developed opportunities involved recursive cycles involving four iterating steps, or phases: (1) focusing attention, (2) gathering information from the community of inquiry, (3) negotiating opportunity beliefs on team-level and (4) developing opportunities. Focusing attention involved how entrepreneurial teams collectively allocated resources to issues of importance and urgency in opportunity development; gathering information from the community of inquiry involved the micro-practices of engaging, exploring, and validating; while negotiating belief systems on team-level centered around articulated and unarticulated processes that led teams to collectively choose particular opportunity development activities and preferred outcomes. Finally, developing opportunities involved the decision and articulation of changes to these negotiated goals and plans, and their communication toward stakeholders in the form of verbal statements or written manifestations (e.g. on their website or within the business plan). Each of these four steps yielded two possible paths that differed by the manner in which

entrepreneurial teams executed and experienced the step. In this chapter, I define and provide evidence for each of the steps, the micro-practices that underpin steps where applicable, and the different experiences that entrepreneurial teams made as they continuously moved through the recursive four-step cycle.

5.1 Entrepreneurial teams' focus of attention in developing entrepreneurial opportunities

When I started analyzing the data, it soon became apparent that four of the entrepreneurial teams consistently emphasized the innovative potential of their opportunities and the technological possibilities they could possibly exploit. I use fictitious names with the suffix "T" to reflect the focus on high technological innovativeness as the envisioned outcome of their opportunity development activities— Smartbox(T), Digilamp(T), Biowing(T), and Rotowheel(T). As one of Smartbox(T)'s founders explained, "*we see our strength in our vision, the vision that we have for our innovation, and all the things that we'll be able to do with it in the future.*" (F2-2). 'Innovation' and 'technology' were seemingly interchangeable terms for these teams, and closely intertwined with their vision: for instance, Smartbox(T) aspired to build a technical infrastructure that would, amongst others, enable new types of digital marketplaces and thereby "*induce societal progress*" (F1-1), Digilamp(T) expected societal improvements in productivity and health from their product which they perceived to be "*radical in every aspect*" (F1-1), while Biowing(T) believed in "*the beginning of a new s-curve*" (F2-1) which their technology could potentially exploit as a first mover. Identifying and developing the most promising opportunity development pathway i.e. the one that would result in the most promising solution, was amongst the main foci of attention for these teams, which oftentimes involved selecting among multiple fundamental approaches with a variety of benefits and drawbacks. As one of the Biowing(T) founders described,

> "I can give you a really long list of selling points that our product could offer… the thing is, you really have to focus on the question "what do I want to stand for?" (F2-1)

Developing innovative solutions, these teams argued, relied on novel patterns in thinking and experimentation when evaluating different potential technical features. This entailed heavy research into technologies and the consideration of several ideas in parallel, which led the teams to "*add a few new directions*" to opportunity development (Smartbox(T)-F2-2) and to "*start from scratch*" if necessary (Rotowheel(T)-F1-2). Teams urged themselves "*open the mind to extremely innovative possibilities*" (Digilamp(T)-F2-1), often "*intuiting which direction could hold the highest technological potential*" (Biowing(T)-F1-1). The main focus within these teams' opportunity development activities was therefore the reduction of technological uncertainty, encompassing the selection, combination and configuration of technologies, of technical infrastructures, and of designs, to produce solutions that they perceived to be most 'radical' and/or technically superior.

When describing how possible business model development pathways were evaluated, teams reported relating various models to the impact that they would yield on the underlying technologies:

> "If we choose a business-to-business model, we can send service technicians to set up our product, but that comes with a whole bunch of costs and issues… On the other hand, with a business-to-customer model, we'll have to build in setup-features that help them get the product running, which has huge technical and financial implications on our solution. So now we're thinking, if we choose a business-to-customer market with self-employed people as our customers […] we can offer more and charge more, leaving more leeway for the self-setup… we're in the process of evaluating how all of this affects our product." (Smartbox(T)-F1-2)

As in this example, teams usually evaluated aspects of their business models against the financial leeway they would provide for the technical implementation of their vision. Ideal cost ranges were extrapolated from potential customers' willingness to pay, such as in the case of team Digilamp(T) that explained that "*there's a psychological line at 300€, it either has to cost less than that or otherwise it can run for 700€*" (F1-1), or from competitive offerings, as done by team Rotowheel(T) that described the following scenario:

> "[The competitor] is building something similar but much bigger and therefore much more expensive, so we quickly knew how small [our product] should be and what it should cost at the most: 1000€ altogether or better yet, much less." (F2-1)

This focus on costs as an anchor to reduce technological uncertainty was confirmed by one of the teams' start-up coaches, who assessed that the development of solutions was "*often driven by this cost factor*" (Digilamp(T)-SC-2).

The second salient source of uncertainty that this group of teams appeared to focus considerable attention on was market-related: when describing strategies for opportunity development and particularly for interacting with communities of inquiry, teams repeatedly mentioned the significance of being perceived as a legitimate and professional provider of innovative solutions to be able to commercialize them. This is a manifestation of supplier uncertainty (i.e. uncertainty whether potential customers perceive the team as legitimate suppliers of the solution) (Autio et al., 2013), and was illustrated by one founder who explained that "*customers just don't like to buy from start-ups, especially corporate customers*" (Digilamp(T)-F1-2). To the teams, being able to develop the superior solution was a matter of "*proving oneself*" (Biowing(T)-F1-3) and if this was accomplished within a given cost range, these teams felt a comparably low level of uncertainty that there would be demand for their particular solution – i.e. that the problem exists, as well as a competitive advantage large enough for customers to choose their product.

In evaluating demand uncertainty, the teams emphasized that they were "*eligible for every customer in a market* [worth] *billions of Euros in turnover*" (Biowing(T)-F2-1), and that it was well possible for them to "*become the next Apple*" (Digilamp(T)-F1-1). In fact, the teams reporting having "*decided to go for this* [opportunity] *pretty much right away after* [they] *had the idea*" (Digilamp(T)-F1-1), "*not thinking about it anymore in detail after that*" (Smartchat(T)-F2-1). With regard to product uncertainty, teams believed that it came down to "*finding that balance between innovation factor and cost factor to be competitive*" (Smartbox(T)-F1-2), i.e. that it was automatically addressed by reducing technological uncertainty. Moreover, it emerged that the thought of competition even reduced perceived product uncertainty in some cases, since the teams perceived competition as legitimization that the demand was advanced enough to be commercially exploited, while feeling confident that they would outdo the competition:

> "I thought ok, it's good that more competitors are climbing on the bandwagon, because I had been worrying that we're one to two years too early with this…but then we're clearly not. So luckily there's competition coming now, but luckily also, their products are not as good as ours, or better said, they're less radical than us." (Digilamp(T)-F1-1)

Even if teams hadn't decided yet which features would be necessary to provide greater value than their competition, they felt secure that customers would choose them eventually due to their innovative potential as a team unit:

> "We had a lot of discussions: what's our unique selling proposition? We're always looking for what makes us different, and maybe that's not much yet, but […] we still think we can survive on the market with the values we create. I think what makes us unique is our team which is highly capable – which is a value in itself and which will help us deliver value." (Smartbox(T)-F1-2)

Teams therefore demonstrated low levels of perceived demand and product uncertainty, which subsequently diverted their attention away from respective issues. To summarize, teams focused on high technological innovativeness demonstrated two main themes that underlined the purpose of opportunity development, and therefore the purpose of information seeking from communities of inquiry: reducing technological uncertainty and supplier uncertainty. Faced with the challenge of uncovering and delivering on possibilities for new means-ends-relationships, and having to identify and prioritize issues from each domain both in their immediate problem space and within their long-term strategy, these entrepreneurial teams typically sought more information on means than on ends to reduce uncertainties and decide on appropriate courses of action.

In contrast to this group of teams, the other four entrepreneurial teams demonstrated a consistent focus of attention on reducing demand and product uncertainty (i.e. reducing uncertainty regarding the general market demand for an envisioned solution, and reducing uncertainty regarding the solution's competitive advantage in potential customers' eyes) (Autio et al., 2013) to achieve successful opportunity development outcomes. I use fictitious names with the suffix "M" to reflect their focus on market acceptance as the envisioned outcome of their opportunity development activities—Medicup(M), Digihub(M), Smartchat(M), and Smartlab(M). All these teams initially conducted

extensive market research to decide whether to begin exploiting their potential opportunities, such as team Medicup(M) that described conducting scientific research to "*quantify the problem*" (F2-1). I observed that these teams directed high levels of attention to demand uncertainty by determining which potential application of the solution customers needed most urgently, described by some founders as "addressing a pain":

> "People might tell you "yeah this is nice to have". But the key issue that you should think about is: are we really addressing a pain? That's a question that many start-ups can't actually answer. It needs to be emphasized much more." (Smartchat(M)-F2-2)

Addressing a pain specifically involved "*understanding both the problem and the customer"* (Smartlab(M)-F1-3). Despite initially being overwhelmed by a variety of technical possibilities and other considerations, these teams soon prioritized problems over solutions:

> "We have sobered up now. Before, we were wasting our time on a bunch of different things, but now, we simply focus on the most important details: what are the true customer needs, and what are real pains, stuff like that." (Smartlab(M)-F2-2)

Even then, teams reported "*regretting having been biased toward the assumption that a problem exists and not getting even more feedback on problems earlier*" (Digihub(M)-F2-3). While problems were being understood, potential solutions were assessed against their level of differentiation toward the competition, representing the second salient source of uncertainty, product uncertainty, which teams addressed by studying both competitors and customers. As one founder described, "*if your solution doesn't offer ten times more value than your competition, people won't bother switching away from their available alternative*" (Smartchat(M)-F2-2). This induced teams to allocate particular attention to the topics of differentiation and value creation as perceived by potential customers. In the words of one of Smartlab(M)'s founders, "*you have to focus on your unique selling proposition*" (F2-1), which led teams to study competitors in great detail, going as far as "*actually using competitive products and trying to perceive them with customers' eyes*" (Medicup(M)-F2-1).

In this group of teams, differentiation was understood as a function of meeting customer needs in a superior way, not as a function of technological innovativeness, as put by one founder of team Smartchat(M): "*customers see fancy videos with futuristic promises of the technology, but the reality*

looks different and these things might not really be technologically possible yet" (F2-2). Therefore, technical solutions were assessed primarily to the degree that they solved potential customers' problems:

> "You first have to even understand, how can your product touch people, and how can you generate revenues? And then you have to evaluate the technical development and see what production techniques there are, and which one can you afford that will deliver a good product." (Smartlab(M)-F1-3)

Teams searched for existing solutions to build on in order "*not to reinvent the wheel*" (Smartlab(M)-F2-1), and effectively believed that they "*did not need to deliver the perfect solution from the very beginning*" (Medicup(M)-F1-1), hence focusing comparably low levels of attention on technological sophistication. This inherently implied that they didn't believe commercialization would be hampered by sharing unfinished products, indicating low levels of supplier uncertainty. When immersing themselves in the development of their solutions, these teams sometimes also expressed the wish to hold back prototypes until they were sufficiently mature, similar to teams focused on technological innovativeness. However, as team Smartlab(M)'s mentor described, team members then "*pushed each other to overcome this reluctance by putting the focus back on the fact that they were running out of money and needed to make progress*" (M4-1).

To summarize, in this group, the evaluation of different potential ways of moving the opportunity forward was based upon teams' potential understanding of customer problems and competitive offers, i.e. ends rather than means, while neither technological uncertainty nor supplier uncertainty appeared to play any significant role. The two groups' foci of attention and their characteristics are summarized in figure 20, and table 8 provides illustrative quotes of entrepreneurial teams' focus on high levels of innovativeness or on market acceptance.

As I considered these initial findings, I sought to explore the differentiating features among these groups of teams with regard to their interactions with communities of inquiry. How would the type of uncertainty that teams focused on affect their interactions and opportunity belief development regarding both means and ends of opportunities? I uncovered three primary dimensions that my interviewees described as influencing the nature and effects of these interactions, and which differed substantially

among both groups. In the following sections, I report on these major dimensions that emerged from my data.

FIGURE 20: Entrepreneurial teams' foci of attention and their characteristics

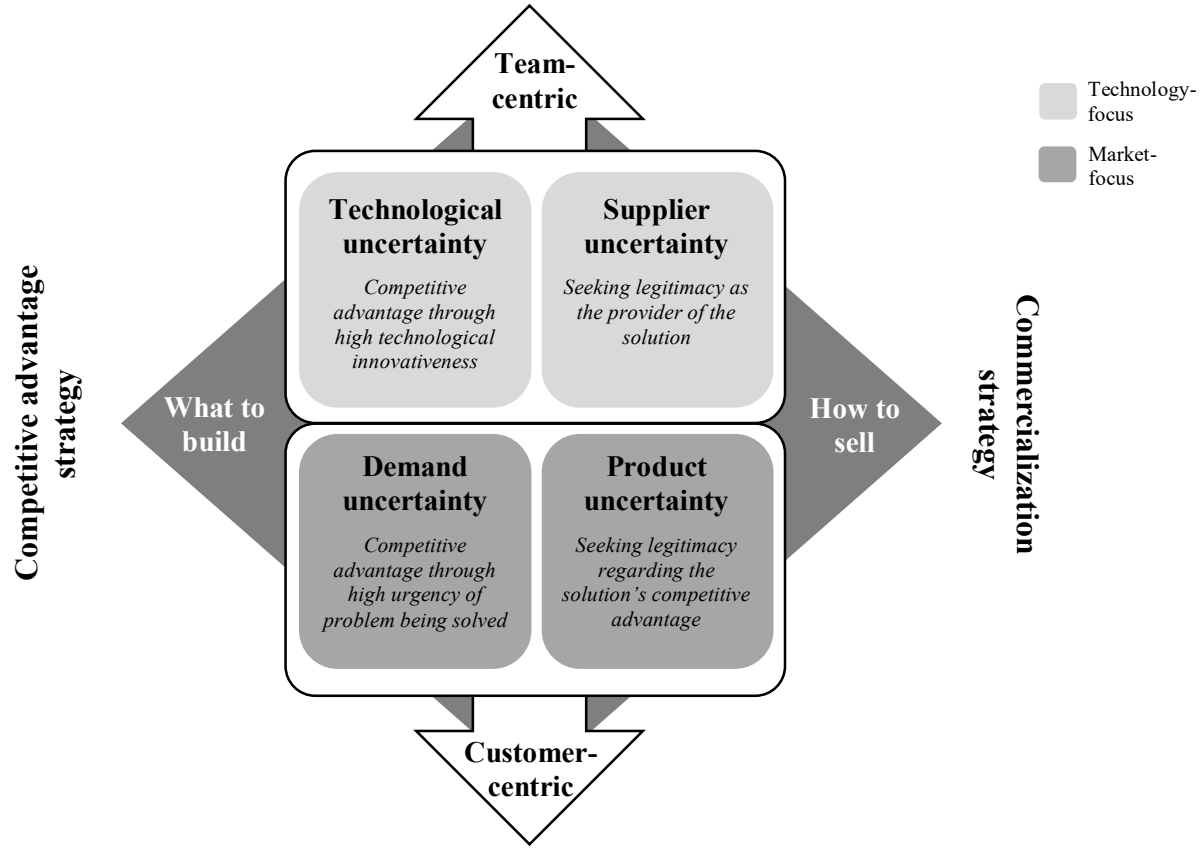


TABLE 8: Illustrative quotes of entrepreneurial teams' foci of attention

Attentional focus primarily on technological and supplier uncertainty	Attentional focus primarily on demand and product uncertainty
Smartbox(T)-F1-1: It's not just a product, but an ideology. […] From our research we know that there's a huge unsaturated market. And our idea *was* the solution. We didn't explore the problem anymore after that […]. We didn't focus on the idea requested by that one customer group, that wouldn't have concurred with our innovative vision.	Medicup(M)-F1-1: First, there was some semi-scientific research to understand, does this problem really exist? That was just for us because we thought, there's got to be a point to what we're doing. […] So we began the development because now we knew that this direction made sense.
Smartbox(T)-F1-1: Each of our IT guys convinces you of another direction, including a feature vs. not including a feature, but it'll eventually be a question of the technology's costs.	Medicup(M)-F1-2: With regard to the technical perfection, we'll listen to experienced manufacturers, they know what their machines can do.
Smartbox(T)-F2-1: In the beginning it's about selling ideas and future visions. And focusing on getting it built within the cost range.	Medicup(M)-F2-1: 'Proof of concept' means nurses really prefer us and buy it. […] it's not a technical question.
Smartbox(T)-F2-2: Our strength lies in our innovativeness […] We know what we want, and how we achieve it is a function of our potential.	Medicup(M)-F2-1: Your prototype doesn't have to be perfect […] nobody cares about the details that we're concerned with on the development side
Digilamp(T)-F1-3: Our vision never changed, we just played around with the details. […] You know, the university doesn't teach you to think about customer needs, they only care for a technical, highly scientific solution. That dictated our thinking.	Digihub(M)-F1-1: We are researching pains to see which ones there are and where we can add value with our technology. […] We first really have to understand customers' pains more.
	Digihub(M)-M-1: With their first vision, they asked "do I have pains

Digilamp(T)-F1-1: What we are doing, nobody has ever done before. The combination of technologies, all three in one, is unique […]. The challenge that we can't implement some features that we would like, because that would increase the costs. […] To solve this challenge, you have to think of the problem in more abstract terms.

Digilamp(T)-F2-1: For our government funding application, we came up with a bouquet of feature ideas […]. We try to keep it more simple now, but we also might add more features if we think they make sense.

Biowing(T)-F1-1: Our minimal viable product isn't minimal enough to be viable [laughs]. The technical part foregoes the market part, i.e. it's more the technical challenges and less market challenges to overcome.

Biowing(T)-F2-1: Many other people might think that our idea is crazy, or way too complex to say the least. We think it's just innovative.

Biowing(T)-F2-2: The market will probably want it to be super durable. But that's less of a priority. We have to develop the performance a lot, to even get to that point. Then we'll know what to make of it.

Biowing(T)-F1-3: Looking back, the technical innovation should have been second place. In our case it was in our focus because we had so many problems there. But it's much more important to solve a problem for someone, and that that person is actually willing to buy it.

Rotowheel(T)-F1-1: Government funding was great because that enabled us to experiment with many more technical options. […] The problem was, it got more and more complex, we couldn't handle that.

Rotowheel(T)-F2-3: I've always found our product sexy and that hasn't changed. […] When the business guys wanted to take business plan sessions, I always said "we first have to prove that this works".

and gains here? Do I really have a USP?" That's why they re-defined themselves. […] They always have their focus on the customer.

Digihub(M)-SC-1: When they moved into the incubator, I asked them if they really knew their customer. And surprisingly, they had already thoroughly done their homework. That happens less often than you think.

Smartchat(M)-F1-1: Our product claim is derived from "what is the underlying pain that we want to solve?" […] We explore these pains in pilot projects.

Smartchat(M)-F2-2: The test results were […] pretty bad. So we put an end to augmented reality. It wasn't worth the effort trying to make it work.

Smartlab(M)-F1-2: Although [changing the technical base] enables more features, it adds many uncertainties. A chain of issues is affected. We'll do it when the time is right.

Smartlab(M)-F2-1: That's what defined our product, […] thinking "we have to generate revenues soon". You can't implement every feature you like. […] To sell, you have to understand the problem and your customer in detail. What is hurting him, what's his pain doing what he does?

Smartlab(M)-M-1: They don't waste too much time experimenting. When they need to know which [technological] program to use, they ask an expert. I think in the beginning they had concerns regarding idea theft, but they have let that go.

5.2 Entrepreneurial teams' interactions with communities of inquiry in developing entrepreneurial opportunities

As I tracked entrepreneurial teams' interactions with communities of inquiry, the members that all teams reported engaging with for the purposes of opportunity development consisted of (1) start-up coaches serving as their main contact person and intermediary within the incubator, (2) coaches and experts affiliated to the incubator and offering specialized workshops in opportunity development and venture creation, (3) technical or industry experts proactively acquired by the team or introduced by the incubator from within the university ecosystem or the external industry landscape, (4) mentors proactively acquired by the team or introduced by the incubator from within the university ecosystem or the external industry landscape, (5) other entrepreneurs within and beyond the incubator's boundaries, (6) potential users and/or customers, (7) potential manufacturers, as well as (8) potential investors, and finally (9) members from their private circle (founders' families, friends and acquaintances).

My data revealed that the two groups of teams differed along three dimensions, or micro-practices, in the extent to which they sought and utilized information from their community of inquiry: (1) engaging

communities, (2) exploring new domains and/or layers of information, and (3) validating existing beliefs. *Engaging communities of inquiry* refers to the fundamental design of the information gathering context; *exploring information* denotes specific actions aimed at producing novel insights to form assumptions about potential alternative courses of action; *validating beliefs* refers to activities for legitimizing the team's existing assumptions and opinions against external perspectives, and determining whether and how new information is incorporated into existing belief systems. Based on these activities, teams developed their beliefs about how opportunities should ultimately manifest themselves into products and business models, and how they would further interact with communities of inquiry as they moved along the development process.

Step 1: Engaging communities of inquiry

Technology-focused teams and engaging communities of inquiry

As I documented with whom, when, and how entrepreneurial teams reported gathering information for the purpose of opportunity development, it became apparent that the design of interactions was linked to teams' attentional foci in several ways. First, technology-focused teams did not necessarily hold back on sharing and presenting their opportunities in a variety of outlets – however, audiences typically consisted of experts that held more or less opportunity-specific knowledge, and either provided technical or business-related information or legitimization to the team. For this purpose, teams primarily interacted with a variety of experts and mentors, who represented the extended human capital of the team "*since you simply cannot know everything yourself, so it's virtually impossible without them*" (Biowing(T)-F2-2). Team Smartbox(T) reported engaging with as much as nine mentors and several experts from a number of industries very early in the opportunity development process, while team Digilamp(T) held "*a large variety of contacts, just not so many from the market side*" (F1-1). The information that teams sought from these knowledge sources was most often aimed at reducing technological uncertainty, and occasionally related to reducing product uncertainty. At the same time, maintaining interactions with mentors and experts served to reduce supplier uncertainty, for instance when teams felt like a mentor was appearing as their representative toward the outside world, which

they deemed a "*significant asset*" (Biowing(T)-F2-3). Furthermore, teams participated in business plan competitions and other institutional communities that would give them feedback on their ideas, but more importantly, would give them a seal of legitimacy which they would then communicate toward the external environment.

