

Unpainting the black box:

exploring mechanisms and practices
of start-up incubation

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Unpainting the black box: exploring mechanisms and practices of start-up incubation

Het openen van de zwarte doos:
een verkenning van de mechanismen en praktijken van start-up incubatie
(met een samenvatting in het Nederlands)

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Chapter 1

Introduction – Sympathy for the start-up

1.1 BACKGROUND

“Let’s give everyone in Europe the ingredients for start-up success (...) And let’s recognise the role these rock stars play in our economy” (European Commission, 2014a). With this statement, former European Commissioner for Digital Agenda Neelie Kroes personifies the many Western policy makers who view start-ups as key drivers of economic growth (Ahmad and Ingle, 2013; Brown and Mason, 2014; Isenberg, 2010). This view originated in the late 1990s (Brown and Mason, 2014; Stam and Bosma, 2015). During this period, governments began shifting their policies away from increasing the quantity of entrepreneurship towards increasing the quality of entrepreneurship, by targeting those new firms with the desire and ability to grow (Ahmad and Ingle, 2013; Stam, 2015). This shift was driven by the realization that only a fraction of small businesses (around 1 to 5 per cent) is responsible for a disproportionately large amount of jobs created by the small business population (around 50 to 75 per cent) (Acs et al., 2008; Bravo-Biosca and Westlake, 2009; Buss, 2002; Henrekson and Johansson, 2010; Storey, 1994). Innovation was seen as a key enabler of growth in small firms (Ahmad and Ingle, 2013; Bravo-Biosca and Westlake, 2009). In addition to creating jobs directly, innovative new firm also indirectly contribute to economic development. Whereas established firms are committed to maintaining or incrementally improving the economic status quo, new firms are seen as outsiders with little to lose that can introduce radical innovations to displace less efficient, or less desirable, innovations and firms (Christensen, 1997; Schumpeter, 1947). Consequently, innovative new firms can be important drivers of structural change and long term competitiveness. The perceived direct and indirect effects motivated governments to increasingly support start-ups: new ventures that exploit technological know-how through the creation of new products and services (Bergek and Norrman, 2015; Trimi and Berbegal-Mirabent, 2012).

Governmental support for start-ups is further legitimized by their high risk nature. New firms, in general, suffer from relatively high failure rates due to liabilities of newness and smallness, which include a lack of visibility in the market, the absence of a track record, and the lack of an established business network (Freeman et al., 1983; Stinchcombe, 1965). Start-ups face additional risks due to various factors. First, the uncertainty of their technology induces technological risks (Casper and Whitley, 2004; Ejeremo and Xiao, 2014). Second, their technological complexity makes it difficult for outsiders to assess the start-up’s potential, which makes it difficult for start-ups to attract funding (Michael and Pearce, 2009; Westhead and Storey, 1997). Third, start-ups are often founded by entrepreneurs who have a strong technological background but little entrepreneurial experience,

and who therefore struggle to translate their technological ideas into viable business propositions (Oakey, 2003; Patton, 2014). These factors cause start-ups to have even higher failure rates than small firms in general (Ejeremo and Xiao, 2014; Westhead and Storey, 1997), and they motivate governmental policies aiming to offset the risks associated with start-ups.

The efforts of policy makers to improve the conditions for start-ups have not been met without criticism. Several studies argue that high-growth, high-impact firms are not necessarily young or small firms (Acs et al., 2008; Brown and Mawson, 2015; Terjesen et al., 2016). Further, technology based firms are not overrepresented in the overall population of high growth firms (Bravo-Biosca and Westlake, 2009; Brown and Mawson, 2015; Henrekson and Johansson, 2010). Critics therefore argue that policies should aim to improve the conditions for high growth firms, in general, rather than focus on stimulating start-ups (Brown and Mason, 2014; Isenberg and Brown, 2014; Shane, 2009). Yet, despite this criticism, policy makers continue to see start-ups as key drivers of economic development and innovation. The past 20 years have therefore seen a “huge upsurge” in public policies aiming to stimulate start-ups in an effort to achieve economic growth (Brown and Mason, 2014 p. 774; Buss, 2002; Isenberg, 2010; Michael and Pearce, 2009). These policies include public co-investment schemes, technology transfer offices, consulting services and cluster policies.

1.1 THE DEVELOPMENT OF INCUBATORS AND INCUBATOR RESEARCH

Incubators have become a prominent part of start-up support policies. The term ‘incubator’ originates from the medical device that provides a protective environment for the care of prematurely born babies (Aernoudt, 2004). Similarly, incubators are organizations that provide a ‘safe haven’ and support for firms during the early and vulnerable stage of their development (Aernoudt, 2004; Amezcua et al., 2013; Bergek and Norrman, 2008; Hackett and Dilts, 2004a; Theodorakopoulos et al., 2014). The support provided by incubators includes access to funding, networks, and mentorship by experienced entrepreneurs. Incubators have been supporting new businesses for over fifty years, during which time period they developed considerably (Barrow, 2001). The ‘first generation’ incubators became widespread in the 1980s. They aimed to create economies of scale by providing shared office space and facilities (Barrow, 2001; Bruneel et al., 2012). Although the provision of such tangible resources is still an important part of the modern incubator’s value proposition, incubators now focus on intangible resources. This started in the early 1990s, when incubators began supporting start-ups (Ahmad and Ingle, 2013;

Bruneel et al., 2012; Leblebici and Shah, 2004). Incubators realized that founders of these start-ups lacked entrepreneurial experience. This led incubators to expand their support towards professional consultancy services, as well as coaching and training for entrepreneurs (Bruneel et al., 2012). These ‘second generation’ incubators also acted as investors by providing funding in exchange for equity. The ‘third generation’ incubators emerged in the late 1990s and focused on networking, with the aim to provide start-ups with access to external resources, networks and legitimacy (Bøllingtoft and Ulhøi, 2005; Bruneel et al., 2012; Hansen et al., 2000). This continuing development of incubators means that modern incubators provide a wide range of resources that enable start-ups to overcome the liabilities of newness and smallness (Bruneel et al., 2012).

As incubators increased the scope of their support, the incubator population expanded rapidly. It is estimated that the number of European incubators has seen a fivefold increase between 2007 and 2013 (Salido et al., 2013), and that there are currently 7,000 incubators world-wide (InBIA, 2016). This expansion has been largely driven by local and national governments. In the United States, the National Science Foundation and Small Business Administration actively promoted incubation during the late 1970s and early 1980s by providing funding and by sharing best practices (Leblebici and Shah, 2004). In Europe, national and European governments advocated and funded incubators in the late 1990s as a way to offset the risks associated with start-ups (Ahmad and Ingle, 2013; ECA, 2014). Nowadays, governments still strongly support incubators. The International Business Incubator Association (InBIA) states that 93 per cent of US incubators are non-profit organizations (InBIA, 2016). In Europe, 63 per cent of incubators is supported by governments (Aerts et al., 2007). Accordingly, the desires of policy makers to facilitate entrepreneurship and innovation still drives the expansion of the incubator population. The incubators is now considered to be a ‘ubiquitous phenomenon’ (Bergek and Norrman, 2008 p. 20) that has become an ‘institutionalized component’ (Ahmad and Ingle 2013 p. 123) of Western countries’ innovation policies.

While the widespread diffusion of incubators suggest that they are effective instruments to help start-ups, the empirical evidence is mixed, at best. Some studies find that incubated start-ups have significantly higher chances of survival, with 80 to 90 percent still being in business after five years (European Commission, 2002), or after leaving the incubator (Aernoudt, 2004). Other studies find that incubators have a positive effect on start-ups’ innovativeness (Colombo and Delmastro, 2002) or growth (Stokan et al., 2015). At the same time, “serious doubts have emerged about the general effectiveness of business incubation” (Tavoletti, 2013 p. 423). These doubts emerge from studies that find the incubator’s impact on start-up

performance to be nonexistent (Pena, 2004; Tamásy, 2007; Westhead and Storey, 1994) or even negative (Schwartz, 2013, 2009).

These contradicting results have been ascribed to various methodological challenges associated with assessing the effectiveness of incubators. First, there is no consensus on the definition of an incubator (Aernoudt, 2004; Bergek and Norrman, 2008; Phan et al., 2005). The rapid growth of the incubator phenomenon has resulted in a heterogeneous incubator population, with incubators using different revenue models, providing different forms of support, and targeting different subgroups of start-ups (Vanderstraeten and Matthyssens, 2012). This diversity is reflected in the many definitions that are used in the literature (see for an overview Aernoudt, 2004; Bruneel et al., 2012; Theodorakopoulos et al., 2014). Accordingly, there is little consensus about what it takes to qualify as an ‘incubator’, which makes it difficult to create a comparable sample of incubators for individual studies, or to compare the findings of different evaluation studies. Second, there is no consensus on an appropriate indicator to measure the performance of incubators (Barbero et al., 2012; Bergek and Norrman, 2008; Schwartz, 2013). Again, the literature uses a wide variety of performance measures, such as the number of jobs created, survival rate of start-ups or start-up growth. This variety can partly be ascribed to the heterogeneity of the incubator population. Different incubators have different goals, and even within a single incubator, different stakeholders may have different expectations (Bergek and Norrman, 2008). Third, as start-ups are screened prior to being admitted into the incubator, it is difficult to establish whether a positive impact of the incubator on start-up performance is due to the incubator’s support, or due to the incubator’s ability to select the most promising start-ups (Aerts et al., 2007; Schwartz, 2009). Most studies address this selection bias by comparing incubated start-ups to matched samples of non-incubated start-ups (e.g. Colombo and Delmastro, 2002; Schwartz, 2013; Westhead and Storey, 1994). However, many factors influence start-up performance, which makes it difficult, if not impossible, to match start-ups on all relevant factors (Schwartz, 2013; Stokan et al., 2015). Fourth, there is a lack of comparable data on incubators and incubated start-ups. The start-ups that are supported by incubators are not publicly listed, and keep their financial statements private to their founders and investors (Buss, 2002). There is no centralized institution that tracks the global incubator population (Aerts et al., 2007; Ahmad and Ingle, 2013), and individual incubators often do not publicly disclose their metrics (Bergek and Norrman, 2008; Schwartz, 2013).

In addition to these methodological challenges associated with evaluating the effectiveness of incubators, there is a more fundamental problem in the sense that there is a lack of understanding about how the incubation process takes place (Aboen, 2009; Mian, 2014; Theodorakopoulos et al., 2014). The emphasis on

evaluating the effectiveness of incubators has led to a ‘black box’ view of incubation: scholars have focused on the inputs and outputs of the incubator, while neglecting the processes in between (Ahmad and Ingle, 2013; Bergek and Norman, 2008; Hackett and Dilts, 2008, 2004a). As Patton et al. (2009 p. 624) state: “the majority of the literature has focused on the outcomes of the activity and not on the activity itself”.

The black box view of incubation has been criticized as it reveals little about the mechanisms and practices that underlie the incubation process (Ahmad and Ingle, 2013; Ahmad, 2014; Hackett and Dilts, 2004a; Mian, 2014). Mechanisms “detail the cogs and wheels of the causal process through which the outcome to be explained was brought about” (Hedström and Ylikoski, 2010 p.50). As such, mechanisms explain *why* there is a relationship between incubation and start-up performance (Elster, 1989; Hedstrom and Sweldberg, 1998; Leuridan, 2012). Practices facilitate these mechanisms as they describe *how* actors involved in the incubation process actually help start-ups.

Hackett and Dilts were among the first, in 2004, to highlight the need “to explain how and why the incubation process facilitates incubatee development” (p. 72). Ten years later, various scholars express identical arguments. Mian (2014) concludes: “what is lacking is any substantive work on understanding the incubation process itself” (p. 362). Theodorakopoulos et al. (2014) urge future research to study “how and why a business incubation process leads to specific outcomes” (p. 614). Accordingly, it seems that the incubator literature has made little progress on this topic in ten years, even though the annual number of papers on incubators has seen a fourfold increase during this period (Albort-Morant and Ribeiro-Soriano, 2015). This lack of progress is partly due to the literature’s focus on (quantitatively) evaluating the outcomes of incubation. At the same time, several studies have tried to (qualitatively) explore the inside of incubators. However, these studies suffer from four main limitations.

First, the literature is criticized for neglecting the perspective of the entrepreneur (Aaboen, 2009; Abduh et al., 2007; Theodorakopoulos et al., 2014), as it has primarily explored the support that the incubator provides while neglecting how entrepreneurs perceive this support. Second, qualitative studies have focused on providing typologies of incubators (e.g. Clarysse et al., 2005; Grimaldi and Grandi, 2005; Pauwels et al., 2015; von Zedtwitz and Grimaldi, 2006). Such studies outline the incubator’s characteristics rather than its practices. Third, the incubator literature has been criticized for being a-theoretical (Ahmad, 2014; Bøllingtoft and Ulhøi, 2005; Theodorakopoulos et al., 2014). Consequently, the theoretical mechanisms that may help in explaining why incubation influences start-up performance remain unexplored. Fourth, while there is increasing awareness that the incubation

process is likely to be influenced by the incubator's national and industrial context, these contextual factors remain underexposed (McAdam et al., 2015), as there is a lack of studies that compare incubators in different industries or countries (Ahmad and Ingle, 2013; Baraldi and Ingemansson Havenvid, 2015; Phan et al., 2005).

1.2 AIM AND RESEARCH QUESTION

Given the limitations outlined above, this dissertation aims to illuminate the black box of the incubation process by answering the following central research question:

“How do mechanisms and practices of incubation contribute to start-up performance?”

To respond to calls for more theoretically grounded research on the incubation process, I use multiple theoretical frameworks to explore mechanisms and practices of incubation. First, I apply the Resource Based View (RBV) to identify the various resources that are provided to start-ups during the incubation process. The RBV points at intangible resources, primarily knowledge (Grant, 1996), and networks (Nahapiet and Ghoshal, 1998), as the most important resources for firms in developing a sustainable competitive advantage (Hitt, 2001). Knowledge and networks have also been identified as key resources in the incubation process (Bøllingtoft and Ulhøi, 2005; Bruneel et al., 2012; Patton, 2014). Therefore, I further explore these resources. I explore the practices through which incubators provide access to knowledge by using theories on Organizational Learning (OL). I explore the practices through which incubators facilitate networking by applying insights from the literature on Communities of Practice (CoP). The RBV, OL and CoP point at the start-up's characteristics (i.e. its resources, knowledge and networks, respectively) as drivers of their performance. The start-up's regional context also has particular attributes that influence the start-up's performance, such as the presence of venture capital and the availability of a well-educated workforce (Ács et al., 2014; Porter, 1998). These attributes may also influence practices of incubation, as incubators enable start-ups to overcome challenges that are specific to the local context, such as a lack of venture capital or legitimacy for start-ups (Amezcuca et al., 2013; Clarysse et al., 2005; Degroof and Roberts, 2004). Therefore, I use the literature on entrepreneurial ecosystems (EE) as a framework to explore this context (Spigel, 2015; Stam, 2015).

The next section discusses these four frameworks. For each framework, I first outline the basic notions and its implications for the role of the incubator. I then

briefly discuss the extant incubator literature that has built on this particular framework. This allows me to formulate the sub questions that I answer throughout this dissertation. After discussing these four frameworks, I discuss how entrepreneurs may perceive the incubator's mechanisms and practices, after which I briefly discuss the concept of start-up performance. I end this section with a synthesis of the theoretical frameworks and a conceptual model that I use in this dissertation.

1.3 THEORETICAL FRAMEWORKS

1.3.1 Resource Based View

The resource based view (RBV) took shape in the 1980s to explain the internal sources of a firm's competitive advantage (Barney et al., 2011). The RBV sees firms as a bundle of resources (Barney, 1991; Wernerfelt, 1984), which are "stocks of available factors that are owned or controlled by the firm" (Amit and Schoemaker, 1993, p. 35). Given that resources are heterogeneously distributed and imperfectly mobile, firms can gain a sustainable competitive advantage over others by leveraging their valuable, rare, inimitable, and non-tradeable resources as well as their unique capabilities to combine and deploy these resources (Amit and Schoemaker, 1993; Oliver, 1997).

In contrast with established organizations, the resource base of start-ups is still developing. Start-ups may struggle to accumulate missing resources, as they do not have a track record necessary to convince stakeholders to commit resources (Aldrich and Fiol, 1994; Bruton et al., 2010). Further, the novelty, uncertainty, and complexity of their technology make it difficult for outsiders to assess the start-up's value. As a result, start-ups are seen as a high-risk investment and find it difficult to acquire sufficient resources (Carpenter and Petersen, 2002; Westhead and Storey, 1997).

According to the RBV, the incubation process can help start-ups to gain a competitive advantage (which subsequently contributes to start-up performance) by creating a resource-rich environment that enables start-ups to complement their resource base in a cost effective and timely manner (Ahmad, 2014; Albert and Gaynor, 2001; McAdam and McAdam, 2008). This was the main rationale behind the first generation incubators that created economies of scale by offering shared resources (Barrow, 2001; Bruneel et al., 2012). Incubators can provide these resources directly, or enable start-ups to access resources through the incubator's networks (Gassmann and Becker, 2006; Grimaldi and Grandi, 2005). The RBV is one of the most commonly applied theories in incubator research (Ahmad, 2014). Studies often use it to describe and categorize the incubator's support (e.g. Clarysse

et al., 2005; Gassmann and Becker, 2006; McAdam and McAdam, 2008). Incubators can provide a comprehensive range of resources, including tangible resources (e.g. office space, equipment, funding) and intangible resources (e.g. specialized knowledge, networks and legitimacy).

Still, little is known about *how* incubators provide these resources (Bergek and Norrman, 2008; Bruneel et al., 2012). Resources are simply perceived to be ‘there’ and subsequently integrated into the resource base of start-ups. This dissertation therefore applies the RBV to explore the following sub question:

SQ 1: “How do practices of incubation facilitate access to resources?”

1.3.2 Organizational Learning

Organizational Learning (OL) explores how organizations acquire, distribute and store new knowledge (Huber, 1991; Levitt and March, 1988; Walsh and Ungson, 1991). Its origins lie in the behavioral theory of the firm (Cyert and March, 1963), which viewed firms as adaptive learning systems (Greve, 2003; Van de Ven and Poole, 2004). Since then, research on OL has expanded rapidly to explore how, what, when and where organizations learn (Dodgson, 1993; Schulz, 2002).

While OL has primarily been applied to study established organizations, there is now increasing interest to study OL in the domain of entrepreneurship (Franco and Haase, 2009; Wang and Chugh, 2014). Entrepreneurship is seen as an experiential learning process, as entrepreneurs learn primarily through ‘learning by doing’ (Cope, 2005; Politis, 2005). Learning plays a central role in the start-up process, as the creation of new knowledge is key to reducing the uncertainty associated with entrepreneurship, in general, and founding a start-up, in particular (De Massis et al., 2012). Accordingly, entrepreneurs’ (in)ability to learn is an important driver of their success or failure (Franco and Haase, 2009). The high failure rate of start-ups is partly ascribed to their inability to learn, as the founders of these start-ups fail to develop necessary complementary knowledge to translate their technological ideas into viable business propositions (Oakey, 2003; St-Jean and Audet, 2012).

From an OL perspective, the incubation process can be seen as a mechanism that accelerates the learning curve of start-ups. This was the aim of the second generation incubators (Barrow, 2001; Bruneel et al., 2012). These incubators provide direct access to knowledge by providing start-ups with experienced management teams or by enabling start-ups to use the incubator’s in-house consultants. Further, the incubator’s networks facilitate ‘social learning’ (Bandura, 1977) by enabling start-ups to acquire knowledge from a variety of stakeholders, such as other entrepreneurs, investors or experienced entrepreneurs who act as ‘mentors’ (Bøllingtoft

and Ulhøi, 2005; Totterman and Sten, 2005). This enables entrepreneurs to avoid the tedious and time consuming process of developing knowledge through learning by doing (Bandura, 1977; Bruneel et al., 2012). Studies applying OL to the incubation process remain remarkably sparse, despite the importance of learning in the incubation process. The few studies that have explored learning in incubators focus on ‘what’ start-ups learn, by exploring the types of knowledge that start-ups acquire (e.g. Scillitoe and Chakrabarti, 2010; Studdard, 2006; Sullivan and Marvel, 2011). Knowledge on how to manage a business (‘business knowledge’) and knowledge about what customers need and how markets operate (‘market knowledge’) seem particularly important, as start-up founders lack such knowledge (Patton, 2014; Rice, 2002). Such knowledge is primarily acquired through interactions with incubator managers, other entrepreneurs, or the incubator’s external network. The incubator’s role in providing knowledge associated with technologies, products and processes (‘technological knowledge’) is debated. Some find that start-ups acquire such knowledge through the incubator’s networks (Scillitoe and Chakrabarti, 2010; Sullivan and Marvel, 2011). Others find that the incubator plays only a limited role in providing such knowledge, since start-ups already have a solid technological knowledge base due to the technological background of their founders (Patton, 2014; Studdard, 2006).

The question of ‘how’ learning occurs in incubators has received less attention (Warren et al., 2009) and it remains unclear how incubators can facilitate learning other than providing relational connections and physical proximity. This dissertation therefore applies insights from OL to answer the following sub question:

SQ 2: *“How do practices of incubation facilitate learning?”*

1.3.3 Communities of Practice

Literature on Communities of Practice (CoP) emerged in the 1990s to promote a social view of learning that emphasizes the tacit nature of knowledge and its embeddedness within people and their network relationships (Lave and Wenger, 1991). CoP literature argues that individuals learn by participating in a community and absorbing its practices and identity (Brown and Duguid, 1991). These ‘communities of practice’ are groups of people informally bound together by shared expertise and passion for a joint enterprise (Wenger and Snyder, 2000). As such, CoPs are not just a network of people. They are *communities* in the sense that they are tightly knit and voluntary in nature (Cox, 2005). Further, the network’s *practice* (i.e. the task, job or profession in which the community members engage) is a source of coherence (Garavan et al., 2007; Handley et al., 2006).

A strong social network has been recognized as a key driver of start-up performance, as it allows start-ups to identify opportunities, to mobilize resources, to access knowledge and to build legitimacy (Fernald et al., 2015; Groen et al., 2008; Stam et al., 2014). From a network perspective, the incubation process has the potential to increase the quality and quantity of the relationships between a start-up and other organizations (Amezcuca et al., 2013). Because start-ups are still in the process of developing networks and trust with external actors, an incubator with an established network and reputation can provide substantial benefits (Bøllingtoft and Ulhøi, 2005; Hansen et al., 2000). These benefits drove the emergence of 'third generation' incubators, which aimed to connect start-ups to their external environment and to each other. Such incubators thereby facilitate the emergence of 'start-up communities': local, dense networks of start-ups and start-up supporters, such as mentors and investors. These start-up communities enable start-ups to quickly share resources, knowledge and networks. They also provide a group of peers that entrepreneurs can identify with, which provides emotional support and contributes to the legitimacy of start-ups (McAdam and McAdam, 2008; Totterman and Sten, 2005).

Several scholars have hinted that the start-up communities that form during the incubation process are similar to CoPs (Ahmad, 2014; Theodorakopoulos et al., 2014). Peters et al. (2004 p.89) even state that "the overall enveloping theory behind the incubation process may be related to the theory of community of practice". Still, these start-up communities have not yet been explored through the lens of CoPs. Studies have primarily applied social capital theory to explore the benefits, risks, structure and relationships of start-up communities (e.g. Cooper et al., 2010; Mcadam and Marlow, 2007; Totterman and Sten, 2005). However, social capital theory pays little attention to the question of how networks can be facilitated (Gedajlovic et al., 2013). Consequently, further research is necessary on the practices through which the incubation process facilitates start-up communities (Ahmad, 2014; Cooper et al., 2010; Theodorakopoulos et al., 2014).

The literature on CoP provides a promising framework to explore such practices. There is growing awareness that CoPs can and should be facilitated (Garavan et al., 2007; Pemberton et al., 2007). Many studies have explored how established organizations can facilitate CoPs, which has led to the identification of a broad range of facilitating practices (Bolisani and Scarso, 2014; Wenger et al., 2002). These practices may also be applicable to start-up communities. This dissertation therefore applies insights from CoP to answer the following sub question:

SQ 3: "How do practices of incubation facilitate networking in start-up communities?"

1.3.4 Entrepreneurial Ecosystems

The entrepreneurial ecosystem (EE) consists of a set of interdependent components (actors, networks and institutions) that exist outside the start-up and that contribute to start-up performance (Spigel, 2015; Stam, 2015). These components include, for example, the EEs physical infrastructure, its talent pool, and its access to domestic and foreign markets (Cohen, 2006; Neck et al., 2004). The EE literature is rapidly gaining momentum to explain the presence or absence of start-up activity in a particular region. It draws on insights from a diverse literature on clusters, social capital, economic geography and, in particular, innovation systems (Ács et al., 2014; Bergek et al., 2015; Spigel, 2015; Stam, 2015). The EE shares its emphasis on context with these concepts. However, the EE approach focuses on the development of start-ups as the main output of the system (Spigel, 2015). Further, it pays explicit attention to the role of entrepreneurs in developing the ecosystem (Feld, 2012); this role is often neglected in the literature on innovation systems (Ács et al., 2014; Autio et al., 2014).

Incubators can influence the EE in various ways. First, the incubator plays a mediating role by connecting start-ups to the various actors in the ecosystem, thereby allowing a more effective flow of resources and knowledge (Amezcuca et al., 2013; Bergek and Norrman, 2008). Second, incubators can protect start-ups from unfavorable institutions by acting as a 'safe harbor' (Amezcuca et al., 2013). For example, the incubator's community can create an internal culture of support and encouragement (Cooper et al., 2010), which may compensate for the absence of such a culture in the entrepreneurial ecosystem. Third, incubators may act as institutional entrepreneurs by transforming or creating institutions that favor the interests of start-ups (Amezcuca et al., 2013; DiMaggio, 1988). Incubators may for example organize a collective group of start-ups, thereby increasing their power and legitimacy, which in turn enables incubators to negotiate favorable regulations (Pacheco et al., 2010).

Conversely, the EE also influences the incubator. There is a growing awareness that there is no 'one size fits all' incubation process that is generally applicable. Instead, incubators should tailor their practices to the local entrepreneurial ecosystem (McAdam et al., 2015). Incubators are thus seen as 'idiosyncratic reflections of local conditions' (Allen and McCluskey 1990 p. 75, see also Phan et al. 2005; Schwartz 2013; Tavoletti 2013). Still, the incubator's context remains underexposed in the extant literature (McAdam et al., 2015; Phan et al., 2005). A few studies pay explicit attention to the relationship between the incubation process and the incubator's context, or compare incubators in various EEs (see e.g. Chandra, 2007; Rubin et al., 2015). However, these studies primarily provide comparisons of in-

incubator attributes (such as configurations, objectives and historical underpinnings) and, as such, do not relate the incubator's EE to the incubation practices. Therefore, this dissertation applies the literature on entrepreneurial ecosystems to answer the following sub question:

SQ 4: *“How do practices of incubation and the entrepreneurial ecosystem influence each other?”*

1.3.5 The importance of incubation mechanisms and practices as perceived by entrepreneurs

By facilitating access to resources, learning and networking in a particular entrepreneurial ecosystem, the incubation process can potentially contribute to start-up performance. Still, this potential can only be realized if entrepreneurs actually engage in the incubation process to make use of the incubator's support. However, recent studies show that many start-ups do not engage in the incubation process (Bruneel et al., 2012; Patton and Marlow, 2011). A possible explanation is that entrepreneurs do not perceive the value of the incubator's resources, learning and networking (Patton, 2014). However, as mentioned before, the incubation literature often neglects the perspective of the entrepreneur (Aaboen, 2009; Theodorakopoulos et al., 2014). Consequently, scholars have called for more entrepreneur-centric research that explores the importance of the incubator's mechanisms and practices as perceived by entrepreneurs (Abduh et al., 2007; Ahmad, 2014; Bøllingtoft, 2012). Therefore, I explore the importance of the three mechanisms that underlie the incubation process (i.e. resources, learning and networks) as perceived by entrepreneurs. This leads to the following sub question:

SQ 5: *“what is the importance of incubation mechanisms and practices as perceived by entrepreneurs?”*

1.3.6 The influence of incubation mechanisms on startup performance

Measuring the performance of start-ups can be challenging. Start-ups are often not yet making sales, as they are still developing their product or service (Westhead and Storey, 1997). This makes it impossible to use traditional firm performance measurements such as turnover or profit. Therefore, I measure start-up performance as the amount of investments that start-ups have attracted. The start-ups that are supported by incubators often require external investments to finance research and development activities at the pre-sales stage (Bottazzi and Da Rin, 2002; Westhead

and Storey, 1997). Start-up investments can be provided by several sources, such as venture capitalists, governments, banks or ‘friends, family and fools’. (Cassar, 2004). While attracting investments can be considered as a means to an end rather than a goal in itself, it is considered to be an important milestone for start-ups, and it has a high signaling value for future performance (De Clercq et al., 2006; Vohora et al., 2004). The total amount of attracted investments is therefore considered to be a valid indicator for the performance of the young start-ups that are typically supported by incubators (Rothaermel and Thursby, 2005). Consequently, start-up investments is commonly used by studies that explore the performance of start-ups, in general (e.g. Batjargal, 2007; Shane and Stuart, 2002) and the performance of start-ups in incubators, in particular (see e.g. Hoffman and Radojevich-kelley, 2012; Rothaermel and Thursby, 2005). Using start-up investments as a performance measurement leads to the sixth, and final, sub question:

SQ 6: “how do incubation mechanisms influence the amount of investments that start-ups attract?”

1.3.7 Synthesis

Figure 1.1 provides an overview of how the theoretical frameworks introduced above are combined into a conceptual model. The RBV, OL and CoP each argue that the incubation process provides a specific set of ‘intermediary benefits’ (resources, learning and networks, respectively) that subsequently contribute to start-up performance. These three frameworks thus provide different mechanisms that explain why incubation contributes to start-up performance. These mechanisms point at two different roles for the incubator (Amezcuca et al., 2013; Bergek and Norman, 2008). First, the incubator provides ‘direct support’, as it directly transfers resources and knowledge to start-ups. The incubation process enables

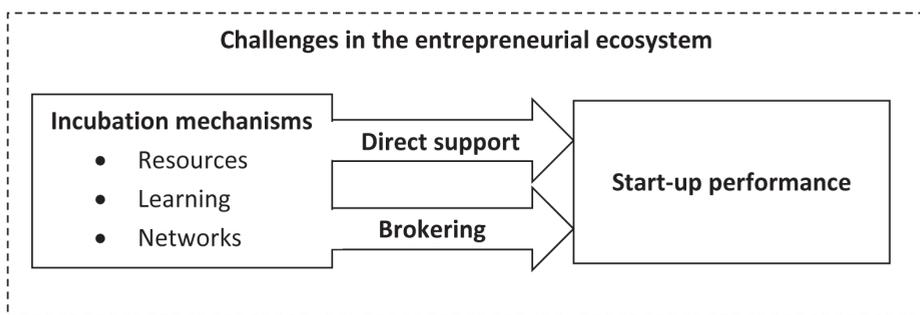


Figure 1.1. Conceptual model

start-ups, for example, to access financial and physical capital, to use the services of in-house consultants or to absorb the practices of the incubator's start-up community. Second, the incubator acts as a 'broker' that enables start-ups to acquire resources and learn from external sources. Brokering consists, for example, of organizing networking events or providing personal referrals. Brokering enables start-ups to be more visible, more aligned and better connected to important actors external to the incubator.

The EE literature provides an appropriate framework to explore the role of the incubator's context. It argues that the mechanisms and practices of incubation are influenced by the incubator's context as the incubator allows start-ups to overcome particular challenges in the EE. Conversely, by addressing these challenges, the incubator has the potential to influence and strengthen the EE.

The four frameworks reflect the development of incubators along multiple generations that facilitate access to resources (1st generation), accelerate the learning process (2nd generation), and provide access to networks (3rd generation). The four frameworks thereby complement each other by illuminating different parts of the black box of the incubation process and, together, enable me to answer the main research question.

1.4 METHODS

I explore and test the conceptual model through a process and a variance approach (Mohr, 1982; Van de Ven and Poole, 2004).

A process approach aims to explain how a sequence of events lead to a particular outcome (Mohr, 1982; Van de Ven and Poole, 2004). The process approach of this dissertation consists of a series of exploratory qualitative studies. I use these studies to explore how the resource, learning and network based mechanisms take place during the incubation process, and to identify the practices through which these mechanisms can be facilitated. To explore the role of challenges in the EE, these studies are conducted in different countries, which are all Western countries aiming to stimulate start-ups in an effort to achieve economic growth. I focus on Western countries because they have a high concentration of both start-ups and incubators (Aerts et al., 2007; WEF, 2015) which makes them particularly relevant for my study. Within this constraint, I maximize variation to allow for generalizability. This is particularly important when the population under study is heterogeneous, as is the case for incubators. I therefore collect data both from regions that are seen as successful EEs with a long tradition of incubation (e.g. Silicon Valley, the Greater Boston Area and Israel) and from EEs that are perceived to be lagging behind in terms

of start-up and incubation activities (e.g. parts of Western Europe and Australia). Qualitative data consists primarily of semi-structured interviews with entrepreneurs and incubator representatives. Also within each region, I create a diverse sample. I therefore conduct interviews with entrepreneurs and incubator managers with different backgrounds, active in different industries, in different stages of development, etc. The diversity of these interviewees further contributes to the generalizability of my findings, and allows to identify a wide range of incubation practices. To triangulate findings, I conduct additional interviews with other key stakeholders in the entrepreneurial ecosystem, such as investors and university technology transfer officers. I follow an inductive process in analyzing the qualitative data: I let incubation practices and other relevant concepts (such as entrepreneurs' reasons to join the incubator, characteristics of the start-up community, or challenges in the entrepreneurial ecosystem) emerge from the data. I initially identify concepts by labelling text segments with 'in vivo' codes. These are labels that remain close to the terms used by the interviewees to minimize researcher subjectivity (Gioia et al., 2012). As coding proceeds, I start collapsing and categorizing similar codes. This eventually leads to the identification of broader incubation practices and concepts that provide a comprehensive understanding of how the incubation process takes place. During the data analysis, the four frameworks provide 'sensitizing concepts' (Blumer, 1954), which give a broad sense of what to look for in the data. The EE literature, for example, lists several components that are present in favorable EEs and that provide guidance in identifying challenges of the EE.

A variance approach aims to explain (variation in) outcomes by testing relationships among dependent and independent variables. It is complementary to the process approach, as it can test and validate the mechanisms that are identified in the process approach (Mohr, 1982; Van de Ven and Poole, 2004). The variance approach of this dissertation consists of testing which of the three incubation mechanisms (i.e. access to resources, learning and networks) are most important in the incubation process. I first explore which mechanisms entrepreneurs perceive as most important. I do so through a Discrete Choice Experiment (Louviere and Woodworth, 1983), in which entrepreneurs choose between two hypothetical incubators. Each hypothetical incubator provides a particular set of practices to facilitate access to resources, learning and networking. As entrepreneurs choose between the two incubators, they make a trade-off between the practices, which reveals the perceived importance of each mechanism. I also test the effect of incubation mechanisms on the amount of investments that start-ups attract. I test both the role of the incubator in providing 'direct support' and acting as a 'broker' through binary and ordinal logistic regression analyses. Both variance approaches use the same data set, which consists of a sample of 935 start-up founders. Again, these found-

ers were surveyed in different, Western countries (in North America and Western Europe) to understand the relationship between the incubation process and the EE.

Conducting qualitative and quantitative studies, combined with the great diversity and large size of the datasets ($n = 281$ and $n = 935$, respectively), contributes to the reliability and generalizability of my findings.

1.5 OUTLINE OF DISSERTATION

The remainder of this dissertation consists of a series of empirical chapters (an overview of which is provided in table 1.1) and a conclusion chapter.

In chapter 2, I explore the practices through which the incubation process facilitates access to resources. I use the RBV to categorize the incubator's resources, to identify the most important resources as perceived by entrepreneurs and incubator staff and to explore why differences between their perceptions exist. I then explore the practices through which incubators enable start-ups to make use of the incubator's resources. Data comes from a total of 66 qualitative interviews conducted with entrepreneurs and incubator staff in the Netherlands, France, United Kingdom and Switzerland. I collect data from these Western European countries because questions are being raised about the effectiveness of Western European incubators (Aernoudt, 2004; Schwartz, 2013), which may be due to start-ups not taking advantage of the incubator's resources.

In chapter 3, I explore the practices through which the incubation process facilitates organizational learning. In doing so, I draw on one of the most important

Table 1.1 Overview of empirical chapters

Chapter	Approach	Methods and data	Sub question
2	Process	Inductive analysis of qualitative data from 66 interviews conducted in the Netherlands, UK, Switzerland and France	SQ1
3	Process	Inductive analysis of qualitative data from 69 interviews conducted in Silicon Valley	SQ2
4	Process	Inductive analysis of qualitative data from 53 interviews conducted in Australia	SQ3
5	Process	Inductive analysis of qualitative data from 281 interviews conducted in the Netherlands, Switzerland, France, Germany, Silicon Valley, Australia, Israel and the Greater Boston Area	SQ4
6	Variance	Discrete Choice Experiment combined with latent class analysis based on survey data from 935 entrepreneurs in North America and Western Europe	SQ5
7	Variance	Binary and ordinal regression based on survey data from 935 entrepreneurs in North America and Western Europe	SQ6

classification in the OL literature: the distinction between lower and higher order learning (Argyris and Schön, 1978; Chiva et al., 2010; Fiol and Lyles, 1985). Accordingly, I explore the practices through which incubators facilitate lower and higher order learning. Further, by comparing incubators in the software and life sciences industry, I explore the influence of the specific industry context on the incubation process. I collect data in Silicon Valley because this region is home to the most mature and developed incubators (Aernoudt, 2004; Chandra and Fealey, 2009).

Consequently, Silicon Valley incubators are well known for their ability to help start-ups develop the knowledge and capabilities that are necessary to be successful.

In chapter 4, I apply insights from the literature on Communities of Practice to the domain of start-ups and incubators. I use Wenger's (1998) three dimensions of CoPs (joint enterprise, mutual engagement and shared repertoire) to provide a theoretically and empirically grounded characterization of the start-up communities that are an important part of the incubation process. I then use the CoP literature as a guide to explore the practices through which incubators facilitate networking in start-up communities. I collect data in Australia, because this country has recently seen a strong increase in the number of co-working spaces, incubators and accelerators (Shareable, 2013). These initiatives have led to the emergence of start-up communities throughout Australia.

In chapter 5, I focus on the relationship between incubation practices and the entrepreneurial ecosystem. This chapter takes a two-step approach. First, I use qualitative data from Europe to identify five challenges for European start-ups. Second, I explore how European incubators can learn from their peers in Silicon Valley, Australia, Israel and the greater Boston area to enable start-ups to overcome these challenges. I thereby provide deeper insights in the role that incubators play in the entrepreneurial ecosystem while also exploring how incubators are influenced by the strengths and weaknesses of their particular entrepreneurial ecosystem.

In chapter 6, I explore the importance of incubation mechanisms as perceived by entrepreneurs. I explore how the attributes of an incubator influence the choice of an incubator by different latent classes of entrepreneurs. To do so, I conduct a Discrete Choice Experiment. As entrepreneurs are forced to make a trade-off between different incubators attributes (such as funding and networks), the experiment allows to identify those attributes that are most important in entrepreneurs' choice of an incubator. Further, through latent class analysis, the discrete choice experiment allows to explore heterogeneity by clustering groups of entrepreneurs that display similar choice behavior.

In chapter 7, I test the influence of the incubation process on start-up performance, measured as the total amount of investments that start-ups have attracted. I analyze the role of the incubator in providing 'direct support' and acting as a 'broker'. By providing 'direct support', the incubation process provides start-ups with business knowledge through training and coaching. This can help start-ups to develop stronger, more convincing business propositions, which may subsequently help them to attract investments. Second, through 'brokering', the incubation process provides legitimacy and access to external networks, which enables start-ups to connect to investment sources. This chapter tests if incubators indeed influence the start-up's performance and, if so, how.

In chapter 8, I answer the main research question and discuss how my dissertation contributes to the literature on incubation. I then provide several recommendations to policy makers and incubator practitioners.





Chapter 2

You can't always get what you want: How entrepreneurs' perceived resource needs affect the incubator's assertiveness

This chapter is based on: Van Weele M., van Rijnsoever F., Nauta F. You Can't Always Get What You Want: How Entrepreneurs' Perceived Resource Needs Affect the Incubator's Assertiveness. Currently under revision after which it will be resubmitted for the fourth round of review at Technovation

Previous versions of this paper were presented at the DRUID 2013 conference in Barcelona, June 17-19 and at the Technology Transfer Society Annual Conference in Dublin, October 28 – 30 2015

The PhD candidate was the main contributor in designing the study, developing the methodology, collecting the data, performing the analysis, and writing this chapter

ABSTRACT

A possible explanation for the disappointing performance of incubators is that start-ups do not take full advantage of the resources offered by the incubator. However, existing studies have largely overlooked that incubated entrepreneurs may not be aware of the gaps in their resource base. Using qualitative data from six European incubators, we identify start-ups' resource needs as perceived by incubator staff and by entrepreneurs. Further, we explore the implications of differences in perceptions for the incubator's assertiveness. We find that entrepreneurs are unable to use the incubator's resources to develop necessary intangible resources: entrepreneurs are not aware of their resource gaps, hesitant to step out of their comfort zone, and primarily short-term oriented. In order to ensure that start-ups develop a comprehensive resource base, incubators supporting early stage start-ups were found to take an assertive strategy, creating self-awareness among entrepreneurs, and encouraging or forcing them to make use of the incubator's resources. Our study adds to current incubator literature by providing a more comprehensive explanation for the low usage of the incubator's resources, by identifying circumstances under which an assertive strategy is desirable and by identifying the practices through which an assertive strategy can be implemented.

2.1 INTRODUCTION

Incubators have become an institutionalized component of world-wide policies that aim to stimulate entrepreneurship, innovation and economic growth (Ahmad and Ingle, 2013; Oakey, 2012). There are currently about 7,000 incubators around the world, most of which are supported by local or national governments (Aerts et al., 2007; Dee et al., 2011; InBIA, 2016). These incubators provide start-ups with a broad range of services and resources, such as a physical infrastructure, business services, specialized technological knowledge, and a comprehensive support network (Aerts et al., 2007; Bruneel et al., 2012). As such, incubators have the potential to complement the resource base of start-ups and to facilitate their survival and growth. The popularity of incubators suggests that they are indeed effective instruments to support start-ups. However, while some studies have shown that start-ups in incubators have higher chances of survival or growth (Ferguson and Olofsson, 2004; Mian, 1997), there is a vast amount of empirical work showing that incubators do not help in promoting the success of start-ups (Oakey, 2012; Ratinho and Henriques, 2010; Schwartz, 2013, 2009; Tamásy, 2007; Tavoletti, 2013).

Recent studies show that start-ups do not take full advantage of the incubator's resources, which could partly explain these disappointing results. For example, while incubators organize training and coaching programs for entrepreneurs to acquire necessary business knowledge, participation in these sessions tends to be low (Patton and Marlow, 2011; Patton, 2014). Similarly, incubators enable start-ups to network with peers and external actors, but many entrepreneurs do not engage in these networking activities (Bruneel et al., 2012; Schwartz and Hornych, 2010). These findings suggest that entrepreneurs and incubator staff have different perceptions about the importance of the incubator's resources: while incubator staff feels that their training, coaching and networking are of great importance to incubated start-ups, entrepreneurs apparently do not agree (Patton, 2014).

The extant literature provides two explanations for these differences in perceptions that primarily point at the incubator. First, entrepreneurs may not make use of the incubator's resources when these are of insufficient quality. For example, entrepreneurs may be unwilling to take advice from mentors who lack experience (Lalkaka, 2001; Rice, 2002), and they may not engage in networking activities when the incubator's networks are underdeveloped (Patton, 2014; Totterman and Sten, 2005). A second explanation is that incubators do not sufficiently take the needs of the incubated start-ups into account, which results in a mismatch between the resources provided by incubators and the resources needed by start-ups. Ratinho and Henriques (2010) argue that the incubator's services are too rigid, as they

are not tailored to the specific needs of individual start-ups. Bruneel et al. (2012) finds that the incubator's resources are superfluous, as incubators support mature start-ups that already have a solid resource base. These mature start-ups have no need for the incubator's support, which is more tailored to the needs of early stage start-ups.

A third explanation, which has received less attention, points at the incubated entrepreneurs. These entrepreneurs often have a technological background and little entrepreneurial experience (Rice, 2002; Scillitoe and Chakrabarti, 2010). Such entrepreneurs may not be aware of the resources needed to complement their resource base, and they may be hesitant to ask for help to develop missing resources (Oakey, 2003; Vohora et al., 2004). Hence, they may be unable to recognize the value of the incubator's resources (Patton, 2014). Still, it has not yet been explored which specific resources entrepreneurs undervalue.

Therefore, our first research question is: *"which resources, provided by the incubator, do entrepreneurs and incubator staff perceive as important, and why do their perceptions differ?"*

The explanation for these differences in perceptions has important implications for incubators. If the incubator's resources are not valuable or not in line with the needs of start-ups, then incubators need to focus on developing their resources and listen more carefully to the needs of entrepreneurs. If, on the other hand, it is the entrepreneurs who are insufficiently aware of the needs of their start-up, then merely providing resources on the request of entrepreneurs is not sufficient for incubators. Incubators should then actively intervene in the incubation process by providing guidance on which resources start-ups should develop and by stimulating entrepreneurs to make use of the incubator's resources (Patton, 2014; Rice, 2002). Accordingly, the explanation for differences in perceptions affects the incubator's 'assertiveness', which refers to the extent to which incubators "see themselves as managers of the incubation process or as external facilitators of a process primarily managed by the incubatees themselves" (Bergek and Norrman, 2008 p.24). Therefore, our second research question is: *"what do these differences in perceptions imply for the incubator's assertiveness?"*

To answer these questions, we conducted a total of 66 interviews with incubator staff and incubated entrepreneurs in Europe. Entrepreneurs initially did not perceive business knowledge to be important, and were not willing to develop this resource because they were hesitant to step out of their comfort zone and primarily short term oriented. Incubators supporting early stage start-ups with first-time entrepreneurs were therefore highly assertive, using various practices to encourage or force entrepreneurs to develop particular resources. Our study provides additional explanations for the low usage of the incubator's resources, and identifies possible

responses. It also serves as a practical guideline for incubators and policy makers to help start-ups overcome their resource needs.

In the remainder of this chapter, we first discuss literature on entrepreneurship and incubators, followed by the research methods. We then present our findings. This chapter ends with a discussion and conclusion.

2.2 THEORY

This section develops a framework that guides our data collection and analysis. We first draw on the resource-based view (RBV) to identify and categorize both the resources that start-ups need to survive as well as the resources that incubators may provide. This categorization will be used in the empirical part to outline the perceptions of entrepreneurs and incubator managers regarding the importance of the incubator's resources. We then explore how incubators can intervene in the incubation process by discussing the concept of incubator assertiveness.

2.2.1 Start-up needs and incubator support: resources

According to the RBV, firms can be seen as a bundle of tangible and intangible resources (Barney, 1991; Wernerfelt, 1984), with resources being "stocks of available factors that are owned or controlled by the firm" (Amit and Schoemaker, 1993, p. 35). The competitive advantage of firms lies in their valuable, rare, inimitable, and non-substitutable resources (Amit and Schoemaker, 1993; Oliver, 1997). In contrast with established organizations, the resource base of start-ups is incomplete and still developing, which contributes to the 'liabilities of newness' of such firms (Stinchcombe, 1965). From a resource-based perspective, incubators are seen as addressing these liabilities of newness by providing a resource-rich environment that enables start-ups to complement their resource base (Albert and Gaynor, 2001; McAdam and McAdam, 2008). As such, incubators can provide resources directly, or enable start-ups to access resources externally through the incubator's networks (Gassmann and Becker, 2006; Grimaldi and Grandi, 2005). The following list of resources is not exhaustive, but it outlines the most important resources that start-ups need to survive and grow. In discussing each resource type, we first provide a definition. We then discuss the resource in the context of start-ups, after which we discuss how incubators can support start-ups by providing this resource. Table 2.1 provides an overview.

Table 2.1 Start-up resource needs and incubator support

Resource needs	Incubator support to fulfill resource needs
Physical capital	<ul style="list-style-type: none"> • Office space • University equipment and library
Financial capital	<ul style="list-style-type: none"> • Seed capital in exchange for equity • Access to investors
Knowledge	<ul style="list-style-type: none"> • Provide technological knowledge through proximity to university groups and laboratories • Provide business knowledge through coaching and training
Social capital	<ul style="list-style-type: none"> • Facilitate the creation of external networks by organizing events, creating partnerships and making introductions • Facilitate the creation of a community through co-location, social events and introductions
Legitimacy	<ul style="list-style-type: none"> • Association with an established incubator

Tangible resources

- **Physical capital** includes the physical technology used in a firm, the firm's plant and equipment, its location, and its access to raw materials (Barney, 1991). Physical capital may be difficult to find and expensive to acquire on the small scale needed by start-ups. Incubators can provide physical capital and economies of scale by providing shared office space and facilities such as equipment, meeting rooms or a reception (Bergek and Norrman, 2008). University affiliated incubators can also provide access to specialized physical capital, such as university libraries and laboratories (Mian, 1997).
- **Financial capital** entails all of the different monetary resources available for the discovery and exploitation of the venture idea (Barney, 1991). Start-ups often need high amounts of financial capital for costly research & development at the pre-sales stage (Westhead and Storey, 1997). At the same time, financiers see start-ups as high risk investments due to the novelty and complexity of their technology (Carpenter and Petersen, 2002; Gompers and Lerner, 2001). Start-ups may therefore struggle to attract the necessary financial capital. Incubators can contribute to the financial capital of start-ups by providing seed capital in exchange for equity, or they can help start-ups in an indirect manner to find external investments by connecting start-ups to external funding sources (Costa-David et al., 2002).

Intangible resources

- **Knowledge** can be defined and measured in many different ways (Grant, 1996; Quintane et al., 2011). We follow Scillitoe and Chakrabarti (2010) and Sullivan and Marvel (2011), who distinguish between technological and business knowledge. Start-ups are often founded by entrepreneurs with a technologi-

cal background, which gives start-ups a solid technological knowledge base (Oakey, 2003; Sullivan and Marvel, 2011). However, because these founders often lack managerial and entrepreneurial experience, business knowledge in start-ups tends to be underdeveloped (ibid). Incubators can contribute to the start-up's business knowledge by providing training programs or coaching by experienced entrepreneurs in the incubator (Chan and Lau, 2005; Rice, 2002). University affiliated incubators may also add to a start-up's technological knowledge base, as the proximity to university laboratories and research groups offers easier access to technological knowledge, thereby facilitating the technology transfer process (Acs et al., 1992; Etzkowitz, 2002).

- **Social capital** refers to the ability of actors to extract benefits from their social structures, networks, and memberships (Davidsson and Honig, 2003). Such networks can provide 'social access' to resources controlled by others and can therefore be regarded as a substitute for resources that the actor itself does not own (Adler and Kwon, 2002; Groen et al., 2008). Accordingly, social capital is seen as a key resource for start-ups to access missing resources (Hite and Hesterly, 2001; Soetanto and Jack, 2013). However, because start-ups have not yet had time to build stable relationships and trust with others, they suffer from a lack of social capital (Hughes et al., 2007; Stinchcombe, 1965). An incubator with an established network can therefore provide substantial benefits by acting as a mediator to connect start-ups to external stakeholders (Bergek and Norrman, 2008; Hansen et al., 2000). Incubators thereby enable start-ups to connect to venture capitalists, local governments, potential clients, or service providers. Incubators can facilitate such networks by organizing networking events, by creating partnerships with for example universities or investors, or through incubator managers who leverage their personal network (Hansen et al., 2000; Patton and Marlow, 2011). In addition to the incubator's 'external network', start-ups firms can also benefit from interaction with each other (the incubator's 'community') as they often struggle with similar problems (Hughes et al., 2007). Incubators may encourage such peer-to-peer interaction by co-locating start-ups in the incubator's shared office, by organizing social events or by making introductions (Cooper et al., 2010).
- **Legitimacy** refers to an organization's "right to exist and perform an activity in a certain way" (Bruton et al., 2010 p. 427). Obtaining legitimacy is necessary for organizations to attract other resources, such as social and financial capital (Bruton et al., 2010; Shane and Cable, 2002). Start-ups suffer from a lack of legitimacy as they do not have a track record or an established network (Aldrich and Fiol, 1994; Bruton et al., 2010). To overcome this, start-ups can

benefit from the legitimacy of others by creating partnerships or associations with more reputable organizations (Rao et al., 2008). Consequently, start-ups can gain legitimacy by being associated with or selected by an incubator that has a proven track record of supporting successful businesses, or that is itself affiliated with a reputable organization, such as a renowned university (Bøllingtoft and Ulhøi, 2005; McAdam and McAdam, 2008).

2.2.2 Incubator intervention: assertiveness

While the aforementioned resources have been identified as being important to start-ups, incubators can only add value when start-ups actually use these resources. Recently, the RBV has seen a growing interest in the question of *how* firms obtain the necessary resources (Barney et al., 2011), a process that Sirmon et al. (2007) refer to as ‘structuring’ of the resource base¹. To successfully structure their resource base, firms continuously assess the resources in their possession, the resources they need to achieve their goals, and the subsequent resource ‘gaps’ that need to be addressed (Brush et al., 2001; Ireland, 2003). Then, firms engage in ‘accumulating’ (internal development of resources), ‘acquiring’ (external purchasing of resources) and ‘divesting’ (the shedding of obsolete resources) (Sirmon et al., 2007). While structuring their resource base, firms face difficult trade-offs. Accumulating or acquiring resources means that firms need to invest time and financial capital. As firms in general, and start-ups in particular, do not have unlimited means to fill all resource gaps simultaneously, they need to prioritize which resources to develop first (Brush et al., 2001; Sirmon et al., 2007). Incubators may choose to intervene in this process by stimulating or even forcing entrepreneurs to make use of the incubator’s resources. In exploring how incubators can intervene in the incubation process, Bergek and Norrman (2008) distinguish between ‘strong intervention’ and ‘laissez-faire’ incubators. These two extremes differ in terms of two dimensions: support intensity and the initiator of the support (entrepreneur or incubator).

Strong intervention incubators provide intense and pro-active support. Support may be provided by a large interdisciplinary team of incubator staff who are closely involved in the start-up’s development (Clarysse et al., 2005). Such incubators can intervene through various practices. For example, incubators can engage in ‘intense-aggressive’ coaching (Rice, 2002) that may be mandatory for entrepre-

¹ In addition to ‘structuring’, successful resource management also involves ‘bundling’ resources into capabilities and ‘leveraging’ these capabilities to create value (Sirmon et al., 2007). However, during the start-up phase, structuring is most important (Sirmon et al., 2011). We therefore focus on this part of the resource management process.

neurs to participate in (Patton et al., 2009). Incubators may also subject start-ups to an ongoing review process (Rice, 2002), with the incubator setting objectives or milestones that start-ups are required to achieve (Becker and Gassmann, 2006). Strong intervention incubators may even decide to replace the original founder by recruiting and installing experienced management teams (Clarysse et al., 2005). In contrast, *laissez-faire* incubators take a demand driven role and may only provide very few resources unless the entrepreneur explicitly asks for help. Consequently, support is provided on an ad-hoc basis to help entrepreneurs overcome a particular problem. The incubator staff may only consist of the incubator manager (Rice, 2002).

Bergek and Norrman (2008) see strong intervention and *laissez faire* incubators as two opposite ends of a scale. We refer to this scale as the ‘incubator’s assertiveness’. We will build on the concept of incubator assertiveness to identify practices through which incubators intervene in the incubation process and stimulate start-ups to make use of the incubator’s resources.

2.3 METHODS

2.3.1 Research design & case description

We conducted a qualitative multi case study. Such a qualitative approach is particularly suitable to understand the perceptions of actors (in our case, entrepreneurs and incubator staff) and allows us to gain rich and in-depth insights and develop new theory on the incubation of start-ups (Eisenhardt, 1989).

The incubators that were studied in this research are all part of the Climate Knowledge and Innovation Community (Climate-KIC). Climate-KIC is an initiative of the European Institute of Innovation and Technology (EIT) and aims to accelerate the transition toward a sustainable society. Climate-KIC is one of three ‘KICs’, the independent operational parts of EIT that put the innovation agenda of EIT into practice. Every KIC consists of partners from all three sides of the ‘knowledge triangle’: research, higher education, and innovation-entrepreneurship-business (Climate-KIC, 2014). Climate-KIC has 12 academic partners, eight of which have an incubation program. Six incubators agreed to cooperate in this study. A detailed description of the incubators and start-ups in our sample can be found in appendices A and B, respectively.

We selected this sample because it allows for comparison while maintaining a high level of variation, which contributes to the reliability and generalizability of our findings. Our sample is homogenous in the sense that all incubators focused

on supporting start-ups in early stages of development and in technology-based industries. Further, all incubators were affiliated with Europe's main initiative to promote innovative entrepreneurship and with at least one university. Within these constraints, we maximized variation, which is particularly important when the population under study is heterogeneous, as is the case with incubators (Aernoudt, 2004; Bergek and Norrman, 2008). Incubators may provide a different mix of resources, depending on their specific industry focus (Aerts et al., 2007; Schwartz and Hornych, 2008). Whereas start-ups in science based industries (such as life sciences or clean tech) require access to specialized equipment and technological knowledge, these resources may be superfluous for software start-ups. The supply and usage of the incubator's resources also depend on the start-up's development stage (Chan and Lau, 2005; McAdam and McAdam, 2008). For example, access to equipment may be particularly valuable when start-ups are developing a prototype, whereas access to customers through the incubator's network becomes increasingly important when start-ups are making first sales. Our sample captures this variety by including incubators supporting start-ups in different (technology-based) industries and in different (early) stages of development. Consequently, the incubators supported start-ups with different resources and levels of assertiveness, which enabled us to explore relationships between these concepts.

2.3.2 Data collection

We primarily gathered data through semi-structured interviews that were conducted between January and May 2012. We interviewed both entrepreneurs and incubator managers or staff to explore differences in perceptions regarding the resource needs of start-ups and the assertiveness of incubators. We also conducted interviews with local investors and technology transfer officers (TTOs) of the affiliated university to provide additional insights and allow for triangulation. All incubators were visited for a period ranging between 1 and 14 days to conduct face-to-face interviews on-site. This enabled us to augment the interview data with observations and informal discussions. If possible, we complemented the data with written documents, such as annual reports, mission statements, and policy documents. Multiple agents were interviewed within each incubator to minimize personal bias. Together with the manager of each incubator, we selected a group of entrepreneurs to be approached for an interview that we deemed to be representative (in terms of maturity, sector, and background of entrepreneurs) of the particular incubator. We are aware that incubator managers could have obstructed the reliability of this study by exclusively appointing entrepreneurs that were known to be content with the incubator's support. The relatively large number of interviews conducted across multiple cases

minimized the possibility of this bias occurring. Further, the data indeed shows differences between the incubator's and entrepreneur's perceptions, which suggests that this bias did not occur or that its influence was at least minimal.

The interviews were structured as follows: we first asked entrepreneurs to introduce themselves and their start-up. Incubator staff was asked to introduce themselves and describe some basic characteristics of the incubator. The core of the interviews then focused on the resource needs of start-ups, the resources with which start-ups were supported, and the assertiveness of the incubator. We asked both incubator staff and entrepreneurs about their perceptions regarding the resource needs of start-ups. We asked entrepreneurs to discuss why they joined the incubator (i.e., which particular resources they were looking for). This reflected their '*expected resource needs*'. Entrepreneurs were then asked to reflect on their stay in the incubator and identify ex-post those resources provided by the incubator that had been most valuable to their start-up, reflecting their '*experienced resource needs*'. Incubator managers and staff were asked to identify the most important resources that start-ups in their incubator were lacking (labeled as '*observed resource needs*'). The semi structured nature of the interviews enabled the interviewees to explain their answers and to identify resources or other important characteristics in addition to our theoretical framework. Interviews with entrepreneurs and incubator staff took, on average, 30 and 40 minutes, respectively. All interviews were digitally recorded and transcribed verbatim (within three days). After every incubator visit, the interview scheme was reviewed and adjusted if the interviews revealed important information and concepts that were not yet included. Within each case, data were collected until no new concepts emerged and theoretical saturation was reached (Glaser and Strauss, 1967). Appendices C and D contain the final interview schedules that evolved over the interviews.

A total of 66 interviews were conducted. Due to (time and) practical constraints, we only conducted six interviews at incubator F. However, as this particular incubator is a publicly listed company, more written documents were available, which compensated for the relatively small number of interviews.

A highly diverse sample of 42 entrepreneurs were interviewed, with entrepreneurs being active across different industries, across different development stages, and across various backgrounds (ranging from first-time ex-student entrepreneurs to serial entrepreneurs). The age of incubated entrepreneurs differed between incubators; in some incubators, the majority was recent university graduates, whereas for others, entrepreneurs typically joined the incubator after they gathered substantial work or research experience. Next to having a university affiliation, three incubators had partnered with established research institutes or large technology-based companies. Given that a large part of the incubated entrepreneurs found

their way into the incubator via the incubator's partners, it is not surprising that over 80 percent of the interviewed entrepreneurs had a technical education (e.g., mechanical engineering, biomedical sciences or environmental sciences) and no entrepreneurial experience (see Appendix B).

2.3.3 Data analysis

To explore differences in perceived resource needs, a distinction was made prior to analysis between data coming from entrepreneurs and data coming from incubator staff. Entrepreneurs who were incubated at the time of the interview as well as graduates and entrepreneurs who did not yet participate (fully) in the incubation program were grouped as 'entrepreneurs.' Incubator management, incubator staff, and TTOs or investors affiliated with the incubator were grouped as being part of the incubator. Data analysis was done using NVivo, a qualitative data analysis software program, and proceeded in multiple steps.

To answer our first research question, we explored the start-up's resource needs as perceived by entrepreneurs and incubator staff. We did so by categorizing the expected, experienced and observed needs according to the various tangible and intangible resources that were identified in section 2.1. We then re-read the interview transcripts to inductively identify concepts that could explain differences in expected, experienced and observed needs. We initially identified concepts by using open coding (Corbin and Strauss, 1990). We labelled segments with 'in vivo' terms used by the interviewee to minimize researcher subjectivity and bias. We then combined similar open codes into 'first order categories' (Gioia et al., 2012) that were still labelled by staying close to the interviewees' own words. As coding continued, we started combining first order codes into broader, mutually exclusive and theoretically relevant 'second order categories' (Gioia et al., 2012) that provided a comprehensive explanation for the differences in expected, experienced and observed resource needs. The third phase of data analysis focused on the incubator's assertiveness, and was aimed at answering our second research question by identifying practices through which incubators intervene in the incubation process. Again, we initially relied on open and first order codes to allow distinctive incubation practices to emerge from the data. We then related these practices to the broader second order codes 'strong intervention' and 'laissez-faire' that were identified in our theoretical framework. As such, we were able to identify incubator practices that were both grounded in our empirical data and in our theoretical framework. As core categories emerged that explained the differences in perceptions and assertiveness, we turned to 'axial coding' (Corbin and Strauss, 1990) to explore relationships between our interpretations. This was

the fourth phase of data analysis. The observation that entrepreneurs' expected and experienced needs differed made us realize that entrepreneurs' perceptions about the importance of resources change over time, which led us to explore if and how incubator assertiveness changes over time.

Throughout the data analysis process, we discussed emerging interpretations and findings with entrepreneurs and incubator staff to ask for feedback and to validate our findings. Such 'member validation' (Lincoln and Guba, 1986) increased the reliability of our findings.

2.4 FINDINGS

The first part of this section identifies the start-up's resource needs as perceived by entrepreneurs and incubators, and explores (in)consistencies between these perceptions. The second part of this section explores the assertiveness of the incubator.

2.4.1 Start-up needs and incubator support: resources

Descriptive results

Table 2.2 gives an overview of the resources identified in the theory section and the extent to which entrepreneurs and incubator staff perceive them as needs of start-ups. We are aware that it is unconventional to quantify qualitative data. Given

Table 2.2 Start-ups' resource needs as perceived by entrepreneurs and incubator staff. The numbers indicate how often each resource was mentioned during the interviews (interviewees could identify multiple resources).

	Entrepreneurs		Incubator staff
	Expected resource needs	Experienced resource needs	Observed resource needs
<i>Tangible resources</i>			
Financial capital	16	8	3
Physical capital	14	7	2
<i>Intangible resources</i>			
Social capital	External network	4	15
	Community	3	19
Knowledge	Business knowledge	4	24
	Technological knowledge	2	1
Legitimacy	1	1	2
Total	44	75	22

our relatively large interview sample, the purpose of table 2.2 is merely to provide an overview of resource needs mentioned by entrepreneurs and incubators. For the remainder of this chapter we will rely on the qualitative insights obtained through interviews.

- **Expected resource needs.** The most important reason for entrepreneurs in our sample to join the incubator was to access tangible resources (i.e. *physical capital* and *financial capital*). This is in line with previous studies (e.g. McAdam and McAdam, 2008; Soetanto and Jack, 2013). Thirteen entrepreneurs were not consciously looking for any specific resources. They came from a parent organization (often a university) that was a partner of the incubator, which made joining the incubator an ‘obvious’ decision: “*When you start a new company from this university, this incubator is a pretty obvious choice. All the well-known and successful examples come from this incubator*” (Entrepreneur A4).
- **Experienced resource needs.** When reflecting on the resources that had been critical to their success, entrepreneurs primarily referred to *business knowledge* (developed through coaching or training), since they lacked this resource due to their technical background and lack of entrepreneurial experience. The incubator’s *community* and *external network* were also identified as important resources. The incubator’s *community* was mainly used to exchange *business knowledge*. Due to the broad industry focus of incubators in our sample, interviewees felt that the potential to exchange *technological knowledge* within the incubator community was limited. However, entrepreneurs emphasized that they experienced similar business-related challenges: “*Everybody has to deal with customers, the business plan, sales, strategy, the bank, legal challenges. So it’s very useful to talk about these things, even if the product you’re developing is totally different*” (Entrepreneur B4). The incubator’s *external network* was particularly valued when it enabled entrepreneurs to access *business knowledge* through a network of specialized consultants: “*What’s also nice is access to the professional network of the incubator. (...) They have all kind of things: legal, IP, financing, tax, etcetera*” (Entrepreneur F3).
- **Observed resource needs.** Incubator staff consistently identified *business knowledge* as the main resource need of start-ups. Incubators felt that, while entrepreneurs had a solid *technological knowledge* base, they did not know how to do sales, marketing, fundraising, pitching, etc. Accordingly, incubators found that entrepreneurs lacked the necessary *business knowledge* to develop a business model around their technology or idea: “*Selling their product, being able to clearly communicate their value proposition, that’s a thing that a*

lot of entrepreneurs struggle with" (Incubator staff B3). This finding is in line with prior studies showing that technological entrepreneurs often lack the business experience that is necessary for the start-up to become successful (see e.g. Oakey, 2003; Vohora et al., 2004).

Comparison of perceptions

Table 2.2 shows that, whereas the entrepreneur's expected needs focus on physical capital and financial capital, the incubator's observed needs focus on *business knowledge*. The interview data revealed several reasons explaining why entrepreneurs did not perceive the incubator's support to develop *business knowledge* as important, and why entrepreneurs were hesitant to make use of this resource.

Some of these explanations were related to the incubator and its resources. First, entrepreneurs may not use the incubator's resources when these resources are of insufficient quality. For example, entrepreneur B6 felt that the incubator manager "*lacked experience*". He therefore did not engage in the incubator coaching sessions, but preferred to consult with external mentors who had a more extensive entrepreneurial track record. A second explanation can be found in the inability of incubators to tailor their resources to the specific needs of individual start-ups. Entrepreneurs found for example that the incubator lacked connections with industry partners to provide specialized knowledge. Third, we found that mature start-ups had already established a solid resource base, which rendered the incubator's support superfluous. Fourth, early stage start-ups with experienced entrepreneurs also had no need for the incubator's support, as entrepreneur E1 illustrated: "*Most of the workshops organized by the incubator, we think that our experience exceeds the content. Don't forget, I've been an entrepreneur for 25 years. This is my fourth start-up*". These four explanations all suggest that the incubator's resources are of insufficient quality, or that there is a mismatch between the incubator's supply and the start-up's demand for resources. Both explanations are in line with extant literature (Bruneel et al., 2012; Lalkaka, 2001; Ratinho and Henriques, 2010). Incubators tried to strengthen their resources (for example by attracting more experienced mentors) and they implemented selection processes that had to weed out start-ups that were too mature, start-ups outside the incubator's industry focus, or entrepreneurs that were too experienced. These selection processes had to ensure that the incubator only supported start-ups that could benefit from the incubator's services, although incubators were apparently not always able to achieve this goal.

Other explanations for the low usage of the incubator's resources to develop *business knowledge* were related to entrepreneurs and their (mis)perceptions. Further inspection of table 2.2 shows that the entrepreneurs' experienced needs are in line with the start-up's needs as observed by the incubator: both point at *business*

knowledge, developed through training, coaching and the incubator's networks. The sharp contrast between incubators' observed needs and entrepreneurs' experienced resource needs on the one hand, and entrepreneurs' expected resource needs on the other hand is striking. In search of an explanation, the interview data revealed that, upon entering the incubator, entrepreneurs were not aware of the incubator's added value to develop *business knowledge* nor were they willing to develop this resource. The data revealed three concepts that explain why this is the case, which we outlined with representative interview quotes in table 2.3.

First, entrepreneurs not only lacked business knowledge, they were also not aware of its importance. In line with Oakey (2003), we found these technological entrepreneurs to have a 'technology push' view of invention, emphasizing technological development while underestimating the importance of satisfying a market need and creating a viable business model. Incubator manager E1 said that entrepreneurs were "*unconsciously incompetent*". Accordingly, these entrepreneurs had a *lack of self-awareness*: they were unable to recognize the gaps in the resource base of their start-up. Second, entrepreneurs were primarily *short term* oriented: they prioritized activities that yield immediate rewards. Activities such as writing a business plan, participating in sales seminars or building networks with peers and specialized consultants do not create immediate value and can, therefore, be easily neglected during the chaotic day-to-day business of a start-up. Third, these technological entrepreneurs often did not feel comfortable going to sales seminars or writing a business plan, or simply did not enjoy participating in these activities. Incubator manager C1 said that entrepreneurs are *hesitant to step out of their comfort zone*, which refers to entrepreneurs' hesitance to engage in activities where they feel insecure or that they do not enjoy. These three concepts point at the inability of incubated entrepreneurs to structure their resource base (Sirmon et al., 2007), as they are insufficiently aware of their 'resource gaps' (Grant, 1991) and not willing to make the necessary (time) investment to develop missing resources. Overall, the image emerged that entrepreneurs joined the incubator in search of tangible resources, initially being *unwilling to engage in the incubation process to develop business knowledge*, even though they eventually recognized the importance of this resource when reflecting on their stay in the incubator. The following quote, of an entrepreneur who joined the incubator looking for office space, illustrates this point: "*In the beginning, I was like, "I have taken numerous business courses, how are these workshops going to help me?" (...) These workshops turned out to be very valuable (...) But initially, I really didn't see the point"* (Entrepreneur B1). Entrepreneur A5 said: "*When we joined, we had no idea how valuable it would turn out to be. We just thought it would be easy money*". Once entrepreneurs had participated in the incubation process to develop *business*

knowledge, they acknowledged its importance. Accordingly, the unwillingness of entrepreneurs to participate occurs primarily at the beginning of the incubation process. Further, it is primarily starting, first-time entrepreneurs who are not willing and able to make use of the incubator's resources, which is reflected in some of the quotes in table 2.3.

Table 2.3 Concepts that explain the differences between entrepreneurs' expected and experienced resource constraints

Second order codes	First order codes	Representative quote
Entrepreneurs unwilling to engage in the incubation process to develop business knowledge	Entrepreneurs have a lack of self-awareness	"We call that unconsciously incompetence. Entrepreneurs don't know what they don't know" (Incubator manager E1)
		"I've been a first-time entrepreneur. There is a feeling that you can find at almost all of them, that they know a lot of stuff (...) When you're a first-time entrepreneur, often you don't have the connections, the knowledge of the entrepreneur or the ecosystem. But you don't realize it" (Entrepreneur D4)
		[about business activities] "You have to be aware of the importance of these activities. But it takes time to get there ... At first, you don't understand it... Later, you start realizing that it's important" (Entrepreneur A5)
Entrepreneurs are primarily short term oriented		"When you're an engineering start-up, you have very little time to think. You are basically sucked into details. Morning to evening, because you don't have an assistant, you have to manage things by yourself. So (...) you tend to lose sight of obviously priorities" (Entrepreneur D8)
		"During the daily business, entrepreneurs often forget to thoroughly think about their business plan. Because they turn on their computer, and they got an e-mail from a new customer, or they have to work on their website, etc. But they're not doing what's most important—working on their business model or their plan on how to enter the market." (Incubator staff B3)
		"It's stuff that you need to do, but which are slightly less urgent than the rest, and which tend to be delayed, and delayed" (Entrepreneur D8)
Entrepreneurs are hesitant to step out of their comfort zone		"I think entrepreneurs in general, and starting entrepreneurs in particular, pay not enough attention to sales. Instead, they go into their comfort zone. And their comfort zone is the product or service they are developing. And being vulnerable, exploring the marketing side, they often do not like this" (Incubator staff B3)
		"Very early in the chain you need to expose yourself. Go out of your zone of comfort, and talk to customers" (Incubator manager C1)
		"We're working with high-tech start-ups, with students who are not familiar with sales, financing (...). And they really hate those things" (Incubator manager E1)

Our findings show that the low quality of the incubator's resources and the mismatch between demand and supply in resources, as stressed in extant literature (see e.g. Bruneel et al., 2012; Ratinho and Henriques, 2010), only partially explains the low usage of the incubator's resources. While some entrepreneurs indeed felt that the incubator's resources were not in line with their needs, table 2.2 shows that a large number of entrepreneurs in our sample were in fact satisfied with the incubator's resources, but initially not able or willing to develop these resources due to the concepts outlined in table 2.3. Incubators tried to select entrepreneurs who were willing to make use of the incubator's resources and aware of their resource gaps: entrepreneurs needed to be *"coachable"* (Incubator manager B1), *"willing to learn"* (Incubator manager A2) and *"aware of what they're missing"* (Incubator manager E1). However, despite such selection criteria, entrepreneurs were still hesitant to participate in coaching sessions, workshops or networking events: *"too many entrepreneurs enter the building in the morning, go their office and lock the door"* (Incubator staff B3). Consequently, we found incubators to implement various assertive practices to enable entrepreneurs to make use of the incubator's resources, which we explore in the next section.

2.4.2 Incubator intervention: assertiveness

Given that it was primarily inexperienced, first-time entrepreneurs who did not make use of the incubator's resources, we found incubators supporting early stage businesses (which had no funding, no sales, and a business plan that was still developing) with first-time entrepreneurs to be highly assertive. These incubators provided *"pro-active and vigilant assistance"* (incubator manager D1), stimulating or forcing entrepreneurs to make use of the incubator's resources. Incubator manager B1 claimed that such an assertive strategy is particularly important when working with first-time entrepreneurs, as they do not take advantage of the incubator's resources: *"we see that (...) those who are completely new to entrepreneurship are the ones that sit in their offices with the door closed, and we need to stimulate them to participate in the program. They don't see the opportunities that we're offering"*. Incubators implemented various practices to stimulate start-ups to make use of the incubator's resources (see table 2.4).

First, we found incubators to engage in *aggressive coaching* sessions, which refers to incubator managers subjecting start-ups to a critical assessment. During such sessions, incubator managers asked critical questions about the start-ups' business plan: *"a lot of questions that we couldn't answer"* (Entrepreneur C5). The incubator thereby exposed the resource gaps of the start-ups, making entrepreneurs aware of the importance of *business knowledge* and the start-up's lack thereof.

Table 2.4 Incubator assertiveness

Second order codes (incubator assertiveness)	First order codes (incubator practices)	Representative quotes
Strong intervention	Aggressive coaching	<p>"The coaching sessions were very tough. We presented our ideas, and the coaches were just asking good questions. 'How will you make revenue? Who's going to buy it? Why? What is the competition?' A lot of questions that we couldn't answer, because we approached our business in an academic way: we have an idea, the customer will be there. So it was very tough feedback" (Entrepreneur C5)</p>
		<p>"It is people to prioritize, getting them out of their zone of comfort, being very blunt. Sometimes even aggressive some people might feel" (Incubator manager C1)</p>
	Mandatory participation	<p>"We require our entrepreneurs to participate in the master class program if they want to enter the incubator. If they are not willing to, than we know that the entrepreneur does not know himself well enough, because we know that everyone needs it" (Incubator manager A1)</p>
		<p>"They demand that you attend the trainings. In my opinion, it's good. Especially for first-time entrepreneurs (...) If you want to be helped, they help you. If you don't want to be helped, they insist. And oblige you to go to training. Make some compulsory writings" (Entrepreneur D4)</p>
	Fixed milestones	<p>"You have between stage one and stage two three months. It's not you come back when you're ready. You come back in three months. What we look at is the ability of the entrepreneur to behave as an entrepreneur" (Incubator manager C1)</p>
		<p>"The committee will see if they have met their targets, a predefined list of ten criteria, of which they have to achieve seven. If these targets are met, then they will join the program for about six months to one year. If not, then they'll have to leave the incubator" (Incubator manager B1)</p>
	Entrepreneur recruitment	<p>"We find really good management, and we pay them to get involved in these businesses (...) We create an immediate option for the manager to get a big slug from [the equity], and the business is all launched at the same time" (TTO F2).</p>
		<p>"An academic is like an engineer who builds a ship. Although he might be an expert on how to build the ship, this doesn't mean that he is the right person to be the captain of this ship. You could then try to teach him how to sail, but we think it's more effective to hire an experienced captain" (Incubator manager F1)</p>
Laissez-faire	Incubator works demand driven	<p>"We are in favor of a demand driven approach. We don't provide a lot of services if the entrepreneur does not request it" (Incubator manager E1)</p>
		<p>"They [the incubator managers] are like: you know where to find us if you need anything" (Entrepreneur A1)</p>
		<p>"It's up to you to take initiative. We try to consciously ask ourselves 'what are things [the incubator] can help us with?'" (Entrepreneur A5)</p>

As such, the incubator compensated for the entrepreneur's lack of self-awareness. Second, *mandatory participation* entails making attendance of training or coaching sessions a requirement for entrepreneurs to be admitted into the incubator. By doing so, incubators simply forced entrepreneurs to participate in the incubation process and to develop particular resources. Entrepreneurs thereby had no choice but to step outside of their comfort zone and to address long-term challenges during the hectic day-to-day business: *"It's pretty tough when you're forced to leave your office for two or three days every six weeks. But it's very useful to take a step back once in a while, to take a strategic overview of your company. It forces you to think about stuff that is important but not yet urgent"* (Entrepreneur A5). Third, *milestone setting* refers to incubators requiring start-ups to achieve specific targets or goals. Doing so forced entrepreneurs to develop *business knowledge*, as many of these milestones were business-related. Entrepreneurs were for example required to write a business plan, to meet with a certain number of potential customers, or to find a launching customer. Fourth, *entrepreneur recruitment* refers to incubators searching and installing an experienced entrepreneur to replace the technological founder as CEO of the start-up. To do so, the incubator acts as an investor, providing large amounts of *financial capital*.

in return for an equity stake and a board seat. This position enabled the incubator to install a new CEO. This experienced CEO compensated for the technological founder's lack of *business knowledge*. While the above practices may lead to better usage of the incubator's resources, there were also concerns about the incubator taking a strong intervention approach. Some interviewees were concerned that the incubator had too much influence on the start-up's development. This could make start-ups too dependent on the incubator's guidance. Further, the incubator's guidance could be wrong, as incubator manager A1 said: *"It requires a lot of experience. You risk pointing them [the start-ups] into the wrong direction"*.

All incubators that supported mature start-ups used a *laissez-faire* strategy. Some incubators even made an explicit distinction between an assertive first phase (referred to by incubator B as the 'pressure cooker'), and a *laissez-faire* second phase of the incubation process (referred to by incubator A as the 'growth phase'). Incubator manager D1 said: *"during the early phases of the company, the interaction is very intense. We tend to pull back gradually as the company matures"*. In this later phase, start-ups' business plans were mature and stable, the start-ups had raised their first rounds of funding, and most were making sales and delivering products. Incubators supporting such mature start-ups *worked demand driven*, meaning that they provided entrepreneurs with access to the resources they needed, but it was up to the entrepreneur to take the initiative. The incubator's tendency to use a *laissez-faire* support strategy as the incubation process progresses reflected

the start-up's development towards a mature and autonomous company. Start-ups relied less on the incubator, not only in terms of resource support, but also in terms of guidance and intervention. The incubator thereby prepares the start-up to leave the incubator. Incubator manager A2 said: *"The first phase is more intense (...). As entrepreneurs and their companies mature, they start building their own network, and we also expect them to have their own advisory board after four or five years. So they become less dependent on our coaches"*.

This laissez-faire strategy was deemed appropriate for incubators supporting more mature start-ups and experienced entrepreneurs. However, a laissez-faire strategy showed its limitations when applied to early stage start-ups with first-time entrepreneurs who were primarily short term oriented and unable to recognize the importance of the incubator's resources: *"Sometimes I just know that participating in a particular workshop would be extremely beneficial to some entrepreneurs. But they are not willing to go to the workshops we organize because they feel too busy, and they do not see that these things could really help their business"* (Incubator staff B4).

2.5 DISCUSSION AND CONCLUSION

To explain the low usage of the incubator's resources and the implications thereof for incubators, we asked the following two research questions:

- *"which resources, provided by the incubator, do entrepreneurs and incubator staff perceive as important and why do these perceptions differ?"*
- *"what do these differences in perceptions imply for the incubator's assertiveness?"*

Incubator staff identified *business knowledge* as the most important resource. Some entrepreneurs did not perceive the incubator important in developing *business knowledge*, as they found the incubator's resources to be of low quality or not in line with their specific needs. However, most entrepreneurs agreed with incubator staff and perceived *business knowledge* as the incubator's most important resource when reflecting on their stay in the incubator. Still, they primarily joined the incubator to access *physical capital* and *financial capital*. Entrepreneurs initially did not perceive *business knowledge* to be important, and they were hesitant to make use of the incubator's support to develop this resource. The reason for this is that early stage, first-time incubated entrepreneurs are 'unconsciously incompetent'; they are not aware of their resource gaps or the importance of *business knowledge*. In ad-

dition, they are unwilling to engage in the incubation process to develop business knowledge. This is because doing so requires entrepreneurs to step out of their comfort zone, and because entrepreneurs are primarily short-term oriented. As entrepreneurs gain experience in developing *business knowledge*, they recognize its importance and are thus better able to utilize the incubator's resources.

In response to the changing perceptions of entrepreneurs, we found incubators to pursue different levels of assertiveness. When entrepreneurs were inexperienced and did not prioritize developing *business knowledge*, incubators were highly assertive to encourage or force start-ups to develop this resource. Incubators did so by engaging in aggressive coaching, by setting milestones, by making participation mandatory or by recruiting experienced management. Later, when entrepreneurs recognized the importance of *business knowledge*, incubators were found to take a laissez-faire approach. This encouraged later stage start-ups to be more independent, and prepared start-ups to leave the incubator.

5.1 Theoretical implications

This chapter makes two important contributions to the field of start-up and incubator research.

First, we provide a more comprehensive explanation for the low usage of the incubator's resources. Prior studies primarily pointed at the low quality of the incubator's resources and at a mismatch between the start-up's needs and the incubator's supply of resources (Bruneel et al., 2012; Totterman and Sten, 2005). While we confirm these findings, we also stress that they only provide a partial explanation. Our study identified an additional mismatch: a mismatch between the resources entrepreneurs *want* when they join the incubator, and the resources entrepreneurs *need* to complement their resource base. The cause for the latter mismatch is the inability of entrepreneurs to 'structure' their resource base. Entrepreneurs are unable to recognize their 'resource gaps' and not willing to make the necessary investments in developing missing resources (Sirmon et al., 2007) because they are hesitant to step out of their comfort zone and short term oriented. This inability explains why entrepreneurs may not use the resources provided by incubators, even when these are of sufficient quality and in line with the start-up's needs. We thereby provide a partial answer to the question why many incubators struggle to live up to their potential.

Entrepreneurs' inability to structure their resource base implies that providing valuable resources is a necessary but insufficient condition for incubators to help start-ups. Consequently, our second contribution lies in explaining how incubators can intervene to increase the usage of resources and in identifying the conditions

under which incubators should do so. We identified various practices through which incubators can intervene by taking an assertive approach. We thereby responded to calls for deeper insights into incubation practices (Ahmad and Ingle, 2013; Hackett and Dilts, 2004a; Phan et al., 2005). We have shown that it is primarily starting, first-time entrepreneurs who are not able to structure their resource base and not willing to engage in the incubation process. This creates an interesting paradox, as it suggests that those entrepreneurs who arguably need the incubator's support the most are least likely to ask for help and make use of the incubator's resources. Consequently, taking an assertive strategy is particularly important when supporting such early-stage start-ups with first-time entrepreneurs. Further, given that inexperienced entrepreneurs did seem to be aware of the value of tangible resources, taking an assertive approach is required when providing intangible resources in general and *business knowledge* in particular. However, following such an assertive strategy throughout the entire incubation process means that start-ups remain dependent on the incubator's resources and guidance. This may ultimately constrain the start-up's development towards an independent, stable and successful company. Our findings therefore suggest that incubators supporting experienced entrepreneurs with mature start-ups should take a *laissez-faire* approach.

All in all, our findings move away from studies that see incubators merely as a resource rich environment (Albert and Gaynor, 2001; McAdam and McAdam, 2008). Our study points out that start-ups not only lack necessary resources, but also the *ability* or skills to complement their resource base. If incubators only provide resources and guidance without addressing this skills gap, start-ups will likely fail as soon as they leave the incubator. Consequently, the incubator should be an environment where start-ups learn how to identify gaps in their resource base as well as develop the skills necessary to autonomously acquire or develop these resources. By doing so, incubators have the potential to give start-ups a competitive advantage that lasts beyond the incubation period. Our finding that more mature entrepreneurs were better aware of their needs and the value of incubation suggests that the incubators in our sample were indeed able to help entrepreneurs develop these skills.

2.5.2 Practical implications

We recommend incubators to provide entrepreneurs with the resources they *need*, which may be different from the resources entrepreneurs *want*. If intake interviews reveal that entrepreneurs are inexperienced, have a lack of self-awareness, are short term oriented and are not willing to step out of their comfort zone, we encourage incubators to follow an assertive strategy to create awareness among entrepreneurs

and to ensure that they develop the correct resources. Incubators may use the practices that we identified as a guideline to implement such a strategy. In contrast, if incubators are supporting experienced entrepreneurs, we encourage incubators to take a *laissez-faire* approach.

For entrepreneurs, it is important to find an incubator that is in line with their needs. Inexperienced entrepreneurs should acknowledge that they not only need resources, but also guidance on which resources to develop (for example by setting milestones or engaging in reflective coaching). Entrepreneurs should be willing to ask for support and open to receiving feedback. In contrast, experienced entrepreneurs should realize that such an intense program will likely add little value, and they should therefore choose a *laissez-faire* incubator.

Our study also has important implications for policy makers. To improve the conditions for start-ups, scholars often advise policy makers to adapt their policies to the needs of start-ups by asking entrepreneurs what entrepreneurs perceive as the main factors constraining entrepreneurial activity (Carayannis et al., 2006; Stam, 2015). However, when entrepreneurs are not able to recognize their needs, such demand driven policies will likely be ineffective. Consequently, we caution policy makers for merely responding to the needs as perceived by inexperienced, technological entrepreneurs and we encourage them to at least complement these assessments with insights from more experienced entrepreneurs and other stakeholders. Also, rather than only providing resources, we encourage policies that aim more explicitly to provide entrepreneurs with the necessary skills to structure their resource base, such as entrepreneurship education programs.

2.5.3 Limitations and suggestions for future research

Our study has three main limitations that we encourage future studies to address.

First, the interviews with incubators and entrepreneurs were only conducted at one point in time. Although it is not uncommon for studies on start-ups and incubators to use retrospective analyses to obtain longitudinal insights (see e.g. Chan and Lau, 2005; van Geenhuizen and Soetanto, 2009), this form of data collection presents a limitation to our data. The mismatch between entrepreneurs' expected resource needs and their experienced resource needs calls for further longitudinal research to better understand how entrepreneurs' perceptions change over time. Such efforts could also help in identifying particular milestones in the start-up's development that intersect with a growing ability of the entrepreneur to recognize resource gaps and develop missing resources. Such milestones could help in further tailoring the incubator's support to individual start-ups.

Second, the particular characteristics of our sample need to be taken into account when interpreting and generalizing the results. Most importantly, the incubators in our sample were located in different countries. The importance and usage of particular resources may depend on regional characteristics, and may therefore vary across our sample. We found some support for this. For example, *physical capital* was identified at incubator F as an important resource, as affordable office and laboratory space in this particular region was scarce. Still, the importance of *business knowledge* and the entrepreneurs' misperceptions regarding these resources were consistently observed across all cases, and we are therefore confident that this is not influenced by local contextual factors. Still, it would be interesting to expand our approach to incubators active in other regions, or to incubators without university affiliations, with a highly specific industry focus, and/or incubators that support more experienced entrepreneurs.

Third, this study did not take the success of incubators into consideration. The question of how to measure incubator success is one of the most controversial and complex debates in incubator research (Dee et al., 2011; Hackett and Dilts, 2004a) and was outside the scope of this study. We encourage future studies to assess the incubator's output in general, and studies on the relationship between the incubator's assertiveness and its performance in particular. Such studies could test our hypothesis that the need for incubators to take an assertive support strategy decreases as start-ups mature and entrepreneurs gain experience.

In addition to addressing these limitations, we suggest future studies to use two perspectives that can add promising insights, yet remain largely neglected in the context of incubator studies. First, given that our findings point at the importance of entrepreneur's ability to successfully acquire business knowledge during the incubation period, we encourage future studies to apply theories of 'organizational learning' (Cyert and March, 1963) to better understand how incubators help start-ups acquire new knowledge. Second, literature on 'entrepreneurial cognition' may be useful to better understand why entrepreneurs are unable to take advantage of incubators. Studies on entrepreneurial cognition argue that entrepreneurs are more likely to display particular 'cognitive biases' in their decision making (Busenitz and Barney, 1997; Simon et al., 2000). Some of these biases echo the findings of our study, such as the inability of entrepreneurs to recognize their own limitations (Forbes, 2005) and their hesitance to invest in resources that are unfamiliar (Garbuio et al., 2011). Our study suggests that such biases may restrain entrepreneurs from asking for help, thereby limiting the impact of policy measures, such as incubators. Consequently, we encourage future studies to apply literature on entrepreneurial cognition to explore the cognitive biases of incubated entrepreneurs in more detail, as well as the role of the incubator in overcoming these biases.