Teams' focus on supplier uncertainty, i.e. fear of being perceived as low in legitimacy in stakeholders' eyes, went so far as to prevent them from interacting with mentors and experts who they would have liked to interact with (even) more. As nicely illustrated by Biowing(T), the team didn't want to "*annoy* [experts and mentors] *and waste everybody's time*" (F2-1), especially when they perceived particularly high levels of technological uncertainty and expressed "*not even knowing what to ask*" (F2-1). Therefore, the teams often preferred turning to members from their families, friends or acquaintances in all matters whether solution or demand-related, because "*these people wouldn't get offended*" (Smartbox(T)-F2-2), that they further were "*already interested in taking part anyway and involved themselves proactively*" (Rotowheel(T)-F1-2), and that one could "*trust that they knew what they were talking about*" (Biowing(T)-F2-1).

The teams continued this practice despite their coaches and mentors repeatedly advising them to involve actual potential customers instead of members of their families and friends. One coach expressed the belief that "*the team didn't quite have the courage to step up to their customers*" (Smartbox(T)-C-1). When asked, the teams gave multiple explanations: from the simple reason of "*not having had the time*" (Digilamp(T)-F1-2) and therefore instead "*always asking experts for their experiences in working with* [the team's] *potential end customers*" (Smartbox(T)-F1-2), to the belief that "*potential customers or lead users aren't competent enough to decide on important features* […] *when it comes to high end, high tech products*" (Smartbox(T)-F1-1). One of Digilamp(T)'s founders related a lack of interactions with potential customers to the high levels of perceived technological uncertainty:

> "There's no point doing big studies with people on pricing and stuff like that, all those marketing issues, it just doesn't work at this point in the process. Because when you don't know what your product is even going to be, what it will be comparable to, and even who the ideal customer should be, what are you supposed to ask them? You could only guess or try to estimate stuff based on guesses." (Digilamp(T)-F1-2)

Therefore, these teams reported engaging with their community of inquiry rather superficially to reduce demand uncertainty, i.e. ensure that there was a problem large enough that customers demanded a solution to begin with. However, teams recognized that they would have to engage directly with potential customers eventually, to "*learn if customers even really have this problem*" (Smartbox(T)-F1-2). When teams did interact with potential customers, interactions were designed to determine whether customers would abandon their existing solutions for the teams' envisioned solution (reducing product uncertainty), as illustrated by team Digilamp(T): the founders explained that to be successful as a venture, they "*only needed to sell one hundred products in the Kickstarter campaign*" (F1-2), and that "*the people* [they had] *spoken to were all interested to buy*" (F2-2). To summarize, interactions with the community of inquiry most rarely took place with potential customers for these teams, and if they (occasionally) did, they revolved around product uncertainty where potential customers' willingness to pay was the primary topic of interest.

Furthermore, as I started to see some patterns in the types of community of inquiry members that entrepreneurial teams engaged with and why, it also became clear that the nature of interactions varied heavily between the groups in my sample. Technology-focused teams primarily engaged in distant search when interacting, i.e. conducted thought experiments on a variety of topics, with prototypes being demonstrated or tested only late in the development process. Team preferred distant search and dismissed the chance to test unfinished prototypes, even when they received attractive offers from potential pilot customers:

> "We actually just received an offer from the Siemens foundation to test in Columbia but we declined because our product needs to be a bit more developed for that. You can't go down there and test with a prototype that doesn't actually produce electricity, that was always our dilemma." (Rotowheel(T)-F1-2)

Prototype testing was continuously scheduled for later dates and signing letters of intent with potential customers (who they already knew) served to sufficiently reduce these teams' perceived demand uncertainty. Their focus on supplier uncertainty implied that they would "*by no means ever show an unfinished product to potential customers*" (Digilamp(T)-F2-3), or engage customers and experts in

interactions without being able to present "*hard facts* […] *from technical prototype tests*" (Biowing(T)-F2-2) on their chosen solution. Instead, thought experiments were preferred, irrespective of the audience. For instance, team Smartbox(T) "*once met with potential customers at the beginning to develop a list of all the features they would like*" (F1-1), while team Biowing(T) regularly consulted experts by "*having 15-30 minutes long conversations about how they see the future*" (F2-1).

I also observed that these teams displayed the tendency to inquire information selectively based on particular needs, i.e. information acquisition was often done in a unilateral fashion and the teams did not uphold a dialogue after their inquiries were met. As one potential customer described during team Smartbox(T)'s pilot study, which eventually took place toward the end of their incubator residence:

> "I sent the team five pages full of feedback about three weeks ago. And they haven't gotten back to me on those points, apart from thanking me for taking part. So I don't know what's going to happen now. I've stopped testing. When I don't know what's happening then I don't think it makes sense for me." (PC-2)

Similarly, Biowing(T)'s mentor described that he wished "*to have been involved more*" since he "*could not help without knowing what's going on*" (M-2), and a potential customer of team Digilamp(T) wished "*for more actual dialogue and less requests to register for their waiting list*" (PC-2). To summarize the context of interactions with communities of inquiry that emerged for the group of technology-focused teams in my sample, these teams designed the context of information gathering in such a way that mainly mentors, experts, as well as members from their circle of family and friends were involved, prototypes were held back until they had reached an advanced level of sophistication such that interactions mostly took the nature of distant search, and interactions took place in mainly unidirectional fashion than in form of a dialogue.

Market-focused teams and engaging communities of inquiry

In contrast to the first group, the market-focused teams primarily inquired information from their communities of inquiry that was related to customer experiences, and did so early on in the opportunity development process. For example, one of Medicup(M)'s founders explained the team's opportunity development strategy as follows:

> "The development of the solution is done in cooperation with the patients and nurses, who are our co-developers in a way. […] We always said to ourselves we must not develop our solution and forget about the patient… we need to keep in touch with the base." (F2-1)

Accordingly, the team's mentor complimented Medicup(M) on their "*level of proactivity in seeking out advice from different types of people, proving their high levels of self-reflection*" (M-1). Reducing demand uncertainty was a significant issue for these teams, such that they urged themselves to "*keep listening to what* [potential customers] *say they need most, meaning their problems that have not been solved yet*" (Medicup(M), F1-1). Team Smartlab(M) went as far as to engage with "*distributors who know the market and might be able to point out customers' problems or optimization potentials*" (F2-2). Teams described their goals of interacting with the community of inquiry as "*repeatedly inquiring as much information from* [the] *target customer group as possible even if there's only a short amount of time available*" (Smartlab(M)-F2-2). They therefore designed interactions to specifically be able to extrapolate problem-related information:

> "What we would always recommend is to ask from a problem perspective, and go into interviews with an open mind. I mean, in the beginning I always let them tell me whatever came to their mind […] and then it figuratively gushes out of them, and I try to write down as much as I can." (Digihub(M)-F2-1)

Interestingly, these teams perceived and focused on demand uncertainty even in cases when individual team members' extensive prior experiences would have induced many to take assumptions as given, as described by one founder:

> "The others [co-founders] need to be convinced that this is the way to go. They needed to hear it with their own ears. There's no point in me trying to convince them, because I might be wrong at the end of the day." (Medicup(M)-F2-1).

In this group, interactions rarely took place with members of teams' families and friends, and if so, only if they were individuals with expert knowledge on opportunity-specific demand and/or solution related issues. One founder explained this as follows:

> "Yeah we told our friends about it…. But in our context it is important to talk to the right people. It's interesting to get feedback from all sorts of people but when they don't

> understand the context or come from the industry then there's not much value to that feedback. That's why we went to trade shows instead, showed videos and demonstrated our prototype to find out what the needs and pains of our actual customers are." (Smartchat(M)-F2-2)

Indeed, both Medicup(M)'s and Smartchat(M)'s private circles contained a large number of such individuals, while Smartchat(M) and Smartlab(M) had direct access to potential customers through their professional networks, yet the teams additionally expanded their community by unknown customers and experts in order to be able to inquire on important demand and solution-related issues on a larger scale.

Furthermore, interactions with experts and mentors rarely revolved around questions of technological uncertainty, which teams reported to solve rather easily by consulting personal or digital sources. In this fashion, for instance, one of Digihub(M)'s founders shrugged it off and referred to "*a few forums where these type of questions can be discussed*" (F1-2), while another founder emphasized that "*the type of technical questions worth discussing with an expert are so specific that it's pretty straightforward*" (Medicup(M)-F1-1). Supplier uncertainty similarly did not appear to be an issue that teams focused their attention on. To the contrary: team Medicup(M) showed a very early prototype to potential customers, although acknowledging that it "*looked extremely ugly at that point*" (F2-1) and that it would be difficult for customers to picture the final product at that specific point in time. Team Smartchat(M) emphasized their goal to "*always show the prototype or parts of it in order to get people hooked on the product*" (F1-2). This related closely to my observation that this group of teams performed their interactions with communities of inquiry most often in a manner of local search, inquiring about concrete rather than abstract development options and utilizing prototypes early on for this purpose.

Another pattern distinguishing market-focused from technology-focused teams was their engagement in a systematic and continuous dialogue with potential customers, experts, coaches, or mentors in order to strategically build knowledge and networks, as one of Digihub(M)'s founders reported:

> "Dialogue is extremely important. When we receive inputs from customers testing our product, we answer within two days and give them feedback on their raised issues. Maybe it's something we're already working on, then we'll tell them when it's coming. If we don't hear from them, we send out a reminder to see how they're doing." (F2-2)

The ongoing efforts to keep up conversations were confirmed by the teams' communities of inquiry. For example, Medicup(M)'s potential customer reported how the team "*first came with questions and returned with prototypes to follow-up on issues*" (PC-1). To summarize, the teams focused on market uncertainty included not only experts and mentors but a variety of market-related stakeholders into interactions, going beyond members from their circle of family and friends to inquire primarily about demand and product uncertainty-related issues. Further, they laid emphasis on including prototypes into interactions despite their lack of sophistication, typically engaging in local search throughout their interactions, and keeping continuous dialogue with community members over time. Illustrative quotes of teams' engaging with communities of inquiry are summarized in Table 9. The nature of the community of inquiry members that teams primarily interacted with are further summarized in figure 21.

After having understood the fundamental principles of the first micro-practice involved in interacting with communities of inquiry, i.e. designing the context of interactions, I now move on to activities aimed at using interactions to either develop entirely new opportunity beliefs than those already being considered (*exploring*), or aimed at validating existing beliefs upon which teams have already decided to build opportunity development activities (*validating*).

TABLE 9: Illustrative quotes of entrepreneurial teams' engaging communities of inquiry to develop opportunity beliefs and opportunities

Technology-focused teams and engaging communities of inquiry: *mainly experts & friends, distant search, few prototypes, little dialogue*	**Market-focused teams and engaging communities of inquiry:** *mainly customers, local search, early prototypes, dialogue*
Smartbox(T)-F1-1: We automatically mention the topic to friends because it's on our minds already. We didn't go out to do a survey with people on the subway. I have to admit we haven't taken that step yet. That will follow.	Medicup(M)-F1-1: We went from hospital to hospital. […] We also showed our prototype to the university chair, and they said it's too expensive to produce and no one will want to use it. But your other solution idea is great. So that's what we pursued.
Smartbox(T)-F2-1: We could work with lead users, but […] to do really complex technological development, you need to focus within your team. […] Customers can help you with optimization, they can't tell you "you should build a different product and sell it to a different segment".	Medicup(M)-F2-1: We wanted to validate the numbers we found so we surveyed customers, partly online and partly face to face, in clinics. We asked fifty nurses with a standardized questionnaire, and it turned out that they have this particular problem. We also went to different types of nursing homes to test our first prototype.
Smartbox(T)-F2-2: It's better to test with less customers […] because you get distracted from development. […] What we did do is, we asked customers what they would pay and they'd pay 500-700€ for our product because they otherwise have to spend 70.000€ hiring someone who can do the job… so that's the range we're going for.	Digihub(M)-F1-1: Our first pivot was nearly immediately after we started because our prototype tests showed right away that our target group … wasn't excited enough. So we took a step back and … worked on our second idea. And then there was this two-week test where we worked on some exemplary content and showed it to people, to see if that's what they want.
Digilamp(T)-F1-1: I spoke to lots of people actually. Not on the market side, though, that will follow later. […] We'll have real contact with	

customers when we start selling through our Kickstarter campaign. […] at the end of the day we're selling to customers who are clueless of these details, so there's no point in asking them.

Digilamp(T)-F2-1: We could actually test the prototype with customers now. That's been on my agenda, but it always gets buried under my other [technology-related] tasks.

Digilamp(T)-SC-1: I repeatedly connected them to potential customers they could talk to. But they didn't make use of any of the offers as far as I know.

Biowing(T)-F1-1: It only makes sense to talk to customers about technological innovations when you have clean and reproducible results. They wouldn't believe that you can really do it if you keep going back to them without good answers to their questions.

Biowing(T)-M-2: At one point they update you and then they disappear, because they are super busy. And then they come back after six months and say "okay now here is where we are". This stop and go is not really productive in my opinion. I can only help if I know what's going on.

Rotowheel(T)-F1-1: It's easier to test with friends because the testing site isn't easy to get to, and sometimes prototype parts are missing… and there's no use presenting the prototype [to potential customers] because then you have to give it a price point, and there's no use giving it a price point before you have actually built the product.

Rotowheel(T)-F2-2: I had my brother join me for testing a couple of times, or other friends who found it interesting and wanted to help.

Rotowheel(T)-PC-1: They didn't really seem that interested in talking to us regularly. At least, they didn't take the appointments we offered.

Digihub(M))-F2-1: We must have spoken to 200 people when we were showing our first prototype on campus. […] By now, we have about 400 people in our regular testing pipeline, that's super cool. […] We try to meet our most active users once a month for a group discussion.

Digihub(M)-F2-1: With our second product we invested €100 in a quick AdWords campaign to see if our prototype would draw conversion and if potential customers would actually sign up for our website. It wasn't statistically significant but it immediately gave us a better gut feeling.

Smartchat(M)-F1-1: When we had our first augmented reality idea we immediately built a first small prototype, and contacted my old employer to test it there.

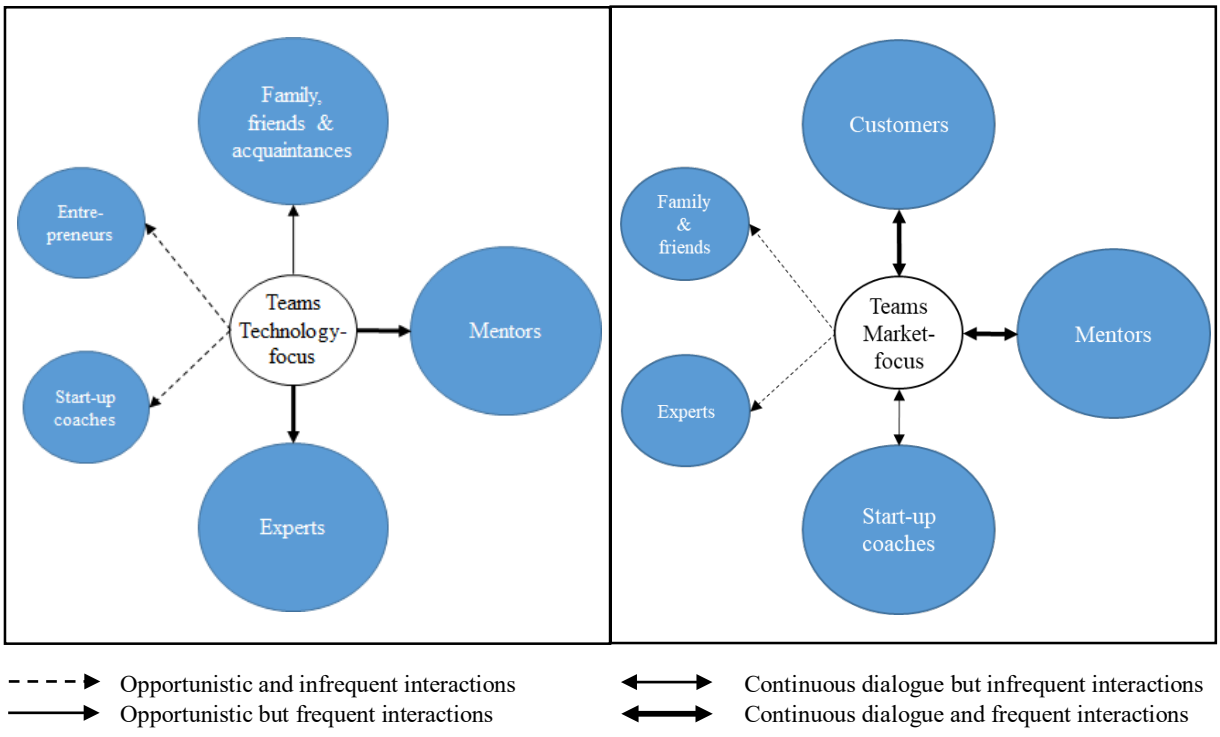
Smartchat(M)-F2-2: These regular meetings [potential customers] are sometimes uncomfortable […] but still I think you can never put too much emphasis on the value of external feedback.

Smartlab(M)-F1-1: There's a legendary guy at the Chair lab, he's much older than us and the perfect example of our target group, forty or older and kind of nutty. He became our go-to guinea pig from the very beginning.

Smartlab(M)-F2-1: We constantly get feedback because we work with several laboratories at the same time. And regarding the big laboratory chains that are hard to reach, I did telephone interviews with five of them. You just call and try your luck, and have them put you through to the people making the buying decisions.

Smartlab(M)-M-1: In terms of customers and testing, I don't think they could have done more than they did, if you think about how many people they worked with. I think they're doing a really good job.

FIGURE 21: Overview of community of inquiry members primarily involved throughout opportunity development, per attentional focus



Step 2: Exploring new opportunity beliefs with communities of inquiry

Technology-focused teams and exploring new beliefs with communities of inquiry

My data revealed that the pattern by which technology-focus teams explored new domains of opportunity-related information with communities of inquiry was characterized by *variety*, and aimed at building an exhaustive solution space. For example, pondering how to protect their digital product from power outages, Team Smartbox(T) considered several alternative technological solutions that represented varying degrees of a trade-off between complexity in usage vs. complexity in production. As one founder explained, this "*seemingly small technicality is hugely important because it affects many parts of the whole concept*" (Smartbox(T)-F1-1). The two primary solutions that were considered came at similar costs and offered advantages that individual team members prioritized differently; however, rather than interact with potential customers or distributors to explore market preferences, the team redoubled their efforts in exploring possible technological angles with technical experts, and more and more time was "*spent* […] *discussing all the alternatives, going back and forth*" (Smartbox(T)-F2-1). Whenever teams added resources in form of temporary student project teams, they did so to explore even more solution pathways, as one team described:

> "We were working a lot with students which was great, great input, but it didn't get us far because we usually didn't have budget for the solutions they suggested. So new student teams kept coming in and kept trying to find a cheaper solution… and all the previous work was discarded because nobody felt responsible for actually testing all those ideas. Sometimes the teams would simply suggest things we didn't want, so again that didn't get us anywhere. Eventually we gave the students five unshakable requirements, five points of our vision that were weren't going to budge on, to make the process more efficient." (Rotowheel(T)-F1-1)

The exploration of potential solutions was rarely executed from potential customers' perspectives, and if so, happened purely conceptually and within the team's boundaries, such as "*brainstorming the product features that alternative markets, customers or cooperation partners would potentially ask for*" (Rotowheel(T)-F2-2). Team Digilamp(T) illustrated how this process was conducted, as team members

collectively used the prototype and thought aloud about the opinions that potential customers might have:

> "We often just thought about it among ourselves, "so what is this like?". Put it on our desk and noticed, oh, if it's this big, then I can't have a conversation with the person across the table from me anymore. But I might want to. So that sucks. Then we asked ourselves, maybe we should build a desk version instead? Because then people will more probably say "aha, it's a desk lamp, so it belongs on the desk". But if we want to have this illumination-feature, then it's bound to be a bit bigger, and then people will ask "why does a desk lamp have to be this big?". I'm sure that's what they would say." (S2-x)

This quote serves to show the paradox between the heavy emphasis on producing and evaluating a large quantity of solution alternatives with communities of inquiry, and the purely conceptual perspective that this group of teams consistently took in exploring market-related questions in opportunity development.

Market-focused teams and exploring new beliefs with communities of inquiry

Market-focused teams, in contrast, appeared to understand exploration in an entirely different manner: instead of exploring the solution space, these teams prioritized exploring the problem space, which is essentially the customer's perspective, in order to eliminate alternatives with regard to possible solutions (e.g. particular product features). Therefore, solution ideas were often held back during the initial conversations with new potential customers, to draw as objective inferences as possible:

> "To really understand the problem, what's hurting your customers when they're doing what they're doing, you most importantly shouldn't tell them what solution you're thinking of, if you want to find out which pains people *really* have." (Smartlab(M)-F2-3)

As described earlier, these teams showed their prototypes as soon as they had implemented very basic versions of them; but even before that i.e. before determining which functions these prototypes should entail (or at the beginning of interactions with new community of inquiry members), teams let potential customers independently explore solution ideas as a starting point. One of the teams' mentors confirmed this as follows:

> "During their initial conversations with their customers, they didn't know yet how to position themselves. Now that they've figured that out, they've started talking to them more

specifically about the product." (Smartlab(M)-M-2)

When it came to potential alternative solutions to their envisioned problem, teams deprioritized their further pursuit when they felt they lacked understanding of the underlying customer perspective, which further reduced the number of alternatives. Accordingly, one of team Medicup(M)'s founders reported why the team had decided to disregard a potential customer group that they had already spent comparably large amounts of time interacting with, including the demonstration and testing of prototypes:

> "That's another possibility, to sell it to speech therapists, then we could make the cup out of glass and sell it at a higher price. But that's a completely different case – speech therapists would have to buy it from us and resell it, and we don't even know yet if that's something they'd really do. So we're not thinking about that at the moment." (F1-2)

Therefore, the concept of 'exploration' was executed in quite distinctive ways by both groups in my sample, differing not only by the type of uncertainty that was addressed, but also by the goal of increasing vs. reducing the variety of possible solution alternatives. Illustrative quotes of teams' exploring new beliefs with communities of inquiry are summarized in Table 10.