Appendix 2A: characteristics of sample incubators

Incubator	Country	Size	Age (years)	Background	Start-up development stages	Resources provided	Incubator assertiveness	Industry focus	Interviews conducted
A	The Netherlands	Incubator team of 6 employees The incubator premises houses 55 firms	7	The incubator was established as a nonprofit by the local government and university	Start-ups enter the two-year incubation phase when their business plan is still developing. Start-ups have no sales or funding. At the end of the incubation period, start-ups have typically raised capital, are making sales and have hired employees. Start-ups then enter the 'growth' phase	The incubator provides office space, financial support (as a loan), a community, an external network, coaching and training	During the two year incubation phase, participation in the training sessions is mandatory	Software Clean tech Life sciences	Incubator manager A1 Incubator manager A2 Incubator staff A3 TTO A4 TTO A5 TTO A6
B	The Netherlands	Incubator team of 4.5 employees The incubator premises houses 35 firms	3	The incubator was established as a nonprofit through the merger of several entrepreneurship programs that were related to local institutes for higher education	Start-ups enter the six month 'pressure cooker' phase when the business plan is still developing. Start-ups have no sales or funding. Start-ups then enter the incubation phase: the business plan is stable and start-ups are working towards making sales	The incubator provides office space, financial support (as a loan), a community, an external network, coaching and training	Start-ups have to meet specific milestones during the pressure cooker phase to be accepted into incubator phase	Software Life sciences Clean tech	Incubator manager B1 Incubator manager B2 Incubator staff B3 Incubator staff B4 TTO B5 Investor B6 Investor B7

Incu- bator	Country	Size	Age (years)	Background	Start-up development stages	Resources provided	Incubator assertiveness	Industry focus	Interviews conducted
C	Switzerland	Incubator team of 2 employees	5	The incubator was established as a nonprofit organization by philanthropic (private) foundations in cooperation with universities	Entrepreneurs apply with an idea. There is a very basic business plan, no sales or funding, and the start-up has not incorporated yet. The incubation program lasts nine months, after which start-ups should be ready to raise money	The incubator does not provide office space. Start-ups gain access to coaching and a support network, and receive financial support (as a grant)	Allowance into the program is dependent on the start-up reaching specific milestones	Software Clean tech	Incubator manager C1 TTO C2 TTO C3
D	France	Incubator team of 7 employees The incubator premises houses 40 firms	12	The incubator was established as a nonprofit by local educational institutions, research institutions and multinational companies	Start-ups enter the two-year 'incubation' phase when their business plan is still developing. At this point, start-ups have no sales or funding. At the end of the incubation period, start-ups enter the 'post incubation phase', and have typically raised capital, are making sales and have hired employees	The incubator provides office space, financial support (as a loan), a community, an external network, coaching and training	During the incubation phase, participation in the training sessions is mandatory. Start- ups are required to meet specific milestones	Software Clean tech Life sciences	Incubator manager D1 Incubator manager D2

Incubator	Country	Size	Age (years)	Background	Start-up development stages	Resources provided	Incubator assertiveness	Industry focus	Interviews conducted
E	The Netherlands	Incubator team of 1.5 employees	2	The incubator was established as a nonprofit through the merger of several start-up programs that were related to local governments and educational institutes	The incubator supports projects from a very early 'idea' stage up to established SMEs	The incubator does not provide office space. Financial support is provided as a loan. Start-ups also receive access to a support network	The incubator provides support only on the request of entrepreneurs	Agro / food Chemicals Life sciences	Incubator manager E1 Incubator staff E2 Incubator staff E3 TTO E4
F	United Kingdom	Incubator team of 3 employees The incubator premises houses 17 firms	6	The incubator was established as a for profit organization by a university in cooperation with a (university related) investor and technology commercialization company	At the research and idea phase, a start-up is created around a technological idea. Once the 'business plan is agreed' and start-ups have raised capital, the start-up may move into the incubator premises.	Funding is provided in exchange for equity. The incubator provides office space, a community, an external network	At the idea phase, an experienced management team may be recruited. Once moved into the incubator, the incubator provides support on the request of entrepreneurs	Life sciences Clean tech Chemicals	Incubator manager F1 TTO F2

Appendix 2B: characteristics of sample start-ups

Incubator	Entrepreneur	Start-up industry	Start-up age (years)	First-time entrepreneur	Technological formal education
A	A1	Software	2	Yes	No
	A2	Software: security	4	Yes	Yes
	A3	Maritime technology	5	Yes	Yes
	A4	Clean tech: energy production	1	Yes	Yes
	A5	Clean tech: energy production	< 1	Yes	Yes
	A6	Maritime technology	2	Yes	Yes
	A7	Clean tech: energy production	2	Yes	Yes
B	B1	Life sciences: software	2	No	Yes
	B2	Telecommunications	< 1	Yes	No
	B3	Life sciences: diagnostics	< 1	Yes	Yes
	B4	Clean tech: energy production	< 1	Yes	Yes
	B5	Software: social platform	< 1	Yes	No
	B6	Software: social platform	1	No	Yes
	B7	Software: social platform	< 1	Yes	No
C	C1	Software: social platform	< 1	Yes	Yes
	C2	Clean tech: energy efficiency	2	Yes	No
	C3	Software: social platform	< 1	Yes	Yes
	C4	Clean tech: energy efficiency	3	Yes	Yes
	C5	Clean tech: energy efficiency	3	Yes	Yes
	C6	Clean tech: energy efficiency	3	Yes	Yes
	C7	Clean tech: energy production	3	No	No
	C8	Life sciences: biotech	1	Yes	Yes
D	D1	Clean tech: energy production	2	No	No
	D2	Software: security	3	Yes	Yes
	D3	Telecommunications	6	Yes	Yes
	D4	Life sciences: diagnostics	2	Yes	Yes
	D5	Telecommunications	6	Yes	Yes
	D6	Software: social platform	< 1	Yes	Yes
	D7	Software: social platform	< 1	Yes	Yes
	D8	Life sciences: software	< 1	Yes	Yes

Incubator	Entrepreneur	Start-up industry	Start-up age (years)	First-time entrepreneur	Technological formal education
E	E1	Life Sciences: biotech	3	No	Yes
	E2	Maritime technology	7	Yes	Yes
	E3	Life sciences: diagnostics	< 1	Yes	Yes
	E4	Software: e – commerce (food)	< 1	Yes	Yes
	E5	Agro	2	Yes	Yes
	E6	Software: e – commerce (food)	2	Yes	Yes
	E7	Agro	2	Yes	Yes
	E8	Life sciences: biotech	2	Yes	Yes
F	F1	Life sciences: diagnostics	11	Yes	Yes
	F2	Agro	1	No	Yes
	F3	Chemicals	4	Yes	Yes

Appendix 2C: Interview Questionnaire, Incubator Management

Introduction: Incubator Characteristics

1. Could you please state your name and your responsibilities within this incubator?
 - a. Are you also a personal mentor of some tenant firms?
 - b. Could you briefly describe your personal background (e.g., entrepreneurial experience)?
2. When was this incubator program established?
3. How many people work for the incubator (FTE)?
4. What is the annual budget of this incubator?
5. How many tenant firms are currently within the incubator?
 - a. How much employees (FTE) do they have (in total)?
6. Do you have an advisory board in place?
 - a. What is their role?

Problem: Incubator Necessity

1. Why do entrepreneurs need this incubator?
 - a. Why is it hard for entrepreneurs to succeed?
 - b. What are problems entrepreneurs struggle with?
2. How would you describe the general entrepreneurial climate in this country or region?
 - a. What are strengths or weaknesses (for example, government regulations, the status that society attaches to entrepreneurs, an overload of bureaucracy, etc.)?
 - b. How would you compare it with other (European) regions?

Aim: Incubator Success

We have now discussed the entrepreneurial climate of this region and various challenges that entrepreneurs struggle with. I assume that this incubator is a means to overcome these challenges.

1. What is your goal as an incubator? When would you consider yourself to be successful?
 - a. How do you measure your success?
 - i. Do you often measure your success and compare it with your peers?
 - ii. Is there an agreed definition of this incubator's success?
2. Can you tell me anything about postexit performance of the tenant firms?
3. Do you measure your survival rate?

- a. If yes, what was your survival rate last year (measured as the total number of tenant firms divided by the number of tenant firms that quit their business)?

Solution: Incubator Support

Now that we have addressed both the issues entrepreneurs struggle with as well as your mission to help them overcome these problems, I would like to talk about how you support the entrepreneurs.

1. What kind of support do you offer to tenant firms (for example, linking tenant firms to experienced entrepreneurial mentors, offering tenant firms an extensive network, etc.)?
 - a. What form/forms of support do you think is/are most important?
 - b. What do you receive/expect in return from tenant firms?
 - c. In what ways do you deliver this support (e.g., master classes, networking events, mentor sessions)?
2. *Based on the answers given to the previous question, check if the use of the following types of resources have been discussed and how valuable they are for tenant firms.*
 - a. Physical capital
 - i. Basic: office space, administrative services
 - ii. Specialized: laboratories, libraries
 - b. Financial capital: investments, start-up capital, loans
 - c. Human capital: training programs, master classes, education
 - d. Knowledge
 - i. Business skills (mentor/coach)
 1. How many firms is each individual mentor assigned to?
 - ii. Scientific knowledge (role university)
 - e. Social capital:
 - i. Community
 - ii. External networking
 - f. Reputation
3. Is there any form of support that is offered to tenant firms but is not used?
4. What do you think is most important in your range of support services?

Other

1. What does the university do to stimulate students and academic staff to engage in entrepreneurial activities?
2. Let's talk about the process by which you select the tenant firms.

- a. Where are tenant firms coming from (e.g., mainly students or also outside university)?
 - b. How can potential tenant firms apply for a position inside the incubator?
 - c. Would you say you have a more entrepreneur- / entrepreneurial team-focused approach or a more idea-focused approach?
 - d. What percentage is accepted?
3. Does the incubator specialize in a certain industry or sector?
 - a. To what extent is this incubator oriented toward clean-tech industry or clean-tech firms?
 - i. What percentage of the current tenant firm portfolio operates in the clean-tech industry?
4. Would you recommend all start-ups to be supported by an incubator (either this one or another)?
 - a. Why or why not?

Appendix 2D: Interview Questionnaire, entrepreneurs

Introduction Questions

1. Can you state your name, company name, and your responsibilities within the company?
2. What is the basic product or service that the company delivers?

Prior to Start-up (Background)

Let's go back to the point just before you started your current business.

1. Was there a link with the university?
 - a. Were you a student/PhD/professor?
2. Was this business the result of research at a university/research institution?
 - a. Did you feel like the university supported you during the venture creation process?
 - i. Why or why not?

Joining the Incubator (Perceived needs)

1. What was your main motive to apply for a position at this incubator?
 - a. What were problems/challenges you struggled with?
2. At what point during your business cycle did you apply for the incubator, and to what extent did you develop your business ideas/business plan?

Incubator Support (Experienced needs)

2. In what ways does the incubator support you and your business?
 - a. What is most important?
3. *Based on the answers given to the previous question, check if the following types of resources have been addressed and how valuable they are for tenant firms.*
 - a. Physical capital
 - i. Basic: office space, administrative services
 - ii. Specialized: laboratories, libraries
 - b. Financial capital: investments, start-up capital, loans
 - c. Human capital: training programs, master classes, education
 - d. Knowledge
 - i. Business skills (mentor/coach)
 - ii. Scientific knowledge (role university)
 - e. Social capital
 - i. Community: other entrepreneurs
 - ii. External networking

- f. Legitimacy: do you feel that being associated with the incubator brings certain credibility to your company?
4. We have now discussed various ways in which the incubator supports you and your venture.
 - a. First of all, is there any way in which the incubator supports you and your venture that we have not discussed during this interview?
 - b. Can you think of any way in which the incubator could support you more than it does right now?
 - c. Is there any kind of support which is offered to you that you do not make use of?
 - d. Does the incubator play a pro-active role, or do you mostly initiate the support process?
 5. Looking back from the point where you and your business are right now, how important was the incubator to your success/development on a five-point scale?
 - a. Would you have started your business if it wasn't for the incubator?





Chapter 3

Between a soft landing and a hard place: How Silicon Valley software and life sciences business incubators facilitate learning

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The PhD candidate was the main contributor in designing the study, developing the methodology, collecting the data, analyzing the data, and writing this chapter.

ABSTRACT

Business incubators, which are one of the most prominent instruments to support start-ups, increasingly focus on helping start-ups to learn. However, little is known about the mechanisms through which they do so. Further, existing research on incubators largely ignores the influence of industry characteristics. This chapter explores through which practices software and life sciences incubators facilitate lower and higher order learning. Data consists of 69 interviews with incubator managers and entrepreneurs in Silicon Valley's most successful software and life sciences incubators. We find that incubators facilitate lower order learning by providing quick access to missing knowledge through their networks. Higher order learning is facilitated by creating a high pressure environment that challenges the start-up's core goals and assumptions, and stimulates or forces start-ups to experiment with new technologies, markets or business models. Both software and life sciences incubators facilitate both forms of learning, but the balance depends on the start-up's level of 'structural inertia'. Whereas the flexible software start-ups emphasize a process of improvisation and higher order learning, the inert life sciences start-ups primarily rely on careful preparation and optimization of existing practices through lower order learning. Our study contributes to the extant literature by suggesting that the dominant view of incubators as protective environments may negatively influence the success of start-ups, as this may constrain higher order learning. Our study also helps to design more effective incubation practices that are better in line with the industry dynamics of start-ups.

3.1 INTRODUCTION

As a major source of employment and innovation, start-ups play an important role across all industries (Bravo-Biosca and Westlake, 2009; Brown and Mason, 2014). However, over the past three decades, start-ups have been particularly instrumental in driving innovation and growth in the software (SW) and life sciences (LS) industries (Casper et al., 1999; Cincera and Veugelers, 2013). The low capital requirements and short development times of the SW industry creates a favorable environment for start-ups to enter the market and rapidly grow into successful companies (Nowak and Grantham, 2000; The Economist, 2014). Consequently, the SW industry is a dynamic, competitive industry in which most firms are relatively young (Harrison et al., 2004; Zahra and Bogner, 2000). In the LS industry, start-ups have become important players as well, as growing technological complexity has led established pharmaceutical companies to increasingly rely on partnerships with these firms to acquire necessary technological capabilities (Baum et al., 2000; Bianchi et al., 2011). SW and LS are currently the largest start-up industries: in 2014, 60% of the venture capital in the US was invested in start-ups operating in SW or LS. Even though both domains are traditionally far apart, SW and LS become more and more intertwined with the introduction of 'big data' (Dehzad et al., 2014; Howe et al., 2008; Schadt et al., 2010). This creates opportunities for start-ups operating at the nexus of both domains. For example, the field of 'bioinformatics', which involves the analysis of biological data, is expected to grow into a 10 billion dollar market in 2020 (Allied Market Research, 2014; Grand View Research, 2015).

The potential impact of start-ups in both domains is constrained by their high risk nature: many empirical studies show that most start-ups fail or remain small (Bartelsman, 2005; Santarelli and Vivarelli, 2007; Shepherd et al., 2000). To explain their failure, scholars point at the inability of start-ups to learn, as start-ups are unable to develop the expertise necessary to transform their technological ideas into viable businesses (Blank, 2013; Politis, 2005; St-Jean and Audet, 2012). In light of these challenges, policy measures increasingly focus on helping start-ups to learn. One of the most prominent instruments to support start-ups are (business) incubators (Ahmad and Ingle, 2013; Oakey, 2012). Incubators are organisations that create a supportive environment that is conducive to the "hatching" and development of start-ups, by providing start-ups with a comprehensive and integrated range of services and resources (Adegbite, 2001; Bergek and Norrman, 2008). Whereas incubators initially only provided start-ups with access to office space and economies of scale, they now focus on providing intangible resources and helping start-ups to learn (Aerts et al., 2007; Bruneel et al., 2012). Incubators

can do so through a variety of practices, for example by providing mentorship, by encouraging peer-to-peer learning, by organizing workshops or by providing access to a comprehensive support network (Bøllingtoft and Ulhøi, 2005; Hansen et al., 2000; Rice, 2002).

Despite the importance of incubators to facilitate the learning process of start-ups, few efforts have been made to study the mechanisms through which incubators do so (Franco and Haase, 2009; Wang and Chugh, 2014). It remains particularly unclear how the industry context influences these mechanisms. It is important to consider such industry contextual factors, as they affect the learning process of start-ups. For example, learning specialized technological knowledge and skills is particularly relevant start-ups in high-tech industries, such as LS (Hine and Kapeleris, 2006; Tidd et al., 2001). Further, start-ups in such industries may be hesitant to engage in radical change due to sunk costs and extensive product life cycles (Hannan and Freeman, 1984). These differences suggest that the mechanisms through which incubators can facilitate learning also depend on the industry context. However, these industry differences have been largely ignored in extant literature. The majority of incubator research focuses solely on the SW industry (Aerts et al., 2007; Hansen et al., 2000), while LS incubation remains an underexposed subject (Baraldi and Ingemansson Havenvid, 2015). A few recent studies compare incubators in different industries (Rubin et al., 2015; Soetanto and Jack, 2013; van Geenhuizen and Soetanto, 2009), but none of these studies have specifically looked at learning. Consequently, there is a need to explore the differences in incubation practices between both industries. Doing so can help to design more effective programs to support start-ups in SW, LS and those operating at the nexus of both domains.

A promising theoretical framework for this is 'organizational learning', which explores how organizations acquire, distribute and store new knowledge (Huber, 1991; Levitt and March, 1988; Walsh and Ungson, 1991). We apply this framework in the context of incubators and, in doing so, draw on one of the most important classifications in organizational learning literature: the distinction between lower and higher order learning (Chiva et al., 2010). Lower order learning is a process of incremental change. It is associated with optimizing and extending existing capabilities and skills and leads to greater efficiency. Higher order learning is associated with revolutionary change as it challenges the start-up's underlying values and routines, and leads to search for radical new knowledge (Chiva et al., 2010; Fiol and Lyles, 1985). Further, to identify more specifically the areas in which lower and higher order learning occur, we use organizational learning to distinguish between technological, market and business knowledge.

Accordingly, this chapter answers the following research question: “*through which practices can SW and LS incubators facilitate lower and higher order learning for different types of knowledge?*” Empirically, we conducted a qualitative multi-case study in which we studied SW and LS incubators and start-ups in Silicon Valley. We selected this region because it has the most mature and developed incubators, both in SW and LS (Aernoudt, 2004; Chandra and Fealey, 2009). This enabled us to identify successful incubation practices and explore the appropriate mix of lower and higher order learning. Our findings suggest that SW incubators focus on facilitating higher order learning, by creating a high pressure environment that challenges the start-up’s existing technologies, markets and business models, and stimulates start-ups to experiment with new ideas. In contrast, LS incubators emphasize lower order learning and optimization of existing technologies by providing quick access to missing knowledge. In the remainder of this chapter, we first outline our theoretical framework, followed by the methods section. We then present our findings, after which we provide a brief discussion and conclusion.

3.2 THEORY

For this study, we draw on the literature of Organizational Learning (OL), which studies how organizations acquire, distribute and store new knowledge (Huber, 1991; Levitt and March, 1988; Walsh and Ungson, 1991). In this section, we discuss some of the key concepts of OL, which we will use to guide our data collection and to structure our data analysis. We begin by exploring different types of knowledge that start-ups require and how incubators can provide these types of knowledge. We then explore the concepts of lower- and higher order learning to better understand how start-ups can develop this knowledge. Finally, we explore the concept of ‘structural inertia’ to better understand how industry characteristics influence learning.

3.2.1 Technological, business and market knowledge in start-ups and incubators

The goal of technology-based start-ups is to bring a new product or technology to the market through the establishment of a new organization (Bhave, 1994; Vohora et al., 2004). In the process of doing so, start-ups need different forms of knowledge. A common distinction is made between technological knowledge (or product knowledge) and market knowledge (Burgers et al., 2008; Scillitoe and Chakrabarti, 2010; Sullivan and Marvel, 2011). *Technological knowledge* refers to knowledge associated with technologies, products or processes. It includes

knowledge about product design, manufacturing and optimization. *Market knowledge* refers to knowledge about what customers need and how markets operate. It includes knowledge about potential customers' problems and preferences, as well as knowledge about market size, distribution channels, pricing and entry barriers (such as competition and regulations). In addition to technological and market knowledge, start-ups need to develop business knowledge, which is also referred to as 'organizational knowledge' or 'managerial knowledge' (Barbero et al., 2013; Becker and Gassmann, 2006; Vohora et al., 2004). *Business knowledge* refers to knowledge about how to start, manage and grow a business and includes knowledge on hiring employees, raising capital, defining a business plan and drawing contracts.

Young firms, in general, have an underdeveloped knowledge base as they still need to learn new roles and develop organizational routines (Hannan and Freeman, 1977; Stinchcombe, 1965). Start-ups face particular knowledge constraints, as their founders typically have a technological background that gives them extensive technological knowledge yet little business and market knowledge (Oahey, 2003; Sullivan and Marvel, 2011). Further, start-ups may struggle to complement their knowledge base, as their lack of connections, limited visibility in the market, and non-existent reputation constraints their ability to externally acquire missing knowledge (Baum and Amburgery, 2002; Stinchcombe, 1965). Incubators have the potential to address these 'liabilities of newness'. Incubators may do so by providing a resource-rich environment that enables start-ups to easily acquire the necessary knowledge (Hughes et al., 2007; Sullivan and Marvel, 2011). As such, incubators provide a protective environment that helps start-ups to survive and grow during the early stages when they are most vulnerable (Aernoudt, 2004; Carayannis and von Zedtwitz, 2005).

Incubators can help start-ups acquire the necessary knowledge through several practices. First, sessions with the incubator manager or external mentors enable start-ups to learn from experienced entrepreneurs and thereby enable entrepreneurs to acquire necessary business and market knowledge (Scillitoe and Chakrabarti, 2010). These sessions also help start-ups to create new knowledge through reflective activity, as mentors and entrepreneurs jointly evaluate the start-up's progress and experiences (Radu Lefebvre and Redien-Collot, 2013; Sullivan, 2000). Second, 'networked' incubators can have a catalytic function in connecting start-ups to an external network of investors, service providers and universities (Hansen et al., 2000). These external networks enable start-ups to connect to more specialized and diverse actors, and are an important channel through which incubated start-ups access technological knowledge (Scillitoe and Chakrabarti, 2010). Third, incubators enable start-ups to learn from each other, as co-location in the incuba-

tor facilitates the creation of a 'community' of peers with whom entrepreneurs can exchange market, technical and business knowledge (Hughes et al., 2007; Rubin et al., 2015). When learning from external sources, incubator managers enable start-ups to filter, integrate and make sense of the newly acquired knowledge, thereby further contributing to the creation of a solid knowledge base (Patton and Marlow, 2011; Patton, 2014).

3.2.2 Lower order and higher order learning

Although different terminologies are used to distinguish between lower and higher order learning, such as lower level and higher level learning (Fiol and Lyles, 1985), single loop and double loop learning (Argyris and Schön, 1978) and adaptive and generative learning (Senge, 1990), their characteristics are very similar (Chiva et al., 2010; Cope, 2003; Wang and Chugh, 2014). *Lower order learning* refers to reinforcement of existing knowledge, routines and capabilities and may be no more than optimizing practices through repetition (Espedal, 2008; Fiol and Lyles, 1985). It is associated with ad – hoc problem solving, as its aims to correct a particular aspect of the organization (Chiva et al., 2010; Fiol and Lyles, 1985). Lower order learning leads to practical, certain and immediate outcomes and is primarily a conservative process of incremental improvement that aims for efficient operation. Examples of lower order learning are optimizing existing products or institutionalizing formal rules (Fiol and Lyles, 1985). *Higher order learning* is associated with radical change, as organizations move away from long held practices, routines and capabilities (Spicer and Sadler-Smith, 2006). Examples of higher order learning are the introduction of radically different technologies or the development of a new organizational culture (Fiol and Lyles, 1985; Van de Ven and Polley, 1992). The distinguishing element of higher order learning is that it challenges and redefines the organization's 'frames of reference' (Fiol and Lyles, 1985; Huber, 1991). These *frames of reference* reflect implicit and explicit assumptions and beliefs about the organization, its goals and its environment, and they serve as the basis for making decisions (Fiol and Lyles, 1985; Nicholls-Nixon et al., 2000). Higher order learning occurs when organizations realize that existing frames of reference no longer adequately meet the needs of the environment. Because these frames are deeply ingrained within organizations, some sort of 'shock', 'jolt', or 'crisis' is necessary before organizations start questioning and changing them (Cope, 2003; Fiol and Lyles, 1985). Higher order learning thereby not only involves the creation of new practices, but also the 'unlearning' of old ones.

Engaging in higher order learning is necessary, as relying exclusively on lower order learning limits creativity and flexibility (Spicer and Sadler-Smith, 2006).

Further, compared to lower order learning, the outcomes of higher order learning are more widely applicable, as it aims to create 'a new way of looking at the world', rather than a particular behavioral outcome (Senge, 1990). However, as the outcomes of higher order learning are distant from the organization's current state, they are unknown and uncertain. Further, too much higher order learning constrains an organization's ability to optimize capabilities and capture their benefits (Espedal, 2008; Nicholls-Nixon et al., 2000). Accordingly, a balance between both forms of learning is required. Start-ups often engage in higher order learning (Wang and Chugh, 2014). Because they are still in search for a viable business model, they often find that their initial assumptions are incorrect, as their plans turn out to be technologically unfeasible or commercially unviable (Blank, 2013; Nicholls-Nixon et al., 2000).

3.2.3 The influence of industry characteristics and structural inertia on Organizational Learning

Differences between SW and LS in terms of learning and incubation can be explained by differences in the need and ability of start-ups to engage in lower and higher order learning. Environments that are relatively stable favor efficiency through the optimization of existing practices and, therefore, lower order learning (Garg et al., 2003; Gupta et al., 2006; Uotila and Maula, 2009). In contrast, rapidly changing environments require the ability of organizations to adapt through higher order learning (Hannan and Freeman, 1977; Van Rijnsoever et al., 2012). However, organizations may not be able or willing to engage in higher order learning. This inability or resistance of organizations to change their core organizational features, or their frames of reference, is known as '*structural inertia*' (Baum and Amburgery, 2002; Hannan and Freeman, 1984). Several factors contribute to such inertia, such as sunk costs, standard procedures, vested interests or commitments to external organizations (Hannan and Freeman, 1984). SW and LS start-ups have different levels of structural inertia, which influences the balance between lower and higher order learning.

The SW industry is characterized by low levels of structural inertia. The competitive advantage of firms lies primarily in their ability to identify and respond to user needs (Ethiraj et al., 2005; Tidd et al., 2001). The skills needed to found SW start-ups are broadly applicable and can be learned quickly, due to the emergence of easy to learn programming languages (Pisano, 2006). Recent technological developments, such as cloud computing, open source software and the emergence of mobile app stores, have led to a decrease in the costs required to found and operate a SW start-up. Accordingly, SW start-ups can rapidly and cheaply experiment with dif-

ferent products or markets (Kerr et al., 2014), which means that the costs and risks associated with higher order learning are low. We therefore expect SW start-ups to engage in this form of learning more often.

The LS industry, consisting of biotechnology, pharmaceutical and medical devices firms (Pricewaterhousecoopers, 2015), is an example of an industry with more inert start-ups. It is a high-tech industry in which the competitive advantage of firms lies in their ability to exploit and advance (basic) science and develop technically related products (Pavitt, 1984; Pla-Barber and Alegre, 2007). Founders of start-ups need high levels of human capital, as extensive, specific skills sets are required (Pisano, 2006). Capital requirements are also high and product life cycles are long: it has been estimated that it takes up to 15 years and 1 billion dollar to develop a drug and bring it to the market (Hine and Kapeleris, 2006; Pisano, 2006; Pronker et al., 2011). These factors make LS start-ups more inert than SW start-ups. The technological complexity of the LS industry makes it unlikely that start-ups are able to develop all necessary technological knowledge in-house. They are therefore more likely to partner with universities, research laboratories or established pharmaceutical companies (Fernald et al., 2015; Laursen and Salter, 2004; Powell et al., 1996), which may further limit their flexibility. Finally, the strict regulations of the LS market (especially compared to the unregulated SW market) also contribute to the inertia of LS start-ups. Compared to SW start-ups, LS start-ups can therefore be expected to have a greater emphasis on lower order learning.

3.3 METHODS

3.3.1 Research design

To develop new theoretical insights on the learning processes of incubated start-ups, we conducted a qualitative comparative case study (Eisenhardt, 1989). Such a qualitative approach is particularly suited to explore *how* incubators facilitate learning and *why* this differs across industries. We studied incubators in the LS and SW industry, which we compare in terms of their 'incubation practices'. Doing so is in line with recent calls for incubator scholars to focus on incubators' *practices* rather than their *attributes* (Ahmad and Ingle, 2013; Hackett and Dilts, 2004a), because understanding the incubator's practices is key to understanding how incubators function and add value (i.e. how they facilitate learning). We collected data from the Silicon Valley area. This geographical region between San Jose and San Francisco, California, inhabits around 1 per cent of the US population, but is responsible for 12 per cent of US patents, and almost 50 per cent of US venture

capital (PWC, 2014; Silicon Valley Index, 2014). Silicon Valley is arguably the most well-known and successful entrepreneurial ecosystem in the world and home to many successful start-ups and incubators in the SW and LS industries (Herrmann et al., 2012).

The SW industry is largest, and many established firms in the software industry are headquartered in the area, such as Facebook, Twitter and Google. Almost all of these firms began life as a Silicon Valley start-up. SW start-ups are still dominant in 'The Valley': in 2012, 36 percent (almost 4 billion dollar) of the region's venture capital was raised by start-ups in the SW industry (Pricewaterhousecoopers, 2015). The LS industry is also well-represented in Silicon Valley. With the creation of Genentech in 1976, South San Francisco came known as 'the birthplace of biotech'. Many biotech and pharmaceutical companies have offices in this region, enabling them to be in close proximity to universities such as Stanford, UC Berkeley and UC San Francisco. The LS industry is the second largest start-up industry of Silicon Valley, raising 16% (1.8 billion dollar) of the region's venture capital in 2012 (Pricewaterhousecoopers, 2015).

3.3.2 Case description

A qualitative, exploratory study such as ours aims for analytical generalization to theory rather than statistical generalization to a wider population (Bansal and Corley, 2011; Bryman, 2008; Yin, 2009). Accordingly, for this study, we aim to understand how SW and LS incubators *could* facilitate lower and higher order learning, rather than to explain how incubators (in general) *are* facilitating such learning. In selecting the cases, we therefore did not aim to select cases that were representative for the larger population. Rather, we selected cases that could yield new and rich insights into the phenomenon under study, for example because these cases yield particularly good results (Patton, 1990). We therefore decided to purposefully sample for successful SW and LS incubators in Silicon Valley. Accordingly, we primarily collected data from Silicon Valley's most prominent LS incubator and the two major SW incubators. The SW incubators operated with an 'accelerator' model. Some authors differentiate between accelerators and incubators (see e.g. Cohen and Hochberg, 2014; NESTA, 2011). They do so because they see incubators as providers of office space and basic services, whereas accelerators are seen to focus on more intangible services (e.g. mentoring, networking). However, modern-day, 'third generation' incubators are not merely providers of shared office space, but organizations that provide a comprehensive range of support services (Aernoudt, 2004; Bergek and Norrman, 2008; Bruneel et al., 2012). These services include those that are also provided by accelerators, such as mentoring

and networking. Further, there is great diversity among the models and definitions of both incubators (Aernoudt, 2004; Bergek and Norrman, 2008; Bruneel et al., 2012) and accelerators (see e.g. Brown and Mawson, 2015; Pauwels et al., 2015). 'Incubators' and 'accelerators' are both seen as 'umbrella terms' (Aernoudt, 2004 p. 127; Pauwels et al., 2015 p. 1) that largely overlap (Stam and Bosma, 2015). Consequently, in practice, accelerators and modern incubators can be very similar. In our view, such an explicit distinction between incubators and accelerators is therefore not justified

Both entrepreneurs and investors regarded these incubators as the leading incubators in their industry. Each incubator had supported hundreds of start-ups since their founding, which had raised hundreds of millions of dollars in cumulative private funding. We therefore regard these three cases as examples of successful incubators, and suitable cases to identify best practices. The first SW incubator in our sample was established in 2005. It operated with a for-profit model, in which the it took a small share in the start-ups. This incubator did not offer shared office space, but had a strong focus on providing access to networks and mentorship. A small group of incubator managers and partners provided the start-ups with advice. The second SW incubator was founded in 2010, and operated with a similar model. However, entrepreneurs were not guided by the incubator management, but by a large network of external 'mentors'. This incubator did provide shared office space, although co-location in the incubator was not a requirement. The LS incubator was established in 2000 by local universities and governments. It charged tenants for renting space and using its services and facilities. In addition to the physical facilities, start-ups were provided with various support services similar to those provided by the SW incubators, such as mentorship, a support network, peer-to-peer networking, etc. The LS incubator housed a broad range of LS start-ups, ranging from biotech firms to start-ups developing medical devices and diagnostics platforms. It was the largest LS incubator in the area, and operated with four different facilities that were managed independently from each other. We also interviewed some LS entrepreneurs and incubator managers outside the LS incubator, which operated with very similar models. Therefore we consider the LS incubator in our sample to be representative for LS incubators within Silicon Valley. The LS and SW incubators supported start-ups in a similar stage of development. Most incubated start-ups were still young, typically without public funding and no or few paying customers.

3.3.3 Ethics statement

Due to the low risks associated with the content of the interviews, we did not ask for written consent. Further, we were concerned that doing so could impede the conversational style that we hoped to achieve during the interviews. Still, participants who were formally interviewed were informed about the goals of the study, about how we would use the interview data, about the intent of publishing the results and about the guarantee that they would remain anonymous. Participants gave their consent, verbally, by e-mail or by phone, by agreeing to participate. At the start of the interview, participants were again informed about the purpose of the study, they were informed that they were not obliged to answer all questions and they were asked for permission to record the interview. No prior approval was obtained (nor requested) from an institutional review board or ethics committee because this is not required or common for studies like this conducted at universities in the Netherlands. Approval is only required when participants are actively manipulated or when working with vulnerable populations, such as children (none of the interviewees in our sample were under the age of 18).

3.3.4 Data Collection

The first author visited the area between February and July 2013. The second author joined for 7 days to assist in data collection, to discuss findings and to adjust the data collection where necessary. This ensured an open view and increased the reliability of the research. Interviews were the main data source. Potential interviewees were initially identified for an interview through the incubators they were affiliated with. In addition, we asked respondents after the interview to recommend other entrepreneurs or stakeholders from their incubator who they felt could provide further insights. The interview data was augmented with informal conversations and notes taken from attending meetings, events and workshops, and with written documents such as e-mail conversations, policy documents, personal weblogs, and mission statements.

A total of 117 interviewees were approached for an interview, out of which 71 agreed to participate (the reason for individuals not to participate was typically that they felt too busy). A total of 69 interviews was conducted (2 interviews were conducted with two founders at once). We interviewed 27 SW entrepreneurs and 31 LS entrepreneurs. Founders of LS start-ups were typically higher educated: 30 out of 31 LS entrepreneurs had a PhD degree, compared to only 6 out of 27 for SW entrepreneurs. LS entrepreneurs were also older on average (38.8 years compared to 28.4 for SW entrepreneurs). Most of the entrepreneurs in our sample had a

technological background (80 per cent) and lacked entrepreneurial experience (66 per cent were first time entrepreneurs when they joined the incubator). In line with previous studies, we found entrepreneurs in our sample to have different perceptions about the quality and value of the incubator's support (Patton, 2014; Rice, 2002). Some entrepreneurs were highly satisfied and viewed the incubator as playing a decisive role in the success of their start-up (two entrepreneurs even became 'recurring customers', as they went through the incubator process with two different start-ups). Other entrepreneurs were more critical about the incubator's support. One LS entrepreneur even left the incubator because of this. These different viewpoints enabled us to get a nuanced view on the incubators in our sample. We also interviewed other key stakeholders in the start-up ecosystem, such as incubator managers, investors or technology transfer officers. Finally, we conducted a number of interviews with entrepreneurs who were not incubated, to explore potential contrasts with more traditional ways of learning. These interviewees were approached at the meetings and events. Interviewing such a diverse group of respondents enabled us to triangulate our findings. A detailed breakdown of the response by sector is given in table 3.1.

Table 3.1 Overview interviews

Industry	Interviews
Life sciences	4 incubator representatives 31 entrepreneurs
Software	3 incubator representatives 27 entrepreneurs
Other	1 investor 1 TTO 2 Entrepreneurship professors

3.3.5 Interview scheme and data analysis

During the interviews, entrepreneurs were first asked to introduce themselves and their start-up. Entrepreneurs were then asked to discuss the support they received from the incubator. We then asked entrepreneurs to discuss key skills and insights they learned over time, and to identify actors who were important in their learning process. An important part of this interview phase was for entrepreneurs to describe the changes they made to the start-up's technological, market and business knowledge base, as well as the reasons for those changes. The interview questionnaire for entrepreneurs is provided in S1 Appendix. Incubator representatives were asked to explain the incubator's background, history, goals and support provided. They were then asked to reflect on common mistakes made by entrepreneurs, and skills that they felt entrepreneurs needed to develop during the incubation process. The interviews took on average 50 minutes. All interviews were digitally recorded and fully transcribed within three days. After every interview, the interview scheme was reviewed and adjusted if the interviews revealed important information and

concepts that were not yet included. Data were collected until no new concepts emerged, which suggests that theoretical saturation was reached (Glaser and Strauss 1967).

Data were coded and analyzed using Nvivo, a qualitative data analysis software program that allows for a systematic analysis of unstructured qualitative data. During the data analysis, we used a ‘learning episode technique’ (see e.g. Knight and Pye, 2005; Lefebvre et al., 2015; Theodorakopoulos and Figueira, 2007). This technique connects learning antecedents (such as a conversation with an incubator manager or a seminar organized by the incubator) to perceived learning outcomes (such as increased knowledge about presenting to investors or the development of a new product). The learning antecedents were initially labelled with ‘open codes’ that were very close to the interviewees’ own words. These open codes were then collapsed and categorized to create five incubation ‘practices’. Then, using our theoretical definitions, we categorized the learning outcomes as lower or higher order learning, and as technological, market or business knowledge. This process enabled us to understand how each incubation practice was associated with each type of learning and each form of knowledge. Table 3.2 provides examples of codes associated with different forms of learning and knowledge.

Table 3.2 Codes associated with different forms of learning and knowledge

Definitions	Technological knowledge knowledge associated with products, technologies or processes	Market knowledge knowledge about what customers need and how markets operate	Business knowledge knowledge about how to start, manage and grow a business
Higher order learning Creating new knowledge while questioning and modifying the start-up’s underlying norms, policies and objectives	Questioning existing technology or product and exploring new ones Example codes: - Switch ideas - Change underlying technology	Questioning existing market and exploring new ones Example codes: - Identify target market - Change customer	Questioning existing business practices and exploring new ones Example codes: - Change company culture - Change business model
Lower order learning Creating new knowledge without questioning the start-up’s underlying norms, policies and objectives	Improving existing products and technologies Example codes: - Improve efficiency - Add features	Improve understanding of markets Example codes: - Learn about market barriers or competitors	Improving and extending business practices Example codes: - Learn accounting, marketing or fundraising

3.4 FINDINGS

We begin this section by discussing the various incubation practices and how these practices differ for the LS and SW industry. We then discuss how incubators balance lower and higher order learning, and how this balance differs across the SW and LS industry.

3.4.1 Incubation practices

Table 3.3 provides an overview of the incubation practices. Before discussing these practices, we note that incubators enabled start-ups to outsource many of their non-core activities by providing for example a pre-setup laboratory space, legal and accounting services, or grant writing support. Such outsourcing does not lead to the creation of new knowledge. Hence, it does not lead to learning, and we do not consider it as an incubation practice. However, incubators hereby indirectly facilitate the learning process, as they eliminate distractions and enable start-ups to focus on their business: *“You’re not dealing with all that noise, and you can just focus on your development plan”*. LS incubators in particular provided a wide range of in-house services. Consequently, and in contrast with SW entrepreneurs, LS entrepreneurs regarded the ability to outsource parts of their activities as a key component of the incubation process.

Table 3.3 Incubation practices. X = practice observed for both LS and SW incubators, LS = LS only

Incubation practices	Technological knowledge		Market knowledge		Business knowledge	
	Lower order	Higher order	Lower order	Higher order	Lower order	Higher order
1. Organizing trainings and seminars			LS		X	
2. Facilitating a community	X		X		X	
3. Mentoring	X	X	X	X	X	X
4. Creating external network						
- Customers	X	X	X	X		X
- Investors		X	X	X		LS
- Universities	X	LS				
- Service providers (e.g. lawyers, accountants)					X	
- Technical consultants	LS					

Organizing seminars and trainings

Incubators organized seminars and training sessions; formal settings that were focused on teaching entrepreneurs specific skills under the supervision of a renowned expert. These seminars were primarily on business-related topics such as fundraising, accounting or marketing. In addition, the LS incubators organized seminars on market-related topics, such as industry specific regulations. These topics were all labelled as lower order. Although some entrepreneurs welcomed the ability to quickly learn skills and gain insights from experts, attendance of these seminars was rather low: entrepreneurs felt that they were too busy, that the topics did not align with the start-up's particular needs, or that the skills and knowledge they needed *'cannot be learned from taking a class'*. Consequently, none of the interviewees regarded these seminars as a key component of the incubation process, and most entrepreneurs preferred to engage in a direct conversation with their peers or mentors, as this enabled them to have a more interactive discussion that was tailored to the start-up's particular situation and problems.

Facilitating a community

Start-ups can learn from their peers in the incubator's community as they develop knowledge by imitating each other and by exchanging knowledge. Incubators facilitated the creation of an entrepreneurial community by providing shared office space, online social platforms and social events. Consequently, entrepreneurs felt comfortable asking each other for help. Almost all entrepreneurs valued this learning practice, as it is an efficient way of learning: *"Most other companies have gone through a lot of the same stuff, so why re-do it yourself? Use what's already there, and save as much effort as possible"*. By quickly consulting their peers, the community enabled start-ups to efficiently overcome a particular challenge, learn a specific skill, or access missing pieces of information. Accordingly, the entrepreneurial community was an important source for lower order learning. The interviews did not show that the community played a role in higher order learning, which was confirmed by one of the incubator managers: *"Entrepreneurs talk with each other more about the day-to-day business and struggles. What vendors do you use? How do you solve this particular technological issue? The more strategic mentoring and advice isn't something that people can extract from the entrepreneurial community"*. Entrepreneurs used the community to exchange knowledge about technology, market and business related topics. Some interviewees felt that the potential for learning on market and technological topics was limited, as these topics were more start-up specific. Further, although community interactions enable start-ups to quickly access missing knowledge, they may also distract and limit the ability of start-ups to develop knowledge in-house. One SW entrepreneur said:

“If I were to do it again. I would go in and thinking that I wouldn’t get any work done on the product. It’s mainly for the networking”. Entrepreneurial communities played a similar role for LS and SW start-ups, as the aforementioned patterns were observed for both groups of start-ups. However, LS entrepreneurs were more reluctant to engage in the community. Start-up communities pose a threat of involuntary knowledge spillovers (McAdam and Marlow, 2007; van Weele et al., 2014). Sensitive technological knowledge is more prevalent in the LS industry. The LS start-ups in our sample were all very early stage and many of them had not yet been granted a patent to formally protect their technology. Consequently, some LS entrepreneurs were very reluctant to engage in the community exchange knowledge, especially regarding technological topics.

Providing mentorship

Mentoring is a process in which an experienced veteran helps to shape or guide a newcomer (Brown, 1990). For the incubators in our sample, mentorship was provided by the incubator manager or external mentors, who were often experienced entrepreneurs or investors. Similar to the community, mentors enable entrepreneurs to efficiently learn from the mentor’s experience, and we found mentor sessions to address a wide variety of lower order market, technology and business topics. In addition, we found mentors to play an active role in facilitating higher order learning. During mentor sessions that entrepreneurs described as *“tough”* and *“stressful”*, mentors brought in a different perspective and aimed to make entrepreneurs think by asking critical questions: *“It’s not that they tell you you’re wrong, they’ll ask you to quantify your answers. Push back. Sometimes you need somebody to not assume everything you say. That was very useful”.* Mentors challenged the entrepreneur’s ideas and goals, thereby forcing entrepreneurs to explicate the assumptions underlying their start-up. Because of their successful entrepreneurial track record, mentors were seen to have the credibility to make entrepreneurs re-consider these assumptions. In doing so, mentors triggered a process of higher-order learning. This required mentors to have a deep understanding of the start-up’s activities (one entrepreneur said that mentors need to *“dig in”*). Consequently, higher order learning did not occur during short and superficial interactions, but required intense, long or multiple mentor sessions. One of the entrepreneurs provided an example where a critical review from a mentor led to a completely different start-up: *“[The incubator manager] wasn’t excited about our idea and had some very critical questions: ‘of all the things you can do right now, you think this is the best you can do?’ So afterwards we spent the entire afternoon brainstorming with the three of us, to see what needed to change (...) We eventually came up with an entirely different idea”.* Early on, mentor sessions are focused on higher order learning, as start-ups

were still in search for a technologically and commercially feasible business. In later stages of the incubation process, mentor sessions tend to focus on lower order topics, for example on presenting the start-up to investors, optimizing the start-up's technology, or growing the start-up's user base. As all incubators in our sample facilitated the creation of mentor relationships, there were no strong differences between sectors for this practice.

Although many entrepreneurs found mentors to be of great value, there were also entrepreneurs who were skeptical of mentors. Similar to the community, mentors may be a source of distraction. Further, mentorship may lead to groupthink, which creates the risk for start-ups to acquire knowledge that is not applicable to their situation. Given that mentors and incubator managers work with a large number of start-ups, they are able to recognize patterns on best practices and common mistakes, and transfer this knowledge to start-ups. This can be an efficient way or learning; one of the interviewees said that mentors thereby provide a "shortcut" to learning from the incubator's entire portfolio. However, there is a risk that these patterns become rigid guidelines that limit flexibility and search for new knowledge or routines. Further, in the SW incubators, mentors were often former participants in the program ('graduates'), creating a rather homogenous group of mentors. Consequently, interviewees said that different mentors gave similar advice, as they had similar backgrounds and ideas about running a start-up. Orlikowski (2002) already warned that such a strong, shared way of doing things "may also lead to an organizational form of groupthink with less flexibility around change" (p. 258). Such concerns also emerged during the interviews, but were only raised by entrepreneurs in the first SW incubator. As we stated on page 65, mentorship at this incubator was provided by a small group of incubator partners and managers. These mentors were often 'graduates' (i.e. former participants in the program). This created a homogeneous group of mentors who provided similar advice. One of the entrepreneurs said that norms and values were so deeply ingrained in the incubator's practices that he referred to them as "cliches". Another entrepreneur said that "it might be good to get some other experience from outside the [incubator's] network". Indeed, there were several instances where entrepreneurs felt that the patterns recognized by mentors were not applicable to their situation. One of the SW entrepreneurs said the following about the mentor sessions: "We are very different from everyone else in the program ... The advice was meant well, but sometimes it was not good advice. They were (...) applying things that worked with other people".

Creating external networks

Besides connecting start-ups to each other and to mentors, incubators also acted as a mediator in connecting start-ups to stakeholders outside the incubator, such as investors, customers or service providers. All incubators played a direct role in creating such networks as mentors associated with the incubator leveraged their personal network, as the incubator organized networking events, and as the incubators maintained partnerships with for example universities or corporations. Entrepreneurs unanimously welcomed the ability to connect to the incubator's network, and it was an important source for lower order learning, for example when start-ups consulted lawyers for legal advice or universities to answer specific technological questions: *"Whatever question you may have, whether it's something technological or operational, there's always someone who has dealt with that before"*.

The incubator's external network also triggered higher order learning. Customers were an important source for higher order learning, as start-ups reconsidered their target market, technology or strategy based on their feedback. Incubators connected start-ups to customers, and mentors actively encouraged start-ups to engage with customers. One of the SW entrepreneurs said the following about the incubator manager: *"He's always been emphasizing the whole customer development thing. Get out and talk to customers, launch early. 'If you're not embarrassed, you launched too late', that sort of philosophy"*. As such, start-ups were stimulated or even forced to reach out to customers and adapt accordingly: one incubator even had a formal requirement that every start-up should talk to at least 100 customers during their stay in the incubator. Whereas SW start-ups had a clear understanding of their customer (i.e. the end user of their product), LS start-ups identified multiple customers, such as the patient who uses the product, the doctor who prescribes the product, the FDA who needs to approve the product, etc. These various customer groups were all sources for higher order learning, and part of the incubator's network. A second, but more disputed, source of higher order learning were investors. Although entrepreneurs were skeptical of investors' expertise and motives (one of the entrepreneurs said that *'investors are either useless or dangerous'*), entrepreneurs also acknowledged that in order for the start-up to appeal to investors their feedback needed to be taken into consideration, and we found several higher order learning outcomes to be triggered by feedback from investors. The importance of customers and investors was one of the reasons why the SW incubators only provided a small amount of funding, just enough to cover the founders' living expenses during the duration of the incubator program. Providing small amounts of funding forced start-ups to seek out customer and investor feedback, and adapt accordingly. One of the incubator managers said: *"If you give too*

much money in the beginning, good founders can work on bad ideas for too long". For LS start-ups, we also found universities to be a potential source for higher order learning, for example when technological breakthroughs at universities made start-ups reconsider their underlying technology.

3.4.2 Balancing lower and higher order learning in the SW and LS industries

The aforementioned practices enable start-ups to develop the combination of technology, market and business knowledge both through lower order learning (for example by improving the performance of an existing product or by introducing new features based on customer feedback) and higher order learning (as start-ups experimented with different technologies, markets or business models). Each start-up described one or multiple iterations we labelled as higher order learning. Because start-ups are still searching for a commercially and technically feasible business idea, their ability to adapt through higher order learning was seen as key to their success, as one incubator manager illustrated: *"You need to be able to modify your dreams on the fly (...) Don't try to construct the future like a building, because your current blueprint is almost certainly mistaken"*. In line with our theoretical framework, we found crises (such as a failed clinical trial or the inability to find customers and raise venture capital) to provide the shock necessary to trigger higher order learning, as these crises made entrepreneurs willing to question and change the start-up's underlying assumptions. Also unexpected success, such as a technological breakthrough, could trigger higher order learning. Despite the importance of higher order learning, interviewees emphasized that balancing lower and higher order learning is important for start-ups to be successful, as one entrepreneur illustrated: *"Both sides can't be taken to the extreme. I've seen entrepreneurs be super driven on one direction, unwilling to hear anything. Those people seem like ignorant. But then there's the people who change constantly. And that's not practical either, because you never know what you're doing. You're in a constant mode of brainstorming"*.

In line with our theoretical expectations, the short development time and low requirements for equipment and financial capital made SW start-ups more flexible, as the costs for experimenting with different technologies, markets or business models are low. Therefore, SW start-ups relied on improvisation and were open to higher order learning, as the following SW entrepreneur illustrated: *"Think of something, but don't overanalyze it (...) Just start doing something, see what the feedback is, and be open to the fact that you could be wrong"*. In contrast, the long development time, strict regulations, dependence on partners to develop the technology (e.g. universities, suppliers, pharmaceuticals) and sunk costs make

LS start-ups more inert. Therefore, LS start-ups were more hesitant to engage in higher order learning. Instead, they spent much time on preparation (for example by conducting extensive market and technological analyses) prior to creating a start-up and making the decision to go in a particular direction. An LS investor illustrated: *“A lot of it has to do with hypothesis setting (...) If you are investing in a biotechnology therapeutics company, you’re kind of committing to a path”*.

The factors that make LS start-ups inert are primarily related to their technology: for example, the obtained research grants, the purchased specialized equipment, the training of technical personnel and the agreements about intellectual property all mean that LS start-ups are committed to developing a particular technology. Further, the technological knowledge that underlies LS start-ups is often the result of years of development in universities or pharmaceuticals. This makes LS entrepreneurs unable or unwilling to engage in higher order technological learning (one of the interviewees said that LS entrepreneurs are *“emotionally attached”* to their technology). Given that radical technological change was difficult, higher order learning for LS start-ups focused on finding an application for the existing technology, by exploring different markets and business models. One LS entrepreneur illustrated this by saying: *“We’ve looked at business plans that would cover anything from pharmaceuticals to fine chemicals, to novel materials and even bio fertilizers. But at the core of all those is a common set of technology that I think could drive all these businesses forward”*.

These differences between SW and LS start-ups were reflected in the role of the incubator. SW incubators actively promoted an iterative development process of higher order learning: *“usually we advise start-ups to launch early and iterate”*. In addition, SW incubators spent much time on idea generation, which was reflected in eight SW start-ups in our sample abandoning their original idea to pursue a completely new idea (and, thus, a new start-up). In contrast, we found the LS incubator to emphasize lower order learning, especially with regard to technological knowledge. Incubators aimed to increase the performance of the start-up’s existing technology. One of the LS incubator managers said: *“It’s about improving efficiency, or ‘operational excellence’. It is an important reason why life science start-ups fail: they are not able to deliver their product in a (cost)efficient manner (...) So we try to help them with this”*. Further, higher order learning within the LS incubator focused on finding a market application for the existing technology, as one LS entrepreneur illustrated when reflecting on her stay in the incubator: *“the big question was to find and articulate the need. That’s the problem with lots of cool technologies: the technology is cool, but is there a need?”*.

In addition to the industry characteristics, we found the balance between lower and higher order learning to depend on the start-up’s development stage.

As organizations mature, they become more inert (Hannan and Freeman, 1984). Consequently, the early stages of incubation are focused on higher order learning by defining a product, market and business model, whereas the later stages of the incubator process were focused on optimizing the start-up's existing practices.

3.5 DISCUSSION AND CONCLUSION

This chapter explored the practices through which SW and LS incubators facilitate lower and higher order learning for different types of knowledge. By doing so, we can draw three conclusions:

Lower and higher order learning are both important in the context of SW and LS start-ups, but facilitated in distinct ways. Lower order learning is facilitated by providing quick access to missing knowledge. Higher order learning is facilitated by creating a high pressure environment that challenges the start-up's core goals and assumptions.

The industry context influences the balance between lower and higher order learning. Whereas SW start-ups and incubators emphasize improvisation and higher order learning, LS start-ups and incubators focus on careful preparation and optimization through lower order learning.

Rather than facilitating learning, incubators may *constrain* learning when they become overprotective, when networking opportunities distract from developing knowledge in-house, or when a homogeneous group of mentors create a sense of groupthink.

We now discuss the implications of these conclusions for managers and scholars of incubators in greater detail. We end this section with a brief reflection on the limitations of our study.

3.5.1 How incubators facilitate lower and higher order learning

By focusing on the incubation practices, we were able to reveal the mechanisms through which SW and LS incubators facilitate lower and higher order learning. All practices facilitated lower order learning, as they enabled start-ups to rapidly learn specific skills or solve particular problems. Only mentoring and the incubator's external network (through interactions with customers and investors) were associated with higher order learning. These are therefore key practices that should be well-developed: incubators should have experienced and credible mentors, as well as a strong network of customers and investors. With these practices, incubators create a high pressure environment that challenges the start-up's existing business

and stimulates it to experiment with different technologies, markets and business models. To further facilitate higher order learning, incubators should not be too protective. Rather, they should let start-ups make mistakes, as these mistakes serve as 'shocks' that make start-ups aware of the need to change and willing to engage in higher order learning. Our findings depart from the dominant perspective in research and practice in which incubators are seen as a 'a safe haven' (Amezcuca et al., 2013) that provides 'shelter' (Carayannis and von Zedtwitz, 2005) for start-ups 'in the period when they are most vulnerable' (Aernoudt, 2004; InBIA, 2016). Our findings suggest that such a perception of incubators will likely constrain higher order learning. Instead, incubators should operate between providing a 'soft landing', by enabling start-ups to quickly access missing knowledge, and being a 'hard place' that challenges the start-up.

3.5.2 How the industry context influences the balance between lower and higher order learning

SW start-ups were more flexible than their LS counterparts. This is primarily due to the low capital requirements and short development times. Consequently, they emphasize higher order learning, by doing little preparation, experimenting with various products or markets and adapting their start-up to feedback from mentors, customers and investors. In contrast, several factors make LS start-ups inert, such as extensive product life cycles, sunk costs, stringent regulations, reliance on partners, motivations of the entrepreneur and investments in specialized equipment or knowledge. The inertia of LS start-ups makes higher order learning risky and costly and favors careful preparation and optimization of existing practices. LS start-ups were particularly reluctant to engage in higher order technology learning, as the factors that create structural inertia are primarily related to their technology.

Incubators supporting SW start-ups can create an environment that stimulates start-ups to experiment rapidly with various products, markets and business models. However, incubators supporting science-based, capital-intensive start-ups (such as LS start-ups) should acknowledge that these start-ups may not be willing or able to radically change the underlying technology. Consequently, we recommend incubators operating in such industries to focus on enabling start-ups to optimize their existing technology while enabling them to explore various applications for the technology. Incubators supporting start-ups on the intersection of LS and SW should consider the technology intensity of the start-up. Such start-ups that are based on scientific knowledge (e.g. those in the field of bio-informatics) may be less inert than 'traditional' LS start-ups, as they require less equipment and capital. However, many of the other factors that cause structural inertia (such as the

regulations, investments in specialized knowledge and reliance on partnerships) are also present for these start-ups. Consequently, we expect that such science based start-ups are more at home in LS start-up support programs. In contrast, start-ups developing more low-tech solutions (e.g. those using smartphones and social media for developing telehealth solutions) can be supported in a similar way to 'traditional' SW start-ups.

The industry context is not only important for incubator managers to take into account, but also for incubator scholars: although extant literature has largely neglected the influence of industry characteristics, our findings show that this is important to take into account, as it might explain differences among incubators in terms of their practices.

3.5.3 How incubators may constrain learning

In addition to constraining higher order learning by being overprotective, incubators may lead to groupthink and distract entrepreneurs from developing knowledge in-house. Entrepreneurs should be aware of these potential risks. Incubators should minimize the risk of groupthink by ensuring a diverse group of mentors. Consequently, incubators should be careful not to only recruit mentors who previously participated in the incubator. Further, incubators should create a balance between, on the one hand, enabling start-ups to engage in events, workshops and mentor sessions and, on the other hand, let start-ups work on their business. Although there have been several recent calls for research to explore 'best practices' and the mechanisms through which incubators contribute to the start-up's success (Aaboen, 2009; Ahmad and Ingle, 2013; Hackett and Dilts, 2004a), the negative effects of incubators still remain underexposed in extant literature (Mcadam and Marlow, 2007), This is surprising given the growing skepticism about the performance of incubators (Ahmad and Ingle, 2013; Tamásy, 2007). Accordingly, we recommend future studies to also explore the mechanisms through which incubators contribute to the start-up's *failure*. A good starting point would be for scholars to not only focus on successful examples of incubators (as we did in our study), but also to explore poor performing cases to identify 'worst practices'.

3.5.4 Limitations

Our study has several limitations. First, data was collected exclusively in Silicon Valley. Taking risks and relying on trial and error learning is typical to the Silicon Valley culture, and was also actively promoted by the Silicon Valley SW incubators in our sample. Accordingly, one could argue that the iterative development

process of higher order learning that we found for SW start-ups is only applicable to Silicon Valley and its incubators. However, interviews with SW start-ups that were not incubated suggested that they used a similar iterative development process, which is also in line with 'lean' and 'agile' development methods that have become increasingly popular in the SW industry (Dingsøyr et al., 2012). Therefore, we are confident that the emphasis on higher order learning found for SW start-ups is typical to the SW industry in general. Still, we encourage further research on learning processes in incubators in other geographical regions. Second, we purposefully sampled for *successful* incubators. Consequently, our findings may not be applicable to incubators that have a less impressive track record. However, such incubators may use the findings from our study as a source of inspiration to strengthen their incubation practices. A third limitation of our study is its qualitative nature. This research design enabled us to understand how incubation practices are related with different forms of learning and knowledge, but did not allow us to analyze the relative importance of each practice or their impact on start-up success.

APPENDICES

Appendix 3A: Interview Questionnaire Entrepreneurs

Part 1: Introductory questions

1. First of all, could you state your name and age, as well as the company name and the number of employees?
2. What is your personal background? (e.g. entrepreneurial experience)
3. What is the company about; what is the basic product or service that you're developing?
4. What were the reasons for you to become an entrepreneur?
 - a. What do you want to accomplish?
5. Is this startup the result of research at a university or other research institution?
 - a. What was the spin-out process like; did you feel supported?

Part 2: Incubator Support

6. When did you apply for this incubator, and to what extent did you develop your business plan?
7. What were your reasons for joining this incubator?
8. The incubator provides many forms of support: funding, an alumni network, mentoring by the partners, etc. Looking back at your time in this incubator, what have been the most important forms of support?
9. How could the incubator improve its services?
10. To what extent does the incubator take a pro-active approach in supporting you?
11. Did you feel additional pressure to perform at this incubator?

Part 3: Entrepreneurial learning

Then I would like to talk about the evolution of your business and your personal development as an entrepreneur in a bit more detail.

12. First of all, what have been the most important changes you made to your business? This could be for example the technological trajectory, the markets you target, the business model, etc.
 - a. What was the reason for this change?
13. What kind of skills did you need that you did not have?
 - a. How did you learn these skills?
14. What is the most important lesson you have learned during the process of creating your business, either inside the incubator or outside?
 - a. Where / how did you learn this lesson?

15. Would you describe yourself as eager to learn?
 - a. On which particular topics?





Chapter 4

Using Communities of Practice to shine a light on start-up communities in Australia: the role of geographical scope and social breadth

This chapter is based on: Van Weele MA, Steinz H, Van Rijnsoever FJ. Using Communities of Practice to shine a light on Start-up Communities in Australia: the role of Geographical Scope and Social Breadth. Currently under revision after which it will be resubmitted to Papers in Regional Science.

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The PhD candidate was the main contributor in designing the study, developing the methodology, analyzing the data and writing this chapter. Data was primarily collected by H. Steinz, with the support of F.J. van Rijnsoever.

ABSTRACT

We explore how start-up communities can be characterized and facilitated. Data consists of a total of 53 qualitative interviews with entrepreneurs and community facilitators in Australia. We identify four conceptualizations of start-up communities. Depending on their conceptualization, start-up communities can be facilitated by selecting the right members, managing the introduction of newcomers, fostering social relationships, connecting demand and supply for knowledge and creating an inspiring environment. We contributing to a better understanding and more consistent use of the term 'start-up communities'. We also point out that community facilitators can play a much more active role in nurturing such communities than previously assumed.

4.1 INTRODUCTION

Governments see technology based start-ups as key drivers of regional development (Acs et al., 2007; Qian et al., 2012), which is reflected in their efforts to develop regional clusters (Porter, 1998), innovation systems (Asheim et al., 2011) or entrepreneurial ecosystems (Spigel, 2015). Start-up communities, which we tentatively delineate as local groups of people who start or support technology based start-ups, are increasingly considered as a key factor in enabling such regional entrepreneurial activity. Start-up communities allow rapid flow of resources, enable collective learning and stimulate start-ups to remain in the region (Breznitz and Taylor, 2014; Casper, 2007; Saxenian, 1996; Spigel, 2015; Westlund et al., 2014). Consequently, the presence or absence of strong start-up communities may play a decisive role in the success (Saxenian, 1996) or failure (Breznitz and Taylor, 2014) of entrepreneurial regions. Governments around the world therefore try to stimulate these communities, for example through science parks, incubators and co-working spaces (Spinuzzi, 2012; Theodorakopoulos et al., 2014). Such efforts, however, are constrained by two limitations of the extant literature.

First, while facilitating start-up communities arguably begins with understanding what they are, there is growing ambiguity surrounding the concept. The literature on start-up communities has been criticized for being atheoretical and descriptive (Spigel, 2015; Theodorakopoulos et al., 2014). Consequently, ‘start-up community’ has become an umbrella term that is mentioned in various contexts, such as co-working spaces (e.g. Spinuzzi, 2012), incubators (e.g. Hughes et al., 2007), science parks (e.g. Bakouros et al., 2002), cities (e.g. Feld, 2012) and regions (e.g. Spigel 2015). Existing studies demonstrate conflicting ideas about the members of start-up communities. Some only include entrepreneurs (Bøllingtoft and Ullhøi, 2005; Hughes et al., 2007), whereas others also regard other actors such as mentors, venture capitalists or service providers to be part of the community (Feld, 2012; Spigel, 2015). This further contributes to a lack of understanding about what start-up communities are.

Second, there are few studies that explore the activities² through which start-up communities can be facilitated. Existing studies focus on only two facilitating mechanisms. First, clustering start-ups within an incubator, science park or city is seen as a catalyst for creating relationships, and, therefore, for the creation of start-up communities (Bøllingtoft, 2012; Spigel, 2015). Second, selecting start-ups in a similar industry and development stage should create complementarities and

² In the remainder of this dissertation, I refer to these activities as ‘practices’. For this chapter, to avoid confusion with communities of practice, I use the term ‘activities’ instead of practices.

synergies among entrepreneurs (Hughes et al., 2007; Spigel, 2015). The effectiveness of both mechanisms is open to debate. Many studies have shown that merely co-locating a similar group of start-ups in an incubator, science park or region does not guarantee the emergence of a start-up community (see e.g. Bakouros, Mardas, and Varsakelis 2002; Breznitz and Taylor 2014; Schwartz and Hornych 2010). Further, Schwartz and Hornych (2010) found that specialization in incubators did not lead to increased networking among entrepreneurs. Accordingly, there is a need for studies to explore additional activities that can help in facilitating start-up communities (Bøllingtoft and Ulhøi, 2005; Theodorakopoulos et al., 2014).

A possible perspective to shed more theoretically grounded insights on the characteristics and facilitation of start-up communities is the literature on Communities of Practice (CoP). CoP literature explores how groups of people within a similar domain form communities to exchange knowledge (Wenger, 1998). CoP literature has extensively explored the characteristics, boundaries and dimensions of these communities (Brown and Duguid, 1991; Lave and Wenger, 1991; Wenger, 1998) as well as the activities that can be implemented to maximize the value of CoPs. (Cox, 2005; Wenger et al., 2002). Still, CoP has almost exclusively been applied to study communities within established organizations (Oliver and Kandadi, 2006; Scarso et al., 2009). Roberts (2006) even wonders whether the concept of CoP is applicable to smaller organizations, such as start-ups, as they may not be able to spare the resources necessary to maintain CoPs. Yet, initiatives like incubators or co-working spaces may provide these resources instead (Hughes et al., 2007; Spinuzzi, 2012).

Therefore, this study applies concepts of CoP in the context of start-up communities to answer the following research question: *'What characterizes start-up communities, and through which activities can they be facilitated?'* Empirically, a total of 53 semi-structured interviews were conducted with entrepreneurs and facilitators of start-up communities in Australia. This study contributes to the CoP literature by applying its concepts to explore interorganizational communities of start-ups, which have rarely been examined within this literature (Bolisani and Scarso, 2014; Swan et al., 2002). This study also contributes to the field of entrepreneurship studies by providing a theoretically and empirically grounded characterization of start-up communities and by responding to calls for research on the facilitation of these communities (Theodorakopoulos et al., 2014). Practically, the results may serve as a guide for policy makers and community facilitators who wish to facilitate regional entrepreneurship through start-up communities.

The remainder of this chapter is structured as follows. First, we briefly review the central concepts of CoP literature that will guide the data collection and analysis.

The theoretical framework is followed by the methods section. We then present the findings after which we provide a brief discussion and conclusion.

4.2 THEORY: COMMUNITIES OF PRACTICE

4.2.1 Characterizing Communities of Practice

The term 'communities of practice' was coined by Lave and Wenger (1991). Their concept was based on a social view of learning that emphasizes the tacit nature of knowledge and its embeddedness within people and their social relationships. Accordingly, individuals learn by participating in a community and absorbing its practices and identity (Brown and Duguid, 1991). These *communities of practice* can be understood as groups of people informally bound together by shared expertise and passion for a joint enterprise (Wenger and Snyder, 2000). CoPs are not just a group or network of people. They are *communities* in the sense that they are tightly knit and voluntary in nature (Cox, 2005). Further, the *practice* is a source of coherence (Garavan et al., 2007). However, CoPs are not necessarily homogenous and clearly demarcated. Individual members of CoPs can be diverse in terms of their knowledge base and level of involvement (Lave and Wenger, 1991). They may join and leave CoPs or can be simultaneously involved in multiple CoPs (Wenger, 1998). Consequently, the boundaries of a CoP can be dynamic, vague and there may be disagreement among members about who belongs to the community. To be able to detect and distinguish CoPs, Wenger (1998) identified three elements that constitute a CoP:

- **Joint enterprise** is the shared understanding of what the community is about (Zhang and Watts, 2008). It reflects the common or shared *goals and interests*. It is never prescribed and unlikely to be formally defined. Rather, it is the result of collective negotiation (Wenger, 1998), which creates accountability among members to contribute to the joint enterprise.
- **Mutual engagement** refers to how members in the community interact with each other (Zhang and Watts, 2008). It describes the community's 'social fabric': the *social relationships* through which members interact, the shared *norms and values* that they establish, and the *shared identity* that reflects these interactions and values (Akkerman et al., 2008). This shared identity contributes to members feeling a sense of belonging to a particular community.

- **Shared repertoire** entails the resources and capabilities that community members produce and adopt by jointly contributing to an enterprise (Garavan et al., 2007; Wenger, 1998). It includes 'routines, words, tools, ways of doing things, stories, gestures, symbols, genres, actions, or concepts' (Wenger, 1998 p. 83) that have become part of the community's practice.

It is the combination of these three elements that creates coherence among members of CoPs; *joint enterprise* creates a common goal, *mutual engagement* creates relationships that enable learning, and the *shared repertoire* embeds the learning in what members do (Wenger, 2004).

The tightly knit nature of CoPs allows *knowledge to diffuse* rapidly within CoPs, as members continuously share problems, information and practices (Brown and Duguid, 1991). The community's high levels of trust and members' willingness to help each other contributes to the *social capital* of its members (Wenger, 2000). By sharing problems and challenges, CoPs may also be a source of *emotional support* and motivation (Pemberton et al., 2007). Although the term 'community' carries a generally positive connotation, there are also risks associated with CoPs (Cox, 2005; Pemberton et al., 2007). For example, the shared modes of thought that reside in CoPs make them inflexible and *resistant to change* (Roberts, 2006). Consequently, CoPs may limit the development of radical innovations that challenge existing norms, logics and implicit assumptions (Swan et al., 2002; Wenger et al., 2002). CoPs may also *fail to embrace new members* when participation is dominated by key figures, or members may be hesitant to share knowledge when there is a *lack of trust* (Roberts, 2006). Finally, maintaining a CoP requires time and resources (Cothrel and Williams, 1999), which may create tensions between members' daily business routine and involvement in the community.

4.2.2 Facilitating Communities of Practice

Many scholars have studied CoPs in established organizations in knowledge intensive industries, such as consultancies, banks or engineering firms, to explore how management of these organizations use CoPs as a tool to foster innovation and knowledge sharing. The general consensus is that CoPs cannot be created, but that management should indirectly foster their emergence and development through various activities (Scarso and Bolisani, 2008; Wenger et al., 2002). Management may for example provide *supporting infrastructure* and decide who can join the CoP (Wenger et al., 2002). It can design processes that facilitate the *acceptance of new members* (Wenger, 2000). Management may also introduce community facilitators who create synergies and connections between members, for example by acting as

a 'broker' between those looking for advice and those who can help (Garavan et al., 2007; Wenger, 2000). Such brokers may also *bridge boundaries* between CoPs by introducing members or practices from one community into another (Wenger et al., 2002). Management can also exert greater control by implementing more formal activities. It may for example decide on which communities to allow, the frequency of meetings that take place, and it can even provide financial rewards or penalties to stimulate or enforce participation (Wenger et al., 2002).

The concepts outlined in this section can be used to understand what CoPs are and how they can be facilitated. We use these concepts to analyze the empirical data on start-up communities.

4.3 METHODS

4.3.1 Research design and case description

We conducted a qualitative exploratory case study in which we explored start-up communities in Australia. Such an approach is particularly suitable to provide in-depth insights into a particular phenomenon (Eisenhardt, 1989), which is in line with our aim of providing a characterization of start-up communities. It also allows to inductively identify activities through which communities can be facilitated.

We chose Australia as a case because the country is a typical example of a Western country with a developed economy (Steffens et al., 2011) that tries to stimulate start-ups in an effort to boost innovation and economic growth. Table 4.1 provides key statistics for Australia and the three cities in which we collected data. Australia has recently seen a strong increase in the number of co-working spaces, incubators and accelerators. The number of co-working spaces, for example, has seen a fivefold increase in two years to a total of 62 in 2012 (Shareable, 2013). These initiatives have led to the emergence of start-up communities throughout Australia. We collected data in the cities of Sydney, Melbourne and Canberra. Sydney and Melbourne have become the country's entrepreneurial hubs, and are home to almost 90 percent of Australia's total number of tech start-ups (PWC and Google, 2013). Canberra has traditionally been dominated by a large government sector, but a start-up community is now emerging. Collecting data in three different cities makes the findings more robust, as it minimizes the chance that the findings are influenced by the unique characteristics of one particular city.

Table 4.1 Background data for Sydney, Melbourne, Canberra and Australia. ¹ (Australian Bureau of Statistics, 2015) ²(PWC and Google, 2013) ³(Global Entrepreneurship Monitor, 2015)

	Sydney	Melbourne	Canberra	Australia
Population	4,757,083	4,347,955	381,488	23,135,281
Three largest industries, as a percentage of employment in 2011 ¹	Health care and social assistance (10.9), retail trade (9.8), Professional, scientific and technical services (9.6)	Health care and social assistance (11.1), Manufacturing (10.8), Retail trade (10.6)	Public administration and safety (32.7), professional, scientific and technical services (9.8), health care and social assistance (9.2)	Health care and social assistance (11.9), retail trade (10.6), construction (8.8)
Total number of businesses in 2013 ¹	463,639	404,618	25,245	2,079,659
Total number of tech start-ups in 2013 ²	950	350	30	1500
Individuals with bachelor's degree or higher in 2011 ¹	24.1%	23.6%	34%	23.2%
Total early stage Entrepreneurial activity in 2014 ³	NA	NA	NA	13.1%

4.2 Sample and data collection

We collected data between February and July 2013. One researcher was based in Canberra and immersed in the Canberra start-up community. To collect data in Sydney and Melbourne, three visits of three to five days were made to both cities. Doing so allowed to conduct interviews face to face and thereby augment the interview data with observations and informal discussions. At different stages a second researcher joined the interviews to ensure that concepts missed by the first researcher were included and that the interview data could be interpreted and triangulated at an early stage. In each of the three cities we identified and approached potential interviewees through events, desk research

and existing network contacts. After the interviews, we asked every interviewee to introduce us to additional potential interviewees. In total, we conducted 53 qualitative, semi-structured interviews (that lasted 53 minutes on average) at 12 organizations or programs supporting start-ups.

An overview of the interviewed facilitators and entrepreneurs is presented in Appendices A and B, respectively. 20 interviewees were involved in the start-up support programs as supporting staff (e.g., community facilitator, community ‘catalyst’, director or investor); they were labelled as ‘facilitators’. Among the interviewees were 26 entrepreneurs who were affiliated with the start-up support organizations. Two interviewed entrepreneurs were not affiliated with an incubator or co-working space. All but two of the entrepreneurs in the sample were developing a technical product.. Although there was no demarcation by sector or industry, the start-ups in our sample were mostly active in software. The sample also included 5 university researchers on Australian entrepreneurship to gain additional insights. The diversity of the sample contributed to the reliability and generalizability of the findings. It also allowed us to identify a broad range of facilitating activities. Data was collected until concepts were well-defined and further interviews did not reveal additional information, that is, until theoretical saturation was reached (Corbin and Strauss, 1990).

4.3 Data collection and analysis

The interviews were roughly structured as follows. First, we asked entrepreneurs and community facilitators to introduce themselves and their start-up or organization. The core of the interview consisted of questions about the start-up community. We used open-ended questions and probing questions to allow interviewees to explain and elaborate on their answers. Interviews were recorded and fully transcribed. In four instances this was not possible, either because the interviewee did not allow this or for practical reasons. Still, the notes taken during those interviews were sufficient to create an interview report.

Interviews were coded using the qualitative data analysis program NVivo. Coding proceeded as follows. To answer the first part of the research question and characterize start-up communities, we explored the characteristics of the communities by coding parts of the interviews in which interviewees described the start-up communities. Initially, we coded data in terms of expressions and words used by the interviewees themselves. Using such ‘open’ or ‘in vivo’ codes helps to minimize the influence of personal bias (Gioia et al., 2012) and led to a variety of characteristics that emerged inductively from the qualitative data. Then, we combined similar open codes into ‘first order codes’ (Gioia et al., 2012) that were still labelled by staying close to the interviewees’ own words. These first order codes were then related to the elements of CoPs as introduced by Wenger (1998). These three elements formed the broader and theoretically relevant ‘second order codes’ (Gioia et al., 2012) and were the core concepts of the characterization. This

process created a characterization of start-up communities that is both theoretically grounded in the CoP literature and empirically grounded in the interview data. To answer the second part of the research question, we re-read the interviews to identify facilitating activities. Again, we began coding by labelling activities with open codes and combining similar open codes into first order codes. These first order codes were the individual activities. Similar activities were then collapsed and clustered into aggregate second order codes (Gioia et al., 2012). This eventually led to the identification of 5 ‘sets of facilitating activities’, which formed the second set of core concepts. The first order codes, second order codes and representative interview quotes are provided in appendix B.

4.4 FINDINGS

This section starts with the characterization of Australian start-up communities, after which we explore the activities through which these start-up communities can be facilitated.

4.4.1 Characterizing start-up communities

Before we apply the elements of Wenger (1998), we explore the boundaries of start-up communities by exploring the use of the term by interviewees. Similar to CoPs, these boundaries were contested.

Interviewees used the term ‘community’ when referring to two different scopes of start-up communities. First, interviewees referred to groups within the physical boundaries of collaborative workspaces. Such use of the term is consistent with studies on incubators or co-working spaces (e.g. Hughes et al., 2007; Spinuzzi, 2012). These start-up communities were labelled as ‘*workspace communities*’. Second, interviewees talked about a community within their particular city, which is in line with literature on entrepreneurial ecosystems (e.g. Feld, 2012; Spigel, 2015). These communities were labelled as ‘*regional communities*’. Compared to workspace communities, regional communities are large and heterogeneous. Because the workspace communities are nested within the larger regional communities, members can be simultaneously involved in both. Accordingly, there is some overlap between the workspace and regional communities. Still, as the next section shows, they markedly differ in some of Wenger’s elements, and therefore remain distinct.

Interviewees also had different ideas about who belongs to the community: *entrepreneurs* or *entrepreneurs and start-up supporters*. Start-up ‘supporters’ are for

example mentors, investors, community facilitators, service providers or ‘nascent’ entrepreneurs who are exploring the idea of creating a new business (referred to by some interviewees as ‘wantrepreneurs’). Some were critical about the contribution of supporters. They felt that *‘a lot of people want to get involved in the scene’* (Entrepreneur G1) and referred to wantrepreneurs as *‘fake entrepreneurs’* (Facilitator F3). Others perceived the breadth of the community as a strength and embraced supporters (including wantrepreneurs) as full members of the community: *‘it’s open to anyone. We don’t limit anything. We get people from corporate companies, students, freelancers (...). Everyone can contribute in some way’* (Facilitator F1). Again, the next section will show that one’s perception of who belongs to a start-up community (the community’s ‘social breadth’) influences the interpretation of Wenger’s elements.

Next, we use the three elements of Wenger (1998) to characterize start-up communities. In doing so, we first describe each element for start-up communities in general. Then, we discuss how these elements are influenced by the community’s geographical scope and social breadth.

Joint enterprise

The community’s joint enterprise concerns the community’s joint or shared interests and goals. Members of start-up communities share an interest or passion for start-ups, as well as a belief in the importance of start-ups. They have therefore a shared goal of *helping start-ups succeed*: *‘One thing I really like about Sydney is that – it’s like the common goal is ‘there needs to be more successful businesses’* (Entrepreneur A4). Different communities and members may have different reasons for why they want to achieve this goal. For example, for interviewees in incubator and investor I (which focused on clean tech start-ups), start-ups were a way to improve the environment: *‘we use the expression ‘we like to make a dollar and we like to make a difference’* (Entrepreneur I1). Members of co-working space D, which focused on social entrepreneurship, believed in the power of start-ups to improve society: *‘you want to go there if you want to do good’* (Entrepreneur F1). Members also share a belief in the power of working together and *sharing knowledge* to achieve this aim. Start-up communities thereby aim to become a source of knowledge for anyone interested in start-ups: *‘it’s built for people who want to learn about start-ups’* (Facilitator F1). Accordingly, although the joint enterprise was never formalized, there seems to be an implicit understanding that the community serves to help start-ups succeed by facilitating knowledge exchange on setting up a technology-based start-up.

Members of workspace communities share an additional goal. An important aspect of these communities is the communal work environment. Accordingly,

part of the workspace's joint enterprise is to create a pleasant working environment. Members feel accountable to contributing to this enterprise, for example by socializing with others or by cleaning up the common areas. Members of regional communities also share an additional goal. The desire to *'build the ecosystem'* (Facilitator A1) was an important driver for members to participate in these communities: *'I am a great believer in Canberra as a city (...). And so the reason I have joined here is because (...) it fits very well with my belief that this city can be a hub of innovation'* (Facilitator J1). An important way to achieve this goal is for members to get start-ups *'out in the public eye'* (Facilitator A1), thereby creating more legitimacy for start-ups.

The community's enterprise is shared both by entrepreneurs and supporters. However, entrepreneurs are all part of distinct start-ups that have their own goals. This may create tensions between the start-up's interests and the community's interests: *'It sounds selfish - but there are just so many start-up coffees I can go to, I don't have the time anymore (...). And now there are people that have put a truck load of money in [name start-up] and expect some good results and we want the results as well, so we need to get going'* (Entrepreneur A4). Accordingly, although entrepreneurs feel committed to the communal joint enterprise, they are not always able to contribute as much as they would like to. This in contrast to many supporters involved in the community, such as *'wantrepreneurs'* or community facilitators, who feel less pressure than entrepreneurs or whose sole responsibility, as in the case of community facilitators, is to facilitate the community and contribute to its enterprise.

Mutual engagement

Mutual engagement concerns the community's relationships, norms, values and shared identity. For start-up communities, mutual engagement is primarily developed through face-to-face contact: *'They strike up conversation, sit with people and play table tennis together (...). And within a week, they're laughing and friends'* (Facilitator E2). Members interact online, but such interactions were only seen as a way to extend the physical interaction: *'It's virtual to an end. But the face to face is crucial'* (Facilitator D1). The importance of face-to-face interaction explains why start-up communities are a local phenomenon that are situated within collaborative workspaces and regions. The extensive face-to-face interaction creates *strong relationships* between members.

As members get to know each other, they realize that they share similar ambitions, interests and problems. Consequently, they identify themselves with other members, referring to them as a group of *'like-minded people'* (Entrepreneur C1). Start-up communities thereby create a *shared identity* or sense of belonging to

a community: *'it feels like we are actually part of a bigger team'* (Entrepreneur A1). Interviewees emphasized that each start-up community has its own identity. Workspace communities focus on a particular type of start-up and have their own culture. Entrepreneur F2 illustrated this when comparing various co-working spaces: *'[Co-working space D] has a social entrepreneurship-like focus. (...) They've got really cool political projects that are happening there. [Co-working space E] actually has a huge amount of freelancers. So, they have less focus on like established firms'*. Similarly, every regional community was perceived to have its own identity, too; Sydney focuses on start-ups in the financial industry, Melbourne has many social, lifestyle and tourism start-ups, and Canberra start-ups are focusing on government services. This also creates a distinct culture in every regional community: *'Sydney is much more cut and dry (...) Whereas Melbourne is a bit more community focused (...). So for example, community based sites seem to do a little bit better down in Melbourne (...) Whereas BigCommerce and those sort of guys are based in Sydney'* (Facilitator E1).

The shared identity means that members of a community recognize themselves in the challenges experienced by others. This contributes to their willingness to help each other. This desire and obligation to help others in the community is one of the *norms and values* that are established through the ongoing interaction. Other norms are, for example, that members are not allowed to use the community for the sole purpose of making sales, or that members do not infringe on IP of others. These shared norms contribute to the high levels of trust among members, as certain behavior is expected. Although these norms and values are mostly implicit rather than formalized, members are aware of these norms and values, and do not allow others to violate them: *'If you're part of the community here it's expected that you're going to ask people for help or advice or whatnot. It's expected that you also help back'* (Entrepreneur E1).

The workspace communities also display norms related to their joint enterprise of creating a pleasant working environment, such as the obligation for members to be considerate of others by minimizing noise when having phone calls or meetings. In general, the level of mutual engagement is particularly high in these workspace communities, because individuals meet each other on a daily basis. Relationships are further strengthened by the relatively small size and homogeneity of workspace communities. Accordingly, interviewees referred to other members of their incubator or co-working space as *'family'* (Entrepreneur A2) or *'close friends'* (Entrepreneur F2). Within the regional community, members meet at events such as meetups, start-up conferences and start-up weekends. However, interactions are less frequent than in workspace communities. Regional communities are also much larger and more diverse. Consequently, although some individual relation-

ships may be strong in the regional communities, mutual engagement in general is not as high as it is in the workspace communities. Although some interviewees hinted at strong regional relationships, others were more critical about the regional sense of community: *'There seems to be a very critical look at one another here, which is kind of unusual. There's definitely not this 'all in together' atmosphere'* (Entrepreneur A2) *'Everyone's doing their own thing'* (Facilitator I1).

Mutual engagement is higher within communities of entrepreneurs than in communities of entrepreneurs and supporters. Strong relationships and shared norms formed between entrepreneurs and supporters alike. For example, we as researchers also felt the community's dense network and willingness to help when trying to connect to potential interviewees. The shared identity, however, is particularly strong among entrepreneurs. This was reflected in interviewees who felt that only other entrepreneurs can really identify with the *'roller coaster'* (Entrepreneur B3) that is the entrepreneurial process: *'I think you really need people to understand, you know, your process and so they can be sympathetic to that'* (Entrepreneur C1). Therefore, entrepreneurs considered each other not only as like-minded, but as *'peers'* (Entrepreneur B1) who are *'just as crazy as you'* (Entrepreneur B3).

Shared repertoire

The shared repertoire concerns the communal resources that have become part of the community's practice. We found members of the community to read the same books, follow the same thought leaders and use similar *tools and methods* such as the 'lean start-up' method (Ries, 2011): *'we all do start-up weekends, lean thinking, that becomes the culture, same page'* (Facilitator A2). Members of start-up communities also speak a similar *language*. They often use terms that may be confusing to people outside the community, such as 'minimum viable product', 'bootstrapping', 'follow-on funding', 'disruption', 'business model canvas', or 'pivot': *'everybody talks about pivots'* (Facilitator J1). The creation of shared tools and language contributes to the ability of members to understand each other and quickly share knowledge. This repertoire was heavily influenced by the culture and role models in Silicon Valley. In addition to drawing inspiration from abroad, members celebrate local successful start-ups that thereby become communal *success stories* that every member is familiar with: *'There are already enough success stories that raised lots of money, moved to US etc. And people know these stories, for example Kickfolio, 99 designs'* (Facilitator G2). Due to the informal character of start-up communities, most of the repertoire is not formally captured, but informally shared during group or one-on-one discussions. Still, the community also creates and shares some *artefacts*, such as open source software code, power point presentations ('pitch decks'), or legal documents.

There are some subtle differences regarding the shared repertoire between the workspace and regional communities that reflect their differences in joint enterprise. The workspace community's shared goal of creating a pleasant work place was for example reflected in specific artefacts that were observed in all workspace communities and that played an important role in the daily social interaction. These artefacts include white boards, coffee machines or ping pong tables. The repertoire of workspace communities was also relatively specific. Workspace communities create a shared, homogenous 'way of doing things', for example as they organize courses that almost all members participate in, create a roadmap on how to grow a start-up, or provide standardized templates and documents that all members use. Incubator and investor A, for example, had a particular philosophy for managing a start-up: *'our framework and everything we follow, everything is metrics based. (...) And so everything we do, week on week, we'll be looking to improve those KPIs'* (Facilitator A1). The repertoire of this community (e.g. the discussions that take place or the methods that are used) evolved around this metrics based framework and was typical to this community. For regional communities, the joint enterprise of contributing to a local entrepreneurial ecosystem was reflected in for example reports on the local entrepreneurial ecosystem that these communities produced. Whereas the repertoire of workspace communities is relatively specific, it did not seem that the 'Sydney way of managing a start-up' was very different from the 'Melbourne way'. There are some subtle differences in the repertoire of different regional communities (for example the local success stories that serve as role models), but, overall, the repertoire is rather similar between regions.

The community's shared repertoire is particularly strong and shared in communities of entrepreneurs. Entrepreneurs face similar problems and challenges and continuously exchange problems and solutions. Entrepreneurs thereby create a shared way of working or a set of *shared practices*. These practices are for example related to raising funding, marketing, programming, etc. Because these practices are validated (or *'tried and trued'*, as entrepreneur I6 said) by other entrepreneurs, they are quickly absorbed by newcomers. Although the supporters may also be familiar with these practices (to some extent), entrepreneurs are the only ones who actually use these practices.

Characterizing start-up communities

The interpretation of Wenger's elements depends on how one perceives start-up communities: as a group of entrepreneurs or as a group of entrepreneurs and supporters, who interact within a workspace or within a region. Accordingly, four different conceptualizations of start-up communities can be identified, whose

characteristics are summarized in figure 1. The differences between these conceptualizations and their characteristics should not be interpreted as absolute, nor should the four conceptualizations be considered as clearly demarcated categories. Rather, they help to understand how perceptions of start-up communities differ, and how different conceptualizations of start-up communities have a tendency to display particular characteristics:

		Entrepreneurs and supporters in a workspace	Entrepreneurs and supporters in a region
Social breadth	Entrepreneurs and supporters	<p>Joint enterprise: help start-ups be more successful, share knowledge and create a pleasant work environment</p> <p>Mutual engagement: strong relationships and willingness to help, developed through face-to-face contact</p> <p>Shared and specific repertoire: start-up language and tools (e.g. lean start-up), local entrepreneurs as success stories</p>	<p>Joint enterprise: help start-ups be more successful, share knowledge and create an entrepreneurial ecosystem</p> <p>Mutual engagement: relationships and willingness to help, developed through face-to-face contact</p> <p>Shared repertoire: start-up language and tools (e.g. lean start-up), local entrepreneurs as success stories</p>
	Entrepreneurs	<p style="text-align: center;">Entrepreneurs in a workspace</p> <p>Joint enterprise: help start-ups be more successful, share knowledge and create a pleasant work environment. Tensions may arise between the goals of the community and the start-up</p> <p>Mutual engagement: strong relationships, shared identity and willingness to help, developed through face-to-face contact</p> <p>Shared and specific repertoire: start-up language and tools (e.g. lean start-up), local entrepreneurs as success stories, shared practices on how to manage a technology based start-up</p>	<p style="text-align: center;">Entrepreneurs in a region</p> <p>Joint enterprise: help start-ups be more successful, share knowledge and create an entrepreneurial ecosystem. Tensions may arise between the goals of the community and the start-up</p> <p>Mutual engagement: relationships, shared identity and willingness to help, developed through face to face contact</p> <p>Shared repertoire: start-up language and tools (e.g. lean start-up), local entrepreneurs as success stories, shared practices on how to manage a technology based start-up</p>
		Workspace	Region
Geographical scope			

Figure 4.1 Characterizing start-up communities

4.4.2 Facilitating start-up communities

Wenger & Snyder (2000) argued that CoPs cannot be created, but recommended facilitators to focus on optimizing the conditions for such communities to flourish. Interviewees raised similar arguments for start-up communities. They emphasized

that start-up communities are self-emerging (they ‘spring up in areas where there already are people interested in entrepreneurship’, as Entrepreneur F2 said) and that the role of facilitators is to ‘create an ideal environment (...) in which the community can grow in an ideal way’ (Facilitator D1). We now explore the activities that can be implemented to facilitate start-up communities. We categorized similar activities into a total of five sets of activities. Figure 4.2 gives a visual overview of which activities were observed at which conceptualization.