TABLE 10: Illustrative quotes of entrepreneurial teams' exploring new opportunity beliefs with communities of inquiry

Technology-focused teams and exploring with communities of inquiry: *presenting and increasing solution alternatives*	**Market-focused teams and exploring with communities of inquiry:** *withholding own solution ideas, decreasing solution alternatives*
Smartbox(T)-F1-1: We have a relatively large network of nine mentors who pretty much all have technology know-how but come from different industries […] the more information you get, the clearer your perspective becomes.	Medicup(M)-F1-2: Before we showed [customers] our solution [for a lid], we just took a regular lid of a coffee-to-go cup, put it in front of them, and let them discuss it amongst themselves. After a while, they forget that you're even there, and you can observe and write everything down. That's really good and helpful input to know what you should build.
Smartbox(T)-F2-1: Everyone you talk to might spark an idea for a new direction that you can take. It takes so much longer to have all these ideas yourself. They know the shortcuts.	Medicup(M)-F2-1: It's not just my own view on the product, but there are multiple perspectives that come together that you have to understand. And the most important is the customer's.
Smartbox(T)-F2-2: We're re-assessing the potential applications of our solution, there are so many. You have to consider, what are the different use cases that are possible with your technology? And then define a USP for each use case. So, with all the things we can do with our technology, we can also show investors: 'look, there are several huge markets that we can tap into'.	Medicup(M)-F2-2: Nurses and speech therapists have guided us […]. They have helped us immensely by saying "here your product doesn't help, because the problem is different", or "here you need to do this differently".
Digilamp(T)-F1-1: So, we already knew that [several parameters] are going to be important to make our model work. Then, we receive feedback [from experts] saying that it needs to interact with the hardware too, and with [more parameters]. It's difficult to bring all of this together. You have to find a good mix […] You need [the community] to explore all possibilities.	Digihub(M)-F1-1: To understand [customers'] pains more, we always ask customers from a "what's your problem?"-point of view, without showing them anything yet.
Digilamp(T)-F1-2: I'm someone who's always thinking about ideas. So that's what I talk about [with the community], I can't help it.	Digihub(M)-F1-2: Right now it's rather about […] learning how users actually experience the journey, just […] watch them search for certain solutions and learn from that.
Digilamp(T)-F2-2: We talk to a variety of feedback providers […] and	Digihub(M)-F2-2: We first really focused on asking about problems. There's no point asking [potential customers] if they would like a smarter collaboration tool; of course they'll say yes […] understanding

then we brainstorm different features that could be interesting for them, like little extras that we can charge an additional fee for. Biowing(T)-F2-1: We did excursions so to speak into the scientific side of things. We talked to researchers about our model and about our product, we talked to experts about all sort of things such as our measurement results. We got a lot of different inputs on our solution. Biowing(T)-F2-3: Thinking back, talking to so many experts created fake certainty. But because of that, [the product] got more complex. Biowing(T)-SC-1: The team constantly switches from one topic to the next, it's hard to follow sometimes. […] Just too many ideas at once. Biowing(T)-M-1: They didn't have a clear idea about potential applications so we discussed many different alternatives. Rotowheel(T)-F1-1: We are currently working with a researcher who is exploring a few new use cases and give us feedback on our options. Rotowheel(T)-F2-2: You can, or better said you should, do a whole matrix of feature options and how it affects one another. You can't do that without expert input, there are so many variables.	the problem allows you to focus on what they *really* need. Smartchat(M)-F1-2: Our first solution was met with lots of enthusiasm because […] everybody wants to be innovative. A lot of people were blinded by our solution, but didn't think of applying it on a day-to-day basis. […] So then, we learnt that we have to understand customers more […] and not show them something too quickly, so we don't waste any more time with the wrong paths. Smartchat(M)-M-1: In meetings [with potential customers], they don't talk about themselves or their solution anymore. Of course the customer already knows what it's about, or they wouldn't get the meeting, but they go in with an inquiring attitude. Smartlab(M)-F1-1: Without telling [customers] what kind of product we're offering we ask them what pains they have in that area. Smartlab(M)-M-1: The team conducts [conversations with customers] completely objectively, because they know that it's not good when potential customers already know about the idea. When you know it already, you'll immediately find a way to give positive feedback.

Step 3: Validating existing beliefs with communities of inquiry

Technology-focused teams and validating existing beliefs with communities of inquiry

When teams Smartbox(T), Digilamp(T), Biowing(T) and Rotowheel(T) interacted with members of their community of inquiry to collect information aimed at validating opportunity beliefs they were already holding, they sought evidence confirming their current technological solution and avoided or discounted evidence disconfirming their opportunity conjectures. This behavior is consistent with confirmation bias (Nickerson, 1998). For example, when observing Biowing(T)'s presentation of their potential opportunity to technical experts, I noticed a strong emphasis on the projected technological benefits of the envisioned solution. As one of the founders subsequently noted:

> "We kind of always just automatically put a label on it: 'reduces noise', without actually knowing if it will end up working that way [laughs]. But in theory we'll filter out all these effects, so our product should be more quiet." (Biowing(T)-F1-2).

As the community members were rarely offered the opportunity to test these benefits on prototypes, the team was more likely to receive positive i.e. confirmatory feedback on their opportunity development choices:

> "It often went like this: we presented our concept, and they said "yeah that's pretty intriguing". And it quickly became clear which detailed use cases they would have, so that's the direction we went for." (Rotowheel(T)-F1-1)

When these entrepreneurial teams eventually presented prototypes to potential customers after several

months and had them test and provide feedback, they focused attention on feedback that confirmed their opportunity conjectures rather than showing an openness to disconfirming evidence. For example, one of Digilamp(T)'s founders remarked: "*She said she likes it. She was using it in a weird way, to be honest, we didn't really understand why. We did ask her, but it still didn't really make sense to us afterwards*" (F2-2). When I subsequently interviewed this potential customer, it turned out that she had perceived the prototype to be interfering with her work habits, and stopped using it for most of the time (which team Digilamp(T) had interpreted as "using it in a weird way"—the potential customer was wrong, not them). However, at the time she expressed an overall positive opinion about the product to the team because she did not want to hurt their feelings. The team readily accepted this explanation and considered it positive feedback without further interrogation, albeit not understanding the breakdown that occurred when the potential customer tried to use the product.

Similarly, when team Rotowheel(T) eventually did test their prototype in a third world country (their envisioned launch target market), the prototype proved to be unfit for local conditions. Yet, when this experience was recalled, the team emphasized that "*the prototype went down really well with locals*" (F1-2), which at that point confirmed the team's belief that they were on the right pathway despite the unexpected technological challenges. Similar to this example and the underlying mindset, the teams generally reported feedback from potential customers to be consistently positive, as one start-up coach remarked: "*One of the founders sometimes gets exasperated because they others always go "it's great, we're only getting positive feedback and everybody loves it'*"" (Rotowheel(T)-SC-2).

Whenever teams were confronted with direct critique, they shifted their focus toward their own expert status, again increasing their sense of legitimization instead of alerting them to problems. Members from the community of inquiry were deemed less specialized or less informed than the teams perceived themselves to be, since the teams had "*spent a year and a half working on this, while others might only know the concept for three months*" (Rotowheel-F1-2). These entrepreneurial teams even discounted feedback from experts. For example, in reflecting on an expert's comments about their potential opportunity, one founder noted that it was only possible to "*assess their helpfulness in pursuing a certain*

vision until ten years later" (Digilamp(T)-F1-1), even going on to postulate that „*it might be possible that 10% of what they know and do is right, and the other 90% is complete garbage*", thereby discounting negative concerns from their community of inquiry about the feasibility of their opportunity beliefs. Community members acknowledged this attitude, recounting how teams "*react defensively to critique*" (Smartbox(T)-SC-1). Indeed, one start-up coach exhaustedly described team Digilamp(T)'s attitude with the words: "*when I give them more detailed feedback, they go into the mindset of 'we know it better anyway'*" (SC-1). Team Smartbox(T) simply laughed off critique, even when community of inquiry members repeatedly raised particular issues in concern, as I observed during an interaction with their mentor (that they otherwise held a very close relationship with). The latter attempted to convince them that their unique selling proposition was not clearly developed enough and that this would be critical to differentiate themselves from competition later on. The team, however, described these exchanges to me as follows:

> "Our mentor kept asking, "guys, I don't see your unique selling proposition… where is it?" We kept explaining to him, but he kept repeating his question. All I know is, it's here, isn't it? [laughs]" (Smartbox(T)-F2-2)

Across all technology-focused teams, I observed that whenever suggested solutions or prototypes received ambiguous market-related feedback, teams avoided following up on details perceived as potentially negative. Instead, they directed attention on positive elements and subsequently returned to exploring technological features and/or capabilities.

Market-focused teams and validating existing beliefs with communities of inquiry

In validating existing opportunity beliefs, market-focused teams sought to interact with the community of inquiry in a manner that would induce critique, believing that the early identification of potential problems in their current prototypes would increase their chances of success later on. After equipping potential customers with prototypes, they sought in-depth feedback on the occurrence of potential problems and unsatisfactory or unnecessary technological features. For example, a founder of team Medicup(M) reported on their medical device prototype:

> "Once it's being used every day, you can see if it really stands the test. Whether it's

> effective, or whether there's too much discharge… maybe the membranes snatch every five hours. We've already tested it ourselves, but you never know how it's going to be in real life, maybe patients stick their fingers into it, or a spoon, can you apply this concept in a clinic at all? That'll be exciting to find out." (F1-1)

My data showed that the teams tended to acquire both positive and negative feedback (confirming and disconfirming evidence about existent opportunity beliefs), to identify potential issues with their potential opportunity, potential solutions to those issues, and necessary refinements in developing the potential opportunity. When conversations with potential customers were perceived as "*uncomfortable because things come up that you wanted to suppress*" (Smartchat(M)-F2-2), the teams reminded themselves that "*it's good that these things come up anyway*" (Smartchat(M)-F2-2) and pushed themselves to put existing beliefs aside and keep an open mind. Beyond asking for feedback, all teams made a point to observe customers during their usage and took notes of unexpected behaviors to identify issues that the customers might not be aware of themselves and therefore might not be able to verbalize. As an example, one of Digihub(M)'s founders described these observations as follows:

> "You try to read their initial reactions and just write them down without filtering anything. And you observe how they handle the product, even if they're not saying anything, like if it takes someone ages to find a button, then you absolutely need to make a note of that. That's negative feedback in a way, but it's super important to do this." (F2-1).

Similarly, these entrepreneurial teams tried to be critical about potential biases among community members and within their own thinking, so that positive feedback did not automatically legitimize their current beliefs, as one of Digihub(M)'s founders described: "*It's an unwritten rule that people don't want to bash your product when they know you created it, so* […] *I try to keep* [interactions] *as neutral as possible."* (F2-1). They went as far as focusing on selling products as an outcome of interactions – a manifestation of their efforts to reduce product uncertainty head-on. Teams believed that they needed to develop products that were "*interesting enough for people to pay for in the end*" (Smartlab(M)-F1-2), which shaped their interactions with communities of inquiry from the beginning:

> "As soon as you have developed something you should try and sell it, otherwise it won't be worth the effort. You can't do greenfield development. And only when people are paying for something they'll give you the information you need." (Smartchat(M)-F2-3)

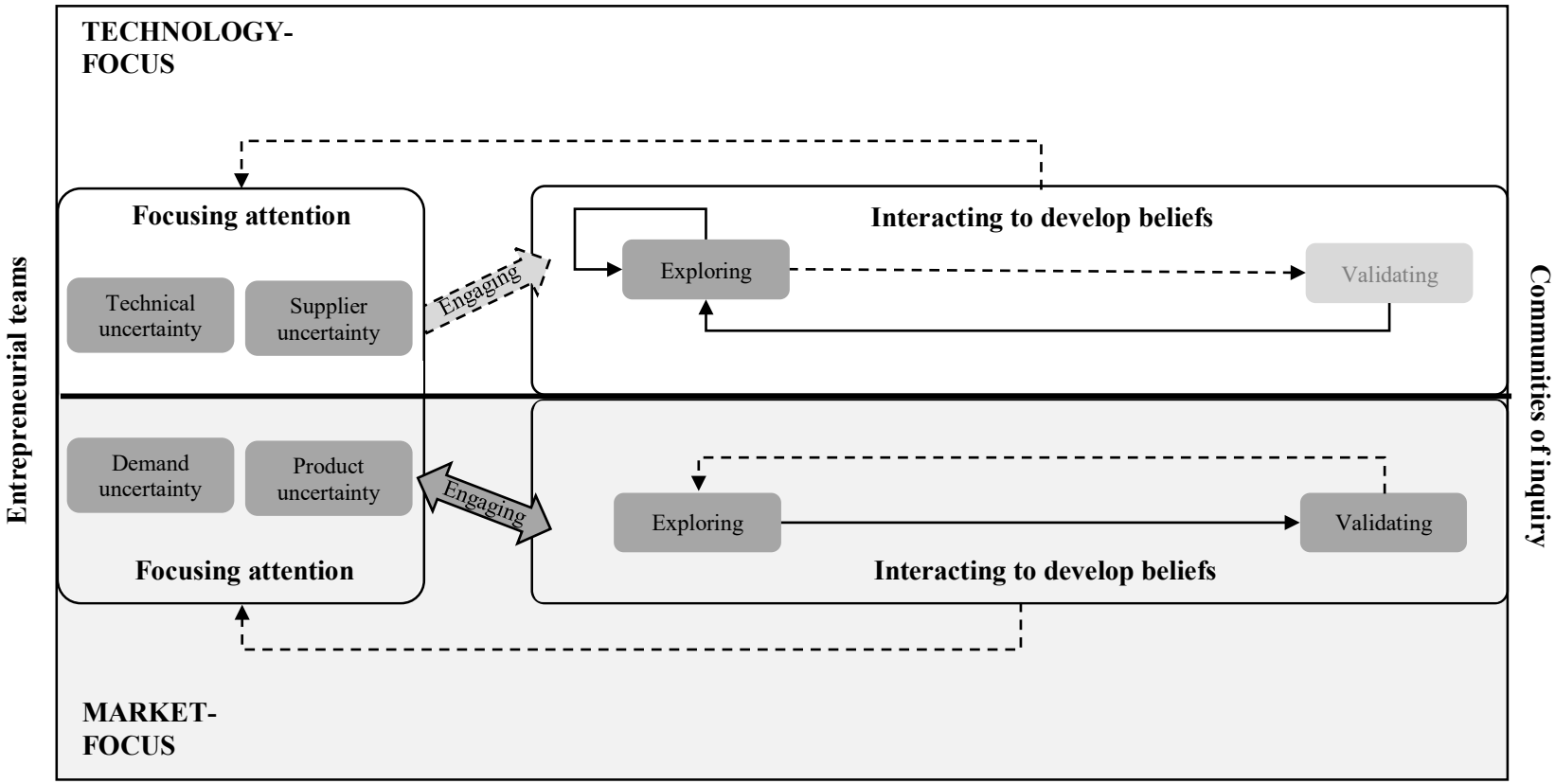
In fact, teams continued to focus interactions around reducing product uncertainty, "*even when potential customers who are testing the product said "it's a cool product, I would pay this amount for it", because the question really is, will they pay for it after all?*" (Digihub(M)-F2-1). Instead, they "*only* [felt] *secure by getting paying customers on board as early as possible and seeing what they prioritize*" (Digihub(M)-F2-1).

To summarize, market-focused teams validated existing beliefs by objectifying them i.e. purposefully inducing critique and taking biases into account, while technology-focused teams displayed behavioral patterns that strongly pointed toward the need to legitimize their existing belief systems rather than test them. Illustrative quotes of teams' behavioral patterns in validating existing opportunity beliefs with communities of inquiry are summarized in Table 11. Moreover, figure 22 summarizes the micro-practices involved in interacting with communities of inquiry that entrepreneurial teams execute in varying manners depending on their primary foci of attention.

TABLE 11: Illustrative quotes of entrepreneurial teams' validating existing opportunity beliefs with communities of inquiry

Technology-focused teams and validating with communities of inquiry: *idealizing opportunity traits, avoiding negative feedback*	**Market-focused teams and validating with communities of inquiry:** *testing by observing on detail-level and by selling, awareness of bias*
Smartbox(T)-F1-1: Customers could potentially tell you about their needs, but these needs might be outdated once you enter the market four months later. So I believe in retaining a certain degree of freedom in implementing things, even if the market isn't convinced of them yet.	Medicup(M)-F2-2: We just gave [the nurses] our prototype and they tested it on real patients. At the end of the day, if it doesn't help them in real life, they won't give positive feedback. It doesn't matter what they said before.
Smartbox(T)-F2-1: We always pitch the universal potential of our technology, all the use cases that it could possibly serve.	Medicup(M)-PC-1: Regarding some issues specifically […] he showed me three prototypes to test different shapes of the nozzle.
Smartbox(T)-PC-1: When I saw their presentation I got the impression that they forecast their business development more than optimistically.	Digihub(M)-F2-3: In our testing sessions, we first observe them using it, and then we have a chat about it. […] I regularly test with new users so that I get a fresh, un-biased perspective on the current state of the product.
Digilamp(T)-SC-1: I've asked several times, have they tested their product with customers? They say they have, but it's just not true. They don't want to hear what doesn't work or what they don't know.	Digihub(M)-F1-2: We have implemented analytics software that gives us all details about user behavior. That's hard facts. For instance, we didn't think the mind map feature would be a big deal. Then we saw that a lot of people actually rely on it a lot.
Digilamp(T)-PC-2: After their presentation, they didn't come back to ask me any questions of any kind. They should pursue more actual dialogue and less requests to register for their waiting list.	Digihub(M)-PC-2: Sometimes it gets very detailed. Like about two weeks ago, we got into this deep conversation about the user experience and keyboard shortcuts. It's cool that we can have these conversations, I've worked with several start-ups and they're by far not all like that.
Biowing(T)-F1-1: Even though there are [technical] difficulties and risks, that doesn't mean the idea dies. The question is rather, how do you convince an investor to think the same as you?	

FIGURE 22: Micro-practices involved in interacting with communities of inquiry, varying by entrepreneurial teams' primary focus of attention



Biowing(T)-F1-1: We often receive the same feedback saying "have you considered noise reduction?". The problem is, we have zero measurements about that […] so there's no point discussing it at this point. But it would make you think that noise reduction is even more important to [potential customers] than performance enhancement. [field note: continue to prioritize performance enhancement over noise reduction, despite getting the impression that noise is more important]

Biowing(T)-F1-2: Of course we always tell outsiders "it's a bionic principle, birds do the same thing and we copy the effect". But actually that's not exactly how the idea has developed [laughs].

Rotowheel(T)-SC-2: They kept saying "we'll be able to build it for less money and also increase performance", both at the same time. But it's clear that everything has its limits. […] Even in their government funding application, the numbers were completely idealistic.

Rotowheel(T)-PC-1: I often felt like […] they communicated at me, not with me. Not like "let's find a solution together that works" but rather, "no this is not what we want to hear, we only want to hear about the good stuff". I felt like their perception was quite selective.

Smartchat(M)-F1-1: At first we pitched to so many people. But our resources are limited, so now, we've reduced it to having continuous exchange with a specific group of people […] who we know tell us the truth, even if it's not comfortable.

Smartchat(M)-F2-3: There are so many things you can do wrong when testing. I recently read this book, 'The Mom Test', I can really recommend it. It teaches you how to test in way that even your Mom, who is the most biased in your favor, gives you objective feedback. It's about ruling out as much bias as possible, on both sides.

Smartlab(M)-F1-1: Without prototypes to touch and look at, it's difficult. It's too abstract [for potential customers] to imagine using it, so there's no point in describing how it works in theory. You can only validate the product and people's willingness to buy by using a prototype.

Smartlab(M)-F2-1: Only when people are using your prototype on a daily basis can they get into the nitty gritty of things and give you detailed feedback.

5.3 Entrepreneurial teams, the collective development of opportunity beliefs, and the development of opportunities over time

Having established the role of entrepreneurial teams' attentional focus in information gathering with communities of inquiry and the micro-patterns that determine how interactions are carried out has allowed me to draw conclusions with regard to my first research question: *(1) How do entrepreneurial teams interact with communities of inquiry to develop opportunity beliefs and reduce uncertainty?* Now, I draw my attention to my second research question: *(2) How are opportunity beliefs collectively developed in light of a variety of meanings and objectives?* The goal of this section is to understand entrepreneurial teams' first-hand experiences in negotiating collective opportunity belief systems while navigating through opportunity development pathways over time. To understand the former, we must first address the latter, which I will outline in the following.