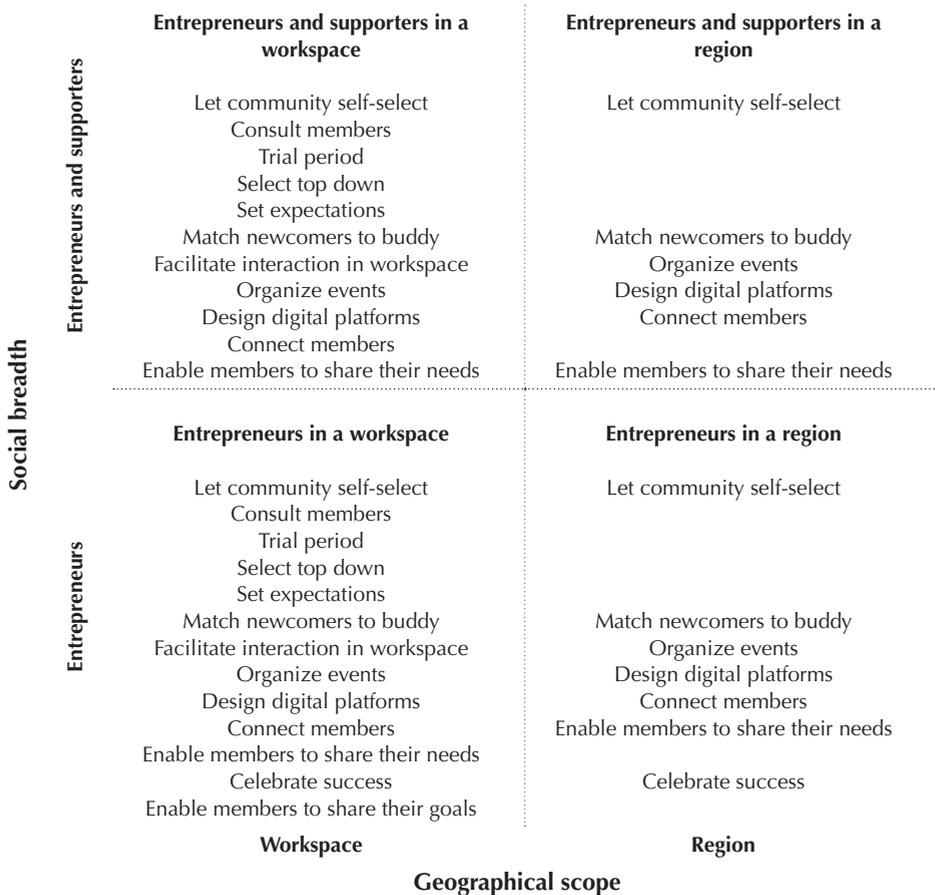


Figure 4.2 Facilitating start-up communities

Select members who fit in the community

Start-up communities are *self-selective*. Given their unique identity, every start-up community attracts a particular type of member. If members do not fit in the community (for example because they do not abide to the community’s norms and rules) they will not be accepted by the community. Regional communities

had no additional selection processes. Workspace communities did have formal selection processes, for which the community facilitator decided who could join the community. Some facilitators made this decision by relying on the opinion of existing members. Facilitators *consult members* when deciding whether or not to accept newcomers, or they *installed a trial period for new members* of a couple of days or weeks to ensure that there is a cultural fit between the community and the newcomer. Similar to CoPs, start-up communities may use *top-down selection processes*. Such selection processes create synergies among members, by ensuring the community's focus on for example software start-ups or social entrepreneurship. In addition, selection processes are a way to curate the community's culture: facilitators emphasized that newcomers had to be willing to help others and facilitators tried to avoid competing start-ups in the community, as this would inhibit the open culture that they tried to create.

Manage the introduction of newcomers

Newcomers are not yet embedded in the community's social relationships, not aware of the community's norms and values, and not familiar with the community's repertoire (Lave and Wenger, 1991). Consequently, joining the community can be intimidating, as entrepreneur C3 said: *'I felt like everybody knows a lot more about this than I do (...) And everyone seemed to know everyone (...). And, yeah, you're the new person'*. While this quote refers to the workspace community, facilitator D1 raised similar concerns about the regional community: *'Melbourne itself is very cliquey place. Melbourne has a wonderful sense of community with the flip side of community is that it can be much harder for a stranger to get in and be accepted'*. To overcome this problem, processes may be implemented that facilitate the introduction of new members (Wenger, 2000). For workspace communities, this process starts with the formal selection process, during which facilitators *set expectations* in terms of the behavior that is expected from members. Newcomers thereby get acquainted with the 'unwritten rules' of the community. Facilitators may also *match newcomers to a buddy*, an experienced member who introduces the newcomers to other members and who explains the norms and values of the community. Within the workspace communities, such 'buddies' were sometimes formally appointed, but both the workspace and regional communities also contained members who voluntarily took such a role.

Foster social relationships

Activities in this category are associated with creating and strengthening social relationships within the community. For workspace communities, the physical design is an important *'catalyser'* (Facilitator A2) that *facilitates interaction*, as members

meet each other at the water cooler, when playing table tennis or just by walking along other members' desks and offices. *Organizing events* provides another opportunity for members to get to know each other. Events are also a way for outsiders to connect to the community. As such, events are an important way to 'bridge the boundaries' (Wenger, 2000) between different start-up communities: *'We've been partnering with other networks (...) That means that we have (...) an opportunity for our own members to meet a different community and where there's peer to peer interactions and learning. So it's networks connecting to networks in that way'* (Facilitator D1). Events play an important role both in workspace communities (e.g. lunch lectures, member breakfast, pitch events) and in regional communities (e.g. hackathons, conferences, meetups, drinks). *Digital platforms* (e.g. Facebook, Google groups, Yammer) were also provided, but, as mentioned before, are primarily a way to extend the face to face interaction: *'Because everyone knows each other physically, they respect that relationship a bit more (...). If you spam the list on a Friday you have to walk in there on Monday. Everyone looks at you kind of funny. You get that kind of reputation. You can't be anonymous'* (Facilitator C2).

Connect demand and supply of knowledge

These activities focus on creating connections between individual members to facilitate the exchange of knowledge. Facilitators should create a 'rich fabric of connectivity' among those looking for help and those who are able to help (Wenger, 2000). Within the start-up community, such connections can be established by members or facilitators who act as 'brokers'. Community facilitators, in particular, play an active role in *connecting members* with questions to those having the answers. To do so, facilitators need to have a thorough understanding of each members' skills, networks and needs: *'I think the most important part of it is the fact that you have to know everyone's base to some extent. You have to know what they are looking for'* (Facilitator F3). Community facilitators therefore frequently ask members about their needs and challenges, or use questionnaires to stay informed about members' needs: *'It was trying to gauge where people are having challenges, what's been working and what hasn't (...). Without understanding that there's no way I can kind of create an environment to help them further'* (Facilitator C1). Connecting 'givers and takers' can also be facilitated without the mediation of facilitators, by directly *enabling members to share their needs*. Incubator A held weekly 'cross pollination' sessions where members had the opportunity to present their problems to the entire community. This made all members aware of how they could help each other, which further facilitated knowledge exchange.

Create an inspiring environment

Because members in a community identify with each other, they can relate to other members' success: *'it's like: 'If he or she can do it, so can I''* (Facilitator F2). Some interviewees even felt a 'healthy competition' among entrepreneurs: *'They are competing to be the best start-up in [the co-working space]. That's healthy competition'* (Facilitator G1). Facilitators stimulated this by sharing and *celebrating success* within the community: entrepreneurs take the time to get together and celebrate when start-ups achieve their first sale, raise venture capital or get acquired. The community thereby provides a platform to successful entrepreneurs to act as a role model in inspiring others. Entrepreneurs are also encouraged to *share their goals*: *'Everybody has a no fail goal that you have to achieve. You don't want to be the guy that says 'no, we didn't achieve our goal this week' (...) You want to have bigger goals than everyone else'* (Entrepreneur A2). This activity was only observed at the workspace community. This could be because the high levels of trust in the workspace community makes it easier for entrepreneurs to open up.

4.5 DISCUSSION AND CONCLUSION

This study explored how start-up communities can be characterized and facilitated. We found that interviewees had different perceptions about the community's geographical scope (workspace or region) and about the question who belongs to the community (entrepreneurs or entrepreneurs and supporters). These two dimensions make start-up communities an inherently ambiguous concept, as they lead to four distinct conceptualizations that differ in terms of their joint enterprise, mutual engagement and shared repertoire. This study contributes to a better understanding of what start-up communities are, by exploring these three elements as the key factors that create coherence among members in a start-up community. Further, this study contributes to a more consistent use of the term start-up communities by enabling practitioners, policy makers and scholars to explicate how they conceptualize these communities and to acknowledge the different characteristics of these distinct conceptualizations. Of these conceptualizations, the entrepreneurs in a workspace are most in line with CoPs, given the strength of the shared identity, the tight social relationships and the sharing of practices. Still, the three elements were also observed for the other conceptualizations. Accordingly, start-up communities reflect many characteristics of CoPs. This contrasts with scholars who have questioned the applicability of CoPs to start-ups (see e.g. Roberts, 2006). Accordingly, this study contributes to CoP literature by providing evidence that insights from

CoP are also applicable to contexts outside interorganizational networks in large established organizations.

Start-up communities are seen as key factors in the development of entrepreneurial regions (Breznitz and Taylor, 2014; Lee et al., 2004) and therefore enjoy heightened interest from policy makers. In facilitating start-up communities, the limited extant literature focuses on top-down selection processes and co-locating of start-ups. This study also points at the importance of facilitating the community's self-selecting processes, managing the introduction of newcomers, fostering social relationships through events and digital platforms, connecting demand and supply for knowledge and creating an inspiring environment. The findings thus suggest that facilitators could play a much more active role in nurturing start-up communities than previously assumed. The emphasis on informal and indirect activities is in line with CoP literature (Scarso and Bolisani, 2008; Wenger et al., 2002). Further, the activities that were identified echo many of the activities described in CoP literature, such as the need to adequately introduce newcomers or the importance of 'brokers'. This provides further support for the applicability of CoP to the context of start-up communities. Policy makers and community managers may draw inspiration from these activities in their efforts to facilitate start-up communities and stimulate regional development. In doing so, these actors should be aware that the facilitation of start-up communities depends on their conceptualization. The activities specific to workspace communities are more formal and top-down; the regional communities have a more self-emerging and self-organizing character. The activity of creating an inspiring environment was only observed among entrepreneurs.

This study has several limitations. First, data was primarily collected among start-ups and communities in the software industry, which affects the generalizability of the findings. This focus reflects the dominance of software start-ups in the start-up industry that can be observed not only in Australia, but also elsewhere (PWC and Google, 2013; The Economist, 2014). Still, future research is encouraged to explore if start-up communities in other industries display similar characteristics as those observed in this study. Second, while the qualitative approach as used in this study allowed to explore differences among interviewees' perceptions to explore different conceptualizations of start-up communities, this approach did not allow to validate and verify these perceptions. Further research is necessary to conclude if the perceived benefits of being part of a start-up community actually translate into more successful start-ups, or if the facilitating activities that were identified indeed contribute to greater coherence in the community.

APPENDICES

Appendix 4A: characteristics of sample start-up support programs

Start-up support program	Interviewee(s)	Description	Program age (years)	Program size	Program location
A	Facilitators A1, A2, A3, A4	Investor and incubator	5	6 start-ups	Sydney
B	Facilitator B1	Investor and incubator	10	40 start-ups	Sydney
C	Facilitators C1, C2, C3	Co-working space for entrepreneurs	3	100 members	Sydney
D	Facilitator D1	Co-working space for social entrepreneurs	3	650 members	Melbourne
E	Facilitator E1	Co-working space for entrepreneurs and freelancers	4	100 members	Melbourne
F	Facilitators F1, F2, F3	Co-working space for software entrepreneurs	1	60 start-ups	Melbourne
G	Facilitator G1, G2	University affiliated incubator	1	5 start-ups	Melbourne
H	Facilitators H1	Incubator	10	45 start-ups	Melbourne
I	Facilitators I1, I2	Government sponsored investor and incubator	10	500 start-ups	Canberra
J	Facilitator J1	Co-working space for entrepreneurs	1	40 members	Canberra
K	Facilitator K1	Co-working space for entrepreneurs	< 1	7 start-ups	Canberra

Appendix 4B: characteristics of sample entrepreneurs

Start-up support program	Interviewee	Start-up activity	Start-up size (employees)	Start-up age (years)	City
A	Entrepreneur A1	Online payment platform	3	1	Sydney
	Entrepreneur A2	Online legal services	2	< 1	Sydney
	Entrepreneur A3	Online resource management	4	2	Sydney
	Entrepreneur A4	Online inventory management	2	3	Sydney
	Entrepreneur A5	No start-up; looking for new opportunities	-	-	Sydney
B	Entrepreneur B1	Hydogen refueling	2	2	Sydney
	Entrepreneur B2	Micro energy production	1	2	Sydney
	Entrepreneur B3	Online taxi service	10	2	Sydney
C	Entrepreneur C1	Micro satellite production	1	< 1	Sydney
D	Entrepreneur D1	Online solar panel purchasing service	8	3	Melbourne
	Entrepreneur D2	Geothermal energy production	3	<1	Melbourne
E	Entrepreneur E1	Travel search and booking	5	4	Melbourne
F	Entrepreneur F1	Personalised audio services	5	1	Melbourne
	Entrepreneur F2	No start-up; looking for new opportunities	-	-	Melbourne
G	Entrepreneur G1	Online venues and events	12	1	Melbourne
H	-	-	-	-	-
I	Entrepreneur I1	Home water recycling	5	4	Canberra
	Entrepreneur I2	Machine learning	4	6	Canberra
	Entrepreneur I3	Grid management software	2	2	Canberra
	Entrepreneur I4	3D printing	3	9	Canberra
	Entrepreneur I5	Online identity verification	4	9	Canberra
	Entrepreneur I6	Wind energy development	27	10	Canberra
	Entrepreneur I7	Radio location technology	37	17	Canberra
	Entrepreneur I8	Energy efficiency	2	2	Canberra
J	-	-	-	-	-
K	Entrepreneur K1	Architecture, interior and object design	1	< 1	Canberra
	Entrepreneur K2	Infrastructure consultancy	3	< 1	Canberra
	Entrepreneur K3	Mobile app development	3	3	Canberra
None	Entrepreneur N1	Cloud software	31	8	Sydney
	Entrepreneur N2	Image discovery	9	3	Sydney

Appendix 4C: data analysis

Second order codes	First order codes	Representative quotes
Joint enterprise	Helping start-ups succeed	"We're all united in the goal of internet companies" (Facilitator A2)
	Sharing knowledge	"Our goal is to help the start-ups grow faster. We want to make start-ups share more information about what they are working on" (Facilitator C2)
Mutual Engagement	Strong relationships	"We have socialized a lot with some of the other start-up founders that are based in Melbourne" (Entrepreneur F1)
	Shared identity	"Entrepreneurs are very happy to help other entrepreneurs solve their problems (...) You don't do it because you're looking for a favor in return. You do it because you see the opportunity to help somebody who's struggling just like you are" (Entrepreneur N2)
	Norms and values	"The start-up ecosystem is very much based on trust. I'll only give you an introduction if I trust you. (...) You'll get involved very quickly and easily, but you don't want to misplace that trust (...) No one is chased out with a broomstick but you don't want to be known as someone who takes and doesn't give back" (Entrepreneur G1)
Shared repertoire	Shared tools and methods	"There is a very strong recognition of lean-canvas and the principles around that. So a lot of the community actively run their businesses that way (...) I see the community of Sydney and definitely [investor and incubator A] subscribe to that" (Entrepreneur A1)
	Shared practices	"Just sort of standard business practices (...) making sure all the I's are dotted and the T's are crossed in terms of the finances of the company and that sort of thing" (Entrepreneur I6)
Select members who fit in the community	Let community self-select	"If they are not interested in engaging a discussion, they get left alone and effectively get kicked out of the community through that process" (Facilitator F3)
	Consult members	"Someone wanted to apply and they were a competitor of [name]. We would give [name] first preference to turn it down (...). If they say it's fine then it's fine. But if we have two competitors in here (...) they are both going to hide their learning from each other, which wouldn't be conducive to that open atmosphere" (Facilitator C1)
	Install a trial period for new members	"Anybody who comes in here has to do a two-week trial. That helps us to get to know whether we are similarly aligned, whether we have the same values, whether you're a giver and a taker, whether you actually want to contribute to the community" (Facilitator E2)
	Select top-down	"We're getting the opportunity to curate the culture (...). We have an application process. So we get members who we think can give back to the community and who would receive from the community" (Facilitator F3)

Second order codes	First order codes	Representative quotes
Manage the introduction of newcomers	Set expectations	"A lot of it is setting expectations (...) introduce people and induct them into what is expected and what are the cultural behaviors and values" (Facilitator D1)
	Match newcomers to buddy	"When there's a newcomer, they actually set them up with a buddy so they get along easier (...) A buddy is someone who has been operating in the system for a period of time (...) That person introduces you to other people and supports you working in that space" (Entrepreneur D2)
Foster social relationships	Facilitate interaction in workspace	"So people meet up people there. Here it might be in the kitchen because it's designed to be open (...). These places are really well designed to facilitate interaction. That's one of the things that make working at this place so enjoyable" (Entrepreneur D1)
	Organize events	"Just trying to get everyone together, hosting events. I think the most important part of it is that you have to know everyone to some extent" (Facilitator F3)
	Design digital platforms	"You can never underestimate the power of actual physical interaction. If you rely solely on the online platform, you will lose almost 80% of the value (...). As in very small proportions, the online platform supports your physical engagement, that's what it does" (Entrepreneur D2)
Connect demand and supply for knowledge	Connect members	"We know them well because we spend lots of time with them (...) Lots of people have gone through mergers, lots of people hate their boards. We send them down here to have a coffee" (Facilitator B1)
	Enable members to share their needs	"You'd have two minutes to say what you did last month, what you're going to do next month, and how the room could help" (Entrepreneur A4)
Create an inspiring environment	Celebrate success	"People get confidence from the fact that the guy that they sit next to gets featured on TechCrunch or gets a million dollars in venture capital or whatever it is. And they feel confident that they can actually do it (...) It's actually fostered and celebrated and an incentive" (Facilitator F2)
	Enable members to share their goals	"So, we'll have a meeting, we'll set them tasks and goals to do, they need to go away and do it (...) That can be really important in getting them from point A to point B" (Facilitator I1)





Chapter 5

Start-EU-up! International incubation practices to address the main challenges faced by Western European start-ups

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The PhD candidate was the main contributor in designing the study, developing the methodology, collecting the data, analyzing the data and writing this chapter. Additional data were collected by C. Eveleens, H. Steinz, N. van Stijn and M. Groen.

ABSTRACT

Despite the efforts of policy makers, Western European start-ups are still struggling. Further, as questions are being raised about the effectiveness of incubators, there is a growing call for incubators around the world to learn from each other and improve themselves. This chapter enables Western European incubators to learn from their foreign peers by qualitatively exploring the challenges faced by Western European start-ups and the practices that incubators around the world use to address these challenges. Our study takes a two-step approach. First, using the components of the entrepreneurial ecosystem to structure data coming from 90 qualitative interviews with Western European entrepreneurs and incubator managers, we explore five interrelated challenges that constrain the ability of Western European start-ups to grow into high-impact businesses. In the second part of our study, we conduct a total of 191 interviews in Silicon Valley, the greater Boston area, Israel and Australia to identify practices that incubators in these regions use to address the five challenges identified in the first study. Our findings suggest that, rather than addressing the underlying institutions that cause challenges in the entrepreneurial ecosystem, incubators provide symptomatic solutions by creating an environment that protects start-ups from unfavorable institutions. Accordingly, we conclude that existing incubators have only limited potential to strengthen entrepreneurial ecosystems, and we end this chapter with a call for a new generation of 'systemic incubators' that aim to transform or create institutions to address the institutional challenges that constrain start-up activity.

5.1 INTRODUCTION

Stimulating the emergence and growth of technology-based start-ups (hereafter: start-ups) has become a central part of Western European policies to achieve economic growth (Ahmad and Ingle, 2013; Brown and Mason, 2014). While these start-ups only constitute a small part of the total population of small businesses, policy makers see them as important drivers of employment and innovation (Brown and Mawson, 2015; Michael and Pearce, 2009). However, these start-ups suffer from high failure rates; about one third of Western European start-ups do not survive their second year (Bartelsman, 2005; Scarpetta et al., 2002). To offset the risks associated with start-ups, European governments increasingly support them through incubators: organizations that provide start-ups with a broad range of services and resources needed for survival and growth (Aerts et al., 2007; Bergek and Norman, 2008; Bruneel et al., 2012). It is estimated that there are currently over 1000 European incubators, 85% of which is located in Western European countries, and that their number has seen a fivefold increase between 2007 and 2013 (Aerts et al., 2007; Ahmad and Ingle, 2013; Salido et al., 2013). Accordingly, incubators are considered to be 'the mainstays of high-technology industrial development in Europe' (Oakey 2012 p. 67), and 'an institutionalized component of the EU's and its member states' national innovation systems' (Ahmad and Ingle 2013 p. 123).

The efforts of Western European policy makers to support start-ups through incubators are in line with a global trend: the number of incubators increases rapidly around the world, which has led to a diverse global population of incubators and related start-up support initiatives (Aerts et al. 2007; Chandra et al. 2012). This provides an 'immense opportunity' for incubators all over the world to learn from each other and improve themselves (Ahmad and Ingle 2013 p. 131; see also Aernoudt 2004; Terjesen et al. 2013). Such learning is urgently needed, as questions are being raised about the effectiveness of incubators, in Western Europe (see e.g. Schwartz 2009, 2013; Tamasy 2007) and elsewhere (see e.g. Lewis 2001; Tavoletti 2013). Further, Western Europe still seems to be lagging behind other economies in terms of start-up activity (Startup Manifesto, 2013; The Economist, 2012; Tijssen and van Wijk, 1999).

However, cross-national comparative studies on incubators are rare (Ahmad and Ingle, 2013; Phan et al., 2005; Rothaermel et al., 2007). International studies that do exist (e.g. Aernoudt 2004; Lalkaka 2002; Lee and Osteryoung 2004) have two limitations. First, they primarily provide comparisons of incubator attributes, such as configurations, objectives and historical underpinnings. Such analyses have been criticized for failing to explain how the incubation process unfolds. Accordingly, there is a growing call for scholars to move away from the incubator's *attributes*

and towards the incubator's *practices* to explain in more detail how incubators provide their support (Ahmad and Ingle, 2013; Hackett and Diltz, 2004a; Phan et al., 2005). Second, existing studies pay little attention to the incubator's context. Doing so is important, as incubators enable start-ups to overcome constraints that may be specific to the local entrepreneurial ecosystem, such as a lack of venture capital or legitimacy for start-ups (Amezcuca et al., 2013; Clarysse et al., 2005; Degroof and Roberts, 2004). Identifying incubation practices therefore requires a thorough understanding of the challenges in the entrepreneurial ecosystem that incubators should address. However, although previous studies have looked at Europe's challenges for innovation and entrepreneurship (see e.g. Kelley et al. 2012; Tijssen and van Wijk 1999), none of these studies have looked at the specific challenges faced by the early-stage, technology based start-ups that are typically supported by incubators. It is important to do so, as these start-ups have unique characteristics that distinguish them from the greater small business population: they are young, technology-driven, and their founders often lack entrepreneurial experience (Bergek and Norrman, 2008; Rice, 2002). This may result in specific challenges faced by these start-ups compared to the more generic challenges identified by previous studies.

To address these limitations, our study answers two research questions. First, "what are the main challenges faced by start-ups in Western Europe³?" Second, "which practices can incubators use to address these challenges in the Western European context?". We structure the identification of challenges around the concept of entrepreneurial ecosystems. To create a comparable group of countries, we study innovation driven economies (Kelley et al., 2012). These economies have a relatively high share of opportunity-driven entrepreneurship, which includes technology based start-ups, and are home to the majority of incubators and are therefore relevant for our study (Aerts et al., 2007). Empirically, we base our conclusions on two studies that use semi-structured interviews with entrepreneurs, incubator managers, and other key stakeholders in the entrepreneurial ecosystems of the Netherlands, Germany, Switzerland, France, the United States (Silicon Valley and the greater Boston area), Australia and Israel.

Our study contributes to the extant literature by exploring how incubators strengthen the entrepreneurial ecosystem. Our findings suggest that incubators provide symptomatic solutions rather than addressing the institutions that cause challenges in the entrepreneurial ecosystem. Our study is also of great practical relevance, as Western European policy makers and incubator managers can use

3 'Western Europe' consists of Austria, Belgium, France, Germany, Liechtenstein, Luxembourg, Monaco, the Netherlands and Switzerland (United Nations Statistics Division, 2015).

our study to help start-ups overcome their major challenges. Next, we discuss the components of the entrepreneurial ecosystem and the support provided by incubators. We then present two empirical studies: one in which we identify challenges, and one in which we identify practices. We end this chapter with a brief discussion and conclusion.

5.2 BACKGROUND

We begin this section by discussing the literature on entrepreneurial ecosystems. This literature will guide our empirical analysis by enabling us to identify those components that are underdeveloped in Europe and that thereby constrain start-up activity. We then discuss the incubator's role in the entrepreneurial ecosystem.

5.2.1 Entrepreneurial ecosystems

Over the past five years, literature on entrepreneurial ecosystems has emerged to explain the presence or absence of start-up activity in a geographical area. Its focus on the role of the start-up's environment makes the literature on entrepreneurial ecosystems similar to that on clusters or innovation systems (Ács et al., 2014). However, the entrepreneurial ecosystem literature is unique in the sense that it points at components in the environment that are particularly important for start-ups rather than firms in general (Spigel, 2015). Accordingly, the entrepreneurial ecosystem consists of a set of interdependent components that exist outside the start-up that contribute to the start-up's success (Spigel, 2015; Stam, 2015). Entrepreneurial ecosystems are not only shaped through top-down policies, but primarily through bottom up activities involving a broad range of interdependent governmental and non-governmental actors (Feld, 2012; Stam, 2015). If components in the entrepreneurial ecosystem are underdeveloped, start-ups may face challenges that constrain their growth. The increasing interest in entrepreneurial ecosystems has led to the identification of a variety of components that are deemed to be important for a thriving ecosystem (see e.g. Cohen 2006; Feld 2012; Neck et al. 2004; Spigel 2015; Stam 2015; WEF 2013). In discussing the most cited components, we follow literature on innovation systems to broadly group these components into three categories: actors, networks and institutions (Carlsson and Stankiewicz, 1991; Hekkert et al., 2007; Van Rijnsoever et al., 2015).

There are various actors who can strengthen the entrepreneurial ecosystem by providing resources that are necessary for start-ups to thrive and by shaping the ecosystem's institutions. First, the ecosystem should have a *talent pool* of individuals

with high level of human capital, which includes both technical and entrepreneurial skills (Feld, 2012; Florida et al., 2008). These individuals act as start-up founders or employees (Neck et al., 2004). Second, *domestic and foreign markets*, consisting of consumers and businesses who act as customers, should be accessible and large enough for start-ups to be able to sell their products or services (WEF, 2013). Third, *financial capital*, provided by private investors or public funding agencies, enable start-ups to obtain the necessary resources for their founding and growth (Cohen, 2006; Neck et al., 2004). Fourth, *support services* can provide start-ups to obtain specialized knowledge (Spigel, 2015). These services are primarily provided by mentors (experienced entrepreneurs who advice young founders), professional service providers (e.g. lawyers, accountants or consultants), and incubators (that we discuss in more detail in the next section). Fifth, *universities* may play a catalyzing role. Universities contribute to the ecosystem's human capital by providing well-educated entrepreneurs and employees as well as faculty staff that may act as consultants to start-up companies. Further, their expertise may lead to technological opportunities based on which start-ups can build their products, and they are important in fostering a culture of innovation and entrepreneurship (Etzkowitz, 2004; Neck et al., 2004; Stam, 2015). Finally, both public and private actors can contribute to the ecosystem's *physical infrastructure*. This infrastructure provides start-ups with the required tangible resources, including office space, telecommunication facilities and transportation infrastructure (Spigel, 2015).

The presence of these actors alone is insufficient for entrepreneurial ecosystems to be successful. Actors should be connected through various *formal and informal networks* (Neck et al., 2004) that facilitate the flow of resources between them (Spigel, 2015). Networks of actors in the entrepreneurial ecosystem operate under an institutional environment that supports or constraints start-ups. Institutions are the socially constructed 'rules of the game' that structure the actions of actors in the entrepreneurial ecosystem (North, 1990; Pacheco et al., 2010; Scott, 1995). The entrepreneurial ecosystem literature primarily points at the ecosystem's *regulation* and *culture* as the two most important institutions that influence start-up activity (Neck et al., 2004; Spigel, 2015; Stam, 2015). Governments can create the optimal conditions for innovation and entrepreneurship to flourish, for example by ensuring low levels of corruption, a high quality educational system and adequate intellectual property protection (Casper and Soskice, 2001). In addition, governments can provide regulatory institutions that are specifically aimed at stimulating start-ups, including start-up subsidies or incentives to support R&D collaboration between start-ups and universities (Goldfarb and Henrekson, 2003; van Rijnsouwer et al., 2014). The ecosystem's culture should encourage entrepreneurship as a career path, it should ensure that (nascent) entrepreneurs think in terms of the market

where they want to sell their products, it should make risk taking socially accepted, and it should celebrate successful local start-ups (Spigel, 2015; WEF, 2013).

5.2.2 Incubators in the entrepreneurial ecosystem

Incubators can strengthen the entrepreneurial ecosystem by supporting local start-ups. Since their widespread diffusion in the 1980s, the incubator's value offering has developed considerably (Bruneel et al., 2012; Mian, 2014), which reflects their changing role in the entrepreneurial ecosystem. Accordingly, incubators support start-ups in various ways.

First, as part of the ecosystem's support services (Spigel, 2015; Stam, 2015), incubators provide start-ups with direct access to several ancillary resources and services. Initially, the 'first generation' incubators focused on providing start-ups with shared office space and other tangible resources, such as meeting rooms, to create economies of scale (Barrow, 2001; Bruneel et al., 2012). More specialized (e.g. university-affiliated) incubators also provided access to equipment or laboratories (Mian, 1997). From the early 1990s, incubators increasingly focused on supporting technology based start-ups (Ahmad and Ingle, 2013; Bruneel et al., 2012). Incubators realized that founders of these start-ups lacked entrepreneurial experience, which led incubators to expand their service portfolio (Bruneel et al., 2012). Incubators started providing professional consultancy services, as well as coaching and training for entrepreneurs, primarily as a way for entrepreneurs to develop missing business knowledge (Rice, 2002). These incubators also started to provide financial capital by investing in their tenant companies (Aerts et al., 2007; Barrow, 2001).

Second, by curating the relationship between entrepreneurs and their peers, or between entrepreneurs and other actors in the entrepreneurial ecosystem incubators act as a node in the entrepreneurial ecosystem (Bergek and Norrman, 2008; Spigel, 2015). This was the focus of the 'third generation' incubators, which emerged in the late 1990s and aimed to facilitate access to external resources and networks (Bøllingtoft and Ulhøi, 2005; Hansen et al., 2000). These incubators stimulated start-ups to interact with each other in the incubator's 'community', by co-locating start-ups in the incubator's premises, by creating synergies among start-ups through the incubator's selection process, by organizing network events, and by acting as relational 'brokers' to make one-on-one connections (Cooper et al., 2010; Hughes et al., 2007; Totterman and Sten, 2005). The incubator thereby creates a dense network of start-ups that are willing to help each other by engaging in collaborative projects or by exchanging knowledge and networks (Mcadam and Marlow, 2007; Totterman and Sten, 2005). Facilitating such network density leads

to greater visibility of start-ups in the entrepreneurial ecosystem, which makes it easier for start-ups to connect to external actors. Incubators further facilitate such access to external networks by organizing events, by establishing partnerships with for example investors or universities, or by leveraging the personal networks of incubator managers and mentors (Hansen et al., 2000; Patton and Marlow, 2011).

Third, incubators can help start-ups to cope with the institutions of the entrepreneurial ecosystem. They may do so by acting as a ‘safe harbor’ that protects start-ups from unfavorable institutions (Amezcuca et al., 2013; Hackett and Dilts, 2004b). For example, the incubator’s community creates a culture of support and encouragement (Cooper et al., 2010), which may compensate for the absence of such a culture in the entrepreneurial ecosystem. Start-ups in the incubator may also benefit from the added credibility that incubators bring, as acceptance into the incubator acts as a ‘stamp of approval’ to potential collaborators (NESTA, 2011). This contributes to the start-up’s legitimacy, which may be particularly valuable in ecosystems where founding a start-up is perceived to deviate from the dominant cultural norms and values. In addition to protecting start-ups from unfavorable institutions, incubators may also act as ‘institutional entrepreneurs’ (Amezcuca et al., 2013); actors who transform or create institutions that favor their interests (DiMaggio, 1988). For example, by organizing a collective group of start-ups, the incubator increases the power and legitimacy of the individual start-ups (Pacheco et al., 2010), which may enable incubators to negotiate favorable regulations. As an institutional entrepreneur, the incubator no longer only impacts individual start-ups, but has the potential to improve the institutions of the entrepreneurial ecosystem as a whole.

5.3 METHODS STUDY 1

5.3.1 Research design and case selection

To explore the challenges of Western European start-ups, we conducted 90 semi-structured interviews with entrepreneurs, incubator managers and other key stakeholders in the entrepreneurial ecosystem, such as investors, university technology transfer officers, mentors and policy makers⁴ in Western European countries. Our sample consists of 13 incubators, six of which were part of the Climate Knowledge and Innovation Community (Climate-KIC), a European initiative to stimulate

4 The interview data from the six university-affiliated incubators was also used in a prior study on incubator strategies (Van Weele et al., 2013).

clean tech innovation and entrepreneurship. These university-affiliated incubators were located in the Netherlands (3), France (1), Switzerland (1) and Germany (1). Although Climate-KIC focuses on supporting clean tech start-ups, these six incubators were active in a wide variety of industries. To complement our sample, we included insights from seven non-university affiliated incubators located in Germany (5) and the Netherlands (2). These incubators were approached through events, desk research and existing network contacts. The final sample of 13 incubators allows for comparison while maintaining a high level of variation, which contributes to the reliability and generalizability of our findings. The sample is homogeneous in the sense that all incubators focused on supporting early stage start-ups, which we defined as new ventures where technical know-how is capitalized and exploited through new products and services (Bergek and Norrman, 2015; Trimi and Berbegal-Mirabent, 2012). Further, rather than solely focusing on one type of support (e.g. co-working spaces that only provide office space, or educational programs that only provide mentorship) the incubators in our sample supported these start-ups with a comprehensive range of services. Within these constraints, we maximized variation. This is particularly important when the population under study is heterogeneous, as is the case with incubators (Aernoudt, 2004; Bergek and Norrman, 2008). Our sample reflects this variety as it includes incubators in different industries (e.g. software, clean tech, life sciences), with different founding partners (e.g. universities, investors, municipalities), operating both for profit and non-profit. The diversity of the interviewees as well as the relatively large number of interviews that we conducted contributes to the reliability of our findings, as it enabled us to triangulate our findings in an early stage, thereby minimizing the influence of interviewees' individual bias and (mis)perceptions (Bryman, 2008).

We were not able to conduct interviews in the Western European countries of Austria, Belgium, Liechtenstein, Luxembourg and Monaco. However, the nine Western European countries are very similar in for example their regulatory framework and entrepreneurial attitudes and are therefore often grouped in the same categories in for example the Global Entrepreneurship Monitor and the literature on Varieties of Capitalism (Hall and Soskice, 2001; Kelley et al., 2012). Further, among the interviewees were several European policy makers, as well as entrepreneurs that were active in multiple European countries, and incubator managers and investors overseeing an international portfolio of start-ups. The international background of these interviewees compensated for the limited number of European countries in which interviews were conducted. We are therefore confident that the challenges that we identify are relevant to Western Europe as a whole.

5.3.2 Data collection and data analysis

Interviewees were approached through the network of Climate-KIC, through the researchers' personal networks, through desk research and by asking interviewees to introduce the researcher to other interesting actors for this research. All interviews were conducted between January 2012 and May 2015. Conducting interviews on-site enabled us to augment the dataset with observations and informal conversations. Table 1 below provides an overview of the interviewees per category and country. In addition, we attended various start-up events and formal meetings organized by Climate-KIC during which challenges and solutions for European (clean tech) entrepreneurship were discussed. This enabled us to triangulate our findings and to enrich our interviews.

Table 5.1 Interviews conducted for study 1

	Entrepreneurs	Incubator staff	Other (e.g. investors, policy makers, university representatives)	Total
Netherlands	24	13	12	49
Switzerland	8	1	2	11
France	8	2	0	10
Germany	12	6	2	20
Total	52	23	15	90

The interviews took 40 minutes, on average. During the interviews, we wanted to “follow wherever the informants lead us in the investigation of our guiding research question” (Gioia et al. 2012 p. 20). We therefore conducted semi-structured interviews with a common set of questions, while allowing interviewees to elaborate on their answers and enabling us to ask additional probing questions. Accordingly, the list of questions as provided in Appendices A and B should not be interpreted as a strict interview protocol, but as a broad set of questions that guided the interviews. Every interview started with a brief introduction of the research goal. We then asked interviewees to describe their personal background as well as the background of their start-up or incubator. Given our aim of identifying challenges faced by start-ups, we then asked interviewees to discuss what they perceived as the strengths and weaknesses of their particular region or country in terms of starting a business. This discussion formed the core of the interviews. Many interviewees had an international background, and we asked them to compare the different entrepreneurial ecosystems in which they had lived to each other. In this part of the interview, the concepts of the entrepreneurial ecosystem literature acted as ‘sensitizing concepts’ (Blumer, 1954) that guided us to ask probing question about

specific components of the entrepreneurial ecosystem (e.g. to what extent did you feel supported by your university when founding this start-up? What forms of start-up capital are available?). Initially, we relied on open questions to identify general challenges. As the study evolved, we included more specific questions to explore particular challenges in greater detail. In the case of incubated entrepreneurs and incubator staff, we also asked about what forms of support were provided by the incubators.

If possible, the interviews were recorded and transcribed. Data was collected until no new relevant topics emerged, which suggests that theoretical saturation was reached. Data was analyzed by coding the interviews using the qualitative data analysis program Nvivo. As a qualitative, inductive study, our coding was a highly iterative process. Still, it roughly proceeded in three phases. During the initial stage of coding, we labelled segments of interview scripts with codes that were based on interviewees' own words. For example the segment *"the skills that you need as an entrepreneur: presenting, networking, etc., they don't teach these at a university"* was labelled as 'universities do not teach entrepreneurial skills'. Using such 'in vivo' codes minimizes researcher subjectivity and bias (Gioia et al., 2012). In the second phase of coding, we combined in vivo codes into broader categories. Again, the literature on entrepreneurial ecosystems guided our analysis as they provided a general sense of what to look for. For example, codes that were related to universities (e.g. 'universities do not teach entrepreneurial skills', 'universities lack entrepreneurial culture', 'difficult to negotiate IP with universities') were combined into a higher level code that was labelled 'universities are not focused on entrepreneurship'. These higher level codes eventually formed the core concepts of this study: the challenges faced by Western European start-ups. Given that the components of entrepreneurial ecosystems are interdependent, the third phase of coding consisted of 'axial coding' (Corbin and Strauss, 1990) to explore relationships among codes. This eventually enabled us to create a schematic overview of how the challenges are connected and potentially re-inforce each other.

5.4 FINDINGS STUDY 1

We now discuss the main challenges faced by Western European start-ups, by focusing on those components in the entrepreneurial ecosystem that interviewees felt were underdeveloped. In doing so, we focus on those challenges that were consistently identified over almost all countries in our sample. Appendix C provides additional supporting material for these challenges to confirm that each challenge was observed in each country.

- **Lack of market orientation.** The entrepreneurs in the incubators typically had a strong technological background, but the interviews showed that most entrepreneurs were unfamiliar with activities related to managing and growing their business such as presenting to investors, reaching out to customers or managing employees. A Dutch incubator manager said: *“Selling their product, being able to clearly communicate their value proposition, that’s a thing that a lot of entrepreneurs struggle with”*. Entrepreneurs were seen to underestimate the importance of fulfilling a customer need and were thus *struggling to create a scalable business* around their idea. One of the Swiss incubator managers said: *“There has to be a strong market focus. A lot of ideas we get, people think only from the product itself, like a researcher or so who hasn’t thought of customers at all”*. This lack of market orientation was partly seen as the result from education systems in Europe, which *pay little attention to the development of entrepreneurial skills* and a practical and commercial mindset. In addition, one of the interviewees said that Europeans are inherently modest and not as good as ‘sales people’ as Americans. Accordingly, this challenge is primarily rooted in cultural European institutions that are not easily changed.
- **Lack of an entrepreneurial culture.** Related to this, interviewees found that the culture of Western European countries does not encourage entrepreneurship. This challenge has also been recognized by the European Commission (European Commission, 2013). Entrepreneurs felt that entrepreneurship is perceived as a high risk career choice, and that their social environment was skeptic towards their aspirations to start a business. An entrepreneur illustrated: *“they give me so much credits for having the courage to take this risk”*. Interviewees also found that failure is not socially accepted and they were concerned about stringent bankruptcy laws. These formal and informal institutions contribute to a high fear of failure among entrepreneurs, they may inhibit entrepreneurial initiatives and they may temper ambitions of entrepreneurs. Investors and incubators found that those start-ups that do exist have *limited ambitions for growth*, as entrepreneurs were primarily motivated by a desire to be their own boss instead of aspiring to create a large company. One of the investors said: *“It’s all about the entrepreneurial drive: what is your goal? Where do you want to go? Many entrepreneurs are happy when they have one or two customers ... They’re playing it safe”*.
- **Small domestic market.** Compared to US or Asian markets, the individual European countries have relatively small domestic markets, and the larger European market is fragmented. This problem has been recognized before

(Bravo-biosca, 2011). However, despite policy makers' efforts to unify the European markets (European Commission, 2013), foreign markets, even within Europe, remain difficult to access. Interviewees perceived the European market to be fragmented, as countries differ from one another in terms of language, regulations, customer preferences, etc. These institutional differences make it difficult for start-ups to capture the entire European market. While start-ups offering similar products or services may co-exist in different European countries, it is *difficult for start-ups to scale* their activities. The small domestic markets can partly explain the limited ambitions for growth of European entrepreneurs. As one Dutch investor and former entrepreneur illustrated, European *start-ups think local* instead of global: *"Our goal was to attract 100,000 users. Which is a lot by Dutch standards, but nothing from an international point of view. The problem is that you're not thinking big, and we made some wrong choice because of that"*.

- **Lack of early stage capital.** Europe's lack of financial capital for start-ups is well-documented (Bottazzi and Da Rin, 2002; Philippon and Véron, 2008) and was also identified as a challenge by interviewees in our sample. Interviewees felt that 'seed funding', a relatively small amount of funding to get the company started, was relatively easy to obtain. However, entrepreneurs felt that only a small number of investors were willing to provide 'early stage capital', larger amounts of additional funding necessary to develop a proof of concept and to scale marketing activities. A German incubator manager said: *"it's very rare that very big investments are made in Berlin or Germany. There are a lot of smaller investments and lot of angel investors, but it seems to be very hard to larger get investments here"*. Again, this makes it *difficult to scale start-ups*. As an explanation, multiple institutional causes were mentioned. First, investors found it *unattractive to invest in start-ups* due to Europe's fragmented market and because start-ups lacked an experienced management team and a strong market focus. Second, entrepreneurs found *investors to be risk averse*, as they preferred to invest in real estate or family owned, low tech businesses. Third, the motivations of European entrepreneurs to be their own boss makes them *hesitant to give up equity* to investors (Audretsch et al., 2002; Fiedler and Hellmann, 2001). This was illustrated by one of the entrepreneurs who said: *"I don't want anyone to interfere. (...) I want to be the one in charge. That is my main concern"*.
- **Universities are not focused on entrepreneurship.** European universities were perceived to fulfill their role as catalysts in the entrepreneurial ecosystem only to a limited extent. A manager of a university affiliated incubator in the Netherlands said: *"there are cultural and institutional causes for this,*

but no, there's not an entrepreneurial culture. That doesn't mean that people don't do it [founding a start-up], but it's definitely not stimulated". Although research and education at European universities were perceived to be of high quality, interviewees said that it was difficult to create start-ups based on university research, as the basic research conducted by universities is not ready for commercialization. Start-ups also struggled to access university equipment and entrepreneurs felt that university technology transfer offices had little experience with start-ups, constraining the transfer of knowledge from universities to start-ups. Thereby, entrepreneurs were *unable to access cutting-edge knowledge and technology* that can form the basis of high-tech firms with a competitive advantage (Grant, 1996; McEvily and Chakravarthy, 2002). Finally, in line with Wilson (2008), we found entrepreneurship education at universities to be rare, and poorly integrated in the university's curriculum. Interviewees found that universities neglected entrepreneurship as a career choice and prepared students for careers in government, multinationals or universities instead. Some universities organized standalone courses in which students developed entrepreneurial skills, such as writing a business plan. However, these courses were not focused on creating technology-based start-ups with a high growth potential. Universities thereby *lack a culture of ambitious entrepreneurship*. When discussing the university's culture and curriculum, one student entrepreneur said: *"You're expected to pursue a career at a big multinational or to start a PhD. Entrepreneurship is just not an option (...) The skills that you need as an entrepreneur: presenting, networking, etc., they don't teach these at a university"*. The institutional cause of this challenge is the strong incentive for universities to pursue academic research rather than to collaborate with industry or to commercialize knowledge (Goldfarb and Henrekson, 2003).

Figure 1 provides a conceptual overview of the challenges that we identified. Overall, it seems that the main problem in Western Europe is not the unwillingness or inability of entrepreneurs to *found* start-ups. Rather, the lack of market orientation, ambition and resources (e.g. access to large markets and capital) constrains the ability of existing start-ups to *grow*. One Dutch incubator manager illustrated this as follows: *"Most start-ups are able to achieve some small successes: to think of a good idea, to attract some subsidies, to find a launching customer ... But they fail to make it out of that stage to experience real growth"*. Consequently, the image emerges that the overarching challenge is for start-ups to grow into successful businesses. This creates a reinforcing, vicious cycle, as there are few successful entrepreneurs who could serve as *inspiring role models* or as *'angel investors'* who

5.5 METHODS STUDY 2

5.5.1 Research design and case selection

Next, we conducted a multi-case study in which we studied start-ups and incubators in various entrepreneurial ecosystems. We used a theoretical sampling strategy to identify a specific case (i.e. a specific region or country) that would be likely to provide useful practices for every challenge identified in study 1⁵. These ecosystems are, similar to Western Europe, innovation driven economies (Kelley et al., 2012) that stimulate entrepreneurship to achieve economic growth. Our sampling strategy resulted in the following four cases:

- **Silicon Valley.** We use Silicon Valley as a case study to identify incubation practices through which incubators make start-ups more market oriented, as Silicon Valley has the most developed entrepreneurial ecosystem and also the most mature and developed incubators (Aernoudt, 2004; Herrmann et al., 2012). Consequently, Silicon Valley entrepreneurs and incubators are famous for their ability to translate technological ideas into successful, high-growth start-ups, and Silicon Valley is therefore a suitable case study. Data was collected between February and July 2013.
- **Australia.** We study start-ups in Australia to gain further insights on how start-ups are able to thrive in a country lacking an entrepreneurial culture. Although Australia has a rich history of small businesses, it also has a high fear of failure (Kelley et al., 2012) and the lack of an entrepreneurial culture has been recognized to constrain the development of technology based start-ups (PWC and Google, 2013). Data was collected in Sydney, Melbourne and Canberra between February and July 2013.
- **Israel.** To identify incubation practices that enable start-ups to overcome a small domestic market we look at Israel. This country has a small domestic market that is isolated from foreign markets. However, this challenge has not stopped Israel from becoming a 'start-up nation' with Israeli start-ups having a global impact (Senor and Singer, 2009). Data was collected in the high-tech regions of Tel Aviv and Haifa between May and July 2014.

5 Although we connected every individual case to a specific challenge, we also derived incubation practices from other cases. For the lack of early stage funding, we did not include a specific case, but identified incubation practices across all four cases. The interview data Australian was also used for a study on start-up communities (van Weele et al., 2014).

- **The greater Boston area.** To identify incubation practices that facilitate the relationship between start-ups and universities we study the greater Boston area, which is the metropolitan area surrounding the city of Boston that covers cities such as Somerville and Cambridge. This area is not only home to many top-tier research institutes, but also to many start-ups in a variety of industries, such as IT, clean tech and life sciences. Data was collected between February and July 2014.

5.5.2 Data collection and data analysis

The authors visited the countries between two and six months, which enabled them to be submerged in the local entrepreneurial ecosystem to gain in-depth insights. For all countries, the second author assisted in data collection to discuss and interpret findings and to ensure a consistent and valid process of data collection and analysis. Similar to study 1, interviews were the primary data source, and we interviewed a similar group of entrepreneurs, incubator representatives and other stakeholders. In addition to incubators we studied related programs that aim to facilitate entrepreneurship, such as co-working spaces, university entrepreneurship programs and national entrepreneurship policies. Table 2 below provides a detailed breakdown of the number of interviews per category. We collected data on a total of 34 incubators (and related start-up programs) in Silicon Valley (6), Australia (11), Israel (10) and the greater Boston area (7). Similar to study 1, we aimed to have a diverse rather than a representative sample to identify a variety of practices. Interviewees were identified and approached through desk research, by attending events and by asking interviewees to make introductions to other interesting individuals after the interviews.

Table 5.2 Interviews conducted for study 2

	Entrepreneurs	Incubator staff and other facilitators	Other (e.g. investors, policy makers, university staff)	Total
Silicon Valley	60	7	4	71
Israel	11	11	9	31
Australia	28	20	5	53
Greater Boston	12	7	17	36
Total	111	45	35	191

Again, the interviews were semi-structured, and the same set of guiding questions was used as for study 1. We explored the strengths and weaknesses of the entrepreneurial ecosystem in a similar way as we did for study 1. Then, because we aimed to identify incubation practices, the support provided by the incubator

was discussed in more detail. We asked incubator representatives about how they support start-ups, and we asked entrepreneurs what forms of support they receive, how, and when. In doing so, we asked case specific questions based on the country focus as outlined in section 5.1 (e.g. “how does your incubator enable start-ups to overcome Israel’s small domestic market?”). The literature on incubators guided us here, by enabling us to ask probing questions about forms of support that the interviewee might have missed (e.g. “what is the role of the incubator’s community

Table 5.3 Incubation practices. An ‘X’ signals that a particular incubation practice was identified in a particular entrepreneurial ecosystem

Challenges and practices	Europe	Silicon Valley	Australia	Israel	Boston
1 Lack of market orientation					
- Push for interaction with customers	X	X	X	X	X
- Provide mentorship	X	X	X		X
- Provide small amounts of funding		X		X	
- Facilitate outsourcing			X		X
2 Lack of an entrepreneurial culture					
- Organize start-up tours			X	X	
- Create a supportive community	X	X	X	X	X
- Create a healthy competition among start-ups		X	X	X	X
3 Small domestic market					
- Create an international community	X			X	
- Create international partnerships		X	X	X	X
- Enable a soft landing in foreign ecosystems				X	
4 Lack of early stage capital					
- Selectively connect start-ups to funding sources	X	X	X	X	X
- Enable start-ups to be capital efficient	X	X	X	X	X
- Create a separate joint fund		X			
5 Universities are not focused on entrepreneurship					
- Provide access to technical expertise and equipment	X				X
- Mediate in internships					X
- Complement university curriculum					X
- Create a student board		X			X

in connecting to international markets?”). Similar to how the questionnaire of study 1 evolved, we began by asking general questions about the incubator’s support. In later stages, we focused more explicitly on particular incubation practices to understand them in greater detail.

Interviews were recorded, transcribed and analyzed with Nvivo in a similar manner as in study 1. We started the coding process by staying close to the interviewees’ own words. We then categorized similar codes into broader categories that formed the incubation practices. Again, data was collected until theoretical saturation was reached and no new concepts emerged. Then, for every case, detailed country reports were written to create an in-depth understanding of the entrepreneurial ecosystem and incubation practices for every individual case. The final phase of data analysis consisted of a cross case comparison, in which we related the various incubation practices to the challenges faced by Western European start-ups.

5.6 FINDINGS STUDY 2

We now discuss how incubators in Silicon Valley, Australia, Israel and the greater Boston area can help start-ups in overcoming the challenges that we identified in study 1. In doing so, we also relate the incubation practices to the institutions that are at the heart of these challenges. Table 3 provides an overview of the incubation practices.

5.6.1 Lack of market orientation

Incubators used a variety of practices to make start-ups more market oriented:

- **Push for interaction with customers.** Inspired by the lean start-up method (Blank, 2013; Ries, 2011), incubators encouraged start-ups to engage with customers in order to identify customer needs. Some incubators informally encouraged start-ups to do so through mentors who emphasized the importance of such ‘customer development’. One of the Silicon Valley incubators had a formal requirement that every start-up should talk to at least 100 customers during their stay in the incubator.
- **Provide mentorship.** One of the incubator managers said that start-ups develop parameters or boundaries around their idea that result in implicit assumptions about their product or market. These assumptions may constrain the search for a suitable target market when they become taken for granted assumptions that are not questioned during daily operations. During “tough”

and “stressful” one on one sessions, mentors forced entrepreneurs to explicate and challenge these underlying assumptions, making entrepreneurs re-evaluate their start-up: *“It’s not that they tell you you’re wrong, they’ll ... push back. Sometimes you need somebody to not assume everything you say. That was very useful”*. These mentors were typically experienced entrepreneurs who had started multiple businesses in the past and were seen to have the necessary credibility to make entrepreneurs re-evaluate their technology or business model.

- **Provide small amounts of funding.** To find a viable business model, one of the more prominent Silicon Valley incubators promoted an iterative development process in which start-ups continuously adjusted their product or idea based on the feedback of the market (being customers and investors). This incubator was skeptic of providing start-ups with too much money, as this eliminates the market pressures that force start-ups to iterate on their business model: *“If you give too much money in the beginning, good founders can work on bad ideas for too long”*. Accordingly, the incubator only provided a small amount of funding, just enough to cover the founders’ living expenses during the duration of the incubator program.
- **Facilitate outsourcing.** Given the limited entrepreneurial experience of entrepreneurs, they struggled to get acquainted with the various aspects of setting up a company, such as incorporating the company or filing for taxes. Instead of developing these skills in-house, the incubator enabled start-ups to outsource these unfamiliar activities. We found incubators to provide a wide range of in-house services, such as design, legal, or human resources. This enables start-ups to focus on developing their product and finding a market application: *“At this incubator you’re only supposed to do two things: talk to your users and develop your product”*.

All but the third practice are focused on networks, as incubators connect start-ups to each other, to mentors or to external networks. These practices primarily aim to help start-ups find a target market and to accelerate their development. They do not change the underlying cultural institutions that cause start-ups to be insufficiently market-oriented. The practices raise questions about the tendency of European incubators to be founded and supported by governments and universities (Aerts et al., 2007; Barbero et al., 2012). The practices suggest that, to make start-ups more market-oriented, incubators need be more market-oriented as well. One way to do so is by relying more on private instead of public funding. Further, mentors and incubator staff require entrepreneurial experience to be credible. However, interviewees found that European incubator staff often had a policy or academic

background. A French entrepreneur illustrated: *“We were in contact with the university. In which there are some coaches. But it was all *****. They have no idea what was the reality in the field. So it is really important to have people that have been in a start-up. That have the experience”.*

5.6.2 Lack of an entrepreneurial culture

Incubators can use several practices to create a culture of entrepreneurship and ambition:

- **Organize start-up tours.** Some Israeli and Australian incubators organized a start-up tour to foreign ecosystems such as Silicon Valley. These start-up tours aimed to expose start-ups to the cultural values of a different entrepreneurial ecosystem, by connecting them to start-ups and other stakeholders abroad, rather than changing the culture of the domestic entrepreneurial ecosystem. Some entrepreneurs explained that they were *“inspired”* by the ambitious Silicon Valley start-ups, taking that mindset back home: *“Getting that mindset of how things operate down in the Valley. And adopting that to our... Not only to our business, but to ourselves”.*
- **Create a supportive community.** The community of start-ups in an incubator forms a group of likeminded individuals that entrepreneurs can identify with. These communities created a shared ‘sense of belonging’, and provided motivation and comfort as entrepreneurs saw other start-ups going through similar challenges: *“It shows that things are not easy, and everyone has these issues that they go through ... Hearing their struggles makes you feel like “o, we’re not doing so badly”.* Selectively admitting start-ups to the community was seen as important. Some of these communities had a selection process to decide who could join. Being accepted into the community provided motivation and confidence that helped entrepreneurs to justify their aspirations to their social environment. As one Australian entrepreneur illustrated: *“It makes me confident that I got picked by these twenty people ... I might fail ... but people can’t tell me I was a fool, because I was picked”.*
- **Create a healthy competition among start-ups.** The incubator’s community contributed to a *“healthy competition”* between start-ups, as start-ups were inspired by the positive results of others, and aspired to achieve similar success. One entrepreneur said: *“You don’t want to be the only team that did not get funded”.* This culture of peer pressure stimulated entrepreneurs to push themselves and to set their ambitions higher. This culture can be stimulated by organizing weekly meetings during which entrepreneurs were encouraged to show each other their progress. These meetings *“pushed people to finish*

things in order to show them off". One of the Australian incubator managers said: "we have a Monday morning meeting. Everybody has a 'no fail goal' that you have to achieve. You don't want to be the guy that says "no, we didn't achieve our goal this week".

The above practices are all focused on encouraging interaction between start-ups. By doing so, the incubators create its own culture that encourages risk taking and ambitious thinking. The incubator thereby becomes a 'safe haven' for start-ups, rather than addressing the culture in the broader entrepreneurial ecosystem. An Australian incubator manager illustrated this as follows: *"I think [entrepreneurs] need a place like this because it gives them a safe place to experiment, which is free from the negative Australian cultural traits".* Incubators emphasized that it is important to only select high quality entrepreneurs, as this contributes to the healthy competition and inspiring culture in the incubator's community.

5.6.3 Small domestic market

Incubators can use various practices to enable start-ups to overcome the small domestic market constraint by facilitating the expansion into foreign markets:

- **Create an international community.** Israeli incubator managers emphasized the importance of having a mix of international teams in the incubator's community. This encouraged all start-ups to *"think big"* and to have a *"global mindset"*; to use English in communications, and to see their start-up as a potentially global business.
- **Create international partnerships.** Incubators in all countries relied on their external network to connect entrepreneurs to foreign customers, thereby compensating for the start-up's lack of international networks. One Israeli incubator manager said that only providing introductions is insufficient, as start-ups suffer from a 'knowledge gap': start-ups were unaware of cultural differences between countries, and they did not always appreciate that foreign customers or investors may value the start-up's services differently. Consequently, to sell their products in foreign markets, start-ups first needed to gain in-depth understanding of these foreign markets. This incubator created structural and ongoing partnerships with foreign corporates that enabled start-ups to do so: *"we realized that there were more pieces missing, and it led us to understand the need to bring in these organizations as partners, and not just introduce the start-ups to them".*

- **Enable a soft landing in foreign ecosystems.** One of the Israeli incubators had their main office in Silicon Valley at which the entire incubator program took place. Entrepreneurs were provided with office space, and, more importantly, with advice and guidance on local regulations and customs. The incubator thereby enabled Israeli start-ups to have a “soft landing” in Silicon Valley, facilitating the transition towards a different ecosystem and providing access to a larger market. The incubator encouraged start-ups to have their sales office in Silicon Valley, while continuing R&D in Israel. This enabled start-ups to be ‘immersed in the market’, creating a deep understanding of local rules, norms and institutions.

One Silicon Valley incubator manager said: “a strategy that is successful in their home country is not necessarily successful here. The rules of the game are different”. Through the above practices, incubators enable start-ups to understand institutional differences across countries by creating relationships with local customers and investors. Incubators provide guidance on where to adjust the start-up’s strategy to ensure a fit with the local context, thereby enhancing the growth potential of the start-up. However, the incubator facilitates the transition to a different market environment without addressing the institutions that inhibit this transition itself.

5.6.4 Lack of early stage capital

We found incubators to use various practices to help start-ups overcome the lack of early stage capital:

- **Selectively connect start-ups to funding sources.** With some incubators having an acceptance rate as low as five per cent, the incubator acted as a quality filter to investors: “It’s the ability to distinguish themselves in the crowd ... [Investors know that] you’ve been screened, you’ve been trained, and you’ve already made it past these first bars”. Consequently, being part of an incubator gave the start-up a strong competitive advantage. Silicon Valley incubators in particular tried to connect start-ups to networks of investors, for example by organizing a ‘demo day’, during which all start-ups presented to a large group of investors in an attempt to raise capital. Incubators also connected their start-ups to banks, corporates or government funds. Again, the incubator acts as a quality filter, as one member of a grant review panel illustrated: “You probably had to go through some sort of selection process to get admitted in an incubator. Even if it’s as simple as talking about your technology a little bit. That’s the kind of filter that even on a minimal level is important on a grant application”. For corporates, incubators were not only a filter, but, by

partnering with them, also a way to create a more 'entrepreneurial' company image, to attract talented future employees, or to engage in demand driven open innovation strategies. One of the Israeli incubators asked its corporate partners to identify challenges in their company, after which the incubator selected start-ups that offered potential solutions to these challenges. For the incubator, these partnerships may be an additional source of revenue.

- **Enable start-ups to be capital efficient.** Next to providing funds, incubators enabled start-ups to be 'capital efficient', by cutting the start-up's expenses. Besides facilitating access to economies of scale and providing subsidized office space, we also found incubators to negotiate deals with service providers (such as software companies or lawyers). Consequently, incubators can provide start-ups with 'perks' (e.g. free software or legal services) worth tens of thousands of dollars.
- **Create a separate joint fund.** One of the Silicon Valley incubators had a separate early stage venture capital fund, in which it invested together with local investors and corporates. However, It should be noted that such a fund may also constrain the ability of start-ups to raise funding from external investors, as it may provide a negative signal when the incubator's fund decides not to invest in a particular start-up, as one entrepreneur illustrated: *"That's very confusing, to have a VC arm judging start-ups. ... I think it's a conflict of interest. It's confusing to the outside world. 'You're in the incubator, but they're not investing in you? What's going on?'* This signaling issue can be overcome by ensuring that, although the incubator may help in creating the fund and finding partners, the fund has no official affiliation with the incubator, and that it is not only bound to invest in start-ups from the incubator.

With the exception of the third practice, these practices create networks between start-ups and investors. The first two practices enable start-ups to make better use of the existing funds available in the entrepreneurial ecosystem. The incubator thereby does not address the institutions that cause the lack of early stage capital. By creating a separate joint fund, the incubator has the potential to extend the pool of investors. In addition, by co-investing and by acting as a filter to investors, the incubator mitigates some of the risks associated with investing in start-ups. The incubator thereby addresses the risk-averse cultural institution that partly causes the lack of early stage capital. Inspired by Silicon Valley success stories, we found Western European incubators to connect start-ups to investors by organizing demo days. However, we argue that the potential to do so is limited, due to the underdeveloped capital services and because Western European incubators often lack the track record and selectiveness to raise the interest of investors. Moreover, attracting

venture funding may conflict with entrepreneurs' desire to stay in control of their start-up.

6.5 Universities are not focused on entrepreneurship

Incubators may use several practices to improve the interaction between start-ups and universities:

- **Provide access to technical expertise and equipment.** By providing introductions to university staff and technology transfer offices, the incubator enables start-ups to access scientific knowledge that may give them a competitive advantage. Start-ups can access such knowledge by involving university staff as personnel, as consultants or as advisory board members. Start-ups may also benefit from accessing university specialized equipment, such as a wind tunnel or gene sequencing equipment. However, negotiating terms of use with the university was perceived as an obstacle. Incubators may help by, in addition to contacts, providing standardized contracts. These contracts ensure that the start-up's IP is protected, and enable start-ups affiliated with the incubator to have more favorable terms.
- **Mediate in internships.** Start-ups perceived the university as a valuable source of talented interns that can effectively transfer knowledge and technology from the university to the start-up. One university representative from the Boston area perceived internships as *“one of the most effective ways”* to foster relationships between universities and start-ups. However, there are several barriers to start-up internships. Start-ups were concerned about the time required to host interns, students found it difficult to connect to start-ups, as they did not post internships on their website, and universities were concerned about the uncertain nature of start-ups: *“start-ups can blow up or implode. I think that we may be hesitant to devote too much time and energy to finding internships in start-ups because start-ups are very volatile”*. Incubators can mitigate these concerns. One of the Boston incubators organized 'intern fairs' to connect interns to start-ups. Further, incubators may help by providing standardized internship agreements, or by guaranteeing internships and placing interns at different start-ups when the original hosting start-up exits the market.
- **Complement university curriculum.** One of the university-affiliated incubators in the Boston area organized courses, such as project-based marketing courses or business plan competitions, together with universities, and hosted the courses at the incubator facility. The incubator also provided course mate-

rial through case studies or projects at start-ups. One interviewee said that the incubator thereby extends the university's theoretical curriculum with 'implementation education' that is more practical and hands-on. Another interviewee said that the incubator is 'co-curricular' as it complements the university's traditional courses: *"If the next Facebook were to come out of this [incubator] no one would complain but that is not the main goal because they're students, they're here for school ... This execution part is still educational. And after they have left [the university], if they want to execute on something else, they'll be better prepared"*.

- **Create a student board.** One of the incubators had created a 'student board' that organized guest lectures, coordinated workshops, and facilitated internships at start-ups. Both students and university staff found that the student board played an important role in fostering an entrepreneurial culture at the university. Having student members in the board creates close relationships between the incubator and the student community, and the board thereby creates a bridge between students and start-ups.

The above practices are focused on facilitating interaction between start-ups and university staff or students. By doing so, the incubator fosters a culture of ambitious entrepreneurship at universities, and provides start-ups with high quality scientific and entrepreneurial skills that are required for building a start-up with potential for high growth. However, the practices do not aim to change the regulatory incentives that make entrepreneurship an underexposed topic at universities. Further, although incubators may contribute to creating an entrepreneurial culture among students and university staff, the interviews suggest that the potential to do so is limited. One of the incubator managers said that the university culture takes a long time to change, and compared universities to an 'oil tanker' ship whose direction is difficult to change due to its size and momentum. Consequently, these practices primarily aim to facilitate entrepreneurship in a given institutional environment.

5.7 DISCUSSION AND CONCLUSION

The five challenges faced by Western European start-ups all contribute to the main problem for start-ups to scale their activities and grow into high impact businesses. The challenges all have institutional roots, which makes it difficult to overcome them entirely. Most of the identified practices that address these challenges are based on connecting the start-up to other actors. Based on these practices we conclude that the concepts of 'networked incubators' (Bøllingtoft and Ulhøi, 2005;

Hansen et al., 2000) and 'third generation incubators' (Aerts et al., 2007; Bruneel et al., 2012) are still applicable to the prominent entrepreneurial ecosystems we studied.

We contribute to the extant literature by providing deeper insights on the incubator's role in the entrepreneurial ecosystem. Incubators can directly provide some of the resources that entrepreneurial ecosystems require, such as financial capital, mentorship or a physical infrastructure. Moreover, their emphasis on connecting start-ups to each other and to other actors means that incubators can play an important role in strengthening the ecosystem's networks. Regarding the ecosystem's institutions, our findings suggest that incubators address challenges in the entrepreneurial ecosystem by mitigating the effects of unfavorable institutions. Incubators do so by creating a 'safe haven' that protects start-ups from these institutions or by bridging institutional differences between actors or countries. As such, incubators do not address the institutional causes of malfunctioning entrepreneurial ecosystems but provide symptomatic solutions instead. Consequently, whereas prior studies emphasized the potential of incubators in contributing to entrepreneurial ecosystems (see e.g. Clarysse et al. 2015; Fernández et al. 2012; Tsai et al. 2009), our study points at the limitations of incubators in strengthening the entrepreneurial ecosystem.

This finding also has important implications for policy makers and incubator managers. Policy makers should be aware that incubators are only a partial solution to institutional problems that run too deep for any single incubator to solve. If start-ups are indeed considered to be a vital component of future Western European economic growth, it is necessary to change the underlying regulations and cultural attitudes. Incubators can play a role in this process by acting as institutional entrepreneurs. Therefore, we call for a 'fourth generation' of 'systemic' incubators that aim to transform or create institutions to strengthen the entrepreneurial ecosystem (DiMaggio, 1988). By doing so, these incubators would have the potential to improve the entrepreneurial ecosystem as a whole. Although questions are being raised on the effectiveness of many European incubators, there are also some incubators that have been around for many years and that have created a track record of supporting successful start-up. As such, they have established themselves as legitimate actors in the entrepreneurial ecosystem. This, combined with the networks among incubated start-ups that enable incubators to take collective action, puts these incubators in a good position to engage in institutional entrepreneurship. They can do so for example by lobbying for start-up friendly regulations at a national or European level. Or they could try to influence the national culture by organizing events that reach a national audience in promoting successful role models. A first step towards this fourth generation incubators can be

found in the European Accelerator Assembly (Accelerator Assembly, 2015), which aims to strengthen Europe's entrepreneurial ecosystem by connecting the incubator community to European policy makers.

Strengthening entrepreneurial ecosystems by transforming institutions will likely take years. Until then, incubator managers and policy makers may use the incubation practices that we identified to address the challenges faced by start-ups. We also recommend policy makers to address the dependence of Western European incubators on public funds (Aerts et al., 2007; Barbero et al., 2013), as this contributes to the lack of market orientation of start-ups. It also encourages start-up quantity over quality. Such 'low selectivity' strategies (Clarysse et al., 2005; Degroof and Roberts, 2004) do not seem appropriate in the Western European context, as our findings suggest that Europe does not suffer from a lack of start-ups in general, but of a lack of start-ups that experience growth. Accordingly, we recommend incubators to be more selective by focusing on supporting start-ups with potential for high growth, and to explore funding streams in addition to public funds. One suggestion would be for incubators to partner with corporates, as we have seen in for example the Israeli case.

We end this chapter with some limitations and avenues for further research. First, we are aware of cross country institutional differences within Western Europe that may affect the severity of the challenges we identified (Ahmad and Ingle, 2013; Bosma and Schutjens, 2011; Cunningham and Link, 2014). However, as our findings are in line with European policies and studies, we are confident that the five challenges play a role in every Western European country, and that the variation lies mostly in the strength of certain challenges. Given that the aim of our research was to identify challenges without measuring their relative importance, further research is necessary to provide deeper insights into the importance of these challenges and the influence of country specific influences. The second limitation is related to our qualitative research design. We opted for a qualitative approach because, by relying on the knowledge and perceptions of interviewees to inform us, it enabled us to inductively identify incubation practices that have the potential to address the challenges faced by Western European start-ups. Given that we derived these practices from incubators in successful entrepreneurial ecosystems, we believe that these practices are an important first step towards more effective incubators. However, our qualitative approach did not allow us to verify the effectiveness of these practices. Consequently, we encourage future research to take the next step by quantitatively testing if incubators in general, and the incubation practices that we identified in particular, indeed address the challenges that we identified and thereby contribute to the success of European start-ups.

APPENDICES

Appendix 5A: list of questions entrepreneurs

Introduction

1. Could you briefly describe your personal background? (e.g. entrepreneurial experience, education)
2. What were your motivations to become an entrepreneur?

Context

3. What do you consider to be weak and strong points of the entrepreneurial ecosystem your start-up operates in? (e.g. capital market, entrepreneurial community, regulations, overall culture: risk taking, ambition, status of entrepreneurs, etc.)
4. Do you have any suggestions to increase the emergence and growth of start-ups in your industry?

Incubator

5. What were your reasons to join this incubator?
6. In terms of support provided by the incubator, what has been most valuable?
7. How would you describe your relationship with the incubator? (e.g. formal, informal, how often do you meet, who takes the initiative for support, etc.)

Appendix 5B: list of questions facilitators*Introduction*

1. Could you briefly describe your personal background? (e.g. entrepreneurial experience, education)
2. What are your responsibilities within this incubator?

Context

3. How would you describe the entrepreneurial ecosystem?
 - a. What are strengths and weaknesses? (E.g. regulations, availability of capital, level of ambition, culture, etc.)
4. What would you change to strengthen the entrepreneurial ecosystem for start-ups?

Incubator

5. Can you describe the background of the incubator?
 - a. E.g. when was it founded, with what purpose, annual budget, size in terms of employees and start-ups
6. What does your business model look like; how is the incubator financed?
7. What does your incubation process look like? (e.g. do you identify different phases? What kind of support do you provide?)
8. What do you think is most important in the support offered by the incubator?
9. Do you see any patterns or common mistakes made by start-ups?

Appendix 5C: Supporting material

	Lack of market orientation	Lack of entrepreneurial culture	Small domestic market	Lack of early stage capital	Universities not focused on entrepreneurship
Europe	“If you look at the main critics that are given outside on the ecosystem in Europe (.). First is, the companies are not close enough to the market”	“[There] is a lack of sense of urgency. It has to go up, fast. (...) You need ambition”	“European people always talk about how fragmented the markets here are and small compared to the US”	“There is still not enough access to finance. That is the same problem in the rest of Europe”	
Netherlands	“Being vulnerable, exploring the market side, they often do not like this... Selling your product, really making clear ‘this is what I do’, that’s a thing that a lot of entrepreneurs struggle with”	“When you stick your head up, people don’t like it. This is reflected into all kinds of dimensions: stand up when you have something to say, presentation skills, having a big mouth, you name it. That slows down the entrepreneurial spirit”	“You can’t take the European market all at once (...). It’s not possible to put some smart people together, have them think about a brilliant idea, and then just take the entire market.”	“A big difference in the US is (...) the exit climate is much better there. That makes it more attractive for an investor to be in the valley, because you know that when a business really takes off that there are multiple actors in the stage after that who are interested”	“I hear from many entrepreneurs that the process of negotiating IP with the universities is a tough process”
France	“Often companies which are began by scientists, communicate on how brilliant their technology is. They don’t think in terms of customer”	“In France, (...) you tend to feel superior if you work for a very large company. It is very difficult for a young start-up to be accepted and taken serious”			“I would be extremely grateful to have the opportunity to have access to academic institutions”
Switzerland	“Another question is whether the people that have done the research here are the right people for starting a company That’s more difficult (...) You need knowledge from people that come from the field where the start-up is active. (...) For the business plan. To tell what works and what doesn’t”	“All of your friends are going into consulting. Everybody asks: why don’t you go to BCG or McKinsey?”	“We are a little in a disadvantage, regarding financial possibilities here (...). We are a small country, the funds that are available or on a smaller scale. We talk about a few hundred thousands up to a few millions. Large investments are not frequent”	“It is much better organized today. The funds are bigger than before. But it is far less than what we see at the US”	“I had to be really stubborn (...) Having seen at MIT how they handle entrepreneurship, it is really hard (...). Especially when you want to find an application for the technology. Phd’s do not look like at it that way. The willingness to step out of the comfort zone is not there”

	Lack of market orientation	Lack of entrepreneurial culture	Small domestic market	Lack of early stage capital	Universities not focused on entrepreneurship
Germany	“Lots of people are working on their product and do the prototyping and then they realize there might not be a market for it”	“Also the anti-failure culture, as opposite to the US. Here its more doubtful and fearful”	“if you go to for instance the US there is a big home demand (...) The market here is smaller (...). We then could use whatever we build up here to kickstart somewhere else”	“The access to capital is also weaker than in the US (...) One of the big challenges is growth capital, series A & B. Not the very seed-funding, but little later like VCs and angels”	





Chapter 6

Gimme Shelter – A Discrete Choice Experiment to explain entrepreneurs' choice of an incubator

This chapter is based on: Van Weele M., Groen M., van Rijnsoever F., Moors E. Gimme Shelter – A Discrete Choice Experiment to Explain Entrepreneurs' Choice of an Incubator. Submitted to Small Business Economics.

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The PhD candidate was the main contributor in designing the study, developing the methodology, collecting the data, analyzing the data and writing this chapter.

ABSTRACT

The rapidly growing and diversifying incubator population has led to growing efforts to understand why entrepreneurs prefer a particular incubator over another. However, existing studies report from small samples, are sensitive to post-hoc biases, and neglect heterogeneity among entrepreneurs. We conduct a Discrete Choice Experiment to understand how the attributes of an incubator influence incubator choice by different latent classes of entrepreneurs. Data comes from 935 entrepreneurs from North America and Western Europe. We identify three latent classes of entrepreneurs: (1) 'technology driven funding seekers', who base their choice primarily on the funding provided by the incubator, (2) 'individualists', who have an aversion against networking, training and coaching, and (3) 'balanced decision makers', who consider all of the incubator's attributes when choosing an incubator. Overall, the most influential attributes are the funding provided by incubator, its track record and its affiliation. The incubator's coaching, training and networks are of little importance. This finding contrasts the existing literature, where these services are seen as most important.

6.1 INTRODUCTION

Incubators have become one of the most prominent instruments to facilitate the survival and growth of start-ups (Ahmad and Ingle, 2013; Bergek and Norrman, 2008). While measuring the effectiveness of incubators remains controversial, scholars seem to agree that the success of an incubator is largely determined by the success of its start-ups (Bergek and Norrman, 2008; Hackett and Dilts, 2004a). The incubator's ability to attract promising start-ups is therefore a key prerequisite for its success (NESTA, 2014; Patton et al., 2009; Vanderstraeten and Matthyssens, 2012). Doing so, however, is becoming increasingly difficult, as the number of incubators is growing rapidly around the world (NESTA, 2014). Europe, for example, has seen a fivefold increase in the number of incubators between 2007 and 2013 (Salido et al., 2013). Worldwide, there are now over 7,000 incubators (InBIA, 2016). Still, 'no two incubators are alike' (Allen and McCluskey 1990 p. 64). The concept 'incubator' has become an umbrella term that captures a great diversity in terms of support provided to start-ups (Aernoudt, 2004; Bøllingtoft and Ulhøi, 2005; Pauwels et al., 2015). Accordingly, each incubator has its own unique attributes that include the incubator's support, affiliation or particular type of start-ups that it supports.

Following the emergence of such a competitive and diverse landscape, there is a growing interest to understand why entrepreneurs prefer a particular incubator and how incubators can position themselves relative to their peers (Barbero et al., 2013; Grimaldi and Grandi, 2005; Vanderstraeten and Matthyssens, 2012). There is a broad consensus that the value of incubation lies primarily in the incubator's business knowledge and networks (Bruneel et al., 2012; Hansen et al., 2000). These are seen as key attributes for entrepreneurs to consider when selecting an incubator (Grimaldi and Grandi, 2005; Hansen et al., 2000; Isabelle, 2013; Vanderstraeten and Matthyssens, 2012). Incubators can attract entrepreneurs by providing high quality services (Grimaldi and Grandi, 2005; Vanderstraeten and Matthyssens, 2012), such as mentors with extensive entrepreneurial experience, or strong relationships with investors and specialized consultants. Further, start-ups have heterogeneous needs, which enables incubators to differentiate themselves from others by tailoring their support to a particular type of start-up. Incubators may therefore focus on supporting start-ups in a particular industry (Schwartz and Hornych, 2008) or development stage (Chan and Lau, 2005; McAdam and McAdam, 2008).

Most of the aforementioned studies outline the attributes of an incubator that entrepreneurs *should* consider when choosing an incubator (see e.g. Grimaldi and Grandi, 2005; Hansen et al., 2000; Isabelle, 2013), rather than exploring those attributes that entrepreneurs actually *are* considering. The few studies that

do incorporate the perspective of the entrepreneur (see e.g. Chan and Lau, 2005; Schwartz and Hornych, 2008; Soetanto and Jack, 2013; Vanderstraeten and Matthyssens, 2012) suffer from three limitations. First, by asking entrepreneurs why they have chosen for a particular incubator, these studies retrospectively explore the entrepreneur's decisions. Studies using such post hoc techniques may have low internal validity (Shepherd and Zacharakis, 1999). Their data is biased because people display for example recall bias (caused by a limited ability of individuals to correctly recall previous events) and post hoc rationalization bias (caused by the tendency of individuals to overestimate the rationalization of past decisions). Second, as earlier studies report from single qualitative case studies or limited quantitative samples, their generalizability is limited. Third, while these studies point at heterogeneity of start-ups as a driver for the differentiation of incubators, they only capture heterogeneity in terms of observed start-up characteristics, such as industry type (Soetanto and Jack, 2013) and development stage (Chan and Lau, 2005). Unobserved characteristics, however, such as the willingness of entrepreneurs to engage in networking activities or to take advice from external advisors (Patton, 2014; Rice, 2002), may also induce heterogeneity in entrepreneurs' preferences. Such unobserved characteristics can help explain differences in preferences and should therefore be taken into account, for example through latent class analysis (Vermunt and Magidson, 2002).

To address these limitations, we answer the following research question: *“How do the attributes of an incubator influence incubator choice by different latent classes of entrepreneurs?”*

To answer this question, we conducted a Discrete Choice Experiment (DCE). A DCE allows to explore individuals' decision making process when these decisions are being made and to estimate the importance of particular attributes (such as the incubator's resources or networks) without any confounding factors. A DCE can therefore yield reliable insights into entrepreneurs' decision making without the bias that can be the result of retrospective techniques. DCEs also allow to cluster respondents who display similar choice behavior into different latent classes. This allows to explore heterogeneity among entrepreneurs' preferences. Data was collected among 935 early stage entrepreneurs in Western Europe, Canada and the United States. These countries were selected because they have a high concentration of both start-ups and incubators (Aerts et al., 2007; WEF, 2015).

Our results show that there are three latent classes of entrepreneurs: 'technology driven funding seekers', 'individualists' and 'balanced decision makers', each having their own specific choice profile. However, we also show that all these classes consistently identify the incubator's funding, track record and affiliation as the incubator's most important attributes. Our study enables policy makers

and incubator managers to better understand why entrepreneurs prefer particular incubators. This may help them in tailoring their support to the (heterogeneous) needs of groups of start-ups.

The remainder of this chapter is organized as follows. We first review the literature on incubators to identify attributes that may influence the entrepreneur's choice of a particular incubator and to outline the characteristics of entrepreneurs that may explain heterogeneity in their preferences. We then discuss our research design, after which we present our results. We end this chapter with a discussion and conclusion.

6.2 THEORY

We begin this section with a brief discussion of how incubators have developed over the past decades. We then outline the incubator's attributes that may play a role in entrepreneurs' decision to choose an incubator. The second part of this section discusses characteristics of entrepreneurs that may induce heterogeneity in their preferences for a particular incubator. These characteristics will allow us to characterize the latent classes of entrepreneurs that may emerge in the data analysis.

6.2.1 Heterogeneity among incubators

The development of incubators can be captured in three different 'generations' with each generation adding another dimension to the incubator's aims and services (Aerts et al., 2007; Bruneel et al., 2012). The first generation incubators became widespread in the 1980s and aimed to create economies of scale by providing shared office space and facilities (Bruneel et al., 2012). Although the provision of such tangible resources is still an important part of the modern incubator's value proposition, incubators have shifted their focus towards intangible resources and services. This started in the early 1990s, when incubators began supporting technology based start-ups (Ahmad and Ingle, 2013; Bruneel et al., 2012). Incubators realized that founders of these start-ups lacked entrepreneurial experience, and started expanding their services towards professional consultancy services, coaching and training for entrepreneurs (Bruneel et al., 2012). These second generation incubators also started to act as investors by providing funding in exchange for equity. The third generation incubators emerged in the late 1990s and focused on providing start-ups with access to networks, with the aim of facilitating access to external resources, networks and legitimacy (Bøllingtoft and Ulhøi, 2005; Bruneel

et al., 2012; Hansen et al., 2000). The continuing development of incubators means that modern day incubators provide a wide range of resources and services (Bruneel et al., 2012) and form a diverse population (Vanderstraeten and Matthysens, 2012). We now outline this diversity in terms of incubator attributes that are most often mentioned in the literature and that we expect to be important in the decision of entrepreneurs. The levels of the attributes are given in *italics*. Given the exploratory nature of this study with regard to the identification of latent classes, we do not formulate any formal hypotheses.

Funding

Funding refers to the monetary resources that are available for the discovery and exploitation of the venture idea (Barney, 1991). Start-ups often require substantial amounts of funding to finance costly research and development, but, at the same time, struggle to obtain such funding. This is due to the complexity and uncertainty associated with their technology, which makes start-ups a high risk investment (Carpenter and Petersen, 2002; Westhead and Storey, 1997). Incubators can help by providing direct access to funding. The literature reports great diversity in the amount of funding that incubators provide, with incubators providing several thousands or several hundreds of thousands of dollars (Pauwels et al., 2015; Rubin et al., 2015). For our choice experiment, we use four levels for the funding amounts that are often mentioned in the literature: \$0, \$10,000, \$25,000 and \$100,000. Incubators can also provide financial capital in different forms (Pauwels et al., 2015; Rubin et al., 2015). Many incubators are still supported by local or regional governments; such incubators may provide funding as a *subsidy or grant*. For-profit incubators can provide funding as a *loan against commercial rates*, or *in exchange for 6 or 15 per cent equity*. Providing funding in exchange for equity is often seen as a better fitting finance mechanisms for start-ups, due to the lack of tangible assets as collateral for loans (Carpenter and Petersen, 2002; Gompers and Lerner, 2001).

Physical resources

The physical resources provided by incubators consist of office space and other tangible facilities, such as a car park or meeting rooms. Incubators can also provide more specialized physical resources, such as equipment necessary for technological development. Start-ups often struggle to find such physical resources on a relatively small scale; most incubators therefore provide either free or paid access to such physical resources. However, some incubators ('virtual' incubators) do not provide physical resources (Barbero et al., 2013). This attribute has therefore three levels: *no access to physical resources*, *paid access to physical resources* and *free access to physical resources*.

Training and coaching

Incubators may enable entrepreneurs to develop business knowledge through training and coaching (Patton, 2014; Rice, 2002). Coaching refers to one-on-one sessions with incubator managers or mentors, who are often experienced entrepreneurs. Coaches can share their knowledge by advising entrepreneurs or facilitate a more interactive process (Rice, 2002). The incubator manager or mentor may expose the start-up to an ongoing review, thereby facilitating a trial and error learning process as the start-up and its business plan go through several iterations (Patton and Marlow, 2011). Training refers to collective sessions such as seminars or workshops (Patton and Marlow, 2011; Rice, 2002). Such training sessions enable entrepreneurs to learn particular entrepreneurial skills, such as pitching or accounting. This attribute has four levels: *none, training only, coaching only, training and coaching*.

Networks

Networks enable entrepreneurs to access resources controlled by others, and can therefore compensate for resources that entrepreneurs do not own themselves (Adler and Kwon, 2002; Groen et al., 2008). Networks are therefore seen as one of the key resources of entrepreneurs and modern day incubators (Bøllingtoft and Ulhøi, 2005; Hansen et al., 2000; Stam et al., 2014). A distinction can be made between the incubator's internal and external network (Bøllingtoft and Ulhøi, 2005; Patton and Marlow, 2011). The internal network refers to networks among start-ups that are part of the same incubator. Co-location in the incubator can create a strong internal network in which start-ups can quickly share problems, knowledge and networks (Totterman and Sten, 2005). The incubator's external network consists of actors outside the incubator, such as venture capitalists, potential clients, service providers or local governments. By creating a strong external network, the incubator can act as a mediator in connecting start-ups to external stakeholders (Bergek and Norrman, 2008). The distinction between internal and external networks leads to four levels: *no strong networks, strong internal networks only, strong external networks only, strong internal and external networks*.

Track record

A track record refers to the record of performance or accomplishment of an individual or organization (Drover et al., 2014). Incubated start-ups do not have a track record yet. As a result, they lack legitimacy, which makes it difficult for start-ups to convince other stakeholders to commit resources (Bruton et al., 2010). Start-ups can overcome this deficit by associating themselves with other, more reputable organizations (Rao et al., 2008), such as an incubator with a track record of sup-

porting successful start-ups (NESTA, 2014; Patton, 2014). Entrepreneurs may also prefer an incubator with a good track record because they take it as a sign that the incubator provides high quality services. This attribute has four levels: *good track record, neutral track record, bad track record or no track record (yet)*.

Incubator's affiliation

Incubators can have various organizations as their main or founding partners. This affiliation enables the incubator to provide additional (specialized) services, for example by using the networks or knowledge of its partner. In addition, by affiliating themselves with a reputable organization, incubators enjoy heightened legitimacy, which also contributes to the legitimacy of the start-ups in the incubator (Bøllingtoft and Ulhøi, 2005; McAdam and McAdam, 2008). Respondents may also attach a certain sentiment to the incubator's affiliation. For example, respondents may prefer incubators that are affiliated with investors when they expect (whether accurately or not) that these incubators are better connected to other investors than incubators affiliated with governments. We identify six affiliations that are often mentioned in the literature (Barbero et al., 2013; Gassmann and Becker, 2006; Pauwels et al., 2015). These form the six levels of this attribute: *start-up investor, local university, multinational company active across global markets, internationally renowned university, regional government and none: independent, privately-owned incubator*.

Industry focus

Incubators differ in their specific industry focus. Most incubators only support start-ups operating in one or a limited number of industries (Aerts et al., 2007), such as software or life sciences. Others support start-ups operating in a broad range of industries. Some studies suggest that focused incubators can provide more valuable services, as they can provide access to industry specific resources or expertise (Schwartz and Hornych, 2008; Vanderstraeten and Matthyssens, 2012). Chan and Lau (2005) also suggest that specialized incubators have more relevant internal networks, as they create synergies among start-ups. However, empirical evidence to support this claim is lacking (Schwartz and Hornych, 2010). This attribute has two levels: *focus on a specific industry and focus on a broad range of industries*.

6.2.2 Heterogeneity among start-ups

The differences among incubators are partly due to the heterogeneity among start-ups, as incubators tailor their resources to the specific needs of start-ups (Grimaldi and Grandi, 2005). Accordingly, the characteristics of start-ups and their entrepre-

neers can influence the entrepreneur's preferences for a particular incubator. The incubator literature points at two key characteristics that induce heterogeneity in entrepreneurs' preferences: industry type and development stage (Chan and Lau, 2005; Cooper et al., 2010; McAdam and McAdam, 2008; Soetanto and Jack, 2013).

Start-ups in different industries have different needs, which may subsequently influence the entrepreneur's preference for an incubator. For example, start-ups in high-tech industries are more likely to establish partnerships with universities to acquire necessary technological knowledge. Further, they have greater need for specialized equipment for technological development (Laursen and Salter, 2004; McAdam and McAdam, 2008). Consequently, entrepreneurs with high-tech start-ups may prioritize the incubator's provision of physical resources and affiliation with a university. Start-ups in high-tech industries also require greater investments for research and development (Pisano, 2006). Entrepreneurs in high-tech industries may therefore have a stronger preference for incubators providing a large amount of funding.

The needs of start-ups also depend on their development stage (Chan and Lau, 2005; McAdam and McAdam, 2008; Vohora et al., 2004). For example, entrepreneurs whose start-ups are focused on developing a prototype may have a strong preference for an incubator that provides specialized equipment. In contrast, access to networks and customers may be more important for entrepreneurs who are focused on selling their products. During their development, start-ups develop and acquire resources, which means that they become less dependent on the resources that incubators provide (McAdam and McAdam, 2008; Van Weele et al., 2013). This again may influence entrepreneurs' preferences. Entrepreneurs with mature start-ups may for example attach less importance to the incubator's networks, as they have already developed their own networks.

We also expect the entrepreneur's experience and the start-up's funding to be of influence. Entrepreneurs who have had limited education, or who have little entrepreneurial or industry experience, may find an incubator providing coaching, training and a network of specialized service providers to be of particular value (Rice, 2002). Higher educated or more experienced entrepreneurs, in contrast, may have little need for such services. Start-ups that have already raised a large amount of capital may have no need for further financial support. Consequently, they may attach little value to the funding provided by the incubator, or to the incubator's ability to connect start-ups to networks of investors.

The literature also hints at heterogeneity in entrepreneurs' preferences that are due to characteristics that are unobservable to the analyst. Entrepreneurs have been found to display differing views on the value of the incubator's support and services (Patton, 2014). For example, studies on the incubator's networks show that some

entrepreneurs are very eager to network with peers or external actors, whereas others are not, as they see networks as a source of distraction and involuntary knowledge spillovers (Cooper et al., 2010). Similarly, entrepreneurs have different perceptions about the value of training and coaching, because they differ in terms of their 'readiness' (Rice, 2002), or 'willingness' (Patton, 2014) to take advice from others.

6.3 METHODS

6.3.1 Research design: Discrete Choice Experiment

To model the influence of the incubator's attributes on the entrepreneur's choice of an incubator, we use a discrete choice experiment (DCE). DCEs are based on the random utility theory framework (McFadden, 1974), which postulates that each individual (i) attaches an amount of utility (U) to an alternative (j). U_{ij} consists of an observed component V_{ij} and an unobserved component ϵ_{ij} :

$$U_{ij} = V_{ij} + \epsilon_{ij}$$

For this study, the observed component V_{ij} consists of the attributes of incubator alternative j and individual characteristics i that explain the choice. The error component ϵ_{ij} captures the unobserved factors that influence the choice, such as latent classes. Because ϵ_{ij} is stochastic by nature, the choice for alternative j is presented as a probability. This model was tested using a DCE (Louviere and Woodworth, 1983). While choice experiments (such as DCEs) were originally designed to measure preferences of consumers for marketing purposes, there is now an increasing interest to apply them in the broader social sciences, including the field of entrepreneurship (Shepherd and Zacharakis, 1999; Shepherd, 2011). Choice experiments have been proven useful for understanding entrepreneurs' preferences for innovation networks (Lefebvre et al., 2014), venture capitalists (Drover et al., 2014), knowledge acquisition strategies (van Rijnsoever et al., 2015) or investments in innovation (Van Rijnsoever et al., 2012). DCEs present every respondent with a series of choice tasks in which respondents have to choose between two alternatives (in our case, two incubators). Respondents base their choice on the levels of the attributes of each alternative. These levels vary over the different choice tasks and questionnaire versions in such a manner that the overall survey represents an orthogonal design (i.e. there is zero correlation among attributes). Because each choice forces respondents to make a trade-off between

alternatives and their respective attributes, a DCE reveals the utility that is attached to each individual attribute.