Technology-focused teams and developing opportunities over time

Despite this group of entrepreneurial teams generating multiple technological and business model-related alternatives they believed held potential for moving the opportunity to success, they became so overwhelmed with the options they were negotiating that they demonstrated only limited progress to their actual prototype development and commercialization endeavors. Indeed, in all interview rounds, these entrepreneurial teams exhaustively described several new possibilities of the technology and

business model underlying their potential opportunities, as depicted in figure 23. What the figure displays in comparison to figure 24 (market-focused teams) are both the high amounts of actual developments (R; R*) and considered developments (I; I*) to opportunities, and/or the high amount of prototype versions that these teams produced, without however progressing to a point of first commercialization (as opposed to the market-focused teams). This was despite the fact that all these teams engaged multiple student teams as additional resources for prototype development, some of them as many as four teams at one point. Of course, the large amount of features that teams were attempting to integrate into prototypes as well as the high frequency of changes to features and underlying infrastructures ultimately slowed down the development process. However, what caught my attention was that all teams appeared to believe that they were following a rather systematic opportunity development process – yet, according to my documentation, these teams reported having made or seriously considered an average of 15 fundamental changes to their opportunities (product- or business-related), while market-focused only reported an average of nine. Nevertheless, in theory, technology-focused teams described the opportunity development process as a series of rather predictable steps:

> "It's a clear and straightforward iterative process. First, you talk to people about the idea, then you talk about the next more specific iteration of the idea, then you talk about the first prototypes, and finally you talk about very specific prototypes." (Digilamp(T)-F1-2)

As pragmatic as this description was meant to be, observing the team's opportunity development process over time uncovered a significant discrepancy between their self-concept and actual opportunity development pattern, which when reflecting post-hoc, even the team itself described as a "*zig zag*" process (Digilamp(T)-F1-3). Indeed, in practice, teams struggled to identify a clear path for opportunity development:

> "It's trial and error with an unpredictable outcome. You iterate toward a direction and that either gets you somewhere or it leads you into a dead-end, which you might not get out of so quickly anymore." (Digilamp(T)-F1-3)

Since teams considered several streams of ideas in parallel, they often discovered new issues along the way which added to the realm of possibilities and, at the same time, increased their perceived technological uncertainty:

FIGURE 23: Opportunity development events in technology-focused teams throughout the opportunity development process (incl. pre- and post-data collection)

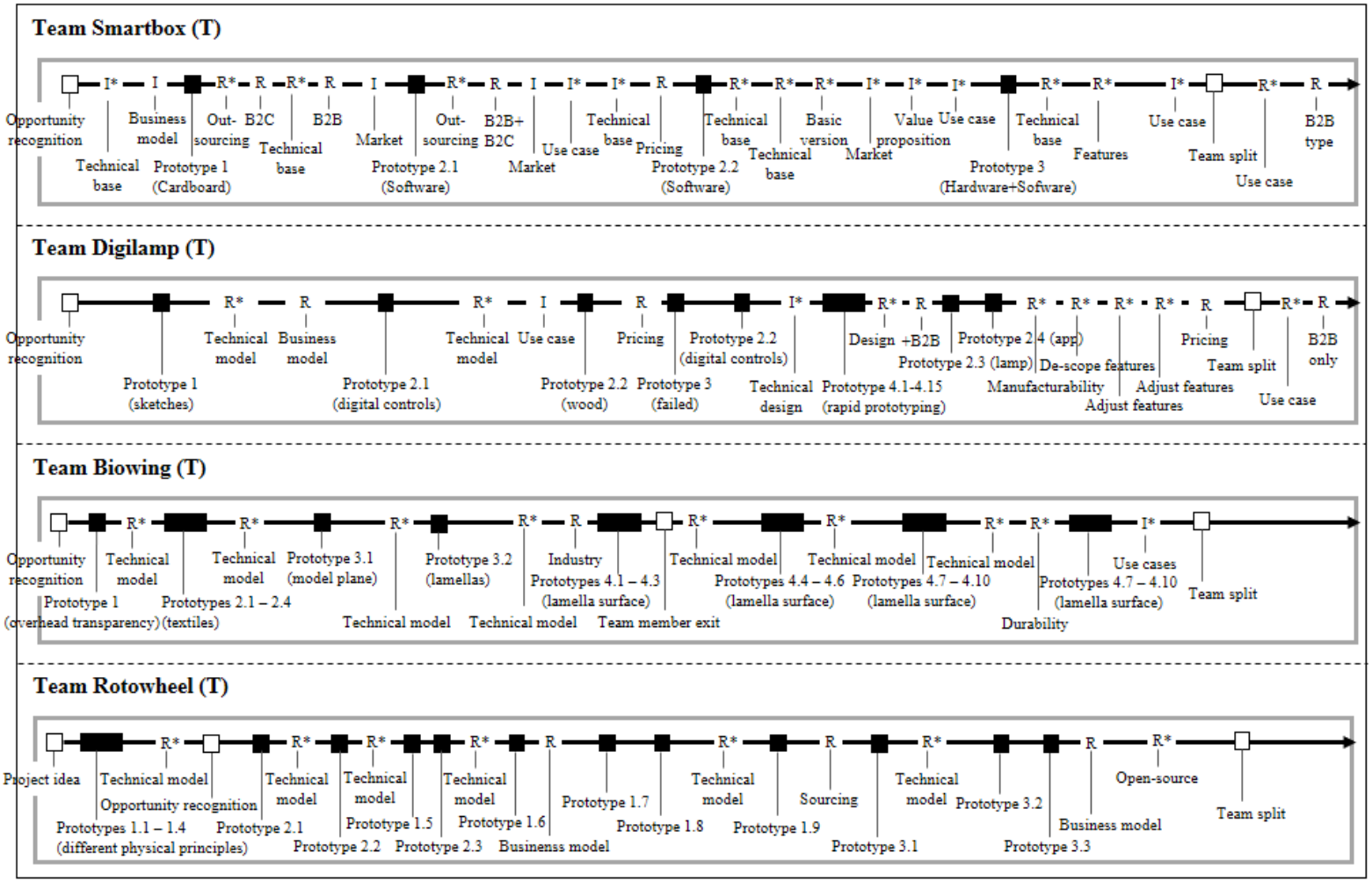
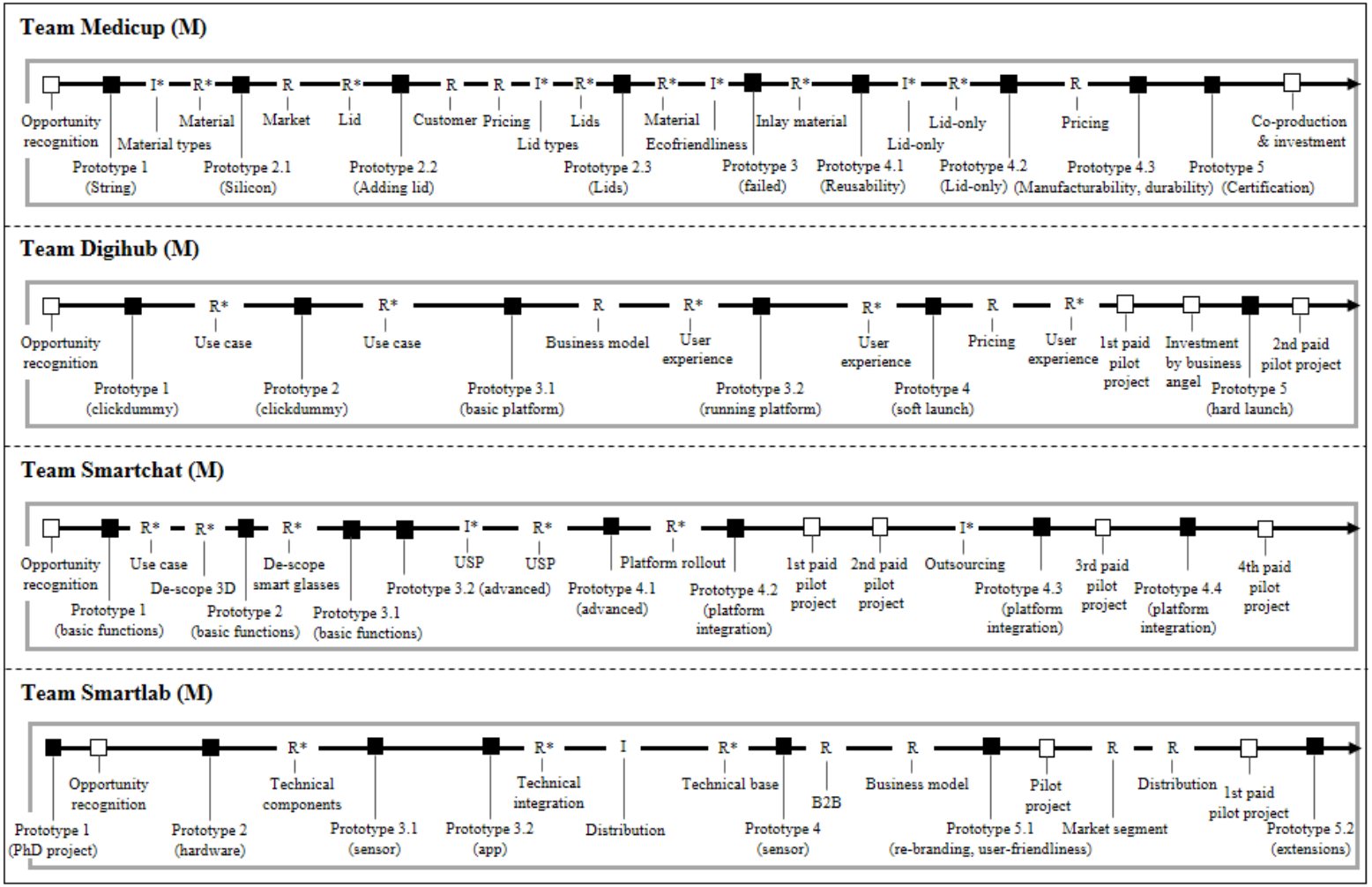


FIGURE 24: Opportunity development events in market-focused teams throughout the opportunity development process (incl. pre- and post-data collection)



> "With every change to the solution you have three new ideas how you could develop it further. But then it's difficult to test all aspects when you lack the knowledge where best to begin, and the technology that could test that most effectively. That's why it's difficult to focus on the right things, those things that will turn out to make most sense in the end." (Biowing(T)-F1-2)

Interactions with communities of inquiry added even more uncertainty as teams attempted to make sense of the overwhelming quantities of information and meanings, yet they did not perceive this as a threat at the time:

> "We're currently re-assessing the potential applications of our solution, there are so many possibilities that we could explore. […] Every time we think some decision is final, we talk to somebody and we end up changing it again. I guess that's the good thing about being a start-up, we're flexible." (Smartbox(T)-F1-2)

Instead, team members demonstrated high levels of trust in teach others' abilities to ultimately make sense of the many ideas and alternatives, as one founder illustrated:

> "Even if sometimes, his new ideas seem to come out of nowhere, they're actually based on some form of reasoning, and it only comes down to structuring that into some kind of matrix in order to interpret things right and make sure we don't go around in circles." (Biowing-F2-1)

Paradoxically, when teams couldn't decide among the array of possibilities they saw themselves confronted with, they sought even more (new) community members' advice, who would provide even more ideas not previously considered, and tempt the teams to fully open up their solution spaces again. This was described, for instance, by team Digilamp(T):

> "We had kind of decided to go with the free-standing version after a while, but then we ran into [a development bottleneck], and decided to show it to a designer-friend of mine in the meantime. And he said, why don't you try something completely new, like free-floating? So we went back to the drawing board and went crazy with it." (F2-2)

Team Smartbox(T) ultimately described this process as a reiterating loop between feature-level, system-level, and financial considerations to extrapolate the optimal technological configuration of their opportunity (and as a derivation, the optimal business model). Whenever the team found itself overwhelmed, the process peaked in the re-emphasis of their original vision and a re-conceptualization

of the features that their ideal solution should be able to provide, setting everything back to zero. At this point, the team would return to the technology-level of analysis, hoping to discover new previously overseen solution possibilities:

> "You try to consider different features and calculate their costs, without allowing your vision to be pushed to the back of your head. After a while, you detach yourself from those thoughts again and reconsider: how could you reach society to its full effect? What does your technology really have to be able to do? So you pause the ideas you've already been working on, and your vision receives more attention again." (Smartbox(T)-F1-2)

Although this increased technological uncertainty yet again, one founder described this steps as necessary and acceptable since "*you have* to *stay true to yourself*" (Rotowheel(T)-F1-1). Each of the technology-focused teams were observed going through this cycle. As team Digilamp(T)'s founder remembered:

> "It was a mixture of many factors: how it should work so that its technological capability is fully exploited, and also the production costs… we iterated a lot, I don't even know anymore […] for instance, our second major prototype was a beam […] but then we figured out that it would be too expensive in production. So we went back to more adventurous ideas […] and even got help from another designer to develop sketches and prototypes until we figured that we're not really passionate about them or that they're also too expensive to produce […]. So basically, the process was alternating between considerations of construction, functionality, aesthetics, feasibility, and production costs, and step by step, we came up with the current design. Looking back, you actually have to admit that it was a complete coincidence. If you repeat the whole process something entirely different might come out of it, and you might even have given up because you couldn't make it work at all." (F1-3)

To test another external perspective on teams' opportunity development patterns over time beyond my own, team Biowing(T)'s mentor assessment provides further evidence:

> "Yes they are learning. As I said, now they have taken another very straight path after having gone back to experimenting. This shows that they are learning, but it's learning that is based on trial-and-error." (M-2)

When directly confronted with doubts by their communities of inquiry that a demand would exist at their envisioned price range, as was the case with teams Smartbox(T) and Digilamp(T), the teams met

this concern by introducing a second, lower-priced and comparably basic version of their solution as an entry product. While this served to reduce their perceived level of demand uncertainty, it again added to their perceived technological uncertainty, since now they had to develop two parallel versions of the solution with to-be-determined feature sets. Apart from this behavior, I found no evidence of technology-focused teams accepting further forms of guidance from their community of inquiry in opportunity development, particularly guidance that would reduce uncertainties that the team persistently could not come to terms about. Instead, they insisted on resolving these on their own:

> "You can't be controlled by external forces… You have to collect a lot of external input, but there also has to be enough input within yourself that you can identify with the product. That's an important point that I always try to stress." (Smartbox(T)-F1-2)

The manner by which they reported this self-reliance indicated a strong need for control over the development of their opportunities, sometimes going as far as perceiving their opportunities as an extension of their own identity.

The collective development of opportunity belief systems in technology-focused teams over time

During data collection, all technology-focused teams consistently emphasized the leading role of their vision during opportunity development, describing it as "*one of their main strengths as a team that* [they are] *equally passionate about*" (Smartbox(T)-F2-2), which had enabled individual team members to consolidate their individual belief systems into a coherent whole throughout many incremental and radical changes to the opportunity. Despite the high levels of uncertainty that remained over time, the vision was a strong enough anchor to make up for 'missing pieces'. My observation over time, however, revealed the emergence of a different pattern. With more and more options and opinions being considered, and increasing amounts of information being gathered from the community of inquiry, teams began experiencing increasing conflicts:

> "That's quite a difficult point. How many inputs and expert opinions do you ask for in order to explore all these things? That even sometimes creates conflict in our team, because with every new idea or question you open up new options, with a whole lot of possibilities." (Smartbox(T)-F1-2)

When team members could not resolve their conflicts over a longer period of time, their individual belief systems started drifting away slowly from the group's, and team members disengaged from the belief development process:

> "There might have been signs that it isn't going anywhere. The others kept saying let's try this too, and let's do that again from scratch, and I said we don't have the resources but go ahead if you think that's the right way. But I zoned out because I was unhappy." (Rotowheel(T)-F1-2).

These entrepreneurial teams had increasing difficulties in consolidating their differing perspectives into a collective vision – beyond some broad notion of technological sophistication – to which new external information added further fuel:

> "We try to collect a lot of external information, and have discussions with our mentors, but then every one of us in the team has a different background and sees things differently, and we end up disagreeing." (Smartbox(I)-F1-1).

Without a collective vision, teams found it increasingly difficult to find common ground for further action in the light of the variety of new information they were gathering, leading to increasingly diverging opportunity beliefs and eventually to a gridlock within these teams. For example, the start-up coach of team Smartbox(T) described:

> "[Another mentor] told them "you have to focus on this", then others have said "no, you have to tackle this customer group" […] and yet others have said "no, that's too difficult, do this and that". [...] And they just have not been able to make a collective decision of how to proceed." (SC-2).

Indeed, the teams began developing disagreements about how new information was to be evaluated in the first place, and different opinions about the value of particular exchanges with their community members. This led to even greater diverging views on the direction for developing the potential opportunity:

> "Different people in the team were open to external feedback to different degrees. Some thought our product doesn't need fancy workshops with post-it notes to be developed." (Rotowheel(T)-F1-3)

As a result of increasingly diverging views over time, I observed relationship conflict arise among these

teams, as members increasingly displayed the urge to defend themselves against their team members' opposing perspectives. Over time, there was growing doubt within the teams about whether some team members "*even know what* [they are] *doing, or how to proceed*" (Digilamp(T)-F1-2), describing their belief in each other's competence as a "*big leap of faith*" (Smartbox(T)-F1-2). Increasing concerns were voiced about the transparency of teammates' behaviors, such as a founder in team Rotowheel(T) who complained that another team member "*stopped providing insights into what she's working on* […] *and doesn't put others in copy on emails because she feels like being scrutinized*" (F2-3). Repeatedly, they raised the issue of having to "*push*" each other (Digilamp(T)-F2-2) to prioritize certain tasks, and were worried that they "*were not talking the same language*" (Smartbox(T)-F2-2). The lack of trust in each other was not resolved, and team members found it increasingly difficult to converge on common belief systems around conflicts. Nevertheless, an atmosphere of "*false harmony*" (Rotowheel(T)-F2-3) prevailed, until community members raised concerns about major delays in the teams' development plans. Up to this point, teams had explained their failure to meet deadlines as "*a normal phenomenon in projects of this scale*" (Smartbox(I)-F2-2) — perhaps as a way of trying to maintain harmony. Once they were confronted by "realities" (from information from the community of inquiry), and particularly once funding was coming to an end, the body of evidence was too great to ignore or to discount, and the focus of team members turned inward. Team members began openly blaming each other for the lack of progress toward commercialization, and relationship conflict ensued.

Market-focused teams and developing opportunities over time

In contrast, market-focused teams appeared to reduce uncertainties through a systematic, continuous process:

> "We track usage on feature-level, which features are being used most, in order to base our next steps on that. We still need a critical amount of data. Because, you know, data doesn't lie." (Digihub(M)-F1-2)

This was also confirmed by the team's mentor, who praised the teams "*perfect database of learnings and to-dos*" (Digihub(M)-M-2). Market-focused teams systematically tracked information to make

feature-level decisions based on the quantity and quality of requests, ruling out many possible innovative solutions along the way, as one founder described:

> "You can't bake a cake for everyone. We have to be very specific in the information we consider because there are so many ways our system could be used. So we collect information and see which of the requested features we can implement at an appropriate effort, so that it is still interesting enough for people to pay for in the end." (Smartlab(M)-F2-3)

This did not mean that their visions remained unchanged – to the contrary, two of the four teams in this group fundamentally changed their opportunity beliefs regarding preferred means-ends-combinations several times, and pursued heavily adjusted versions of their opportunities. Team Digihub(M), for instance, systematically gathered data at the very beginning of opportunity development, carrying out surveys with a large amount of potential customers to explore potential problems and solutions. After a solution pathway had been agreed upon within the team, a rough prototype was quickly developed to specifically test customers' willingness to pay. The team soon realized that "*it would fail due to students' lack of willingness to pay for non-recreational services*" (F1-1). After potential means-ends-combinations of the opportunity were re-considered and a second solution pathway involving a different target group and a different use case was tested (involving a second rough prototype), the team discarded the path another time, due to critique from experts and mentors. Ultimately, the team identified a third solution pathway, which had repeatedly been mentioned by the target group with the highest buying power and been favored by the team's mentor. This third option was then followed through for the rest of opportunity development, without further need for fundamental changes. Hence, several fundamental changes occurred, but rather early in the opportunity development process.

If fundamental developments to opportunities occurred later throughout the process, this was observed to be related to teams' metacognitive abilities. Team Smartchat(M), for instance, continuously focused attention on determining whether their solutions would address an urgent enough need, although they were enthusiastic about the solution they were already building. They therefore repeatedly asked themselves whether they would be able to meet demand in a superior way than their competition:

> "We kept asking ourselves: where is our unique selling proposition right now? At one point, it was too weak. Our solution had turned into a simple communication tool. If we

> went for that direction, we'd have to be 200 times better than Skype and other competitors for customers to choose our product. […] We won't be able to catch up to that." (F2-2)

Another reason that this team began considering fundamental changes to their opportunity was the realization that good feedback from potential customers did not necessarily imply commercialization success:

> "It's not like we didn't conduct many interviews from the beginning. And we had consistently received a lot of positive feedback. But still, there are different levels: there's the level of idea evaluation, or the "idea-fit", which was given in our case. But the "product-fit" wasn't there. The idea-fit is there when people pat you on the back and say "great idea, we want to try that". But when you notice that you can't actually manage to sell it, then you don't have a product-fit. You can only find that out when you build prototypes, give them to customers to play with and get a feeling for it, and then either optimize certain features or kick them" (Smartchat(M)-F2-3)

These teams realized that customers had "*larger biases than expected*" (Digihub(M)-F2-2) when assessing presented solutions, and that "*nobody clearly tells you that it's a bit too complicated, or that it's not solving a huge pain for them*" (Smartchat(M)-F2-3). They acknowledged that they needed to take on "*more of a consulting mindset*" (Smartchat(M)-F1-3) to better understand the urgency of customers' problems and then, as they were already doing, as a consecutive step "*assess willingness to pay, even before getting too far into building the prototype*" (Smartchat(M)-F2-2). By "*understanding customers' perspectives better and better over time, that means how buying decisions are actually made*" (Smartlab(M)-F2-2), teams narrowed down the corridor of potential alternatives and settled on the configuration that yielded the highest promise of sales:

> "So we went back to talking to customers and after a while, this need to store and organize the communication data emerged. That's what people really seemed to want." (Smartchat(M)-F1-2)

Only when these team interacted with potential customers with the intention to acquire them for paid pilot projects, and failed, did they change fundamental aspects to their opportunities, "*without perceiving changes as compromising the vision*" as they had done before (Digihub(M)-F2-2). The later in the opportunity development process, the smaller the chance that radical developments to their opportunities

occurred. One of Digihub(M)'s founders explained the team's experience of this process the following way:

> "Two pivots later, we're personally involved in interactions with customers every day, and have actually learnt how customers make decisions, what features they value how much. That has brought our product to even another level. We originally emphasized collaboration but shifted toward knowledge management now, because we have learnt that it gives us easier market access. Our users have made lots of request towards it […], and it has landed us our first big paying client." (F1-3)

This led to fewer necessary refinements of belief overall, which – compared to the teams from the first group of my sample – freed up resources to develop the chosen solution pathways, reducing technological uncertainty as a side effect. To summarize, although market-focused teams demonstrated an element of trial-and-error until finding the means-ends-configurations of their opportunities that they finally settled on, their systematic methodology somewhat added efficiency and control to a process that is chaotic and unpredictable by nature.

The collective development of opportunity belief systems in market-focused teams over time

While technology-focused teams' opportunity belief systems diverged over time, market-focused teams, with their 'narrowing corridor strategy' in opportunity development, were able to converge in their belief systems i.e. move closer together with each fundamental change. These teams let the community of inquiry guide their opportunity belief development process, i.e. help them navigate "*through a jungle of potential problems and applications*" (Medicup(M)-F2-3), which allowed them to settle on their final pathway of choice more quickly and more efficiently:

> "They're extremely open. […] They don't necessarily decide themselves what they will do, but they let the customer decide. They test and go for what works best. They just accept feedback on what could be critical and test it." (Digihub(M)-M-2)

Solutions were explored within a framework that was firmly determined by the community of inquiry. Having to rely less on subjective opportunity beliefs, these teams spent less time negotiating. Once a critical amount of data on feature usage and potential customers' willingness to pay was gathered, opportunity beliefs were further developed. These teams did not display any relationship conflict over

the course of my sampling period. Moreover, they were described by those outside the team as "*a close unit. They'll be able to just develop something else if this doesn't fly*" (Smartchat(M)-M-1). Team Digihub(M)'s mentor shared this assessment:

> "This is really a dream team. I think when a team understands product and customer development and is open to feedback then it doesn't matter which solution or technology they started out with. I don't know if there are going to be more changes to Digihub's product, but they'll be able to do them if necessary." (M-1).

This reflected the teams' ability to undergo a successful transition from idea to commercialization, which relies on teams identifying potential downfalls of their opportunities early on and being able to adapt in time. Even after a set of beliefs had supposedly been refined, their systematic process helped the teams avoid following a wrong path. And as their focus on demand and product uncertainty was strengthened with time, they challenged each other in productive ways, as Digihub(M)'s mentor illustrated:

> "This team has such a good vibe, they're so good together. They really challenge each other, but in a great, social way. They have fun working together." (M-2)

Therefore, these teams successfully transitioned through major changes to their potential opportunities and underlying opportunity beliefs as a coherent unit, as when the vision shifted, it shifted collectively. Contradicting information from their community members did not create arguments amongst team members, as teams primarily focused on quantifiable observations that they regularly made with respect to their potential customers. Illustrative quotes of teams developing opportunities and developing opportunity beliefs are summarized in Table 12.

TABLE 12: Illustrative quotes of entrepreneurial teams' negotiating opportunity beliefs and developing opportunities over time

Technology-focused teams, developing opportunity beliefs and opportunities: *diverging beliefs among team members while making frequent and unpredictable changes to the development pathway*	**Market-focused teams, developing opportunity beliefs and opportunities:** *converging beliefs among team members while systematically narrowing the development pathway*
Smartbox(T)-M-2: During their user tests, they changed their product strategy *again* to get into the [accelerator]. […] This is the problem: their strategy constantly went astray […] which delayed development, until they had no funds and no product. Smartbox(T)-SC-2: They never managed to prioritize what they want to achieve, and I've observed more and more as the ship is sinking, they never managed to agree on their vision and how to get there.	Medicup(M)-F1-1: In the beginning, we were like a play ball. […] But the [incubator advisors] took us by the hand and showed us how to structure [opportunity development]. Because you don't have to run after every ounce of hope. […] A few detours or even getting on the wrong track sometimes is normal, that's what the government funding program is for. But, when someone [from the community of inquiry] said something that potentially distracted us, we discussed it amongst

Digilamp(T)-F1-3: The prototype that we built for the Kickstarter campaign had a mix of five different colors and three surfaces and so on. Now I think, a simple surface in white and off-white would have sufficed, with less production costs. The software would have been easier then, too. Instead, our technology was way too elaborate. […] Early on, we had actually discussed that we'd rather focus on software instead of adding hardware on top. […] But founder 2's capabilities lie in hardware so he had pushed it in that direction. […] We had lots of arguments over this toward the end.

Digilamp(T)-F2-3: It was a pretty chaotic process. […] A pretty random process, not a real analytical. Or let's say, the analytical aspects of it were small. […] My learning is that product development, marketing, etc., that's the opposite of a scientific process and has nothing to do with truth and analysis. You only find out if something doesn't work once you've tested it, and then you have to try again, without maybe even having understood why it didn't work. […] That's content for arguments. The only thing you can't argue about is how many you've sold.

Biowing(T)-F1-3: The unpredictable issues that kept coming up in every test – if you ask [the other founder] now, he would say that "this one or that one wasn't unpredictable, I did a calculation about it once". […] But that's either not true, or it's just not enough, because why then did these issues cause us *so* many problems and discussions?

Biowing(T)-F2-3: What broke our neck is that our technology kept getting more complex […] But even if [the other founder] doesn't think so anymore, I'm still convinced that one day, I'll prove the solution's potential after all.

Rotowheel(T)-F2-2: Before testing, we would think about it a lot, like students looking at it from a theoretical perspective. Then we would go to the lake to test it and some local would be standing there and watch us and say to us "have you considered pulling the rope from the other side?" [laughs] and the setup would suddenly change completely.

Rotowheel(T)-F1-3: We started out with good goals. But then after a while, it turned out that our long-term plan had actually always been an open question. How much money we wanted to make off of it, and how we would get to a working prototype. […] the opinions just went in different directions.

each other and always found common ground on how to proceed.

Medicup(M)-M-1: You can see how the team systematically goes through the aspects of their product and lets customers evaluate these individually. […] They know that they don't have to achieve everything on their own, even though it's not easy to separate yourself from the idea of the sacred cow. That means, maybe I don't build my own production site, maybe I outsource parts of product development. […] They have a common mindset, and strategic foresight.

Digihub(M)-F1-1: We establish hypotheses, about how active our users are going to be, how many we'll convert from website to application, etc. Then, we decide how long to collect data. At the cut-off point, we let these metrics decide.

Digihub(M)-F2-1: While we're running analytics, I do the customer interviews to understand the underlying reasons for our results. I refine my interviews until we know why the customers want what they want. The others, and myself too, we don't argue against those hard facts.

Smartchat(M)-F2-2: After a while we all agreed, there's no point talking to lots of experts, repeating the same thing to them, and not even having the time to implement all their recommendations. So we focus on fewer, but more effective, [interactions with the community of inquiry]. […] Another thing was, for a while we were considering remote maintenance versus communication in parallel. Because remote maintenance still had AR at that point, so potential customers loved the application. Once we understood that flashy showcases don't sell at the end, we knew what to focus on, and it was much easier figuring out that communication was the way to go.

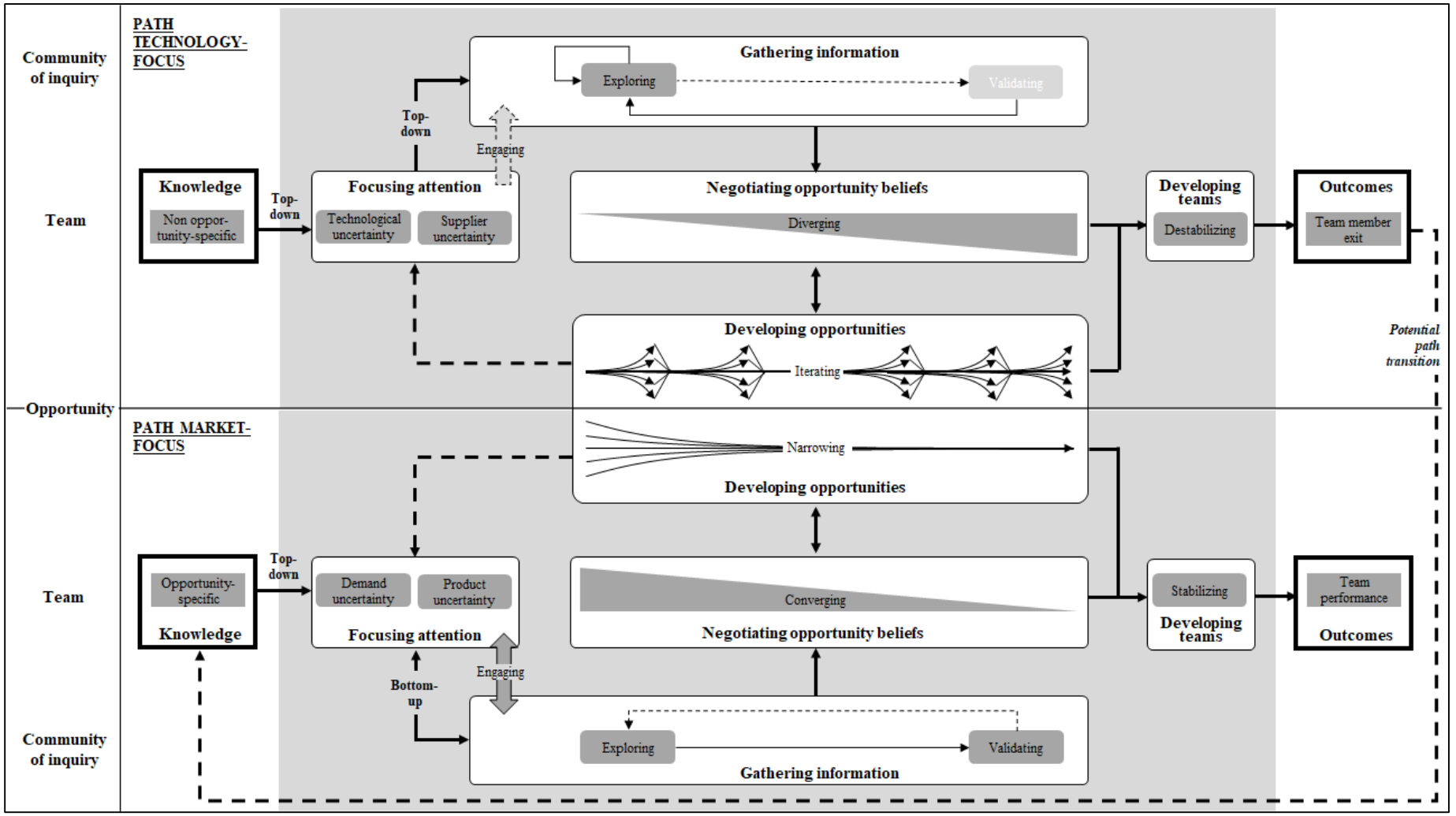
Smartlab(M)-F1-2: The strategy that we have found for ourselves and that works pretty well is that we strike a balance between what customers want, and the 70%-80% of their needs that we need to fulfil so that they buy from us. We don't do the other 20% for which we'd have to modify the whole system, unless they pay for extra resources. That has made the decision process much easier for us on our end.

Smartlab(M)-F2-3: We have a guideline for feature decisions. Our main goal is keeping the user interface simple. Customers will benefit from that much more than from too many features that only a few percent of customers would use. […] That's the criteria that we have agreed on and that works for all of us.

5.4 A socio-attentional model of entrepreneurial teams' development of opportunity beliefs and opportunities over time

Having explored (1) how entrepreneurial teams interact with communities of inquiry to develop opportunity beliefs and reduce uncertainty, and (2) how opportunity beliefs are collectively developed in light of a variety of meanings and objectives, I now move deeper into the nascent opportunity development process, to report the full experience and variation within the practices of developing opportunities, and how it relates to outcomes of interest. This serves to answer my third research question: *(3) How does the development of opportunity beliefs affect the emergence of entrepreneurial opportunities and the emergence of nascent ventures over time?* As it emerged from my data, technology-focused and market-focused teams moved along two different pathways with regard to their experience in progressing through the opportunity development process. Figure 25 illustrates the steps

FIGURE 25: A socio-attentional model of entrepreneurial teams' development of opportunity beliefs and development of opportunities over time



and corresponding characteristics along these pathways. I found that these different pathways were related to differences in the degree to which entrepreneurial teams' human capital was opportunity-specific, both in terms of the experiences that founders brought to the venture, and in terms of the roles they assumed within the team. In a research setting designed to keep the observational context as homogeneous as possible to uncover underlying reasons for the variation between cases, entrepreneurial teams' prior knowledge was uncovered as the differentiating factor that shaped the teams' attentional focus to the degree that it subsequently affected interactions with communities of inquiry, and the overall opportunity belief development process.

Technology-focused teams, prior knowledge, and focusing attention

Technology-focused teams displayed higher levels of general human capital than specific human capital with regard to the particular opportunities pursued, often hindering them from efficiently carrying out opportunity-related tasks:

> "I know some mechanical engineering but my studies had a business focus so I don't really know how to do simulations […] I wish we had a physicist in our team to do that." (Biowing(T)-F2-1)

Similarly, one founder explained that he had "*done stuff in software and* [a co-founder] *has experience in design and electrics, but we don't actually have an electrical engineer on the team*" (Digilamp(T)-F1-1). The community of inquiry might even have raised awareness on this issue at an early point in opportunity development, but the problem remained unresolved:

> "Back then, I told [the founders] to search for a Ph.D. student in aerodynamics, add that person to the team to become a complete package […] but he didn't do that." (Biowing(T)-M-1)

Teams reported having to "*make up for missing skills*" (Digilamp(T)-F1-1) by either "*teaching* [them]*selves a lot*" (Biowing(T)-F1-2) or by "*recruiting students to support solution development on a freelance-basis*" (Rotowheel(T)-F2-2), even when the team already consisted of a large number of founders as in the case of team Smartbox(T).

Furthermore, I observed the cross-functional division of human capital into roles to differ between the two groups. Within the technology-focused teams, roles and responsibilities were organized fluidly i.e. several team members could hold the same responsibilities at any given time, and individual team members' roles and responsibilities could transform over time. Team Smartbox(T), for instance, reported new sets of individual team member responsibilities in every interview, spanning a variety of unrelated topics such as distribution, financing, and communications, and partly overlapping other team members' responsibilities. While this team felt like they were functioning as a unit, expressing that they were "*well-positioned on different levels*" (Smartbox(T)-F2-1), their community of inquiry presented a different opinion: "*with time, you notice that their communication toward the outside world is chaos. Sometimes, three different people answer an email*." (Smartbox(T)-SC-2). Some problems in role division were openly admitted by the teams, such as "*developing the business plan which nobody feels responsible for*" (Digilamp(T)-F1-2). Teams also changed the division of responsibilities due to team member exits, as happened in teams Biowing(T) or Rotowheel(T), as recalled by the start-up coach:

> "The original founder left the team and another took over, another founder was then added but left again, and now there is a new person on the team… you lose track at a certain point." (Rotowheel(T)-SC-2)

Team members were therefore forced to "*take over the business side as well, instead of focusing on the technological development*" (Rotowheel(T)-F2-2). At the same time, "*the functions within the team weren't clearly separated, and everyone wanted to have a say in everything*" (Rotowheel(T)-M-2). The confusion around roles and lack of clear decision competencies ultimately fueled negotiations and diverging belief systems. As one mentor described, some founders "*just couldn't find their place in the team nor the true focus of their responsibilities, making them insecure* […] *and defensive against outside feedback, as they felt like they needed to prove themselves*" (Smartbox(T)-M-2). When incubator coaches confronted several of the teams with the fact that "*some team members' roles still could not really be pinned down after months*" (Digilamp(T)-SC-2), teams recalled internal discussions that were like "*thunderstorms that cleared the air*" (Smartbox(T)-F2-2), but that ultimately only led to little progress according to my conversations with their communities of inquiry.

This lack of opportunity-specific knowledge and the constantly changing roles and responsibilities directed these teams' attentional focus heavily toward within-team negotiations, around the topic they found most difficult to control: technologies. As a result, teams Smartbox(T), Digilamp(T), Biowing(T), and Rotowheel(T) focused their attention using largely a top-down process for opportunity development (upper pathway in the model). That is, the entrepreneurial actors relied heavily on their existing set of knowledge structures to "deductively interact with the environment to notice, interpret, and respond to new environmental stimuli" (Shepherd et al., 2017, p. 627). Their knowledge of current technological developments and their interest in the array of technological possibilities from these developments were instrumental in directing attention for opportunity development. This was projected onto interactions with communities of inquiry, in that entrepreneurial teams designed interactions and integrated gathered information into their belief systems in a manner that matches environmental stimuli only distantly with existing beliefs (i.e. top-down).

Technology-focused teams, opportunity development outcomes, and path transition

Interestingly, during the course of my data collection, all technology-focused teams *eventually* shifted their focus toward demand and product uncertainty, induced by interactions with their community of inquiry. As time progressed, prototypes matured and either governmental or private funds were coming to an end. For this reason, teams expanded their communities of inquiry and showed prototypes more willingly to accelerate the commercialization process. Team Digilamp(T), for instance, launched an online crowdfunding campaign, offering a particular means-ends-combination at a certain price to raise funds for opportunity development, while teams Smartbox(T) and Rotowheel(T) approached institutional entrepreneurship support programs to acquire financial and operational resources. Team Biowing(T) eventually involved an expert who was specialized in potential customers' quality requirements. These new members of their communities of inquiry provided them with new demand-related information, leading the teams to realize fundamental incompatibilities between their current opportunity beliefs and the projected reality. Team Digilamp(T) realized that "*customers did not believe what we were selling* […] *and it became pretty clear customers thought we were crazy for charging that*

much, when they can get something similar at IKEA for a tenth of the price" (F2-3), while team Biowing(T) learnt that the "*best quality that our solution could possibly provide would never suffice to fulfil customers' expectations with regard to life expectancy*" (F2-3). Teams Smartbox(T) and Rotowheel(T) eventually realized that customers' willingness to pay was lower than the minimum production costs that they could achieve with their envisioned solutions even after months of experimentation and development, rendering their solutions obsolete.

All four teams reached a point where the potential demand for their product was suddenly in question, despite the fact that they had put all their effort into providing the most innovative solution. This represented a breaking point for the teams, as their collective opportunity belief systems had already diverged and team coherence had already been negatively affected. The ensuing relationship conflict induced members of teams Smartbox(T) and Digilamp(T) to separate from fellow team members, whose opportunity beliefs had significantly diverged from their own. They then pursued heavily adjusted versions to their original potential opportunities, based on the feedback that they had previously repeatedly received from their communities of inquiry, but had refused to acknowledge (and that their former team mates were still refusing to acknowledge). As I witnessed their first steps in developing these new adjusted opportunities with a new team member structure, it struck me how clearly these teams now emphasized their plan to co-create products with potential customers from their community of inquiry, focusing more attention on external information sources that provided knowledge on markets and potential customers' demand. In contrast, teams Biowing(T) and Rotowheel(T) decided to terminate opportunity development altogether, although single team members expressed the belief that the opportunity could be desirable to be pursued at a future point, when certain technological barriers in solution development could be overcome so that they would "*prove the solution's potential after all*" (Biowing-F1-3). Therefore, the path transition and corresponding shift of attention toward demand and product uncertainty occurred for only two of the four teams in this group, while the remaining two continued to prioritize technologies as the make-or-break success factor of the envisioned opportunities.

Market-focused teams, prior knowledge, and focusing attention

In contrast, market-focused teams demonstrated high levels of opportunity-specific human capital in both market- and technology-related domains of their opportunities. Team Medicup(M)'s mentor expressed praise for the individual team members' backgrounds, describing that "[one founder] *brings customer experience from the industry while* [another founder]*'s technical skills position the team extremely well*" (M-1). Similarly, Smartlab(M)'s mentor presented the founders as "*a part of the family here at our chair*" (M-1), illustrating how some of the team members were deeply involved in the technological domain of their opportunities. This team, as all other market-focused teams, had recognized their opportunity in the context of their specific expertise. As they recalled,

> "[A co-founder] was a Ph.D. candidate at the chair and was doing a project in which he needed something to monitor an incubator atmosphere and I was from the electrical/sensor field so we started working together. […] That's how we met and how the idea was born." (F2-1)

The depth of their knowledge encompassed both problems and solutions, since "*it's not like we are developing a product for customers and problems we only vaguely know something about. We're from this industry*" (Smartlab(M)-F1-3), which also proved helpful to them to fulfil their tasks and connect to important members of their community of inquiry:

> "I was a service technician for two years and that's the reason it developed into this direction […] It was easy for me because I knew service technicians and usually it's not easy reaching customers in this industry." (Smartchat(M)-F1-1)

Furthermore, the division of human capital into individual roles and responsibilities proved to be stable in these teams over time. Tasks were allocated clearly and based on team members' specific human capital, leaving no necessity for team members to take over each other's tasks, or for roles to adjust:

> "[One co-founder] is a nurse and studied nursing science on the side, so he knows the customers. […] I'm a medical engineer so [developing the prototype] is my core competency […]. And then we invited [another co-founder] to the team to do the business side, because he's good at finance and networking and knows patent law." (Medicup(M)-F1-1)

Without exception, all roles were allocated distinctively and comprehensively within these teams, and

team members individually carried out fundamental opportunity development tasks without the need to monitor each other. This evoked high praise and trust across all teams such as recounting how a co-founder is "*totally at eye-level with industry partners who have been doing this for years*" (Medicup(M)-F2-2), or how a co-founder "*single-handedly developed the hardware from start to finish, super cool*" (Smartlab(M)-F2-1). I detected no change to this at any time throughout data collection, which seemed to free up their resources and attention to focus on interacting with their communities of inquiry and developing prototypes.

It was interesting to observe that despite their high levels of specific market-related and technological knowledge, they still placed as much emphasis as they did on exploring possible problems and solutions with their communities of inquiry. Not only did these teams demonstrate high-levels of opportunity-specific knowledge, each team consisted of one member who had experienced the respective problem first-hand and sought a solution for it, similar to lead users: the nurse in team Medicup(M), the service technician in team Smartchat(M), and the Ph.D. student in Team Smartlab(M). In the case of team Digihub(M), the pursued means-ends-combination of the opportunity was a team collaboration product which the team itself used on a daily basis for project managing their opportunity development activities. As the team had not found an acceptable existing product on the market, they themselves became the lead users for the means-ends-combination they were developing. Nevertheless, all teams de-prioritized their own assessments of the most urgent problems and most promising solutions, and let their communities of inquiry guide the development of their opportunity beliefs.

In doing so, teams Medicup(M), Digihub(M), Smartchat(M), and Smartlab(M) used their knowledge in a top-down manner to guide the interactions with communities of inquiry, however creating bottom-up processes for allocating attention during interactions to capture unexpected information (lower pathway in the model). Importantly, their specific knowledge guided the allocation of attention to specific market domains but with an open mindedness to the type of stimuli that might draw attention—openness to bottom-up identification of stimuli. A bottom-up process allows "striking aspects of the environment capture attention whether they are expected or not" (Shepherd et al., 2017, p. 627; see also Ocasio,

2011). It appears that these entrepreneurial teams were aware (based on the specificity of their knowledge) of the limitations of their own knowledge (i.e. they knew that there were things that they did not know). Further, their knowledge structures enabled them to order and link the questions and concepts capturing their attention into coherent belief structures that facilitated their ability to notice a wide array of signals, as well as the ability to differentiate and integrate these signals into clear priorities for developing potential opportunities.

Due to this systematic yet bottom-up approach, fundamental and radical adaptations regarding technological or business-related aspects of the opportunity occurred rather early in the opportunity development process, and did not negatively affect the strategic consensus within the team, so that team members' beliefs steadily converged toward a common goal. Ultimately, teams Medicup(M), Digihub(M), Smartchat(M), and Smartlab(M) reached their first commercialization milestones by engaging in paid co-creation contracts with pilot customers or manufactures by the end of my post-sampling period. I have summarized illustrative quotes of teams' progress in opportunity development as well as team human capital in tables 13 and 14.

To summarize my model, entrepreneurial teams that progressed well in opportunity development relied on specialized knowledge to guide their attention to opportunity-specific domains, from which they used bottom-up attention allocation to be drawn to unexpected aspects of their environment – primarily through their interactions with a community of inquiry. These interactions with the community of inquiry were characterized by gathering diverse information through rich interaction contexts, generating alternatives by co-creating solutions and eliminating solution alternatives with community members, and seeking disconfirming evidence to test opportunity conjectures. Consequently, this allowed the teams to continuously progress toward commercialization, despite radical changes to their opportunity beliefs that occurred due to metacognitive learning and that prompted them to strengthen their focus on demand and product uncertainty even more. In contrast, entrepreneurial teams that lacked progress in opportunity development largely relied on top-down allocation of attention based on general (i.e. non-opportunity-specific) knowledge of (and interest in) technology. This allocation of attention

influenced the teams' interactions with the community of inquiry – these entrepreneurial teams gathered technical information, generated a variety of solution alternatives with technology experts, and sought confirming evidence for opportunity conjectures. The information generated from interactions with the community of inquiry then contributed to team members developing multiple diverging visions for the venture, accompanied by a decreasing level of team coherence. This triggered negotiations which – in a negative spiral – further diverted attention to existing knowledge structures within the team, until teams reached a breaking point and discontinued opportunity development, for a subset of the team to potentially conduct a path transition.