We opted for a DCE for this particular study for two main reasons. First, because attribute levels do not correlate with each other, a DCE enables us to assess the relative importance of each attribute without any confounding factors. Second, respondents can receive multiple choice tasks during a DCE. This allows the identification of latent classes of respondents who display similar choice behavior. As such, a DCE enables us to explore heterogeneity in entrepreneurs' preferences. This heterogeneity is reflected in the parameters of each attribute, which can differ across the latent classes.

6.3.2 Data collection and sample

Entrepreneurs were approached through an online panel of an established European marketing agency and received a small monetary reward for completing the survey. Respondents were surveyed in the United States, Canada, United Kingdom, Ireland, France, Germany, Austria, Switzerland, the Netherlands and Belgium. A major challenge for any study that tries to collect data among founders of start-ups is that the 'incidence rate' is very low when relying on random sampling (Davidsson, 2008). For the countries that we were targeting, the 'Total Early Stage Entrepreneurial Activity' (TEA), which measures the percentage of the adult population that is either a nascent entrepreneur or owner-manager of a new business (Global Entrepreneurship Monitor, 2015), is only 5 to 13 percent (Appendix A). Of these entrepreneurs, only a fraction is founding a start-up (Davidsson, 2008). Therefore, scholars trying to sample founders of start-ups are advised to increase the incidence rate by targeting individuals who are more likely to found a start-up, for example by targeting individuals with a particular education background (Davidsson, 2008). Given that founders of start-ups are more likely to be highly educated (Wadhwa et al., 2008), we chose to direct our sample towards higher educated individuals.

Respondents had to meet three criteria. First, to limit the sample to entrepreneurs, respondents had to be actively starting a business which they would (partially) own. Second, respondents had to be starting a technology-based start-up, which was defined as a new firm whose business is based on the exploitation of technological know-how through the creation of new products and services. Third, as we targeted young start-ups, respondents were screened out if their business had been paying salaries for more than two years. To increase reliability, we based the screening questions on validated questions from the Global Entrepreneurship Monitor (Global Entrepreneurship Monitor, 2015) and Panel Study on Entrepre-

neurial Dynamics where possible (Davidsson, 2008). Appendix B provides an overview of the screening questions.

We used quota sampling, with quota set on a per country basis. To further increase the representativeness of our sample, we weighted the respondents in our sample according to the TEA in 2015 (Global Entrepreneurship Monitor, 2015). Appendix A shows the number of respondents and case weights per country. Despite having the largest number of respondents, the United States was underrepresented in our sample. Ireland was most overrepresented. The case weights correct for these differences.

The age of the respondents ranged between 20 and 69 years (weighted average=37.7). The respondents were primarily male (75%), university educated (69.9%) and first-time entrepreneur (87.7%). These descriptives are in line with previous studies targeting founders of technology based start-ups (Oakey, 2003; Wadhwa et al., 2008). Filling in the questionnaire took, on average, approximately 20 minutes. Respondents spent an average of 20 seconds per choice task.

6.3.3 Questionnaire design

Respondents who met the criteria of the screening questions were first introduced to study's aim and design, after which they received an explanation of the various attributes. In a DCE, these attributes should be selected based on their likelihood to affect the choice of respondents (Hensher et al., 2005). We used the review of the literature as presented in section 2.1 to identify seven attributes. Further, as is common for choice modelling (Kløjgaard et al., 2012), we conducted qualitative interviews with entrepreneurs to validate the list of attributes. Table 6.1 shows how the attributes were presented to respondents. After the introduction, we asked respondents imagine that they were looking for an incubator to help their business. Then, they received 8 choice tasks (an example choice task is given in appendix C). For each choice task, we presented two incubator alternatives and asked: "which incubator would you most likely choose?" During the choice tasks, respondents could re-access the explanation of the attributes and levels through a pop up window.

After the choice tasks, respondents were presented with additional questions to measure the covariates. These covariates were selected in accordance with section 2.2. To identify high-tech start-ups, we asked respondents if they had applied for a patent (or copyright or trademark). We measured the start-up's maturity in terms of their development rather than age. Measuring the age of start-ups can be troublesome, as it is unclear which particular event or milestone marks the 'birth' of a venture (Davidsson, 2008). We therefore follow Bergek and Norrman (2010)

Table 6.1 Attributes and their respective explanations and levels, as presented to respondents

Attribute	Explanation	Levels										
1. Incubator affiliation	The incubator may have various organizations as its core partner.	<ol style="list-style-type: none"> 1. None: independent, privately-owned incubator 2. Start-up investor 3. Local university 4. Multinational company active across global markets 5. Internationally renowned university 6. Regional government 										
2. Physical resources	The incubator may provide your business with the appropriate physical resources, which include office space and shared facilities or equipment.	<ol style="list-style-type: none"> 1. No access 2. Paid access 3. Free access 										
3. Funding amount and funding form	The incubator may provide different amounts of funding to your business. The funding may be provided as a grant, as a loan, or the incubator may take a certain amount of equity and shares in the start-up. This leads to different combinations of funding amounts and funding forms.	<table border="0"> <tr> <td>Funding amount:</td> <td>Funding form:</td> </tr> <tr> <td>1. € 0 (no funding)</td> <td>1. Grant or subsidy</td> </tr> <tr> <td>2. € 10,000</td> <td>2. Loan against commercial rates</td> </tr> <tr> <td>3. € 25,000</td> <td>3. 6% equity</td> </tr> <tr> <td>4. € 100,000</td> <td>4. 15% equity</td> </tr> </table>	Funding amount:	Funding form:	1. € 0 (no funding)	1. Grant or subsidy	2. € 10,000	2. Loan against commercial rates	3. € 25,000	3. 6% equity	4. € 100,000	4. 15% equity
Funding amount:	Funding form:											
1. € 0 (no funding)	1. Grant or subsidy											
2. € 10,000	2. Loan against commercial rates											
3. € 25,000	3. 6% equity											
4. € 100,000	4. 15% equity											
4. Training and coaching	The incubator may provide coaching by experienced entrepreneurs who act as mentors or advisors. The incubator may also provide training such as master classes and workshops.	<ol style="list-style-type: none"> 1. None 2. Coaching only 3. Training only 4. Training and coaching 										
5. Internal and external networks	The internal network refers to interaction with other entrepreneurs in the incubator. The external network includes access to experts, customers and investors. If networks are strong, members are well-connected, accessible and willing to help each other.	<ol style="list-style-type: none"> 1. No strong networks 2. Strong external network only 3. Strong internal network only 4. Strong internal and external networks 										
6. Track record	The start-ups that previously participated in the incubator. Incubators with a good track record have a history of incubating successful start-ups.	<ol style="list-style-type: none"> 1. No track record yet 2. Bad 3. Neutral 4. Good 										
7. Industry focus	The incubator may only support start-ups in your specific industry, or the incubator may support start-ups from a broad range of industries	<ol style="list-style-type: none"> 1. Focus on your industry 2. Broad range of industries 										

who relate the start-up's maturity to its stage of development rather than its age. We operationalized development stage by measuring if, and for how long start-ups had been paying salaries (Davidsson, 2008). To measure the entrepreneur's educational level, industry experience and entrepreneurial experience, we used questions from Mitchell and Shepherd (2010). We also included a question to determine how much money start-ups had raised. Finally, we asked entrepreneurs if they had any incubator experience. We first asked whether respondents were familiar with the concept of 'incubators' and / or 'accelerators'⁶ prior to participating in this study (yes/no). We then asked those who answered 'yes' if they currently are, or have been part of such a program. Based on these two variables we constructed a nominal variable with four levels (see table 6.2).

The questions measuring educational level and capital raised contained a 'decline to answer' option, which was selected by 1.5 and 7.8 per cent of respondents, respectively. We estimated these missing values by applying multiple imputation (Donders et al., 2006) using the Mice package of the R-program.

6.3.4 Data analysis

We analyzed the data using the Latent Gold program. This software program is specifically designed to analyze choice data, and has demonstrated to outperform other programs in terms of latent class analysis (Haughton et al., 2009). The dependent variables in the latent class model were the respondents' choices of an alternative. This choice was predicted by the levels of the seven attributes. We also included an 'alternative specific constant' (ASC). A significant influence of the ASC implies that, after controlling for the attributes' effects, one alternative still is more likely to be chosen due to the influence of its position in the choice experiment (i.e. whether the alternative is displayed on the left or right) (Hensher, 2007).

6 Some authors make an explicit distinction between accelerators and incubators (see e.g. Cohen and Hochberg, 2014; NESTA, 2011). They do so because they see incubators as providers of office space and basic services, and accelerators providers of intangible services (e.g. mentoring, networking). However, modern incubators are not merely providers of shared office space, but organizations that provide a comprehensive range of support services (Aernoudt, 2004; Bergek and Norrman, 2008; Bruneel et al., 2012). These services include those that are also provided by accelerators, such as mentoring and networking. Further, there is great diversity among the models and definitions of both incubators (Aernoudt, 2004; Bergek and Norrman, 2008; Bruneel et al., 2012) and accelerators (see e.g. Brown and Mawson, 2015; Pauwels et al., 2015). 'Incubators' and 'accelerators' are both seen as 'umbrella terms' (Aernoudt, 2004 p. 127; Pauwels et al., 2015 p. 1) that largely overlap (Dempwolf et al., 2014). Consequently, in practice, accelerators and modern incubators can be very similar. We therefore do not make an explicit distinction.

Table 6.2 Indicators and frequencies of start-up characteristics

Characteristic	Question used	Categories and weighted frequencies
Capital raised	How much money did your business raise (in total, including own investments?)	Less than 50,000 (35.5%); 50,000 or more (64.5%)
Development stage	For how long has the new business been paying salaries, wages or payments in kind, including your own?	No payments yet (39.1%); for 0 to 6 months (25.4%); for 6 to 12 months (22.2%); for 1 to 2 years (13.3%)
Entrepreneurial experience	Have you been directly involved in the starting up of other businesses?	No (87.7%); Yes (12.3%)
Industry experience	How many years have you been working in the same industry as your business' current primary industry?	Mean = 8.97; SD = 6.90
Educational level	What is the highest level of formal education you completed?	Less than university (30.1%); university (69.9%)
High tech	Applied for a patent / copyright / trademark	No (75.7%); yes (24.3%)
Incubator experience	Were you familiar with the concept of 'incubators' and/or 'accelerators' prior to participating in this study? If yes, are you currently, or have you ever been, part of an incubator or acceleration program?	Not familiar (43.8%); familiar but never incubated (31.9%); currently incubated (15.1%); incubated in the past (9.2)

Latent classes were identified by categorizing respondents based on similarities in choice behavior. We explored models with 1 to 5 latent classes. The Bayesian Information Criterion (BIC: Schwarz, 1978) was used as a heuristic to determine overall model fit and the number of latent classes, where a lower BIC implies a better fitting model. The BIC penalizes the inclusion of additional parameters and therefore favors a parsimonious solution.

We also explored different scale classes. Scale classes need to be included because respondents display different degrees of consistency in their choice behavior. Not taking this difference in consistency into account may lead to bias in model estimates (Magidson and Vermunt, 2007). Scale classes capture these differences by clustering respondents with a similar degree of consistency (ibid). Again, the BIC functioned as a heuristic in identifying the optimal number of scale classes.

After fitting the optimal choice model, we characterized the latent classes. To do so, we estimated a multinomial regression model in which we used class membership as a dependent variable and the covariates as independent variables. This enabled us to capture heterogeneity in latent classes due to observed characteristics in addition to heterogeneity due to differences in choice behavior.

For each model, we report the McFadden pseudo R^2 (McFadden, 1974) to indicate model performance and the Wald χ^2 to indicate the attributes' relative

importance. The attributes' coefficients were effects coded: the effects are uncorrelated with the intercept and the estimators add up to one.

6.4 RESULTS

Table 6.3 presents the outcomes of the latent class analysis. The BIC revealed that a model with three latent classes and two scale classes provides the best fit. The model has a McFadden R^2 of .28, which is seen as a decent fit for a choice model (Hensher et al., 2005), and a large improvement over the R^2 of a one class model with a lower BIC (McFadden $R^2 = .13$). The latent classes are dependent on the choice behavior concerning all attributes except for financial capital. Although financial capital significantly influenced entrepreneurs' choice of an incubator, the influence of financial capital did not seem to differ across classes. Further, models that included funding as a class dependent variable gave a higher BIC. This is presumably because the BIC heavily penalizes this attribute, since it has 15 levels due to the combinations of funding form and funding amount. Therefore, this attribute was made independent of the class division. The Wald χ^2 shows that all attributes differed significantly per class. Table 6.4 shows the absolute and relative importance of the attributes per class. Table 6.5 presents the results of the multinomial regression to predict class membership using the respondents' characteristics. The pseudo R^2 is .09. We now use tables 3, 4 and 5 to describe the three latent classes of entrepreneurs. In doing so, we use those co-variates that are significant.

6.4.1 The role of funding

The estimators for the levels are equal for all classes (table 6.3) and all three classes attach the same absolute value to financial capital. Since all the other estimators can vary among the classes, the importance of funding relative to the other attributes differs across classes.

Overall, entrepreneurs prefer to receive funding as a grant or subsidy. Further, they prefer to receive funding in exchange for equity, rather than receiving the same amount as a loan. This is in line with theory, arguing that funding in exchange for equity is often seen as a better fitting finance mechanisms for start-ups, due to their high-risk nature (Carpenter and Petersen, 2002; Gompers and Lerner, 2001).

Table 6.3 Latent Class Model. Wald χ^2 indicates attribute importance, Wald χ^2 (=) indicates attribute difference between classes. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Attribute	Level	Wald χ^2 Sig.		Class independent					
		Wald χ^2	Sig.	Coef	Sig				
Financial capital	€ 0 for free	88,64	***	-0.05	***				
	€ 0 for 6% equity			-0.17	***				
	€ 0 for 15% equity			-0.14	***				
	€ 10,000 as grant/subsidy			0.10	***				
	€ 10,000 as loan			0.07	***				
	€ 10,000 for 6% equity			0.16	***				
	€ 10,000 for 15% equity			-0.05	***				
	€ 25,000 as grant/subsidy			0.08	***				
	€ 25,000 as loan			-0.24	***				
	€ 25,000 for 6% equity			-0.06	***				
€ 25,000 for 15% equity	0.00								
€ 100,000 as grant/subsidy	0.18	***							
€ 100,000 as loan	0.01								
€ 100,000 for 6% equity	0.07	***							
€ 100,000 for 15% equity	0.05	***							
Physical capital	No access	91,60	***	Wald χ^2 (=) Sig.					
	Paid access			91.05	***				
	Free access			Class 1		Class 2		Class 3	
				Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
	-0.04	***	-0.09	***	-0.02	***			
	-0.04	***	0.11	***	-0.17	***			
	0.08	***	-0.02	*	0.19	***			

Attribute	Level	Wald χ^2 Sig.	Wald χ^2 (=) Sig.	Class 1		Class 2		Class 3	
				Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
Knowledge	None	92.07 ***	89.04 ***	-0.02**		0.17***		-0.02***	
	Coaching only			-0.05***		0.17***		-0.08***	
	Training only			0.02***		0.00		-0.04***	
	Training & coaching			0.05***		-0.34***		0.14***	
Social capital	No strong network	84.41 ***	80.99 ***	-0.12***		0.17***		-0.14***	
	Strong external network only			0.05***		0.04***		-0.04***	
	Strong internal network only			0.00		-0.11***		-0.01	
	Strong internal & external network			0.06***		-0.11***		0.19***	
Legitimacy	No track record yet	90.46 ***	74.41 ***	-0.01		0.09***		0.07***	
	Bad			-0.17***		-0.09***		-0.34***	
	Neutral			0.05***		0.08***		0.10***	
	Good			0.13***		-0.08***		0.17***	
Incubator affiliation	None: independent, privately owned	91.41 ***	90.59 ***	0.11***		-0.15***		0.05***	
	Start-up investor			0.00		0.09***		-0.18***	
	Local university			-0.11***		0.10***		-0.05***	
	Multinational company active across global markets			0.03***		-0.08***		0.25***	
	Internationally renowned university			-0.04***		0.08***		-0.01	
	Regional government			0.01*		-0.04*		-0.06***	
Industry focus	Focus on your industry	81.13 ***	78.10 ***	-0.03***		0.09***		0.03***	
	Broad range of industries			0.03***		-0.09***		-0.03***	
ASC	Left	90.96 ***	90.95 ***	0.02***		0.19***		-0.05***	
	Right			-0.02***		-0.19***		0.05***	

McFadden R²: 0.28; Number of parameters: 72; Log Likelihood (LL): -4697; BIC (based on LL): 9887

6.4.2 Class 1: technology driven funding seekers (n = 347)

Of all classes, entrepreneurs in class 1 attach the highest relative importance to funding (see table 6.4). The incubator's track record is the second most important attribute. Class 1 entrepreneurs prefer an incubator with a neutral or a good track record and have a strong aversion against incubators with a negative track record. Being associated with an incubator that has a good track record could further help in convincing other stakeholders, such as investors, to commit resources. The incubator's affiliation is the third most important. Closer inspection of table 6.3 reveals that the importance of this attribute is due to entrepreneurs' preference for an incubator that is either independent or affiliated with a multinational. Class 1 entrepreneurs prefer incubators that provide both training & coaching, that have strong internal and external networks and that focus on supporting start-ups in a broad range of industries. However, class 1 entrepreneurs attach relatively little importance to these attributes.

The co-variates as shown in table 6.5 help to explain the preferences of these entrepreneurs. The importance of funding may be because class 1 entrepreneurs are poor on cash: they are less likely to have raised more than \$ 50,000 in funding. Further, class 1 entrepreneurs are more likely to have applied for a patent: such high-tech start-ups require relatively high amounts of financial capital. High-tech start-ups, in particular, suffer from a lack of legitimacy (Carpenter and Petersen, 2002), which may explain why the incubator's track record is of particular importance to this group of entrepreneurs. The high-tech nature of class 1 entrepreneurs may be surprising given that these entrepreneurs are less likely to choose an incubator that is affiliated with (a local or internationally renowned) university. The finding that these start-ups are more likely to have already applied for a patent could mean that class 1 start-ups have sufficient technological capabilities to develop their technology in-house without the help of external actors. This explanation is in line with class 1 entrepreneurs' preference for an incubator associated with a multinational, as entrepreneurs may want to use the multinational's distribution channels to bring the product to the market.

6.4.2 Class 2: individualists (n = 220)

Typical for entrepreneurs in this class is that they display a negative preference towards the incubator's training, coaching and networks. Table 6.4 indicates that, next to funding, these two attributes play an important role in determining the choice of these entrepreneurs. However, table 6.3 shows that incubators with strong internal and external networks, and incubators that provide both training

and coaching, are *less* likely to be chosen. It seems that this class is skeptic about the added value of training, coaching and networking, and, instead, wants to focus on developing their business with minimum intervention from the incubator. Class 2 entrepreneurs prefer an incubator that is affiliated with an investor or a (local or internationally renowned) university.

Table 6.5 shows that class 2 entrepreneurs have less industry experience. This is surprising, as this suggests that class 2 entrepreneurs have less knowledge and networks, and that coaching, training and networks could be particularly valuable. Table 6.5 also shows that class 2 entrepreneurs are more likely to be currently supported by an incubator. It could be that class 2 entrepreneurs are dissatisfied by the training, coaching and networking they currently receive from their incubator. Or, given the support these entrepreneurs currently receive from their incubator, class 2 entrepreneurs may feel that additional training, coaching and networks is superfluous.

The preference of class 2 entrepreneurs for a university could indicate that these entrepreneurs are more likely to operate in high-tech industries. Table 6.5 does not support this, as class 2 start-ups are less likely to have applied for a patent.

6.4.3 Class 3: Balanced decision makers (n = 368)

Class 3 entrepreneurs attach the most importance to the incubator's track record, followed by its affiliation and funding. Although these are the most important attributes, table 6.4 indicates that class 3 entrepreneurs do not base their decision on primarily one or two attributes. Rather, they make a more balanced decision. All attributes rank quite similarly, especially when compared to the other two classes. Even the incubator's physical capital, which is often depicted in the literature as a commodity resource (Hackett and Dilts, 2004a), is important in the decision of

Table 6.4 Relative importance of attributes for each class

Attribute	1	2	3	Total
Financial capital	0.29	0.17	0.17	0.63
Physical capital	0.09	0.08	0.15	0.32
Knowledge	0.07	0.21	0.09	0.37
Social capital	0.13	0.12	0.13	0.38
Legitimacy	0.21	0.08	0.21	0.50
Incubator affiliation	0.15	0.11	0.17	0.43
Industry focus	0.04	0.07	0.03	0.14
ASC	0.03	0.16	0.04	0.23
Total	1.00	1.00	1.00	3.00

Table 6.5 Multinomial logit model. a $p < 0.01$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Start-up characteristic	Wald χ^2 Sig.	Category	β class 1 Sig.	β class 2 Sig.	β class 3 Sig.
Incubator experience	11.71 a	not familiar	0.05	-0.15	0.09
		familiar, not incubated	-0.09	-0.14	0.23 **
		currently incubated	-0.04	0.28 *	-0.24 *
Raised > 50,000 (yes / no)	7.21 *	incubated in the past	0.08	0.01	-0.08
		Yes	-0.32 **	0.16	0.16
Applied for patent (yes / no)	6.11 *	Yes	0.30 *	-0.23	-0.07
Paying salaries	6.95	None	-0.11	-0.10	0.20 *
		For 0 to 6 months	0.01	0.05	-0.07
		For 6 to 12 months	0.04	0.06	-0.10
		For 1 to 2 years	0.05	-0.01	-0.04
Entrepr. experience (yes / no)	0.35	Yes	0.08	-0.01	-0.07
Industry experience (years)	5.01 a	Europe	0.01	-0.02 *	0.01
		North America / Europe	-0.08	0.05	0.03
Sex (male / female)	1.85	Female	0.14	-0.02	-0.13
		Male	-0.01	0.01	0.00
University education (yes / no)	1.75	Yes	-0.12	-0.01	0.13
Industry dummies	70.20				

McFadden R^2 : 0.08; Number of parameters: 90; Log-likelihood (LL): -930.22; BIC (based on LL): 2476

these entrepreneurs. The one exception is the incubator's industry focus. Class 3 entrepreneurs prefer an incubator focusing on their specific industry, but, similar to the other two classes, industry focus only plays a very small role in their decision.

Class 3 entrepreneurs have a strong preference for an incubator affiliated with a multinational company active across global markets. This is in line with the importance that these entrepreneurs attach to the incubator's track record. As an established, large organization, a multinational company is a particularly legitimate entity. Incubators can gain legitimacy by associating themselves with such a reputable organization, which in turn also benefits the legitimacy of the start-ups that are associated with the incubator. Compared to the other classes, entrepreneurs in class 3 attach the most importance to the incubator's training, coaching and networks. They prefer incubators providing both training and coaching, as well as those with both strong internal and external networks. Still, these two attributes are only the fifth and sixth most important, respectively, which means that they do not play a very large role in the decision making of these entrepreneurs.

Table 6.5 indicates that class 3 entrepreneurs are more likely not to have paid any salaries, which could indicate that this class is in an early phase of development. Such start-ups are particularly resource poor (Stinchcombe, 1965; Vohora et al., 2004), which may explain why class 3 entrepreneurs prefer incubators that provide a broad range of resources. Table 6.5 also shows that class 3 entrepreneurs are less likely to be currently incubated, although they are familiar with the concept.

6.5 DISCUSSION AND CONCLUSION

This study explored how the attributes of an incubator influence incubator choice by different latent classes of entrepreneurs. We identified three latent classes with distinct choice profiles: (1) 'technology driven funding seekers', who base their choice primarily on the funding provided by the incubator, (2) 'individualists', who have an aversion against networking, training and coaching, and (3) 'balanced decision makers', who consider all of the incubator's attributes when making a decision. We now discuss the two major conclusions from our results and their implications for incubator scholars and practitioners.

First, the most important attributes based on which entrepreneurs prefer an incubator over another are funding, track record and affiliation. In contrast, the incubator's industry focus, training, coaching and networks were seen as unimportant. Entrepreneurs in class 2 even displayed a *negative* preference for incubators providing networking, training and coaching.

This finding stands in sharp contrast with the extant literature. Funding and track record are rarely mentioned as important attributes that attract entrepreneurs. Rather, there is a broad consensus in the literature that the value of incubation lies primarily in the incubator's knowledge and networks (Bruneel et al., 2012; Hansen et al., 2000). Consequently, entrepreneurs are said to be attracted to the incubator's specific services and expertise (Barbero et al., 2012; Vanderstraeten and Matthyssens, 2012) or to the strength of its internal and external networks (Hansen et al., 2000; Isabelle, 2013). The incubator's industry focus is also seen as an important attribute (Schwartz and Hornych, 2008; Vanderstraeten and Matthyssens, 2012), but is not important for the entrepreneurs in our study.

At the same time, our results should not come as a surprise. Other studies have indicated that entrepreneurs' willingness to participate in networking, training and coaching is low (see e.g. Patton and Marlow, 2011; Patton, 2014; Totterman and Sten, 2005; Warren et al., 2009). The literature provides two explanations. First, the quality of these services may be low. Mentors may lack experience (Lalkaka, 2001), training programs may be unable to meet the specific needs of start-ups (Ratinho and Henriques, 2010), and the incubator's networks may be underdeveloped (Totterman and Sten, 2005). As a result, entrepreneurs are not willing to participate in these activities. Second, entrepreneurs may be unaware of the importance of these services. The inexperienced entrepreneurs in incubators have a 'technology push' view of innovation (Oakey, 2003) in which they prioritize technological development over business development. Although they lack business knowledge, they are not aware of the importance of further developing this knowledge. They therefore do not recognize the value of the incubator's training, coaching or networking as a means to develop business knowledge (Patton, 2014). Further, building networks and knowledge takes time; entrepreneurs may prioritize activities that result in immediate value (Van Weele et al., 2013).

Whichever of these two explanation may apply to the entrepreneurs in our sample, positioning in terms of services, networks and industry focus, as is often advised in extant literature, will likely not be a successful strategy for incubators.

Second, while the aforementioned results display consistency among entrepreneurs' preferences for a particular incubator, our results also confirm that there is indeed heterogeneity in these preferences.

Entrepreneurs are primarily heterogeneous in their preferences for the incubator's affiliation: class 1 entrepreneurs prefer an independent incubator, class 2 prefers incubators affiliated with either a university or investor, and class 3 prefers incubators affiliated with a multinational company. This presents an opportunity for incubators to differentiate themselves from other incubators, in their country or region. If, for example, there are many university- and investor affiliated incubators

in a particular region, then incubators may choose to partner with a multinational in an effort to attract entrepreneurs. Entrepreneurs also differ in the relative importance that they attach to the attributes. Funding, for example, is an important attribute for all entrepreneurs. For class 1 entrepreneurs, however, funding is particularly decisive in their choice.

Our results also support previously raised arguments that this heterogeneity in preferences is driven by start-ups' technology intensity (Soetanto and Jack, 2013) and development stage (McAdam and McAdam, 2008). At the same time, we note that the explanatory power of the multinomial regression was rather low, which means that such observed characteristics only play a small role in explaining the heterogeneity of entrepreneurs' preferences. Accordingly, unobserved characteristics are indeed important to take into account when exploring the decisions of entrepreneurs.

6.5.1 Theoretical implications

We make two contributions to the incubation literature.

First, we provide new insights on the key factors that influence entrepreneurs' preferences for a particular incubator. We identified the incubator's financial capital and track record as important attributes that have been largely neglected by the extant literature. We also provide empirical support for anecdotal evidence that many entrepreneurs do not perceive the value of the incubator's training, coaching and networking when choosing or joining an incubator.

Second, we present a more nuanced view of heterogeneity in entrepreneurs' preferences. Entrepreneurs display heterogeneity in their preferences for the incubator's affiliation and the importance they attach to the incubator's attributes. However, providing funding and having a solid track record are key attributes for all incubators, regardless of the type of start-up they aim to attract.

6.5.2 Practical implications

Based on our results, we have two recommendations for incubator managers.

First, incubators should be aware that funding, track record and affiliation are the most important attributes based on which entrepreneurs choose an incubator. Incubators can attract entrepreneurs by providing money as a grant or subsidy. If this is not possible, then our results suggest incubators to provide funding in exchange for equity rather than as a loan. Incubators with a good track record should encourage entrepreneurs who have graduated from the incubator to act as role models in promoting the success of the incubator. Incubators should also

realize that their affiliation with a particular organization attracts a particular type of entrepreneur. Depending on the incubator's competitive landscape, it could be worthwhile to engage in collaborations with universities, investors or multinationals.

Second, incubators should realize that there is a class of entrepreneurs who have an aversion towards training, coaching and networking activities. To ensure a fit between their services and the needs of entrepreneurs, incubators are advised to select those entrepreneurs who are willing and able to engage in the incubation process (Patton and Marlow, 2011; Rice, 2002). Class 2 entrepreneurs do not fit that profile. Incubators should thus wonder if they want such entrepreneurs in their incubator.

6.5.2 Limitations

Our study has two important limitations that present an opportunity for future research.

First, a DCE explores an individual's stated preferences, rather than their actual (or 'revealed') preferences. Measuring stated preferences allows to gather data over multiple choices per individual and is therefore particularly valuable when exploring latent classes. It also allows greater freedom in the alternatives, as the researcher is not bound by the characteristics of real world examples. However, exploring stated preference may lead to biased results when hypothetical scenarios do not resemble the real world (Hensher et al., 2005). We tried to avoid this by carefully consulting both the literature and entrepreneurs through interviews to ensure that the alternatives in our experiment were plausible. Still, we encourage efforts that complement our study by exploring entrepreneurs' revealed preferences, for example by exploring the number of applications that incubators receive.

Second, designing a DCE requires making trade-offs between including all important attributes and ensuring that the choice tasks were easy to understand for respondents. We therefore decided to limit ourselves to 7 attributes that emerged both from the literature review and the interviews with entrepreneurs as important in explaining entrepreneurs' choice. Given that our model produced a good pseudo R^2 according to the standards of DCEs (Hensher et al., 2005), we are confident that we included the most important attributes. Still, it is possible that attributes have been omitted from our study. Future research could therefore expand our approach by testing additional attributes that may play a role in entrepreneurs' preferences.

APPENDICES

Appendix 6A. case weights

Country	TEA 2015	Country population	Population total early-stage entrepreneurs	Sample total early-stage entrepreneurs	Case Weight
Austria	8.71	8,623,073	751,070	37	0.280
Canada	13.04	35,851,774	4,675,071	109	0.592
Belgium	5.4	11,267,581	608,449	38	0.221
France	5.34	67,107,000	3,583,514	125	0.395
Germany	5.27	81,197,500	4,279,108	125	0.472
Ireland	6.53	4,635,400	302,692	65	0.064
Netherlands	9.46	16,928,000	1,601,389	67	0.330
Switzerland	7.12	8,279,700	589,515	24	0.339
United Kingdom	10.66	64,800,000	6,907,680	104	0.916
United States of America	13.81	322,210,000	44,497,201	241	2.546

Appendix 6B: selection questions for respondents

1. Are you, alone or with others, currently trying to start a new business? This includes any self-employment or selling of goods or services to others.
 - No **Not included in sample**
 - Yes

2. Would you consider the new business to be a technology - based start-up? *A technology - based start-up is a new firm whose business is based on the exploitation of technological know-how through the creation of new products and services. Examples include the development of a new drug or software service.*
 - No **Not included in sample**
 - Yes

3. In the past 12 months, in which of the following activities have you engaged during the development of your business? *Tick all that apply:*
 - Formally registering the business
 - Preparing a written business plan
 - Organizing a start-up team
 - Devoting yourself full time to the business (more than 35 hours per week)
 - Developing a proof of concept or working prototype
 - Applying for a patent / copyright / trademark
 - Defining market opportunities
 - Hiring employees
 - Asking financial institutions or other people for funds
 - Receiving money from the sales of goods or services
 - Purchasing materials, equipment, facilities, or other tangible goods for the business
 - Discussing the new business' product or service with potential customers
 - None of the above: **Not included in sample**

4. Has the new business paid any salaries, wages, or payments in kind, including your own? *"Payments in kind" refers to goods or services provided as payments for work rather than cash. Payments in kind do not include stock options.*
 - No
 - Yes

5. **If previous question was answered 'Yes':** For how long has the new business been paying salaries, wages or payments in kind, including your own?
 - For 0 to 3 months
 - For 3 to 6 months
 - For 6 to 12 months
 - For 1 to 2 years **Not included in sample**
 - For 3 to 5 years **Not included in sample**
 - For more than 5 years **Not included in sample**

6. Do you, or will you, personally own all, part, or none of this business?
 - All
 - Part
 - None **Not included in sample**

7. Is or will the new business be a subsidiary? *A subsidiary is a venture of which another organization owns more than 50% of voting shares.*
 - No, the new venture is not the subsidiary of another organization
 - Yes, the new venture is a subsidiary of another organization **Not included in sample**

Appendix 6C: example choice task

Attributes	Incubator #1	Incubator #2
1. Incubator affiliation	Local university	Start-up investor
2. Physical resources	No access	Free access
3. Funding	\$ 25,000 as a grant	\$ 100,000 as a loan against commercial rates
4. Training and coaching	Coaching only	Training and coaching
5. Networks	Strong external network only	Strong internal network only
6. Track record	Good	No track record yet
7. Industry focus	Broad range of industries	Focus on your industry
Which incubator would you most likely choose? <i>Please select one of the two incubators</i>	<input type="checkbox"/>	<input type="checkbox"/>

Imagine that you were to choose an incubator to help you establish your business. We ask you to choose between two hypothetical incubators. Each incubator has its own characteristics. You can find the table to help you understand these characteristics and their respective levels [here](#). Characteristics that are not mentioned, do not vary across incubators.





Chapter 7

Network brokers or hit makers? Analyzing the influence of incubation on start-up investments

This chapter is based on: Van Rijnsoever F., van Weele M., Eveleens C. Network brokers or hit makers? Analyzing the influence of incubation on start-up investments. Submitted to International Entrepreneurship and Management Journal.

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The PhD candidate was the main contributor in collecting the data and contributed to designing the study and writing this chapter.

ABSTRACT

Incubators are a prominent way to support technology based start-ups. Yet, it remains unclear to what extent these incubators enhance start-up performance, nor is it known through which mechanisms this would occur. In this chapter we test two mechanisms to explain the relationship between incubation and the amount of investments raised by early stage start-ups as performance measure. The 'hit maker' mechanism refers to beneficial effects of the direct transfer of resources and organizational or business knowledge from the incubator to the start-up. The 'network broker' mechanism refers to the benefits that start-ups enjoy from being connected to external funding sources through the incubator's networks. We test which of these mechanisms contribute to the performance of early stage start-ups. Our data comes from a unique survey from 935 entrepreneurs with early-stage technology based start-ups in Western Europe and North America. We find that incubators have a positive effect on (1) the amount of funding that start-ups attract and (2) the ability of start-ups to attract funding from formal investors and banks. Moreover, our results provide evidence for the network broker mechanism, but not for the hit maker mechanism.

7.1 INTRODUCTION

Incubators are one of the most prominent means to support early-stage technology based start-ups (Ahmad and Ingle, 2013; Bergek and Norrman, 2008; Oakey, 2012). Incubators aim to facilitate the survival and growth of these start-ups by providing them with a comprehensive range of services, such as shared office space, specialized knowledge and a network of clients and investors (Bergek and Norrman, 2008; Hackett and Dilts, 2004a). Still, it remains unclear whether these potential benefits also translate into greater start-up performance. Whereas some studies suggest that incubators have a positive impact on the performance of start-ups (Stokan et al., 2015) others have found the incubator's impact to be nonexistent (Tamásy, 2007; Westhead and Storey, 1994) or even negative (Schwartz, 2013). These contradicting findings have been ascribed to several challenges associated with measuring the performance of incubators, which include limited availability of data (see e.g. Barbero et al., 2012; Colombo and Delmastro, 2002; Schwartz, 2013; Stokan et al., 2015), inconsistent use of performance measures (Bergek and Norrman, 2008; Hackett and Dilts, 2004a; Schwartz, 2013), and sample selection biases (Aerts et al., 2007; Schwartz, 2009).

A more fundamental challenge is to identify the theoretical mechanisms through which incubators contribute to the success (or failure) of start-ups. Measuring the incubator's impact on start-up performance has little value if studies are not able to explain *how* incubators make such an impact (Ahmad, 2014; Hackett and Dilts, 2004a). The literature identifies two distinct theoretical mechanisms that explain the incubator's impact on start-up performance: direct support and networking (Amezcuca et al., 2013; Bergek and Norrman, 2008; Patton, 2014). Direct support refers to the direct transfer of resources and organizational or business knowledge from the incubator to the start-up. The resources allow start-ups to focus on the development of their business (Patton and Marlow, 2011). The business and organizational knowledge enables start-ups to develop stronger, more convincing business propositions (Patton, 2014; Rice, 2002). This can be done with help of experienced incubator managers, coaches, pitching training sessions and workshops. By using these support services, incubators can directly improve start-up performance, and can thus be seen as "hit makers".

The networking mechanism refers to the activities of incubators to improve a start-up's network, for example by providing referrals or organizing networking events (Bøllingtoft and Ulhøi, 2005; Collinson and Gregson, 2003; Warren et al., 2009). Through these services start-ups are more visible, more aligned and better connected to important actors external to the incubator, such as investors or banks (Bøllingtoft and Ulhøi, 2005; Hansen et al., 2000). The affiliation with

an established, reputable incubator also contributes to the legitimacy of start-ups, which further helps start-ups to convince investors (Bøllingtoft and Ulhøi, 2005; Rao et al., 2008). Accordingly, the social capital engendered in the incubator's networks can help start-ups to gain access to resources that in turn helps to improve performance (Davidsson and Honig, 2003). The incubator thus primarily serves as a "network broker".

In this chapter we study which of these two mechanisms contribute to the performance of early stage technology based start-ups. Our data comes from a unique survey from 935 entrepreneurs with early stage technology based start-ups in Western Europe and North America. We measure performance as the amount of investments raised by the start-up, as it has a high signaling value for future performance (De Clercq et al., 2006; Rothaermel and Thursby, 2005; Vohora et al., 2004). By studying the combined interaction effect between incubation and the use of different funding sources, we explore if the two mechanisms explains start-up performance. We find that incubators have a positive effect on (1) the amount of funding that start-ups attract and (2) the ability of start-ups to attract funding from formal investors and banks. In addition, our results provide evidence for the presence of a network broker mechanism, but not for the hit maker mechanism. Incubators may use these insights to better understand how they have a positive effect on the performance of start-ups.

7.2 DATA AND METHODS

Assessing the influence of incubation on the performance of start-ups is associated with a number of methodological challenges. First, there is a lack of comparable data on incubators and the performance of their portfolio start-ups. The start-ups that are supported by incubators often do not need to report any financial statements, individual incubators use various performance measures, and they often do not publicly disclose their metrics (Bergek and Norrman, 2008; Hackett and Dilts, 2004a; Schwartz, 2013). Second, start-ups are screened prior to being admitted into the incubator (Aerts et al., 2007). This makes it difficult to disentangle the incubator's contribution from its selection mechanism. Third, many datasets focus on one specific region or country, which makes it difficult to generalize the findings to the incubator population in general (see e.g. Barbero et al., 2012; Colombo and Delmastro, 2002; Schwartz, 2013; Stokan et al., 2015).

To alleviate these problems, we rely on data from an international survey among entrepreneurs. This allows us to measure start-up performance and the necessary control variables directly across different countries. A possible weakness of this

Table 7.1 Descriptive statistics of investment size

Item	Total investments	Response
How much money did your business raise (in total, including your own investment)?	Less than €1,000/ Less than \$1,000/ Less than £749/ Less than CHF1,000	41 (4.4%)
	€1,000 - €9,999/ \$1,000 - \$9,999/ £750 - £7,499/ CHF 1,000 - CHF 9,999	95 (10.1%)
	€10,000 - €49,999/ \$10,000 - \$49,999/ £7,500 - £34,999/ CHF 10,000 - CHF 49,999	172 (18.4%)
	€50,000 - €99,000/ \$50,000 - \$99,000/ £35,000 - £74,999/ CHF 50,000 - CHF 99,000	194 (20.8%)
	€100,000 - €249,999/ \$100,000 - \$249,999/ £75,000 - £199,999/ CHF 100,000 - CHF 249,999	209 (22.3%)
	€250,000 - €499,999/ \$250,000 - \$499,999/ £200,000 - £349,999/ CHF 250,000 - CHF 499,999	120 (12.8%)
	More than €500,000/ More than \$500,000/ More than £350,000 More than CHF 500,000	47 (5.0%)
	No answer	58 (6.2%)

approach is that the data is self-reported. Therefore, we base the measurement in our questionnaire as much as possible on scales that have been successfully used in previous studies, such as the Global Entrepreneurship Monitor (Global Entrepreneurship Monitor, 2015), and the Panel Study on Entrepreneurial Dynamics (Davidsson, 2008). A second problem with survey data is that it is problematic to distinguish between cause and effect (Campbell and Stanley, 1966). Investments can be raised prior, during and after incubation. However, the more investments a start-up raises, the less need it has to be incubated. We argue below how we use this insight to build a model in which the relationship between incubation and investments is plausibly causal.

7.2.1 Data collection

We collected data among 935 early-stage technology-based entrepreneurs. Data were collected via an online business-to-business panel of a large European marketing agency. A major challenge for any study that tries to collect data among founders of start-ups is that the 'incidence rate' is very low when relying on random sampling (Davidsson, 2008). For the countries that we were targeting, the 'Total Early Stage Entrepreneurial Activity' (TEA), which measures the percentage of the adult population that are either a nascent entrepreneur or owner-manager of a new business (Global Entrepreneurship Monitor, 2015), is only between 5 and 13 percent. Of these entrepreneurs, only a fraction is starting a technology-based start-up (Davidsson, 2008). Therefore, we relied on quota sampling, with quota set by country. Moreover, given that founders of start-ups are more likely to be highly

educated (Wadhwa et al., 2008), we chose to direct our sample towards higher educated individuals.

Respondents had to meet three criteria to participate in the questionnaire. First, respondents had to be actively starting a business which they would wholly or partially own. Second, respondents had to be starting a technology-based start-up, which was defined as a new firm whose business is based on the exploitation of technological know-how through the creation of new products and services (Bergek and Norrman, 2015; Trimi and Berbegal-Mirabent, 2012). Third, to weed out mature companies. Respondents were screened out if their business had been paying salaries for more than two years. Appendix A shows in detail the criteria we used to include respondents in our sample. The selection of sectors was made according to the Eurostat classification based on NACE codes (Eurostat, 2009), see Appendix B. Respondents were surveyed in Western Europe and North America. We selected these areas because they have a high concentration of both technology based start-ups and incubators (Aerts et al., 2007; WEF, 2015). To increase the representativeness of our sample, we weighed cases from each country in accordance to the country's TEA in relation to its population. Appendix C shows the number of respondents and case weights per country. Although the United States had the largest number of respondents, the country was still underrepresented in our sample. Ireland was most overrepresented. The case weights correct for these differences.

The average age of the respondents ranged between 20 and 69 years (weighted mean=37.72; SD=8.74); a large majority (74.9%) was male, and 70.7% had a university degree. These descriptive statistics are in line with previous studies on technology based start-ups (Wadhwa et al., 2008). Respondents received a small monetary reward for their participation.

7.2.2 Measurement

We first discuss the dependent variables: investment size (amount of investments) and funding sources. We then discuss incubation as our main independent variable. We then discuss our control variables based on the criterion that these should be related to both the dependent and independent variables

Investment size

We use investment size as performance measure since early stage start-ups often require substantial amounts of funding to finance costly research and development prior to making sales (Westhead and Storey, 1997). Raising funds from external stakeholders is considered to be an important milestone in the start-up's develop-

ment, as it is a signal of viability (De Clercq et al., 2006; Rothaermel and Thursby, 2005; Vohora et al., 2004). Consequently, the amount of investment raised is a commonly used measure in studies that explore the performance of technology based start-ups (see e.g. Batjargal, 2007; Shane and Stuart, 2002) or incubators (see e.g. Hoffman and Radojevich-kelley, 2012; Rothaermel and Thursby, 2005).

We asked how much money entrepreneurs' start-ups had raised, including the investments of the entrepreneur. Respondents could answer on a seven point scale that ranged from "less than \$1000" to "more than \$500,000". The scale was adjusted to the currency in the respondent's country of origin (Euro, US Dollar, Pound Sterling or Swiss Franc). The exact numbers are based on the currency exchange rates and rounded to an interpretable number. Table 2 provides the exact levels of the investment size variable and its descriptive statistics.

As mentioned above, causality is a major challenge for determining the influence of incubation on attracting investments as both processes can occur simultaneously. The process of raising investments can also continue post-incubation. However, given that incubators tailor their support towards early stage start-ups that have typically attracted no or only small amounts of investment (Aernoudt, 2004; Bergék and Norrman, 2008; Pauwels et al., 2015), it is unlikely that a start-up goes into an incubator after having raised a large amount of investments. Therefore, we created a 'large investment size' variable that only captures the investments worth more than \$100,000. All investments smaller than this number were coded as '0', the remaining values were unchanged. We thereby assume \$100,000 to be a reasonable cutoff value for the early stage start-ups in our sample. However, our results also hold for the cutoff value at \$200,000.

Funding sources

Start-up investments can be raised from several sources (Cassar, 2004). Incubators often encourage start-ups to attract venture capital from investors, as these are more likely to invest in high risk ventures like start-ups, and can offer valuable advice (De Clercq et al., 2006). Consequently, investors ask for high returns on their investment, and often demand shares of the company or some form of control (Hellmann, 1998). Possible alternative funding sources are government subsidies, which are usually focused on R&D (van Rijnsoever et al., 2014). Examples are the European Framework Programs and the Small Business and Innovation Research program in the United States. A third source of funding are banks. These provide loans, and are often risk averse and prefer physical assets to secure the loan in case of bankruptcy (Hall, 2002). Fourth, crowd funding is "an initiative undertaken to raise money for a new project proposed by someone, by collecting small to medium-size investments from several other people" (Ordanini et al., 2011,

p.444). Two more informal funding sources are “friends, family and fools” (Kotha and George, 2012), or own investments. We asked respondents which sources their start-up had used to raise funds (% of respondents answering ‘yes’ between brackets): Investor (23.6%), Government subsidy (11.2%), Bank loan (39.9%), Crowdfunding (13.1%), Friends & Family (38.1%), Own investment (47.0%).