TABLE 13: Illustrative quotes of teams' progress in opportunity development

Technology-focused teams and progressing through opportunity development: *termination of opportunity development or path transition*	**Market-focused teams and progressing through opportunity development:** *first commercialization success with customers or manufacturers*
Smartbox(T)-F1-3: Our biggest learning is that our final solution didn't solve the users' problems. Their minimal expectations […] are more specific and complex than we had thought and it turned out our developments couldn't get them covered in the end.	Medicup(M)-SC-2: They've turned down an offer from a manufacturer […] but rightly so because the conditions weren't acceptable. Their mentor advised against it, too. But currently, the talks with [another manufacturer] are ongoing and I believe they have closed the first investment round.
Smartbox(T)-F3-3: It wouldn't ever have gone anywhere. We needed decisions, but [some of the team] always wanted to keep it open, go to fancy events, and come back with ten new connections and ideas. […] When things didn't change, we had to stop it. […] We have focused [the product] on business customers, as we always should have, and are starting to work with a pilot customer next month.	Medicup(M)-F3-3: Nothing is official yet. [field note: the founder confirmed in a later conversation that the investment had been closed.]
Digilamp(T)-F2-3: We made the wrong decisions because we lacked market feedback. We tested everything a bit, and some features were […] interesting, but none of them would have worked. Our Kickstarter campaign made it clear. We had discussed some risks before, but during the campaign it dawned on us that it's too expensive, and that customers don't believe what we promise.	Digilamp(M)-F2-3: You can really only be sure once the money is on your account, but we're close to finalizing the negotiations with our second paying corporate customer.
Digilamp(T)-F1-3: When we presented our prototype at [an accelerator], they said they think the software has real potential. We didn't take [one founder] to the pitch, because he would have pushed hardware again. But we understood it now – we need to focus on what we know best. And we can't do that if we keep [that founder] in the team.	Digilamp(M)-M-2: I told them they should approach more conservative corporations like publishing houses. And low and behold, they have closed a deal with a small online publisher for another custom pilot project.
Biowing(T)-F1-3: We thought we were going in the right direction now. […] But the effect was negative. There was no more value proposition left. Also, we spoke to experts on the market's material requirements, […] and they said, it has to endure 10 years. That was the deal breaker. And [the other founder] had already opted out by then, too.	Smartchat(M)-C-1: Although their original idea was completely different – they started with smart glasses and augmented reality and then it became a communication software – they kept talking to customers and now it's actually knowledge management. […] They listened to their potential pilot customers, they set their focus on [what these customers want], and by now they've landed a few pilot projects.
Rotowheel(T)-F1-1: We looked into all possible business models and discussed tons of assumptions [...] but eventually the market experts said that they just don't see enough financial potential, we just haven't made it cheap enough. That kind of ended it.	Smartchat(M)-F2-3: We have six paying pilot customers […] and have achieved a proof of concept with all of them.
	Smartlab(M)-F2-2: We've been received enormously well by customers. One lab called us after two days and said this is the most convenient access to data they've ever had. […] We're already talking to the Asian market now.
	Smartlab(M)-F2-3: I've just come back from [a trade show] in Bangkok and it went really well. We got a lot of good leads, and I'm flying out for contract negotiations in a month.

TABLE 14: Illustrative quotes of teams' human capital as well as of organizing roles and responsibilities

Technology-focused teams and human capital: *not opportunity-specific, changing roles and responsibilities*	**Market-focused teams and human capital:** *opportunity-specific, stable roles and responsibilities*
Smartbox(T)-M-2: They won't be able to deliver what they originally thought of. It's a shame, because they're a huge team, but they're staffed wrong. They have too little on the technological side considering the kind of product they want to build, and lots of people they don't need. […] they have a philosopher on the team. It's data security, come on.	Medicup(M)-F1-1: One of the other founders [F2] is a nurse and studied nursing science on the side, and he came to me and said my patients keep choking because they have to stretch back their neck while drinking […]. I'm a medical engineer, so he asked me to build something that helps.
Smartbox(T)-F3-3: All that followed our strategy discussions were reorganizations. Instead of getting on with the product, it's like … titles were being shifted around.	Medicup(M)-F2-2: The prototype development is completely on [one of the founders]. I already knew that he was a genius from our previous encounters. … And by now, from our conversations with industry partners who have been doing this for years, it has been proven that he's totally at eye-level with them.
Digilamp(T)-F1-1: I'm a programmer, so I have a talent for technical concepts but I'm not an expert on natural science, and I know nothing about medicine or things to do with health. So I had to read up on a lot of things and find out what's important. That took forever.	Digihub(M)-SC-1: [Two of the founders] are absolute experts in their field. […] and [the third founder] isn't only doing a great job at marketing, she's also enabling the other two to completely focus on their fields.
Digilamp(T)-F1-2: At the moment it's actually pretty clear for a change, [one founder] does most of the hardware, I do a little hardware and the software, and now I particularly do the topics that we've been shifting around because nobody likes doing them.	Digihub(M)-F2-2: Everyone is specialized in their own field, and we trust each other with important decisions. […] If it was about front-end, we would listen to [one founder]'s judgement, same with [another founder] and system-level decisions, and if it was about marketing, I trust that the other two would follow my judgment.
Biowing(T)-F1-1: What made [experts] skeptical toward us is that we're not from this industry. What I learnt is that every industry has its own language. We would use a wrong word, or say something that doesn't go down well with an experienced engineer in this field, and it felt like they wouldn't take us seriously anymore after that.	Smartchat(M)-M-1: The team is fantastic. [One founder] is from this industry to begin with, and also an entrepreneurial thinker. Same goes for [another founder]. … He and [the third founder] are at the top of their game when it comes to coding. That's not comparable to skills that are typically represented within companies.
Biowing(T)-M-2: I have many cases where the situation is not so complicated, so you have a good understanding of the situation and you have to develop a product. And maybe you have to decide exactly how the product should look like, but you know almost everything behind it - right? - so you have a very good technical basis and knowledge. […] In this case, it's a very complicated situation, and […] what was missing is the basic scientific knowledge [in the team].	Smartlab(M)-F1-1: We chose [two of the founders] because they are absolute specialists in their field. […] [the other founder] was my first, and best, bachelor student. He became an expert on this from the start.
Rotowheel(T)-F1-1: Of course we designed a lot of versions in CAD… but the problem was that we didn't have anyone in the team who could *really* construct in CAD. We knew a guy, but he wasn't very reliable. We tried outsourcing, but then you only have so many funds available.	Smartlab(M)-F2-1: The funny thing is, [one founder] doesn't just have a Ph.D. in medical engineering, he also knew everything about the electro technical design of the circuit board, how to integrate sensors, how to read them, analyze the data, he knew all about it. [field note: the design of the circuit board is the expertise of the interviewee.]

6 Discussion

This dissertation began by depicting the black box that is developing entrepreneurial opportunity beliefs with communities of inquiry – a black box through which nascent entrepreneurial teams navigate along potential pathways to take opportunity ideas to their final form. This process is nothing short of assembling a puzzle that changes its theme with new pieces being added, where nascent entrepreneurial teams decide how and with whom new pieces are to be created, and which pieces are to be used, continuously negotiating what the puzzle's final design and ideal assembly strategy might be. The tension that entrepreneurial teams might experience throughout this process was unintentionally illustrated by one founder that I interviewed and who made several contradictory statements in quick succession. The founder first noted that "*when you're developing a product, you really need to focus because your resources are limited*", but went on to point out how limited resources made it particularly difficult to focus between competing pathways, since "*you don't have the resources like established organizations, where individual departments can test different aspects of different possibilities*" (Smartbox(T)-F2-3). Within this context, interactions with the community of inquiry didn't have the chance to bear much fruit at all, and even to the contrary, potentially stirred conflict within the team:

> "You can go and get lots of opinions, but because there are so many potential pathways, it just makes you more insecure which direction you should take at all. And while one path might seem reasonable to some team members, there are always arguments that support other paths, too. That creates turmoil." (Smartbox(T)-F2-3)

While all teams unequivocally emphasized the importance of 'focus' in opportunity belief development as a result of limited resources, such as the first quote, statements such as the subsequent quotes frequently described their challenges in negotiating the subject of this focus as a team, affecting opportunity development and organizing over time.

The results of my dissertation are revealing in several aspects. First, they highlight and explore the ten-

sion that entrepreneurial teams experience throughout the collective negotiation of opportunity beliefs with communities of inquiry and the development of opportunities over time. Second, my results describe the process of nascent opportunity development, during which entrepreneurs are exposed to this tension and have to manage it. Finally, my results highlight the practical and theoretical importance of the different attentional foci and micro-practices employed by entrepreneurial teams in interacting with communities of inquiry to navigate this tension. What my results reveal is the pivotal role of attention as a limited resource and of the differing mechanisms in attention allocation in steering entrepreneurial teams through the process of opportunity development, shaping their experiences and interpretations thereof as they gather new information to develop beliefs, and affecting their assessments of their own opportunity development success despite continuously high levels of uncertainty. Further, my results reveal the reciprocal relationship between opportunity belief development and nascent organizing, whereby the teams' attentional resources are determined by organizational parameters, and resulting opportunity development outcomes affect organizing over time.

Within this section of my dissertation, I discuss the implications and limitations of my results. First, I highlight how my dissertation reinforces the constructionist view of entrepreneurial opportunities as well as a position of pragmatism that defines opportunities as a social product, resulting from the integration of different thought worlds existing among entrepreneurial teams and their communities of inquiry. Next I discuss the specific contributions that this dissertation makes to the literatures focused on nascent opportunity development, social capital, and entrepreneurial teams. I then outline the practical implications of my research for entrepreneurial teams, incubator advisors and other members of communities of inquiry. Finally, I discuss the limitations of my findings as well as avenues for future research that can address these limitations and build on the results of my study.

6.1 Theoretical implications

6.1.1 The construction of entrepreneurial opportunities

Although there is a substantial stream of research that has investigated the identification of opportunities

fully formed (e.g. Bakker & Shepherd, 2017; Shane, 2000), often exploring the sources of opportunities (e.g. Ozgen & Baron, 2007; Shane, 2000) and the drivers of opportunity evaluation and exploitation (e.g. Choi & Shepherd, 2004; Haynie et al., 2009), there has also been research, largely theoretical (Sarasvathy, 2001; Wood & McKinley, 2010) and philosophical (Alvarez & Barney, 2007; Ramoglou, 2013) in nature, that highlights that opportunities can be socially constructed. In terms of empirical investigations, the past decade has seen an increase of research that explores the role of entrepreneurs' *perceptions* of opportunities in opportunity identification and development (e.g. Grégoire et al., 2010; Wood et al., 2014); yet still to this point, our understanding of entrepreneurs' experience of the iterative development of opportunity ideas toward their commercialization remains underdeveloped.

The conceptual model of my dissertation offers a number of new ideas to advance the constructivist perspective of opportunity. In line with opportunity development as a process of continuous evaluation (Dimov, 2010) in which beliefs change and evolve over time (e.g. McCann & Vroom, 2015; Parker, 2006), I argue that the fields of research that have emerged to be most salient in the study of opportunity evaluation should be extended to the study of opportunity development i.e. beyond entrepreneurial actors' decision to exploit: the development of mental models, integration of new information, congruence between thought worlds outside and within entrepreneurs' minds, and effects on action (Wood & McKelvie, 2015). Further, by exploring potential opportunities from a position of pragmatism, i.e. in terms of a process of social interaction and embodiment of knowledge between communities of inquiry and entrepreneurial teams (Peirce, 1958; Shepherd & Patzelt, 2017), my research reinforces the role of mental models and their collective development during entrepreneurial teams' efforts to achieve consensus between their own vision and potential customers' perceptions of a potential opportunity. My constructionist process model is therefore situated at the nexus of entrepreneurial teams' mental models, information from communities of inquiry, and opportunity-specific uncertainty, capturing the effects that the characteristics of these factors may have on the ongoing imagining of potential opportunities (cf. Grégoire & Shepherd, 2012), and how different levels of these factors may foster or impede entrepreneurial action (Wood & Pearson, 2009). By accounting for the role of time both in terms of proximate and distal outcomes, for multiple involved cognitive systems (i.e. those of individual team

members and of the members from the community of inquiry), and for changes to opportunity beliefs, my model provides a thorough foundation to capture the mental representations about opportunities and their development that are formed during the nascency period. Specifically, my model sheds light on how the development of mental models, i.e. learning, constrains and seeds future learning at any point in the process (Gavetti & Levinthal, 2000), revealing why entrepreneurs differ in their learning outcomes during the opportunity development process.

6.1.2 Toward a socio-attentional model of entrepreneurial opportunity development

While entrepreneurs' prior knowledge has been offered as an explanation for learning in new domains relevant to opportunity development (Corbett, 2007; Dencker et al., 2009; Grégoire et al., 2010), there are limits to using knowledge from past experience to direct behaviors into an uncertain future (Hodgkinson, 1997; Tripsas, 2009; Tripsas & Gavetti, 2000). Research that takes on a dynamic perspective on the development of opportunities over time has largely been divided into two research streams: the organizational learning literature that captures backward-looking adjustments based on experience and experimentation (e.g. Corbett, 2005; Dutta & Crossan, 2005; Ravasi & Turati, 2005), and the entrepreneurship literature that largely focuses on the development of forward-looking mental models which facilitate planning and action by shaping expectations regarding the feasibility, desirability and value of potential opportunities (e.g. Dimov, 2010; Felin & Zenger, 2009; McMullen & Shepherd, 2006). While it is well established that both backward-oriented learning and forward-oriented sensemaking are intertwined, in that experience affects the development of mental models and existent mental models affect the processes of learning (e.g. Dimov, 2007b; Gavetti & Levinthal, 2000; Parker, 2006), the role of attention in regulating both processes during nascent entrepreneurial opportunity development is underexplored. While both have been shown to be affected by prior knowledge, I show that entrepreneurial actors' limited attentional capacity plays a mediatory role, by regulating which new opportunity-specific information from their community of inquiry is incorporated into the development of forward-looking mental models (i.e. alternatives considered for development), and which information is incorporated into the backward-looking assessment of experiences (i.e. testing

of alternatives being pursued). Thus, faced with similar starting points regarding the necessity of testing expectations against feedback from a community of inquiry, and similar starting points regarding the infrastructure by which such interactions are possibly facilitated (i.e. an incubator), entrepreneurial actors differ in their attentional focus on which new information is to be sought, and which new information is to be acted upon. Understanding entrepreneurial actors' experiences and outcomes in opportunity development over time therefore requires exploring the role of limited attentional capacity in nascent opportunity development, i.e. the nature, underlying reasons for, and outcomes of these diverse attentional foci, which I will do in the following.

Opportunity development and the Attention-Based Theory of the Firm (ABV)

The role of attention in the context of entrepreneurial opportunities is a growing research stream within the organizational learning and managerial cognition literatures, investigating what determines whether events are identified and interpreted as opportunities or threats, and how this affects information processing and sensemaking (e.g. Cho & Hambrick, 2006; Haynie et al., 2009; Shepherd et al., 2017; Sullivan, 2010). Attention is defined as the "noticing, encoding, interpreting, and focusing of time and effort by organizational decision-makers on both (a) issues: the available repertoire of categories for making sense of the environment and (b) answers: the available repertoire of action alternatives" (Ocasio, 1997, p. 189). Results confirm that a top management team's attentional focus (the aspects of the environment that top managers perceive to be salient) affects the degree of attention that will be directed to given environmental events (Nadkarni & Barr, 2008; Weick, 1995), which lays the foundation of their belief development, decision making and strategy (Cho & Hambrick, 2006; Dutton & Jackson, 1987; Shepherd et al., 2017). Where strategic decision makers' attention is focused, the speed of strategic response to events has found to be fast (Nadkarni & Barr, 2008). Extant research has proposed that organizational processes, resources, and performance as well as environmental characteristics affect managerial attention, which in turn steers whether and how organizations undergo strategic change (Gioia & Chittipeddi, 1991; Tripsas & Gavetti, 2000). This has been epitomized by Ocasio's (1997) attention-based theory of the firm (ABV), a metatheory of organizational action which

postulates that firm behavior is the result of how firms distribute the attention of their decision makers. What decision makers do depends on what issues and answers they focus their attention on, which in turn depends on the specific situation, and on how the firm's rules, resources, and relationships distribute issues, answers and decision makers into specific communications and procedures (Ocasio, 1997; 2011).

Specifically, Ocasio's (1997) model proposes three principles of attention: (1) the principle of focus of attention, (2) the principle of situated attention, and (3) the principle of structural distribution of attention. In doing so, ABV essentially provides a model of firm behavior and adaptation that integrates firms, individuals, and environments, captures both cognitions and actions, and takes micro-level (firm) and macro-level (environment) situational contexts into account. Taken together, these varieties of attention result in a firm's organizational attention, which in turn creates a pattern over time that eventually becomes the firm's strategy. This can be equated with the principle of strategy as perspective (Ocasio, 2011), which West (2007) describes as follows:

> "Strategy as perspective explains why different strategies can emerge from ventures facing identical circumstances. The schema-like structure of team cognition will produce this result for a number of reasons. For example, differences in the team cognitive structure among two competing ventures may prompt one team to notice and attend to certain industry information while the other does not" (p. 81)

While attention has been a key variable in organizational learning and innovation research, linking it to information search, decision making and, ultimately, strategy (Koput, 1997; March, 1988), there is a lack of research that explores how attention affects the antecedents and outcomes of strategy in early opportunity development (Ravasi & Turati, 2005), which is surprising considering that attention is affected by beliefs (Cho & Hambrick, 2006). My study contributes to filling this gap, and sheds lights on the reasons why and how nascent ventures identify, interpret, and include certain informational cues into their strategy, leading to vastly differing opportunity development outcomes even in the face of similar starting points.

Focus of attention: the combination of top-down and bottom-up processing in belief development

To understand what drives managers' focus of attention in the identification and development of entre-

preneurial opportunities, most organizational research has focused on top-down processing (i.e. the knowledge structures through which top managers deductively interact with the environment to notice, interpret, and respond to new environmental stimuli) to investigate the relationship between attention allocation and top managers' ability to notice and interpret potential opportunities (e.g. Cho & Hambrick, 2006; Dutton & Jackson, 1987; Ocasio, 1997). Recently, bottom-up processes of attention allocation in belief formation, i.e. where striking aspects of the environment capture attention whether they are expected or not (Ocasio, 2011), have received more attention, while the combination of both has been considered the least (Shepherd et al., 2017). The few studies that have investigated both attentional processes in the context of opportunities have found differences with regard to the types of environmental change that top managers perceive in a given industry context, with top-down processing facilitating the recognition of incremental change, and bottom-up processing making firms more capable and likely to notice discontinuous change (Shepherd et al., 2017). However, lacking entirely is empirical research on the different variants of attentional information processing and their effect on nascent entrepreneurial teams' identifying and interpreting new opportunity-specific information for opportunity belief development. My study fills this gap, allowing different attentional processes to be evaluated against each other in terms of their effect on the development of opportunity beliefs and on entrepreneurial action.

Although I find some entrepreneurial teams relying heavily on their prior knowledge and top-down information processing in terms of their search for and interpretation of new information, I find that those teams progressing well in opportunity development use a combination of top-down and bottom-up processing which ultimately facilitates opportunity development. Top-down processing provides direction toward potentially important members of the community of inquiry and an emphasis on the entrepreneurial process, while bottom-up attentional processing enables the entrepreneurial team to gather unexpected information for co-creating novel alternatives and testing them in a way that maximizes learning for opportunity development. Therefore, while others have highlighted the risk of cognitive blindness from top-down attention allocation in belief formation (Siggelkow, 2001; Tripsas, 2009; Tripsas & Gavetti, 2000) and the possibilities of bottom-up attention allocation for strategic

(Rindova et al., 2010) and entrepreneurial (Shepherd et al., 2007; Shepherd et al., 2017) decision making, I offer an explanation of how these two processes are combined and to what effect. In contrast to prior research findings on the effect of bottom-up processing on cognition (e.g. Franconeri, Hollingworth, & Simons, 2005; Frey & Eagly, 1993), I find no evidence for bottom-up processing overwhelming the senses, leading in a wrong direction, or interfering with cognitive processing – to the contrary, the combination of top-down and bottom-up attentional processing allows entrepreneurial teams to select and focus on the most salient information presented by their community of inquiry, prioritizing and therefore reducing the amount of relevant information, and thereby streamlining opportunity development. Similarly, I find no evidence that the inclusion of bottom-up processing reduces individuals' reliance on trial-and-error knowledge from past experiences, despite findings from past research proposing that bottom-up processing increases the likelihood of reinventing the wheel and repeating past mistakes (Katila & Ahuja, 2002; Levinthal & Rerup, 2006). Instead, entrepreneurial teams that combined both attentional processes demonstrated an awareness for this risk and continuously searched for efficient development pathways that enabled them to save resources.

Focus of attention: technological and demand-related uncertainty and the tension between informational domains

Due to entrepreneurial actors' limited attentional resources, different types of problems compete for attention such that attention to one problem area is accompanied by the loss of attention to other problem areas (Sullivan, 2010). Additionally, entrepreneurial teams suffer the same if not stronger challenges in attention allocation compared to managers of established organizations in terms of the continuous distraction induced by new, unexpected problems that urgently require solving. There is a lack of theoretical and empirical research on the context through which attention competition occurs, particularly in situations of high novelty and uncertainty (Sullivan, 2010), as well as a lack of research on the effectiveness of attention allocation, other than the non-linear decremental payoff rate associated with allocating attention to new information (Gruber, MacMillan, & Thompson, 2008; Koput, 1997). Nascent opportunity development represents a suitable and interesting research context to explore the

effects of competing attentional foci, due to the large and often overwhelming quantities of information involved in opportunity evaluation and development. Understanding how entrepreneurial teams allocate attention between potentially competing information domains contributes to our understanding of the role of different types of uncertainty in opportunity development, and how these might affect entrepreneurial teams' development of opportunity beliefs.

My results show that the informational domains that are most salient and compete most dominantly for entrepreneurial teams' attention during opportunity belief development are the informational domains related to technological and market uncertainty. In contrast to prior studies finding that the nature of entrepreneurial action in opportunity development is primarily related to the level of perceived technological uncertainty (rather than market uncertainty) (e.g. McKelvie, 2007; Song & Montoya-Weiss, 2001), my findings provide empirical evidence that during the nascent opportunity development process, technological information facilitates opportunity recognition but not entrepreneurial action, while demand-related information facilitates both. While prior research has found evidence for this dichotomy during opportunity recognition and evaluation (Autio et al., 2013), my study extends these findings to the opportunity exploitation phase and provides empirical evidence how this dichotomy holds true, providing a more thorough understanding of the distinct effects of technological and market-related uncertainty on entrepreneurial action.

Specifically, my results reveal that a primary focus on technological uncertainty leads to a variety of identified opportunity development pathways (i.e. facilitating ideation and extending the solution space), that ultimately, however, impede entrepreneurial action by impeding the selection and implementation of a preferred development choice. At the same time, a focus on gathering demand-related information from a social community and evoking feedback consistently facilitates entrepreneurial action, beyond the decision to exploit. In contrast to prior studies that generally distinguish between technological and market-related uncertainty and information (e.g. Autio et al., 2013; McKelvie et al., 2011), my study brings the interrelationship between the two domains into light: technological uncertainty is found to be associated with supplier uncertainty, i.e. the fear that potential

customers will not perceive the entrepreneurial team as legitimate providers of a solution. Technology-focused teams demonstrate a high degree of attention paid to potential customers' legitimacy assessments, which consistently hinders them from taking entrepreneurial action i.e. selecting a preferred opportunity development pathway or gathering the information necessary to make the choice. Furthermore, in contrast to prior studies that typically conceptualize market-related uncertainty in a generalist manner or at most equate it with demand uncertainty, my study highlights the importance of both demand-related and product-related uncertainty in collectively developing opportunity beliefs: market-focused teams rely on information related to fulfilling customer needs as well as information related to differentiating themselves toward competitive offerings to be able to select their preferred opportunity development pathway. Therefore, my study provides a more nuanced understanding of the technological and market-related domains in opportunity belief development, showing that some teams predominantly allocate their attentional focus on demand and product-related uncertainty which is associated with a combination of top-down and bottom-up processing in belief development, while other teams primarily focus attention on technological and supplier uncertainty, exclusively employing a top-down approach to belief development.

Focus of attention: strategic experimentation and changing cognitive representations

According to the ABV, what organizations do depends on the issues and answers they focus their attention on. By shedding light on the role of strategic experimentation and how it affects entrepreneurial teams' attentional foci in belief development, my findings provide another important contribution to the literature on entrepreneurial opportunity development. This literature has established the survival and performance benefits of considering and testing multiple potential market applications for new technologies when facing uncertain or hostile environments (Gruber et al., 2008; Nicholls-Nixon et al., 2000), as well as the performance benefits of simultaneously testing multiple business models in a resource-efficient manner (Andries et al., 2013). In contrast to this prior research emphasizing benefits, my findings highlight the potential risks associated with simultaneous experimentation. Technology-focused teams were found to split their attentional focus into many technological sub-domains without

being able to coordinate the testing of these domains in a resource-efficient manner; simultaneous experimentation therefore proved to be detrimental to the teams' ability to develop beliefs and achieve commercialization.

On the other hand, market-focused teams achieved a high degree of opportunity development effectiveness by testing only a few selected alternatives primarily chosen by their communities of inquiry; these teams were not found to employ a significant degree of simultaneous experimentation at all, but instead emphasized the importance of narrowing down potential alternatives to be able to dedicate resources to their implementation. Therefore, the nonlinear relationship between number of market opportunities identified prior to first entry and new firm performance, i.e. the decreasing marginal return associated with an increasing number of potential development pathways identified (Gruber et al., 2008), has been found to hold true throughout the opportunity exploitation phase, and even more so when experimentation is primarily driven by existing knowledge structures (i.e. top-down processing).

While past research has highlighted the role of external knowledge sources in the recognition of opportunities (e.g. Autio et al., 2013; Baron & Ensley, 2006; Ozgen & Baron, 2007), my research therefore sheds light on their role during the process of exploiting or realizing opportunities, which to this date remains underexplored (Foss et al., 2013). My results show that teams among both the technology-focused and market-focused groups radically changed their opportunity beliefs and associated business models as a result of feedback from social knowledge sources, which disconfirms prior research that has found entrepreneurial teams to change only few (Parker, 2006) and only peripheral aspects of their opportunity beliefs and associated strategy (Nicholls-Nixon et al., 2000). Instead, my study provides evidence that developing and changing cognitive representations represents an important mode of adaptation throughout the opportunity development process, effectively resulting in the allocation of attention to different facets of the environment (Gavetti & Levinthal, 2000). This takes place along a continuum of none or few radical changes (market-focused teams) to frequent radical changes to opportunity beliefs (technology-focused teams). Extant research offers little to explain the

associated benefits and risks of changing attentional foci during opportunity development, apart from entrepreneurs' limited attentional capacity facilitating self-reinforcing cycles in which entrepreneurs dedicate attention to some aspects of opportunities at the expense of others (Ravasi & Turati, 2005). My study therefore extends our understanding of the benefits and risks of changing cognitive representations and attentional foci with regard to venture survival.

Furthermore, prior research on learning has associated shifting cognitive representations with a loss of previously obtained tacit knowledge, creating a trade-off between information generation and information processing efficiency (Gavetti & Levinthal, 2000). In contrast, my research shows that shifting cognitive representation set off either positive or negative self-reinforcing learning cycles, increasing or decreasing information processing efficiency over time: in case of market-focused teams (combining top-down and bottom-up processing to develop opportunity beliefs), shifting cognitive representations about their opportunities and opportunity development increasingly sharpen their attentional focus toward demand and product-related uncertainty, enhancing their tacit knowledge regarding these domains, despite shifting cognitive representations. This allows them to improve their information processing capabilities and to identify the most promising pathway, even when starting the development process with false assumptions about their potential opportunities (cf. Haynie et al., 2012; Simon et al., 2007). In case of technology-focused teams (primarily employing top-down processing to develop opportunity beliefs), on the other hand, I find shifting cognitive representations and associated shifting attentional foci to result in a detrimental self-reinforcing cycle: entrepreneurial teams fragment their attentional focus into an increasing amount of sub-domains, which impedes their ability to develop tacit knowledge.

Situated attention: micro-processes that shape interactions with communities of inquiry

Research that tracks changes to opportunity ideas and how external actors are involved in the identification and evaluation of potential developments mostly stems from the literature on creative revision, where individuals seek out feedback on the novelty and usefulness of ideas, and interactions are investigated in terms of their design and effectiveness in reducing information asymmetries (e.g.

Harrison & Rouse, 2015; Perry-Smith & Mannucci, 2015). By revealing different types of interactions and their characteristics in terms of knowledge transfer and its effect on creative ideas, this line of research brings the investigation of social capital in creativity to the micro-level. However, it fails to embed this investigation into the context of opportunity development, where a change to an opportunity idea may greatly affect an entrepreneurial team in terms of the development trajectory of the opportunity as well as of the team itself. Although we know that social interactions are critical in the entrepreneurial process because they provide access to resources (Davidsson & Honig, 2003; Florin, Lubatkin, & Schulze, 2003; Stam & Elfring, 2008) including information (Adler & Kwon, 2002; Chrisman & McMullan, 2000; Gemmell et al., 2012), my findings indicate that the establishment of such interactions is necessary but not sufficient for opportunity development. Some entrepreneurial teams are able to make more of their potential access to a community of inquiry. It is the entrepreneurial teams that use their top-down knowledge to design interactions in a way that guides attention to general domains, from which bottom-up processes allow attention to be drawn to unexpected signals – they are open to social interactions, open to different social sources of information, and open to be drawn to information from the community of inquiry that is inconsistent with preconceived notions. As a result, these entrepreneurial teams make more of their social interactions to gather information, generate alternatives, and test opportunity conjectures to iterate dynamically in opportunity development.

While extant work focuses on how factors such as creativity, identity, and learning affect the impact of feedback on opportunity development (Andries et al., 2013; Grimes, 2018; Harrison & Rouse, 2015; Larrañeta et al., 2012), I therefore find that it is teams' differing allocation of (limited) attention that results in differing interaction designs for generating new information, consistent with the principle of situated attention (Ocasio, 1997). So far, research on entrepreneurial social capital typically focuses on the structure and strength of entrepreneurial actors' network ties as well as the resources they obtain through them (Greve & Salaff, 2003; Hite & Hesterly, 2001; Stam, Arzlanian, & Elfring, 2014), while work on entrepreneurial stakeholders explores how ventures and stakeholders jointly create value, and how stakeholder relationships change over time (van Werven, Bouwmeester, & Cornelissen, 2015; Zott & Huy, 2007). These studies often do not take the micro-level of interactions into account, presuming

that entrepreneurial teams effectively design and execute interactions with social knowledge sources, with the greatest attention paid to the acquisition and distribution of resources. My findings reveal that entrepreneurial teams differ along three dimensions by which they design interactions with communities of inquiry, and essentially the shared problem space within which opportunity beliefs are developed (engaging, exploring, and validating). My study therefore contributes to the social capital literature by providing a multi-level social process model of entrepreneurial opportunity development, addressing how entrepreneurial actors design interactions and develop their opportunity beliefs in light of limited attentional capacities as well as differing and evolving attentional foci.

Furthermore, research on the cognitive effects of social capital on opportunity development yields mixed results on whether bias such as illusion of control increase the probability of venture success. My findings extend theory on entrepreneurial social capital and cognition by showing that top-down belief development enhances entrepreneurial teams' illusion of control when they perceive a high degree of relational capital (relying on family members and friends) and a high number of weak ties within their community of inquiry (frequently consulting new experts). This approach, however, does *not* relate to progress in opportunity development and even hinders it, contrary to prior research that assumes a positive relationship between venture formation and social capital that is positively assessed by an entrepreneurial team (De Carolis et al., 2009). Instead, I found support for the diminishing payoff-rate of technology-related weak ties on entrepreneurial teams' knowledge creation (McFadyen & Cannella, 2004), which is not due to redundant information but due to the overwhelming amounts of new information and ideas for potential development pathways that these ties contribute.

In theorizing how entrepreneurial teams interact with communities of inquiry during opportunity development, this study moves toward a more complete picture of opportunity development that has wider implications for our understanding of entrepreneurs' social environments. Specifically, the patterns I observed in terms of gathering, exploring and validating information from and with the entrepreneurs' community of inquiry extend theory on the development of entrepreneurial networks over time. While the attention-based framework proposed here is grounded in entrepreneurial actors'

cognition, this framework might help explain the development of entrepreneurial networks over time, by focusing on entrepreneurial actors' attentional foci and information processing aimed at reducing uncertainty. For example, my study might help explain why some entrepreneurial actors show more flexibility and adaptation in the development of their social networks from strong and path-dependent ties to intentionally managed and formalized relationships (Hite & Hesterly, 2001), while at the same time increasing the strength of bonds with selected network members (Maurer & Ebers, 2006). While network management capabilities and reputation might provide one explanation for differences in teams' networking approaches (Maurer & Ebers, 2006; Milanov & Shepherd, 2013), so too might differences in entrepreneurial teams' micro-practices in interacting with communities of inquiry, which serve to fulfil their informational needs during opportunity development. For instance, entrepreneurial actors with a market focus might early in opportunity development build a community of inquiry that contains strong and sustainable relationships that provide market-related information, while technology-focused teams might build relationships with those who provide them with a sense of legitimacy, yet keep community members providing critical market-related feedback at arm's length. This advances our understanding of entrepreneurial teams' information processing with entrepreneurial networks, i.e. the sources and nature of information, and the processes by which information is gathered and evaluated (West & Meyer, 1997). As Busenitz et al. (2003) write, "viewing entrepreneurship in terms of networks and information flow can provide a synthetic view of different theoretical perspectives, and of the multi-level nature of the entrepreneurship phenomenon" (p. 302). My study adopts this approach and reveals how entrepreneurial networks relate to developing a coherent view of a potential opportunity, and specifically to the antecedents and consequences of entrepreneurial action (Shepherd, 2015; West & Meyer, 1997).

Structural distribution of attention: entrepreneurial teams and opportunity-specific knowledge

While extant research on opportunity emergence has typically focused on the beliefs and actions of a single individual decision maker and actor (Sarasvathy, 2001; Wood & McKinley, 2010), I focus on the entrepreneurial team. Studying opportunity development from a team perspective is important because

teams frequently found new ventures to pursue a potential opportunity (Klotz et al., 2014), and require organizing (in a form not required by an individual actor) which influences opportunity development. While the formation of entrepreneurial teams' collective cognition is generally assumed to be based on individual team members' prior knowledge, cognitive processing mechanisms, and organizational processes (Felin & Zenger, 2009; West, 2007), my research highlights the role of attention in directing the development and maintenance of coherent belief structures in light of new opportunity-specific information. Team members need to continuously renegotiate their realities to pursue actions towards reducing uncertainty, and might enter into a self-enforcing diverging spiral in which ongoing infusion of external information contributes to diverging belief systems and ultimately, decreasing team cohesion.

I find the main determinant of entrepreneurial teams' attentional foci in opportunity development to be the level of individual team members' prior opportunity-specific knowledge. My study therefore contributes to research that explores how knowledge and experience influence path creation processes, and how they affect the number of alternative options considered in path creation. Extant studies have yielded mixed results, either finding that the breadth of prior knowledge and experience increases the number of alternative options considered (Gruber, 2010), or that the complex belief structures associated with opportunity-specific knowledge inhibit frequent additions of potential development pathways (Kiss & Barr, 2015). According to the latter, prior knowledge leads entrepreneurial actors to conduct fewer but more nuanced probes that are designed to learn about multiple dimensions of the environment. As ambiguous findings might be partly due to a lack of data availability (Cassar, 2014), my study contributes by firmly grounding results in data, indicating that opportunity-specific knowledge leads to a more selective and nuanced identification and probing of potential opportunity development pathways.

While studies have shown that prior knowledge and associated information processing capabilities potentially decrease entrepreneurial actors' perceived uncertainty, increase perceived control, and thereby diminish information search (Cooper et al., 1995; Kuvaas, 2002), my findings reveal that market-focused teams did indeed not seek less, but more selective information, and did not demonstrate

illusion of control, but rather self-awareness and metacognitive abilities. In contrast, technology-focused teams who demonstrated low levels of opportunity-specific knowledge engaged in comparably more, not less, information search, which contradicts prior studies finding that a lack of opportunity-specific knowledge reduces uncertainty and induces boundedly rational behavior in planning and information search (Cooper et al., 1995; Dencker et al., 2009). Instead, technology-focused teams continuously sought high levels of information, whilst experiencing persistently high levels of uncertainty as the absence of opportunity-specific knowledge increased their difficulties in assessing the risks and returns associated with different potential development pathways (Ravasi & Turati, 2005).

My study therefore extends our understanding of the relationship between prior knowledge and venture emergence, by providing evidence that in highly uncertain contexts, opportunity-specific knowledge within the entrepreneurial team regulates attention allocation which in turn regulates entrepreneurial action (Wood & Pearson, 2009). Contrary to prior findings (Crilly, 2018; Holcomb et al., 2009; Minniti & Bygrave, 2001), I did not find high levels of opportunity-specific knowledge to constrain market-focused teams' solution spaces (i.e. induce design fixation), or knowledge corridors to impede trial-and-error-learning by creating path-dependent development processes. That is, I did not find opportunity-specific knowledge to contribute to the formation of cognitive corridors that homogenize the diversity and novelty of new knowledge and inhibit strategic variety (Grégoire & Shepherd, 2012; Larrañeta et al., 2012), or to contribute to the formation of more favorable opportunity beliefs (Haynie et al., 2009; McKelvie et al., 2011) and a higher degree of confidence (Wood & Pearson, 2009). Instead, my findings confirm that opportunity-specific experience is associated with more accurate and less overoptimistically biased opportunity expectations, an effect that is particularly salient in high-technology environments such as my research setting (Cassar, 2014). Prior opportunity-specific knowledge therefore strongly affects the form that entrepreneurial action takes during the process of opportunity development, as well as the interpretation of actions i.e. learning over time.

Structural distribution of attention: entrepreneurial teams and nascent organizing

As shown by prior research, "the use of external knowledge sources is positively associated with oppor-

tunity exploitation, but the strength of this association is significantly influenced by organizational designs that enable the firm to access external knowledge during the process of exploiting opportunities" (Foss et al., 2013, p. 1453). My study extends this research by revealing which aspects of nascent organizing contribute to different experiences in interacting with external knowledge sources during the development of opportunity beliefs. Over time, a lack of opportunity-specific knowledge is associated with a frequently changing and increasingly unclear division and articulation of roles, which hinders the establishment of gatekeepers who take responsibility for coordinating and conducting information exchange with members of the community of inquiry (Grandi & Grimaldi, 2003). In addition to the many potential development pathways confounding these entrepreneurial teams' limited attention, their attentional focus is continuously drawn toward internal organizing efforts, that are aggravated by a lack of progress in opportunity development, yet reinforce teams' top-down processing habits and thereby inhibit progress in opportunity development even further in a downward spiral. In contrast, teams with high levels of opportunity-specific knowledge provide an organizational context that is designed to free up attention capacity, so that problems are less likely to compete for attention (Sullivan, 2010) and teams are able to retain attentional capacities necessary for learning (Simon et al., 2007). As a result, teams' organizing efforts contribute to self-reinforcing cycles which either facilitate the divergence or convergence of collective opportunity belief systems over time. My study therefore extends prior research (e.g. Andries et al., 2013; Vissa & Chacar, 2009) by highlighting how nascent entrepreneurial teams' internal processes and social networks jointly shape the process of developing opportunity beliefs as well as opportunity development outcomes.

To summarize, the opportunity development literature focuses on the steps taken or milestones achieved by nascent entrepreneurial actors (Andries et al., 2013; Grimes, 2018; McCann & Vroom, 2015; McKelvie et al., 2011). I complement this research by suggesting a critical dependent variable to capture opportunity emergence – opportunity belief development. By documenting and assessing the extent to which beliefs are articulated and action is taken over time, particularly in light of new opportunity-specific information that is continuously produced, my study provides important insights on the ongoing tension between evaluation and implementation throughout the opportunity development process, which

eventually determines which evaluations of the opportunity are realized. At least in the context of high technology incubatee firms, I found that nascent entrepreneurial teams' potential opportunities went through several (and sometimes quite radical) changes in opportunity beliefs, the nature and outcomes of which were characterized by teams' attentional processing. Those teams that survived and emerged were characterized by a combination of bottom-up and top-down attention allocation by which they gradually collected new information and 'untangled the knots' in their understanding and beliefs, thereby reducing their uncertainties regarding their opportunities' potential. In parallel to this process of collective belief development, teams developed and organized their human capital to be able to emerge as new ventures – a relationship that, according to my findings, is likely more complex than a unidirectional one. Indeed, I found that the nature and organizing of human capital within the entrepreneurial team influenced opportunity belief development. Lastly, and further underlining the mutual relationship between opportunity belief development and organizing within nascent entrepreneurial teams, the path transition that I observed in case of two technology-focused teams demonstrates how changes in opportunities that are associated with team member exits (i.e. shifts in human capital) allow collective belief systems to be developed anew, and attentional foci in opportunity development to be shifted (from technology-focus to market-focus).

6.2 Implications for practice

This study has implications for entrepreneurial teams as well as members of communities of inquiry and those designing entrepreneurial support systems such as incubators. Whether aspiring entrepreneurs believe to possess high levels of opportunity-specific information, or perceive ambiguity with regard to the true specificity of their knowledge base, my findings provide a useful monitoring system that helps them effectively utilize their limited attentional capacities in interactions with communities of inquiry and in the development of opportunity beliefs. First, such a monitoring system relies on a team critically reflecting its willingness to share technologically immature prototypes with potential customers from the very beginning of opportunity development, when discomfort over a lack of technological sophistication might be the highest due to the novelty of the situation and perceived weight of feedback.

Second, such a monitoring system requires a team to critically reflect its ability to let go of existing beliefs that are directly or indirectly contradicted by the community of inquiry, as well as its ability to identify when the latter occurs. The case of team Smartchat(M) provides an illustrative example for the importance of self-monitoring systems in light of potential indirect critique, despite teams' perception of themselves as already being customer-driven. Here, the critique occurred indirectly in that it stemmed from issues that potential customers did not communicate – that it seemed complicated to use in light of a relatively small problem – which the team only discovered when customers didn't purchase their product to replace existing solutions. While interactions with the community of inquiry appeared to unequivocally reduce demand uncertainty among these market-focused teams (that were already observant of customers' potential biases), this case illustrates that product uncertainty might be of more equivocal nature and require additional attentional capacity in terms of overcoming inaccurate existing beliefs. This is particularly true in light of potential customers giving unequivocally positive feedback, as experienced by team Smartchat(M).

Next, my research highlights the tension between the desire and recommendation to experiment with multiple alternative development pathways versus the limited quantity of available resources that need to be divided between testing conjectures and developing products. Entrepreneurial actors who are uncertain of their progress in opportunity development in light of frequent and/or radical changes to their opportunity beliefs can take the results of this study as a recommendation to observe the level of opportunity-related, task-related and team-related consensus within the team. An effective monitoring system relies on critically reflecting whether opportunity development decisions are enforced by within-team discussions instead of being inspired by the community of inquiry, possibly accompanied by 'false harmony' within the team despite increasingly conflicting views between individual team members. Particularly, teams can cultivate an awareness for and countermeasures against false harmony, which not only distorts the view on increasing conflicts, tension or stress within the team, but also distorts the recognition that there is a lack of real progress in opportunity development and testing. Such a self-reflective monitoring system helps teams cultivate their metacognitive capacities which they need in order to maintain their attentional focus throughout the long and intense opportunity development

period. Since most entrepreneurial teams will experience some gaps in specialized knowledge that they need to compensate by developing in-depth technological competencies, such self-monitoring systems become even more important in times of increased operational pressure.

To decide between competing development pathways, my findings suggest that teams should employ simultaneous experimentation at a resource-efficient level i.e. involve very basic prototypes and focus early interactions on reducing demand uncertainty. This way, they are less likely to draw false conclusions regarding potential customers' demand, erroneously legitimizing further opportunity development. Simultaneous experimentation on a product uncertainty level, i.e. assessing several alternative development pathways for their potential to achieve a level of differentiation toward competitive solutions that can be commercialized, should logically only increase in priority once demand is established. Further, as the example of team Smartchat(M) shows, the question whether potential customers will prefer an offered solution over competitors might be more subtle than can possibly be assessed by demonstrating (rather than selling) prototypes.

As I was struck by the lack of self-awareness that some teams displayed regarding their lack of attention toward feedback that was (potentially) provided by their community of inquiry, members of the community of inquiry as well as other stakeholders might benefit from an increased level of awareness toward entrepreneurial teams' limited attentional capacities, even if entrepreneurial actors initially appear to be receptive to feedback. Incubators offering entrepreneurial training programs and specialized knowledge might consider not only providing information, but also to train entrepreneurial teams in allocating attention among competing uncertainties at different stages of the opportunity development process. Particularly in case of increasing observed levels of conflict among individual team members' belief systems, advisors might be able to provide more effective support by identifying team members' differing foci of attention in opportunity development, and associated differences in micro-practices in interacting with the community of inquiry (as well as in the evaluation thereof). Mediation between team members and practicing conflict resolution skills, as is often offered in incubator environments, might not bear fruit if the underlying attentional foci continue to diverge.

Lastly, my study provides an insightful perspective on a positive aspect of entrepreneurial exit. Once technology-focused teams crossed a certain threshold of relational conflict, their misguided (functioning) image of the world (or better said, of the team's progress in opportunity development) adapted to the reality that they would not be able to achieve first cash flows by the end of their funding period. The teams' diverging collective belief systems could not recover from this new development to their opportunity beliefs, leading to team splits. However, these proved to be a new chance for members of two teams, who formed new teams around heavily adjusted and community-of-inquiry-'approved' versions of their opportunities. Failure led these team members to develop significantly in terms of their metacognitive ability to learn from their opportunity development experiences. Therefore, entrepreneurial actors as well as the stakeholders supporting them are encouraged to pay attention to the signs indicating that team members' mental models rather revolve around negotiating than around testing, and that teams demonstrate ongoing difficulties and negotiations with regard to the division of roles and responsibilities. It might be beneficial for team members to exit and pursue a new team configuration in which the organizational design is more suitable to successfully steer decision makers' attentional foci through the opportunity development process.

6.3 Limitations and future research

As is common in both qualitative and quantitative empirical research studies, there are several limitations. In the following, I will outline the specific limitations that apply to my research study. First, as with all inductive studies, there are questions about the generalizability of my study due to the lack of a randomized and sufficiently large sample, which represents a trade-off with regard to the rich data collected that allows to explore multi-level processes and practices among multiple observational entities over time. My study's relatively small sample size and theoretical sampling approach is, however, comparable to other multiple case studies in entrepreneurship and management (e.g. Maurer & Ebers, 2006) and appropriate to build propositions that are sufficiently robust (Eisenhardt, 1989; Yin, 2009). Moreover, theoretical sampling is a method explicitly recommended for qualitative research (Eisenhardt & Graebner, 2007; Patton, 2002). To establish the extent to which my findings are

generalizable beyond the scope of this study, it is necessary to apply large-scale empirical research to statistically confirm or disconfirm the veracity of proposed relationships.

Moreover, neither my longitudinal approach nor the triangulation of data allows me to draw final inferences regarding causality, insofar that factors outside the scope of my observations might be responsible for the unfolding processes (such as the quality of consulted community of inquiry members in terms of their ability to provide feedback facilitating opportunity commercialization), or that the proposed relationships unfold in a sequence that is different than what my study proposes (such as opportunity-specific knowledge facilitating more effective within-team communication and thereby facilitating opportunity development decisions and interactions with communities of inquiry). However, this is another common shortcoming of qualitative case studies (Gibbert et al., 2008), which I alleviated by closely relating my model to interview data, relying on real-life examples and triangulating data with community of inquiry members that were most closely involved in opportunity development.

My study makes some advances in terms of identifying boundary conditions that restrict the applicability of my findings. During the course of my research, the boundary conditions that became apparent were related to entrepreneurial teams' resource constraints and the existence of a dominant customer. First, for several teams located within the incubator with whom I spoke, a negative response with regard to governmental funding would have terminated opportunity development altogether. The two teams in my sample that did not receive such funding relied on private resources as well as other institutional or private investments to be able to continue opportunity development without reporting additional constraints. While neither team appeared or reported to suffer ideational constraints being imposed by these funding sources, other scenarios might contain the community of inquiry influencing opportunity development beyond entrepreneurial teams' free choice, such as accelerator programs catering exclusively to specific markets. Similarly, catering to a dominant customer represents a boundary condition that I observed during the course of my research. One team (dropped from my sample for its lacking willingness to share access to its community of inquiry) developed their opportunity specifically for the needs of one potential customer alone, citing this customer's technical capabilities as a reason,

and not even searching for alternatives even when this customer provided only little resources which effectively paralyzed the team and significantly delayed opportunity development. When no alternative information is sought whatsoever or only to minimal degrees, the effectiveness or even existence of a community of inquiry is questionable. Taken together, these absolute constraints that are willingly or unwillingly imposed on opportunity development by entrepreneurial teams and their communities of inquiry represent exceptions to my findings.

Future research will need to empirically test the model to determine the extent to which it is generalizable beyond incubatee firms (to other emerging nascent organizations not supported by an incubator infrastructure), beyond high-tech potential opportunities (to medium and low-tech and perhaps even service-related potential opportunities), beyond new organizations (to opportunity development in corporate new ventures), and beyond the German context (to other developed and less developed countries). Although I expect that the model is generalizable, I also expect that investigations in other contexts will provide the research opportunity to add contingencies and further enrich the model.

Further, although I found entrepreneurial teams using top-down attention allocation based on general knowledge, and teams using top-down guidance of bottom-up attention allocation based on opportunity-specific knowledge, I did not explore teams (because they were not in my sample) demonstrating top-down attention allocation based on opportunity-specific knowledge, nor teams demonstrating a combination of allocation mechanisms based on general knowledge. Future research can explore more fully the different types of knowledge (general, specialized, or other finer-grained categorizations) with the different processes for allocating the entrepreneurial team's attention. For example, would the top-down allocation of attention be more effective at opportunity development with specialized knowledge? Would the top-down guidance of bottom-up attention allocation be less effective when guided by general knowledge (or perhaps even more effective)? This also opens up questions about the team dimension of knowledge in terms of, for example, diversity of education, industry experiences, and entrepreneurial experience (Delmar & Shane, 2006; Ucbasaran et al., 2003), and the team's transactive memory system (Ellis, 2006; Zheng, 2012).

Third, I explained how the interactions with the community of inquiry and the organizing of the entrepreneurial team both influenced opportunity development. I did not explore explicitly the impact of community of inquiry interactions on organizing, nor the impact of organizing on community of inquiry interactions, but future research can make an important contribution focusing on this potentially mutually dependent relationship. Moreover, another perspective worthy of exploring is the development of the community of inquiry as well as the development of community members' opportunity beliefs in light of changes to entrepreneurial opportunities (Shepherd, 2015).

Finally, as I stopped my investigation, it was clear that some teams had progressed well in opportunity development and others had not. An extended period of study could have revealed additional information. Future research can explore what happens to an idea underlying the terminated potential opportunity and what happens to the team. One team told me that they were going to offer the remnants of the potential opportunity for open access. It would be interesting to determine if such a process leads to value creation. Was the idea underlying termination somehow recycled or rejuvenated later? Moreover, did progress in opportunity development lead to successful organizational emergence and success in developing subsequent potential opportunities? I hope future research explores these possibilities.

6.4 Conclusion

The development of new business opportunities is the central process in entrepreneurship. In this dissertation, I inductively develop a socio-attentional model of opportunity development that captures how the opportunity-specificity of entrepreneurial teams' prior knowledge and their attentional focus influence how they engage communities of inquiry in the opportunity development process, and how they acquire and interpret information received from these communities, which has key implications for the development of potential opportunities and entrepreneurial teams. My work therefore focuses on how entrepreneurial teams produce opportunity-specific information through the interaction with selected stakeholders whilst illustrating the different team experiences associated with opportunity development. The model proposes that those entrepreneurial teams that progress well in opportunity

development use top-down guidance of a bottom-up process, to allocate the entrepreneurial team's attention to interactions with the community of inquiry that are primarily aimed at reducing demand and product uncertainty. These interactions gather diverse information, co-create alternatives, and provide evidence to disconfirm opportunity conjectures. Organizing the entrepreneurs into a cohesive team further facilitates the convergence of individual team members' opportunity beliefs into collective belief systems and thereby facilitates opportunity development. In contrast, the entrepreneurial teams lacking progress in opportunity development use their general knowledge to allocate attention to reducing technological and supplier uncertainty in their interactions with a community of inquiry. These entrepreneurial teams focus on gathering targeted information, generating many technological alternatives, and seeking evidence to confirm opportunity conjectures. The organizing of members of these entrepreneurial team lacks cohesion, which adversely affects opportunity development by facilitating a self-reinforcing divergence among team members' belief systems. This socio-attentional model of opportunity development offers new insights into the role of (and inter-relationships between) attention allocation, interactions with a community of inquiry, and organizing, in understanding the dynamics of opportunity development. I hope these findings inspire further research on the contingent development process of entrepreneurial teams and their opportunities.

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Appendix

A1 Interview guideline – interviews with entrepreneurial team members

With the exception of five interviews (team Babylab), all interviews with entrepreneurial team members were conducted in German.

1st interview round

Vorstellung und Einleitung: Herzlichen Dank, dass du an der Studie des Entrepreneurship Research Instituts zum Thema Unternehmensgründung teilnimmst. Mein Name ist Rose Sattari. Wie besprochen wird das Interview etwa 60 Minuten dauern. Ich würde das Interview mit deinem Einverständnis gerne aufnehmen, um die Auswertung zu erleichtern. Selbstverständlich werde ich deine Daten vertraulich behandeln.

1. Bitte erzähle mir zunächst, was dein Team genau macht. Wie lautet eure Geschäftsidee aktuell?
   1.1 Wie würdest du euer Produkt aktuell genau beschreiben?
   1.2 Wie würdest du euer Geschäftsmodell aktuell genau beschreiben?
   1.3 Erzähle mir bitte mehr über die Mitglieder deines Teams und ihren Hintergrund.

2. Nun erzähle mir bitte, wie die Ausgangssituation deines Teams war.
   2.1 Wie kam es zu eurer Idee?
   2.2 Wie ist euer Team entstanden?

3. Als nächstes möchte ich wissen, wie sich eure Geschäftsidee und euer Team seit dieser Ausgangssituation verändert hat. Bitte erzähle mir so chronologisch wie möglich die Geschichte eurer Entscheidungen, die euer Produkt, Geschäftsmodell und Team zu dem gemacht haben, das sie heute sind.
   3.1 Welche Anpassungen habt ihr vorgenommen?
   3.2 Welche Entscheidungen habt ihr getroffen, bestimmte Aspekte nicht zu verändern?
   3.3 Wann wart bzw. seid ihr euch unschlüssig?
   3.4 Wie hat sich euer Team seit der ursprünglichen Ausgangssituation verändert?

4. Lass uns nun darüber sprechen, mit wem ihr seit dem Beginn der Geschäftsidee in Kontakt gestanden seid, um eure Idee zu entwickeln. Bitte erzähle mir so chronologisch wie möglich,
   4.1 Nachdem die Idee entstanden ist, jedoch noch bevor das Team entstanden ist: wer waren diejenigen die eingebunden wurden, um die Idee weiterzuentwickeln?
   4.2 Wie lief der Austausch genau ab? d.h.
      - wie ist der Kontakt entstanden,
      - wie habt ihr euch vorbereitet,
      - wie oft und in welcher Form habt ihr euch ausgetauscht,
      - welche Hilfsmittel habt ihr benutzt,
      - und wie seid ihr nach einem Gespräch weiter vorgegangen?

4.3 Nachdem das Team entstanden ist, jedoch bevor ihr euch beim Inkubator beworben habt: wer waren diejenigen die eingebunden wurden, um die Idee weiterzuentwickeln?
4.4 Wie lief es genau ab?
4.5 Nachdem ihr euch beim Inkubator beworben habt, bis zum jetzigen Zeitpunkt: wer waren diejenigen die eingebunden wurden, um die Idee weiterzuentwickeln?
4.6 Wie lief es genau ab?
4.7 Mit wem plant ihr, euch zur weiteren Entwicklung eurer Idee demnächst auszutauschen?
4.8 Wie plant ihr, diesen Austausch zu gestalten?
4.9 Mit wem plant ihr, euch zur darüber hinaus in der Zukunft zur weiteren Entwicklung eurer Idee auszutauschen?
4.10 Wie plant ihr, diesen Austausch zu gestalten?

5. Nun gehen wir die Entwicklungsgeschichte eurer Idee durch: welche dieser Austauschpartner haben konkret auf eure Entwicklung Einfluss genommen und wie, und welche nicht?
   5.1 Zuerst in Bezug auf eurer Produkt und euer Geschäftsmodell?
   5.2 Und dann in Bezug auf euer Team?

6. Welche Veränderungen an eurem Produkt und/oder Geschäftsidee habt ihr aktuell geplant?

7. Ich möchte zum Abschluss noch gerne deine Einschätzung wissen, wie du diese Austauschpartner aktuell bewertest.
   7.1 Wie hilfreich waren die Interaktionen mit diesem Partner, um eure Geschäftsidee weiterzuentwickeln, und warum triffst du diese Bewertung?
   7.2 Hat sich deine Einschätzung dieses Partners über die Zeit hinweg verändert?
   7.3 Hat sich der Austausch selbst mit diesem Partner über die Zeit hinweg verändert?

<u>2nd interview round</u>

1. Seit unserem letzten Gespräch am XXX: wen habt ihr eingebunden, um die Idee weiterzuentwickeln?
   1.1 Wie lief der Austausch genau ab? d.h.
   - wie ist der Kontakt entstanden,
   - wie habt ihr euch vorbereitet,
   - wie oft und in welcher Form habt ihr euch ausgetauscht,
   - welche Hilfsmittel habt ihr benutzt,
   - und wie seid ihr nach einem Gespräch weiter vorgegangen?

   1.2 Mit wem plant ihr, euch zur weiteren Entwicklung eurer Idee demnächst auszutauschen?
   1.3 Wie plant ihr, diesen Austausch zu gestalten?
   1.4 Mit wem plant ihr, euch zur darüber hinaus in der Zukunft zur weiteren Entwicklung eurer Idee auszutauschen?
   1.5 Wie plant ihr, diesen Austausch zu gestalten?

2. Nun gehen wir die Entwicklungsgeschichte eurer Idee seit unserem letzten Gespräch durch: welche dieser Austauschpartner haben konkret auf eure Entwicklung Einfluss genommen und wie, und welche nicht?
   2.1 Zuerst in Bezug auf eurer Produkt und euer Geschäftsmodell?
   2.2 Und dann in Bezug auf euer Team?

3. Ich möchte zum Abschluss noch gerne deine Einschätzung wissen, wie du diese Austauschpartner aktuell bewertest.

3.1 Wie hilfreich waren die Interaktionen mit diesem Partner, um eure Geschäftsidee weiterzuentwickeln?
3.2 Warum triffst du diese Bewertung?
3.3 Hat sich deine Einschätzung dieses Partners über die Zeit hinweg verändert?

4. Welche Veränderungen an eurem Produkt und/oder Geschäftsidee habt ihr aktuell geplant?

<u>3rd interview round</u>

1. Seit unserem letzten Gespräch am XXX: wen habt ihr eingebunden, um die Idee weiterzuentwickeln?
   1.1 Wie lief der Austausch genau ab? d.h.
   - wie ist der Kontakt entstanden,
   - wie habt ihr euch vorbereitet,
   - wie oft und in welcher Form habt ihr euch ausgetauscht,
   - welche Hilfsmittel habt ihr benutzt,
   - und wie seid ihr nach einem Gespräch weiter vorgegangen?

   1.2 Mit wem plant ihr, euch zur weiteren Entwicklung eurer Idee demnächst auszutauschen?
   1.3 Wie plant ihr, diesen Austausch zu gestalten?
   1.4 Mit wem plant ihr, euch zur darüber hinaus in der Zukunft zur weiteren Entwicklung eurer Idee auszutauschen?
   1.5 Wie plant ihr, diesen Austausch zu gestalten?

2. Nun gehen wir die Entwicklungsgeschichte eurer Idee seit unserem letzten Gespräch durch: welche dieser Austauschpartner haben konkret auf eure Entwicklung Einfluss genommen und wie, und welche nicht?
   2.1 Zuerst in Bezug auf eurer Produkt und euer Geschäftsmodell?
   2.2 Und dann in Bezug auf euer Team?

3. Ich möchte noch gerne deine Einschätzung wissen, wie du diese Austauschpartner aktuell bewertest.
   3.1 Wie hilfreich waren die Interaktionen mit diesem Partner, um eure Geschäftsidee weiterzuentwickeln?
   3.2 Warum triffst du diese Bewertung?
   3.3 Hat sich deine Einschätzung dieses Partners über die Zeit hinweg verändert?

4. Zum Abschluss: wenn du auf die Entwicklungsgeschichte deines Teams zurückblickst,
   4.1 Was würdest du im Austausch mit diesen Austauschpartnern anders gestalten?
   4.2 Welche Ratschläge würdest du jemandem geben, der gerade anfängt, eine Idee zu entwickeln?
   4.3 Was würdest du *nicht* verändern?
   4.4 Worin bist du dir unschlüssig?

A2 Interview guideline – interviews with members of the community of inquiry

With the exception of two interviews (mentor of team Biowing), all interviews with community of inquiry members were conducted in German.

1st interview round

Vorstellung und Einleitung: Herzlichen Dank, dass Sie an der Studie des Entrepreneurship Research Instituts zum Thema Unternehmensgründung teilnehmen. Mein Name ist Rose Sattari. Wie besprochen wird das Interview etwa 45-60 Minuten dauern. Ich würde das Interview mit Ihrer Einverständnis gerne aufnehmen, um die Auswertung zu erleichtern. Selbstverständlich werde ich Ihre Daten vertraulich behandeln.

1. Bitte erzählen Sie mir mehr über Ihren Hintergrund.
2. Wann haben Sie zuerst über die Geschäftsidee gehört, und wie würden Sie diese erste Version, von der Sie gehört haben, genau beschreiben?
3. Wie ist der erste Austausch mit dem Team abgelaufen?
   - 3.1 Wie ist der Kontakt entstanden,
   - 3.2 Wie hat das Team sich vorbereitet,
   - 3.3 Wie oft und in welcher Form haben Sie sich ausgetauscht,
   - 3.4 Welche Hilfsmittel hat das Team benutzt,
   - 3.5 Und wie ist das Team nach einem Gespräch weiter vorgegangen?
4. Welches Feedback haben Sie dem Team in diesem ersten Austausch gegeben?
5. Wie haben Sie dieses Feedback genau vermittelt?
6. Seitdem und bis zum jetzigen Zeitpunkt,
   - 6.1 Wie ist Ihr weiterer Austausch mit dem Team abgelaufen?
   - 6.2 Wie viele Versionen des Prototyps haben Sie gesehen?
   - 6.3 Haben Sie Prototypen getestet?
   - 6.4 Welches Feedback haben Sie dem Team in diesen Gelegenheiten des Austauschs gegeben?
   - 6.5 Wie haben Sie dieses Feedback genau vermittelt?
7. Wie hat das Team jeweils auf Ihr Feedback reagiert?
8. Inwiefern hat sich Ihr Feedback daraufhin auf die Geschäftsidee des Teams ausgewirkt?
9. Inwiefern hat sich Ihr Feedback auf die Strategie des Teams ausgewirkt?
10. Inwiefern hat sich Ihr Austausch mit dem Team seit dem ersten Kontakt verändert?
11. Inwiefern hat sich Ihre Meinung über die Geschäftsidee und das Team seit dem ersten Kontakt mit dem Team verändert?
12. Wie schätzen Sie den Fortschritt des Teams in ihrer Entwicklung ein?
13. Mit wem tauscht sich das Team Ihres Wissens nach noch über die Geschäftsidee aus?
14. Gibt es bestimmte Personen oder Institutionen, die das Team in die Entwicklung einbinden sollte, aber noch nicht eingebunden hat?
15. Wie offen ist das Team darin, Informationen mit Ihnen zu teilen und/oder Informationen für Sie bereitzustellen?

16. Wie bewerten Sie das Team insgesamt in seinem Austausch mit Ihnen, und mit welcher Begründung?
17. Glauben Sie an den Erfolg der Geschäftsidee und des Teams, und mit welcher Begründung?

2nd interview round

1. Seit unserem letzten Gespräch am XXX und bis zum jetzigen Zeitpunkt,
   1.1 Wie ist Ihr weiterer Austausch mit dem Team abgelaufen?
   1.2 Wie viele Versionen des Prototyps haben Sie gesehen?
   1.3 Haben Sie Prototypen getestet?
   1.4 Welches Feedback haben Sie dem Team in diesen Gelegenheiten des Austauschs gegeben?
   1.5 Wie haben Sie dieses Feedback genau vermittelt?
2. Wie hat das Team jeweils auf Ihr Feedback reagiert?
3. Inwiefern hat sich Ihr Feedback daraufhin auf die Geschäftsidee des Teams ausgewirkt?
4. Inwiefern hat sich Ihr Feedback auf die Strategie des Teams ausgewirkt?
5. Inwiefern hat sich Ihr Austausch mit dem Team seit unserem letzten Gespräch verändert?
6. Inwiefern hat sich Ihre Meinung über die Geschäftsidee und das Team seit unserem letzten Gespräch verändert?
7. Wie schätzen Sie aktuell den Fortschritt des Teams in ihrer Entwicklung ein?
8. Mit wem tauscht sich das Team Ihres Wissens nach noch über die Geschäftsidee aus?
9. Gibt es bestimmte Personen oder Institutionen, die das Team in die Entwicklung einbinden sollte, aber noch nicht eingebunden hat?
10. Wie offen ist das Team darin, Informationen mit Ihnen zu teilen und/oder Informationen für Sie bereitzustellen?
11. Wie bewerten Sie das Team insgesamt in seinem Austausch mit Ihnen, und mit welcher Begründung?
12. Glauben Sie an den Erfolg der Geschäftsidee und des Teams, und mit welcher Begründung?
13. Zum Abschluss: wenn Sie auf die Geschichte Ihres Austauschs mit dem Team zurückblicken,
   13.1 Was würden Sie im Austausch mit dem Team anders gestalten?
   13.2 Welche Ratschläge würden Sie jemandem geben, der gerade anfängt, mit Gründungsteams zusammenzuarbeiten?
   13.3 Was würden Sie nicht verändern?
   13.4 Worin sind Sie sich unschlüssig?