Incubation

Incubation is our main independent variable. Some authors make an explicit distinction between accelerators and incubators (see e.g. Cohen and Hochberg, 2014; NESTA, 2011). They do so because they see incubators as providers of office space and basic services, and accelerators as focusing on intangible services (e.g. mentoring, networking). However, modern incubators are not merely providers of shared office space, but organizations that provide a comprehensive range of support services (Aernoudt, 2004; Bergek and Norrman, 2008; Bruneel et al., 2012). These services include those that are also provided by accelerators, such as mentoring and networking. Further, there is great diversity among the models and definitions of both incubators (Aernoudt, 2004; Bergek and Norrman, 2008; Bruneel et al., 2012) and accelerators (see e.g. Brown and Mawson, 2015; Pauwels et al., 2015). ‘Incubators’ and ‘accelerators’ are both seen as ‘umbrella terms’ (Aernoudt, 2004 p. 127; Pauwels et al., 2015 p. 1) that largely overlap (Stam and Bosma, 2015). As, in practice, accelerators and modern incubators can be very similar we do not make an explicit distinction.

We asked respondents whether they were familiar with the concept of ‘incubators’ and / or ‘accelerators’ prior to participating in this study, and if they currently are, or have been part of such a program. Based on this we constructed a nominal incubation variable with four levels: 1) not familiar with incubators or accelerators (43.8%), 2) familiar with incubators or accelerators, but never been part of a program (31.9%), 3) currently part of an incubator or acceleration program (15.1%), and 4) has been part of an incubator or acceleration program in the past (9.2%).

Team size

Larger teams of entrepreneurs may have more time to dedicate to the start-up, may have more technical and business experience and a larger network. Having more team members also increases the team’s ability to generate and develop ideas (Ruef, 2002). Larger start-up teams may thus establish more successful businesses than single founders or smaller teams (Chandler and Hanks, 1994; Roberts, 1991), and, consequently, raise more money. Larger teams also have more ‘mouths to feed’, which further increases the need to raise external investments (Klepper, 2001). We also expect a relationship between team size and incubation. The start-up team is

an important selection criterion for incubators (Aerts et al., 2007; Bergek and Norrman, 2008; Pauwels et al., 2015) and incubators pay close attention to the team's size. Incubators are typically hesitant to take on start-ups with single founders, but also have an aversion against teams that are too large (NESTA, 2014; Pauwels et al., 2015), due to the difficulties associated with managing a large start-up team (Curral et al., 2001). Team size was measured as the number of people in the business' founding team. The mean was 3.65 people with an SD of 2.41.

Start-up maturity

Start-ups grow and mature over time. This is commonly measured by gestation activities that entrepreneurs engage in while establishing a business (Dombrovsky et al., 2011; Liao and Welsch, 2008). These activities can take place prior, during and after incubation. Incubators typically support start-ups in early phases (Bergek and Norrman, 2008), but incubators often do expect a minimum level of maturity prior to being admitted. Start-ups that are more developed can also be expected to be more active in seeking funds and to need more investments. Liao and Welsch (2008) identified 26 gestation activities. To avoid respondent fatigue, we asked in which of the following 12 activities the start-up engaged in during the last 12 months: 1) Formally registering the business, 2) Preparing a written business plan, 3) Organizing a start-up team, 4) Devoting themselves full time to the business (more than 35 hours per week), 5) Developing a proof of concept or working prototype, 6) Applying for a patent / copyright / trademark, 7) Defining market opportunities, 8) Hiring employees, 9) Asking financial institutions or other people for funds, 10) Receiving money from the sales of goods or services, 11) Purchasing materials, equipment, facilities, or other tangible goods for the business, 12) Discussing the new business' product or service with potential customers. The total number of activities was used as this variable. The mean was 4.35 activities with an SD of 3.00.

Industry experience

Entrepreneurs with more experience in the industry of their start-up are more likely to have access to resources, technical and business experience, have a larger network, and more credibility (Bosma et al., 2004; Cooper et al., 1994). Start-ups founded by entrepreneurs with extensive industry experience may be more attractive to incubators, and these start-ups may be more successful in raising funding. This variable was measured as the number of years the respondent had worked in the start-up's primary industry (Mitchell and Shepherd, 2010). The mean was 8.97 years with an SD of 6.90.

Entrepreneurial experience

Entrepreneurs who have founded a start-up before likely have more business experience and a larger network than start-up founders with no entrepreneurial experience (Colombo and Grilli, 2005; Dahlqvist et al., 2000). Entrepreneurs in incubators tend to be first-time entrepreneurs (Patton, 2014; Rice, 2002), as experienced entrepreneurs have less need of the incubator's services. Experienced entrepreneurs may also be more successful in raising funding. This variable was measured as the total number of businesses in which the respondent was directly involved during the start-up phase. The mean was 0.23 start-ups with an SD of 0.71.

Age

During the course of a career, people have the opportunity to increase income and save up money. Consequently, older people have more money available than younger people, which they can use to invest in their own business. This reduces the initial need for seeking investments. Younger entrepreneurs likely have less resources, business experience and a smaller business network. This might motivate them to join an incubator more than older entrepreneurs. For this reason, we include age as control variable.

Gender

Gender and entrepreneurship is a heavily studied topic (Poggesi et al., 2015). Technology based entrepreneurship and incubators can be seen as 'masculine' environments in which women are more likely at a disadvantage (Marlow and Mcadam, 2015; Marlow and McAdam, 2012). This is partly expressed by the use of investments as performance measure. Attracting investment is typically more difficult for women entrepreneurs, as investors tend to be biased towards funding males (Poggesi et al., 2015).

Sector and country

As financial demands, regulations, start-up support by incubators and entry requirements vary by sector (Malerba, 2002), we coded a dummy for each sector. Regulations, finance opportunities, required investment sizes and start-up support also vary per country (Ács et al., 2014; Singer et al., 2015), so we coded dummies for countries as well. See appendix B and C for the descriptive statistics.

7.2.3 Analysis

We fitted a series of ordinal and binary logit models. In the ordinal logit models we used investment size and large investment size as dependent variables. In the first step we only entered the control variables. In the second step we added the four level incubation variable and the funding sources as independent variables. In the third step we added interaction effects between the incubation variable and the use of funding sources. The third step tests whether incubated entrepreneurs tend to raise more funding from a particular source than non-incubated entrepreneurs. In the binary logit models we used the six types of funding sources as dependent variables. In the first step we entered the control variables, in the second step we added the incubation variable to the model. For all models, we used a chi-square test to assess whether each step improved the model. As model performance indicator we report the pseudo R^2 by McFadden (1974). Appendix D presents the full correlation matrix.

To test if incubators are network brokers, hit makers or both, we applied the following reasoning. If incubation has a positive relationship with specific funding sources and these funding sources contribute to investment size, then this is evidence that incubators support start-ups to gain funding from these sources. This would mean that incubators serve as network brokers. However, this does not mean that incubated entrepreneurs gain more funding from a source than a non-incubated entrepreneur, who uses the same source. If the interaction effect between incubation and specific funding sources is positively significant, this means that incubated entrepreneurs gain more funding from a source than non-incubated entrepreneurs. This would imply that incubators are hit makers.

7.3 RESULTS

Table 4 presents the results of the ordinal logit models predicting investment size and large investment size. The McFadden R-squares range between 0.1 and 0.18, which are reasonable model fits. The addition of the incubation and the funding source variables leads to a significant model improvement, as do the interaction effects.

The models for investment size and large investment size are very similar. Step two reveals that in both instances, being part of an incubator, or having been part of an incubator, has a positive effect on the size of investments. The second step also shows that the size of the investments is primarily positively associated with bank loans and investments, and negatively associated with friends & family. The

interactions in step three between incubation and bank loans or investors are not significant. This means that incubated entrepreneurs do not get more funding from these sources than non-incubated entrepreneurs who use the same sources. Having been part of an incubator in combination with crowdfunding is associated with more investments and more large investments, while currently being part of an incubator in combination with crowdfunding is only associated with more investments.⁷ It is worth noting that having been part of an incubator combined with using friends & family or own investments is associated with lower investments. Being familiar with an incubator, but not being a part of one, in combination with using government subsidies, investments from friends & family and own investments leads to more investments. Finally, the control variables show that team size, start-up maturity and industry experience are all positively related to investment size, while entrepreneurial experience, age and gender are not significant.

Table 5 presents the results of binary logit models predicting use of funding sources. The McFadden R²'s range between 0.11 and 0.24, indicating reasonable to good model fits. The addition of the incubation variable significantly improves models fits for all funding sources, except for government subsidies.

Compared to the reference category (not familiar with incubators and never been part of an incubator), entrepreneurs who are familiar with an incubator program, but who are not part of an incubator, are least likely to make use of bank loans. There are no significant differences between the other categories of incubation and making use of bank loans, nor are there any effects for crowdfunding. However, entrepreneurs who are or have been part of an incubator are more likely to use investors than those who were not part of an incubator. Friends & family are less used by entrepreneurs who were part of an incubator, while entrepreneurs who are familiar with incubators, but not a part, are more likely to use their own investments.

Noteworthy is that larger teams use more of all funding sources, except crowdfunding (no effect), and own investments (negative effect). Start-up maturity is positively related to all funding sources, except for friends & family. Industry experience is positively related to loans only, while entrepreneurial experience has small negative effects on using government subsidies and investors. Younger entrepreneurs are more likely to seek loans and crowdfunding for their business. As expected, older entrepreneurs make more use of their own investments. Finally, women entrepreneurs are less likely to use crowdfunding than their male counterparts.

⁷ Being part of an incubator in combination with crowdfunding is positively associated with investments at the 10% level.

Table 7.4 Results ordinal logit models predicting investment size and large investment size. Sector and country are added as fixed effect dummies, but not shown here for reasons of space

	Investment size			Large investment size		
	Step 1	Step 2	Step 3	Step 1	Step 2	Step 3
Incubation		ref.	ref.		ref.	ref.
Not familiar, never been part		-0.01	-0.91**		0	-1.27**
Familiar, but never been part		0.60**	0.27		0.63**	-0.31
Currently part		0.69**	1.83***		0.71*	1.32*
Have been part		-0.03	-0.22		0.01	-0.50
Funding sources						
Subsidy		0.60***	0.43*		0.32*	-0.08
Loan		0.05	-0.20		0.01	-0.52
Crowdfunding		0.90***	0.87**		0.82***	0.70*
Investor		-0.31*	-0.48*		-0.51**	-0.90**
Friends & Family		0.05	-0.15		0.04	-0.29
Own Investment		0.24***	0.21***		0.19***	0.18***
Control variables						
Team size		0.10***	0.09***		0.08**	0.12***
Start-up maturity		0.05***	0.05***		0.04**	0.04**
Industry experience		0.04	-0.04		0.03	-0.03
Entrepreneurial experience		-0.02*	-0.02		-0.01	-0.01
Age		-0.13	-0.18		0.14	0.19
Gender (Female)						
Never been part * subsidy			0.74			0.66*
Currently part * subsidy			0.00			-1.00
Have been part * subsidy			-0.43			-1.30
Never been part * loan			0.16			0.74
Currently part * loan			-0.02			-0.21

	Investment size			Large investment size		
	Step 1	Step 2	Step 3	Step 1	Step 2	Step 3
Have been part * loan			0.07			-0.43
Never been part * crowdfunding			0.20			0.16
Currently part * crowdfunding			0.97			-0.02*
Have been part * crowdfunding			1.57*			0.07*
Never been part * investor			0.44			0.20
Currently part * investor			-0.05			0.97
Have been part * investor			-0.50			1.57
Never been part * friends & family			0.74*			0.44*
Currently part * friends & family			-0.05			-0.05
Have been part * friends & family			-1.25*			-0.50
Never been part * own investment			0.62			0.74
Currently part * own investment			0.76			-0.05*
Have been part * own investment			-1.54**			-1.25*
Model performance	-1421.84	-1379.34	-1354.35	-835.32	-806.03	-781.48
Log Likelihood						
Additional df		6	18		6	18
McFadden R2	0.10	0.13	0.14	0.12	0.16	0.18

Control variables	Investor			Friends & family			Own investment		
Team size	0.13***	0.10*	0.13***	0.15***	-0.14***	-0.12***			
Start-up maturity	0.17***	0.16***	0.04	0.05	0.21***	0.21***			
Industry experience	0.01	0.01	0.01	0.01	0.00	-0.01			
Entrepreneurial experience	-0.32*	-0.36*	-0.04	-0.01	-0.03	-0.07			
Age	-0.02	-0.02	-0.01	-0.01	0.03*	0.02*			
Gender (Female)	-0.25	-0.21	-0.04	-0.05	-0.28	-0.32			
Log Likelihood	-1749.71	-1716.58	-2291.52	-2274.74	-2305.15	-2251.16			
df		3		3		3			
McFadden R2	0.14	0.16	0.08	0.08	0.11	0.13			

7.4 DISCUSSION

Our results show that incubation is associated with larger investments, and that incubation is positively associated with using loans and investors as funding sources. These two sources are also associated with the largest investment sizes. The non-significant interaction effect means that there is no evidence that incubated start-ups raise more investments than non-incubated start-ups from these sources. The incubator provides access to investors and banks, but a non-incubated start-up who has access to these sources raises as much funding from these sources as incubated start-ups. This suggests that incubators serve as network brokers, and not as hit makers.

Also, entrepreneurs who are familiar with incubation but who have not been part of an incubator rely more on own funding or their friends & family, and government subsidies for large investments. This finding is consistent with the argument about network brokerage. Non-incubated entrepreneurs do not have access to sources like banks or investors, and are thus forced to find alternative funding sources.

This study suffers from a number of limitations. First, we associated the two mechanisms for performance with incubation services based on prior literature. However, we did not measure these services directly, which means that we did not fully take into account heterogeneity among incubators, nor were we able to differentiate between quality of the services offered. Our results only apply to contemporary incubation in general. Future research should study how the type and quality of services are associated with performance. Second, to ensure anonymity and ease of filling out the questionnaire, we did not measure the investments per funding source directly. This could have resulted in a finer grained image of relationships that we studied. However, this likely would lead to a lower response and less reliable measurements. Third, we omitted some variables that might explain investments or being part of an incubator. Examples are the quality of the product idea, or the quality of the start-up team (Bergek and Norrman, 2008). Both variables are difficult to measure in a reliable manner through a questionnaire. We encourage future studies to explore the characteristics of the start-up's team in more detail, for example by looking at the team's composition in terms of competences, background, ambitions and networks.

7.5 CONCLUSION

The incubation literature has provided conflicting evidence on the impact of business incubation. This study explored the influence of incubation on start-up invest-

ments, by assessing two different mechanisms. The results show that the prime value of an incubator for raising investments lies in its ability to connect start-ups to specific funding sources. Our results also indicate that, in general, supporting activities directly aimed at gaining more investments (such as pitch training) have limited effect. This does not mean that such supporting activities associated with hit making like coaching, mentoring or workshops are all in vain. Raising investments is only one performance measure that is primarily applicable to early stage start-ups. As start-ups mature they need to eventually become profitable to return these investments. This is when conventional performance measures such as turnover, profit or survival become important. It is well possible that the hit making support activities do have a positive influence on these kind of performance measures, but this is an area for further research. Also, it is possible that some incubators offer these activities with such a high quality that they form an exception to the rule. However, in general, we conclude that incubators serve as network brokers and not as hit makers.

APPENDICES

Appendix 7A: Selection questions for respondents

1. Are you, alone or with others, currently trying to start a new business? This includes any self-employment or selling of goods or services to others.
 - No **Not included in sample**
 - Yes

2. Would you consider the new business to be a technology-based start-up? *A technology-based start-up is a new firm whose business is based on the exploitation of technological know-how through the creation of new products and services. Examples include the development of a new drug or software service.*
 - No **Not included in sample**
 - Yes

3. In the past 12 months, in which of the following activities have you engaged during the development of your business?
Tick all that apply:
 - Formally registering the business
 - Preparing a written business plan
 - Organizing a start-up team
 - Devoting yourself full time to the business (more than 35 hours per week)
 - Developing a proof of concept or working prototype
 - Applying for a patent / copyright / trademark
 - Defining market opportunities
 - Hiring employees
 - Asking financial institutions or other people for funds
 - Receiving money from the sales of goods or services
 - Purchasing materials, equipment, facilities, or other tangible goods for the business
 - Discussing the new business' product or service with potential customers
 - None of the above: **Not included in sample**

4. Has the new business paid any salaries, wages, or payments in kind, including your own? *"Payments in kind" refers to goods or services provided as*

payments for work rather than cash. Payments in kind do not include stock options.

- No
- Yes

If previous question was answered 'Yes':

5. For how long has the new business been paying salaries, wages or payments in kind, including your own?
 - For 0 to 3 months
 - For 3 to 6 months
 - For 6 to 12 months
 - For 1 to 2 years
 - For 3 to 5 years **Not included in sample**
 - For more than 5 years **Not included in sample**
6. Do you, or will you, personally own all, part, or none of this business?
 - All
 - Part
 - None **Not included in sample**
7. Is or will the new business be a subsidiary? *A subsidiary is a venture of which another organization owns more than 50% of voting shares.*
 - No, the new venture is not the subsidiary of another organization
 - Yes, the new venture is a subsidiary of another organization **Not included in sample**

Appendix 7B: Respondents by sector

Sector	Sample respondents
Aerospace	14
Artificial Intelligence	47
Basic metals	26
Biotechnology & Pharmaceuticals	20
Chemistry	30
Clean technology	69
Coke and petroleum products	6
Electrical engineering & equipment	45
Energy	33
Fabricated metal products	7
Functional or processed food	18
ICT & Computers	87
Information systems	157
Machinery	13
Medical & dental instruments	17
Motor vehicles	27
Nanotechnology	5
Optical products	8
Other non-metallic mineral products	1
Photonics	1
Repair & installation machinery	19
Reproduction recorded media	14
Robotics	15
Rubber and plastic products	7
Ships and boats	4
Tele-communications	44
Transport	37
Transport equipment	10
Water	13
Weapons & ammunition	17
Other, please specify:	124
Total	935

Appendix 7C: Respondents and case weights per country

Country	Total early-stage entrepreneurial activity	Country population size	Population total early-stage entrepreneurs	Sample respondents	Case Weight
Austria	8.71	8,623,073	751,070	37	0.280
Canada	13.04	35,851,774	4,675,071	109	0.592
Belgium	5.4	11,267,581	608,449	38	0.221
France	5.34	67,107,000	3,583,514	125	0.395
Germany	5.27	81,197,500	4,279,108	125	0.472
Ireland	6.53	4,635,400	302,692	65	0.064
Netherlands	9.46	16,928,000	1,601,389	67	0.330
Switzerland	7.12	8,279,700	589,515	24	0.339
United Kingdom	10.66	64,800,000	6,907,680	104	0.916
United States of America	13.81	322,210,000	44,497,201	241	2.546

Appendix 7D: Correlation matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1 Investment size																	
2 Large investment size	0.85																
3 Not familiar, never been part	-0.17	-0.14															
4 Familiar, but never been part	-0.09	-0.08	-0.60														
5 Currently part	0.22	0.18	-0.40	-0.29													
6 Have been part	0.17	0.16	-0.28	-0.20	-0.13												
7 Team size	0.30	0.23	-0.10	-0.07	0.17	0.07											
8 Start-up maturity	0.25	0.22	-0.18	0.06	0.08	0.12	0.08										
9 Industry experience	0.08	0.08	-0.02	0.09	-0.10	0.02	-0.03	0.02									
10 Entrepreneurial experience	0.00	0.03	-0.08	0.05	0.02	0.04	-0.01	0.03	0.12								
11 Age	-0.08	-0.04	-0.02	0.13	-0.14	-0.01	-0.11	-0.06	0.57	0.14							
12 Gender (Female)	-0.03	0.00	0.00	0.01	-0.01	0.00	0.09	-0.02	-0.06	-0.01	-0.05						
13 Subsidy	0.00	-0.01	0.01	-0.05	0.02	0.02	-0.04	0.01	-0.07	0.05	-0.07	-0.13					
14 Loan	0.26	0.17	0.01	-0.16	0.14	0.07	0.16	0.18	0.01	-0.09	-0.06	-0.01	-0.05				
15 Crowdfunding	0.13	0.10	-0.03	-0.10	0.10	0.10	0.09	0.11	-0.11	0.00	-0.16	-0.05	0.06	-0.03			
16 Investor	0.25	0.22	-0.13	-0.05	0.13	0.15	0.12	0.19	-0.05	0.01	-0.11	-0.01	0.04	0.04	0.10		
17 Friends & Family	0.02	0.00	-0.02	0.04	-0.05	0.03	0.04	0.10	0.05	-0.03	0.05	0.05	0.04	-0.02	-0.02	0.11	
18 Own Investment	-0.05	0.00	-0.06	0.17	-0.17	0.03	-0.13	0.21	0.09	0.03	0.12	0.00	-0.08	-0.13	-0.09	-0.01	0.18





Chapter 8

Conclusion – Unpainting the black box

8.1 INTRODUCTION

While start-ups can be important drivers of economic growth, they are also highly risky ventures. To offset these risks, governments increasingly support start-ups, and incubators have become one of the most prominent instruments to do so. As the number of incubators has grown, the academic literature on incubation has expanded as well. However, the field's focus on evaluating the effectiveness of incubators has led scholars to neglect the process of incubation itself. This dissertation unpainted the black box of the incubation process by posing the main research question: *“how do mechanisms and practices of incubation contribute to start-up performance?”* In this final chapter, I first discuss the main findings to answer the main research question. I then discuss how my findings contribute to the literature on incubation and to the four theoretical frameworks that I used. I then provide a series of recommendations to policy makers and incubator practitioners. I end this chapter with a critical reflection on the limitations of this dissertation and, based on this, I provide suggestions for further research.

8.2 MAIN FINDINGS

To answer the main research question, I developed the conceptual model as presented in figure 8.1. This model leveraged the resource based view (RBV), organizational learning (OL) and communities of practice (CoP) to explore the incubation process. These three frameworks point at different ‘intermediary benefits’ that the incubation process creates (i.e. resources, learning, networks) and that subsequently contribute to start-up performance. Hence, these three frameworks allowed to explore different mechanisms and practices that explain why and how the incubation process contributes to start-up performance. These mechanisms point at two different roles for the incubator. First, the incubator provides ‘direct support’, as it directly transfers resources and knowledge to start-ups. Second, the incubator acts as a ‘broker’ that enables start-ups to acquire resources and learn from external actors. In addition to the RBV, OL and CoP, I used the literature on entrepreneurial ecosystems (EE) as a framework to explore the role of the incubator's context.

I first explored the conceptual model through a process approach, in which I focused on the incubator's practices by exploring what incubators do to facilitate access to resources, learning and networks. I then followed a variance approach to test the importance of the resources, learning and networks provided during the incubation process. I doing so, I first tested which mechanisms and practices entre-

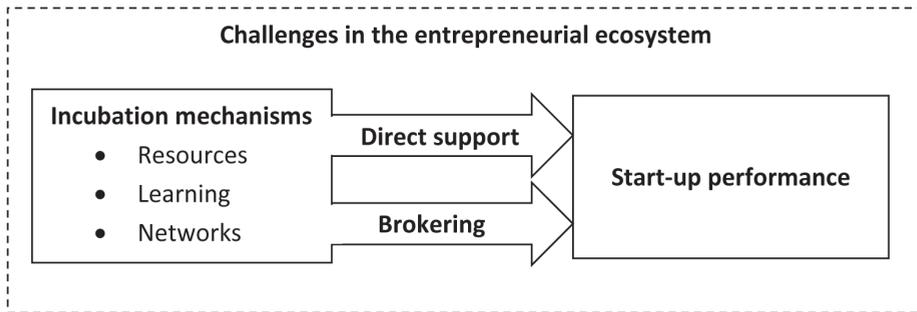


Figure 8.1 Conceptual model

preneurs perceive as most important. I then tested how the incubator, by providing direct support and through brokering, enables start-ups to attract investments from external sources.

I now discuss the main findings by answering the sub questions posed in the introduction.

8.2.1 How do practices of incubation facilitate access to resources?

The incubation process enables start-ups to acquire missing resources in a cost effective and timely manner. Incubators provide direct access to resources and enable start-ups to access resources through the incubator's networks. However, chapter two shows that entrepreneurs do not necessarily advantage of these resources. This is because entrepreneurs are not aware of the gaps in their resource base. Further, developing resources such as social capital or business knowledge may not yield immediate benefits and are therefore neglected during the hectic day-to-day business. Also, the technological entrepreneurs need to step out of their comfort zone to engage in coaching and networking activities, which they are hesitant to do. Consequently, incubators take a more assertive role than only providing access to resources. Incubators actively contribute to entrepreneurs' willingness to use the incubator's resources, as start-ups go through critical assessments that make entrepreneurs aware of their resource gaps. Incubators may also require entrepreneurs to achieve certain milestones or to participate in coaching and training sessions. This forces entrepreneurs to develop missing resources.

8.2.2 How do practices of incubation facilitate learning?

The incubation process can also accelerate the learning curve of start-ups, as shown in chapter three. The incubator's networks, mentors and training sessions

facilitate lower order learning by enabling start-ups to efficiently address a particular problem or to develop a particular skill. The incubation process can also facilitate higher order learning, which occurs when entrepreneurs start questioning and changing the fundamental assumptions and goals underlying their start-up. This may induce radical change as it leads start-ups to experiment with new technologies, markets or business models. Higher order learning can be triggered through rigorous review sessions in which mentors reveal, question and change the start-up's underlying goals and assumptions. Higher order learning is further stimulated by incubators providing start-ups with small amounts of funding, which creates financial pressures that force start-ups to seek out feedback from investors and customers and adapt their business accordingly. The flexible software start-ups were found to engage in higher order learning relatively often. In contrast, life sciences start-ups primarily relied on careful preparation and optimization of existing practices through lower order learning. This is because life sciences start-ups are more inert (due to e.g. capital requirements and strict regulations), which makes higher order learning relatively costly and risky.

8.2.3 How do practices of incubation facilitate networking in start-up communities?

The networks between start-ups and start-up supporters (such as investors and mentors) not only facilitate access to resources and learning, as highlighted in chapters two and three. Chapter four shows that these networks also lead to start-up communities that provide start-ups with a shared identity, emotional support and goodwill. Incubators facilitate start-up communities by providing a shared workspace and through various additional practices. First, incubators curate the community's culture by selecting members whose norms and values are aligned with the community's culture. Second, incubators manage the introduction of newcomers, for example by acquainting new members with the 'unwritten rules' of the community or by connecting newcomers to established members who 'show them around'. Third, incubators foster social networks by organizing events and by providing digital platforms. Fourth, incubators connect demand and supply of knowledge, by acting as knowledge 'brokers' and by enabling members to articulate and share their needs. Fifth, incubators stimulate members to share their goals and successes. This creates a culture of 'healthy competition' that makes start-ups more ambitious.

8.2.4 How do incubation practices and entrepreneurial ecosystems influence each other?

Incubators tailor their resources, knowledge and networks to the local context, as the incubation process allows start-ups to overcome challenges that are specific to the entrepreneurial ecosystem. Chapter five identifies five challenges that constrain start-up activity in Western Europe: (1) lack of market orientation (2) lack of an entrepreneurial culture (3) a small domestic market, (4) lack of early stage capital and (5) lack of entrepreneurial universities. Incubators address such challenges in multiple ways. First, incubators provide direct access to resources that are missing in the entrepreneurial ecosystem, such as financial capital or knowledge on how to manage a business. Second, incubators play a prominent role in connecting start-ups to other actors in the entrepreneurial ecosystem, thereby strengthening the ecosystem's networks. Third, incubators enable start-ups to cope with the institutions in the ecosystem. They do so by mediating the impact of unfavorable institutions. For example, the supportive culture in the incubator's start-up community may compensate for the absence of such a culture in the entrepreneurial ecosystem. Incubators thereby provide symptomatic solutions instead of addressing the institutions that are at the heart of challenges in the entrepreneurial ecosystem. The incubator's role in strengthening the entrepreneurial ecosystem is therefore still limited.

8.2.5 What is the importance of incubation mechanisms and practices as perceived by entrepreneurs?

To explore the importance of incubation mechanisms as perceived by entrepreneurs, chapter six conducts a Discrete Choice Experiment in which entrepreneurs choose between two hypothetical incubators. The heterogeneous preferences of entrepreneurs leads to three latent classes: (1) 'technology driven funding seekers' primarily base their choice on the incubator's funding, (2) 'individualists' have an aversion against networking, training and coaching, and (3) 'balanced decision makers' consider all of the incubator's attributes when choosing an incubator. Overall, entrepreneurs find the funding provided by the incubator, as well as its track record and affiliation to be most important when choosing an incubator. Most entrepreneurs do not consider the incubator's coaching, training and networks as important when choosing an incubator. This chapter thereby confirms the findings of chapter two: initially, when choosing an incubator, a large group of entrepreneurs does not perceive the learning and networking mechanisms as important.

8.2.6 how do incubation mechanisms influence the amount of investments that start-ups attract?

Chapter seven tests the influence of incubation on start-up investments. I use this measurement because it has a high signaling value for future start-up performance (De Clercq et al., 2006; Rothaermel and Thursby, 2005; Vohora et al., 2004) and is therefore commonly used as a performance measure for start-ups (e.g. Batjargal, 2007; Shane and Stuart, 2002). I test the role of the incubator in providing ‘direct support’ and acting as a ‘broker’. By providing ‘direct support’, start-ups can access business knowledge through coaching and training. This could help start-ups to develop stronger business propositions, which subsequently helps in attracting investment (Bruneel et al., 2012; Pauwels et al., 2015; Rice, 2002). By acting as a ‘broker’, the incubation process allows start-ups to connect to potential funding sources by ensuring that start-ups are visible, aligned and connected to these sources (Bøllingtoft and Ulhøi, 2005; Hansen et al., 2000). The results show that the incubation process indeed acts as a ‘broker’, but the results do not support the incubator’s role in providing ‘direct support’.

Overall, my findings point at networking as the main mechanism through which the incubation process contributes to start-up performance. Networking enables start-ups to access missing resources, to efficiently acquire market, business and technological knowledge, to gain legitimacy, to overcome challenges in the entrepreneurial ecosystem and to raise investments. The incubator uses a variety of practices to facilitate such networks, both between start-ups and between start-ups and other actors in the entrepreneurial ecosystem. Paradoxically, a large group of entrepreneurs does not perceive the importance of networking, and primarily perceive the incubator as a source of tangible resources.

8.3 THEORETICAL IMPLICATIONS

This section starts with a discussion of how my findings relate to the incubator literature, after which I reflect on my contributions to the four theoretical frameworks.

8.3.1 Contribution to incubation literature

In the introduction, I argued that the lack of knowledge on the incubation process exists because the extant literature does not take the perspective of the entrepreneur into account, neglects the incubator’s practices, discounts theoretical mechanisms,

and ignores the role of context. I fill these gaps and make four key contributions to the incubation literature.

First, by qualitatively and quantitatively incorporating the perspective of the entrepreneur, I show that the incubator's networks are underappreciated by entrepreneurs. The importance of the networking mechanism that I found is in line with the extant literature on incubation (Bøllingtoft and Ulhøi 2005; Bruneel et al. 2012; Hansen et al. 2000). However, I also show that entrepreneurs may not perceive the importance of networking. As shown in chapter two, entrepreneurs may be 'unconsciously incompetent', as they are not aware of the gaps in their start-up's resource base that the incubator's networks can address. Further, building networks takes time; entrepreneurs may prioritize activities that yield immediate value. Rather than accessing networks, chapters two and six showed that entrepreneurs primarily join the incubator to access tangible resources and legitimacy. This leads to a mismatch between the services that start-ups *want* from an incubator and the services that start-ups *need* to enhance their performance.

Second, by focusing on the incubator's practices, I point at the incubator's asertiveness. The incubator concept is based on an implicit assumption that providing start-ups with missing resources, knowledge and networks contributes to their performance. However, such a supply-side perspective is too simplistic: merely providing a resource rich environment is not sufficient for start-ups to use these resources (chapter two). Similarly, merely providing access to knowledge does not facilitate higher order learning (chapter three) and merely co-locating a group of similar start-ups in a collaborative workspace does not necessarily create a start-up community (chapter four). Accordingly, this dissertation shifts the focus from the incubator's attributes to its practices. In doing so, I point at the important role of the incubator staff, and show what they actually do to make start-ups aware of their resource gaps, stimulate start-ups to make use of the incubator's resources, facilitate the functioning of a start-up community, and trigger higher order learning.

Third, by exploring different theoretical mechanisms, I challenge the dominant discourse on the incubation process. The origin of the term 'incubator', which comes from the medical device that provides a protective environment for the care of prematurely born babies, is still reflected in the extant literature. The incubation process is generally seen as a 'safe haven' (Amezcuca et al., 2013; Chandra and Fealey, 2009) that provides 'shelter' (Bøllingtoft and Ulhøi, 2005; Carayannis and von Zedtwitz, 2005) for start-ups in the period when they are 'most vulnerable' (Aernoudt, 2004; InBIA, 2016). However, by exploring how incubators facilitate access to resources, learning and networks, I show that the incubation process is not only a 'safe haven', but also a 'pressure cooker'. Incubators provide pressure to stimulate entrepreneurs to make use of the incubator's resources (chapter two), to

provide the shock that is necessary to trigger higher order learning (chapter three) and to create peer pressure in the networks of the start-up community (chapter four).

Fourth, by studying incubators in different countries, I provide a more nuanced view on the relationship between the entrepreneurial ecosystem and the incubation process. I found the entrepreneurial ecosystem to influence the incubation process. For example, due to the small size of the country's domestic market, Israeli incubators actively connected start-ups to foreign markets. Similarly, the legitimacy, shared identity and emotional support provided by Australian start-up communities was perceived to be particularly important because this country was seen as lacking an entrepreneurial culture. Next to these differences, I also found consistencies. Regardless of the entrepreneurial ecosystem, start-ups faced similar problems, such as building a business around their technological idea or attracting investments. In line with this, incubators in different countries provided similar support, such as mentorship, a start-up community or access to networks. Accordingly, the view that 'business incubators are idiosyncratic reflections of local conditions' (Allen and McCluskey 1990 p. 75, see also Phan et al. 2005; Schwartz 2013; Tavoletti 2013) is exaggerated: incubators do not tailor their support to the entrepreneurial ecosystem, but to the (perceived and actual) needs of start-ups, which are only partly influenced by the entrepreneurial ecosystem. The incubator also influences the entrepreneurial ecosystem. By providing resources, knowledge and networks, incubators have the potential to help individual start-ups and to strengthen the entrepreneurial ecosystem's networks. However, they primarily provide symptomatic solutions rather than addressing the institutions that are at the heart of challenges in the entrepreneurial ecosystem. Therefore, in contrast with policy makers and scholars who perceive incubators as 'ecosystem builders' (Clarysse et al., 2015; Fernández et al., 2012; Tsai et al., 2009), the current three generations of incubators only play a limited role in strengthening entrepreneurial ecosystems.

8.3.2 Contribution to the four theoretical frameworks

In addition to enriching the literature on incubation, I also contribute to the four theoretical frameworks that I used. Although the resource based view is a well-established framework, it has also been criticized for its static nature and for neglecting how resources are obtained and developed (Kraaijenbrink et al., 2010; Sirmon et al., 2007). I show how actors (start-ups) can acquire resources from others (incubators). In doing so, I highlight the importance of actors' ability to recognize the value of resources as well as their willingness to develop these

resources. I contribute to the organizational learning literature by showing how lower and higher order learning can be facilitated, something that has been largely neglected in the literature so far (Chiva et al., 2010). Further, I apply OL concepts to the often neglected domain of young and small firms (Franco and Haase, 2009; Wang and Chugh, 2014). Similar to OL, the Communities of Practice literature has almost exclusively been applied to established organizations (Oliver and Kandadi, 2006; Pattinson and Preece, 2014). By using the dimensions of CoPs to characterize start-up communities, I found that these start-up communities are similar to CoPs in terms of characteristics and facilitation. This shows that insights from CoP are also applicable outside the intraorganizational networks in established organizations that are typically studied in CoP literature. The conceptualization of start-up communities also contributes to the Entrepreneurial Ecosystem literature. Start-up communities have been recognized as an important component of EEs (Brenzitz and Taylor, 2014; Feld, 2012; Mack and Mayer, 2015), yet it remains unclear what these communities are. Chapter four contributed to a better understanding of start-up communities by providing a theoretically and empirically grounded characterization. I also add to the EE literature by explicating the role of the incubator in enabling start-ups to overcome challenges in the entrepreneurial ecosystem.

8.4 RECOMMENDATIONS TO POLICY MAKERS AND INCUBATOR PRACTITIONERS

My findings have important implications for both policy makers and incubator practitioners.

Don't listen too much to entrepreneurs

Founders of start-ups are poor policy advisers. In their efforts to improve the conditions for start-ups, policy makers are often advised to carefully consult entrepreneurs to ensure that there is a match between the supply of policies and the demands of entrepreneurs (Gassmann and Becker, 2006; Stam, 2015). However, when entrepreneurs are not able to adequately recognize their own needs, such demand-driven policies will provide entrepreneurs with the support they *want* rather than the support they *need*. My findings show that entrepreneurs primarily *want* to be supported with money and subsidized office space. In contrast, they *need* networks and business support. Consequently, I caution policy makers for merely responding to the needs as perceived by inexperienced, technological entrepreneurs and I encourage them to at least complement these assessments

with insights from more experienced entrepreneurs and other stakeholders in the entrepreneurial ecosystem, such as mentors or investors.

Incubator managers should realize that entrepreneurs may not recognize the added value of the incubator's coaching, training and networks and are primarily attracted to the incubator's financial capital and subsidized office space. Therefore, although financial support and office space are arguably not the valuable, rare, inimitable and non-substitutable resources that will contribute to start-up performance, these are still important resources for incubators to provide, as they enable the incubator to attract start-ups. Also, incubators need to actively stimulate entrepreneurs to take advantage of the incubation process. Incubators can do so during critical review sessions, in which mentors reveal the start-up's resource gaps and trigger a reflexive process of higher order learning.

Support should go beyond symptomatic solutions

My findings show that incubators primarily provide symptomatic solutions, as they do not address the institutions that are at the heart of challenges in the entrepreneurial ecosystem. Consequently, stimulating start-ups requires greater institutional change to complement the support provided by incubators. For example, the establishment of an incubator in an effort to stimulate entrepreneurship and technology transfer at universities will likely have limited effects if universities are not incentivized to utilize their knowledge. The incubator itself can play an active role in this process of institutional transformation by evolving into a fourth generation of 'systemic' incubators that actively try to create and transform institutions in an effort to strengthen entrepreneurial ecosystems. Incubators with an extensive track record and large networks among incubated start-ups have established themselves as legitimate actors in the entrepreneurial ecosystem and are able to take collective action. Therefore, they are well-positioned to drive institutional change, for example by lobbying for start-up friendly regulations or by promoting successful role models among a large audience. By doing so, incubators would not only support individual start-ups or promote regional development, but also strengthen the entrepreneurial ecosystem as a whole.

Provide tough love instead of a safe haven

Incubation should not be seen as a way to increase the number of surviving start-ups, as is now often the case (ECA, 2014; European Commission, 2002). Such a view promotes the incubator as a safe haven; a protective environment that prevents start-ups from failing. Instead, incubators need to provide 'tough love' by creating a high pressure environment. Incubators can do so by creating a healthy competition among start-ups, by setting milestones, by providing small amounts of

funding, and by exposing start-ups to critical reviews by experienced and credible mentors.

Ensure that policies fit the local context

Western European policy makers should stop trying to replicate Silicon Valley. European start-up policies are still driven by a desire to copy Silicon Valley's success, which is reflected in Europe's desire to create 'the next Google' (European Commission, 2015) and the Netherlands profiling itself as 'Europe's West Coast for start-ups' (StartupDelta, 2015). Such desires may inspire policies that are not aligned with the local European context. Stimulating venture capital, for example, may not be effective if entrepreneurs are driven by a desire to be their own boss and, therefore, hesitant to give up equity (Audretsch et al., 2002; Fiedler and Hellmann, 2001). Accordingly, policies need to fit with the strengths and weaknesses of the local entrepreneurial ecosystem. In chapter five, I identified five challenges that constrain start-up activity in Western Europe. These challenges form a good starting point for policy makers to address.

8.5 LIMITATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

This dissertation has several limitations, each of which provides an opportunity for future research.

First, the specific characteristics of my empirical sample need to be taken into account when interpreting and generalizing the findings. To reflect the diversity of the incubator population, I created a diverse sample that contained data from start-ups and incubators in different industries, different countries and in different stages of development. To minimize the influence of personal bias, I interviewed a variety of stakeholders in each entrepreneurial ecosystem, such as (incubated and non-incubated) entrepreneurs, incubator staff, investors, university representatives, etc. The resulting diverse sample, combined with the large number of interviews conducted (281 in total), contributes to the reliability and generalizability of my findings. Still, I only collected data from incubators in Western, developed countries supporting start-ups (i.e. new ventures that exploit technological know-how through the creation of new products and services). However, incubators are also active in developing, non-Western countries (Chandra and Fealey, 2009; Steinz et al., 2015) and they also promote other forms of entrepreneurship, such as social entrepreneurship (Fernández et al., 2012) or corporate entrepreneurship (Gassmann and Becker, 2006). Further research is necessary to explore if my insights also apply to non-Western countries and to other forms of entrepreneurship.

Second, I primarily used qualitative methods. This approach allowed me to inductively identify incubation practices, but did not allow me to test the influence of incubation on start-up performance. Although chapter seven quantitatively tested the incubator's impact on start-up performance, it only used one performance measurement (start-up investments). Consequently, further research is necessary to evaluate the effectiveness of incubators and their influence on other performance measurements. In doing so, I urge evaluation studies to move away from the current dominant approach to compare incubated start-ups with non-incubated start-ups in an effort to assess the effectiveness of incubation in general (e.g. Colombo and Delmastro 2002; Schwartz 2009, 2013). A key insight from this dissertation is the great diversity of the incubation process, as it needs to adapt to the industry (chapter three), the entrepreneurial ecosystem (chapter five), and the experience, needs and preferences of the entrepreneur (chapters two and six). Further, I found great differences in the quality of the incubator's services, for example in the size of their networks, the strength of their reputation and the experience of their mentors. This makes it impossible to draw conclusions about the effectiveness of the incubator population as a whole. Instead of trying to do so by comparing the performance of incubated and non-incubated start-ups, I encourage future studies to focus on (quantitatively) testing particular incubation mechanisms and practices as well as the conditions under which these contribute to start-up performance. In particular, I encourage future studies to quantitatively test whether the practices that I identified in the qualitative studies indeed contribute to more effective incubators.

Third, my research focused on the question of how the incubation process can positively contribute to start-up performance. Still, I also found ways in which the incubation process constrains start-up performance. For example, the start-up communities that reside in incubators may be a source of distraction and unwanted IP spillovers. The incubation process may also lead to groupthink, thereby constraining learning, when mentorship is provided by a small and homogeneous group of mentors. There could be additional risks that incubation creates for start-ups. However, despite evidence that incubation has a negative effect on start-up performance (Schwartz, 2013, 2009), the risks of incubation still remain underexposed in extant literature (Mcadam and Marlow, 2007). Therefore, I encourage future studies to further explore these risks.

Fourth, in addition to explanations found in this dissertation, there might be other explanations for why entrepreneurs do not take advantage of incubation. Future studies could further explore these explanations by drawing on the literature on 'entrepreneurial cognition'. This body of literature focuses on entrepreneurs' cognitive processes and finds that entrepreneurs are more likely to display particular 'cognitive biases' in their decision making (Busenitz and Barney, 1997;

Simon et al., 2000). Some of these biases echo my findings, such as entrepreneurs' inability to recognize their own limitations (Forbes, 2005) or their hesitance to invest in unfamiliar resources (Garbuio et al., 2011). Further research could explore the cognitive biases of entrepreneurs in more detail, as well as the role of the incubator in overcoming these biases. Future studies could also use the literature on institutional work to explore the potential role of incubators as institutional entrepreneurs in strengthening the entrepreneurial ecosystem. Institutional work provides a framework to understand the actions of individuals and organizations aimed at creating, maintaining and disrupting institutions (Lawrence and Suddaby, 2006; Lawrence et al., 2011; Maguire et al., 2012). Applying such a perspective may inform practices that incubators can potentially use to drive institutional change in the entrepreneurial ecosystem, or, in the case of corporate incubators and university affiliated incubators, to drive institutional change in their parent organization.

By addressing these limitations, future studies could further improve our understanding of how incubation contributes to start-up performance.





Chapter 9

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Appendix

Summary

Samenvatting

Dankwoord

Curriculum Vitae

List of publications

SUMMARY

In their efforts to stimulate economic growth and innovation, policy makers around the world increasingly support the emergence and growth of start-ups: new ventures that exploit technological know-how through the creation of new products and services. One of the most prominent instruments to support these start-ups are incubators. Incubators support start-ups during their early and vulnerable stage of development. Incubators do so by providing a broad range of services and resources, which include access to funding, networks, and mentorship by experienced entrepreneurs. The number of incubators has grown rapidly over the past decades. There are currently over 7,000 incubators in the world, most of which are supported by local or national governments. Despite their widespread diffusion, it remains unclear if incubators are indeed effective instruments to promote start-up activity. While some studies find that incubators have a positive impact on the survival or growth of start-ups, other studies find that the incubator's impact is non-existent, or even negative. These contradicting findings have been ascribed to the literature treating the incubator as a black box: scholars have focused on assessing the inputs and outputs of the incubator, while neglecting the processes in between. This lack of knowledge constraints the ability of scholars to adequately assess the incubation process, and, ultimately, to evaluate the effectiveness of incubators.

This dissertation aims to 'unpaint' the black box. To do so, it focuses on the mechanisms and practices behind the incubation process. Mechanisms explain *why* incubation influences start-up performance; practices facilitate these mechanisms as they describe *how* actors involved in the incubation process actually help start-ups. Accordingly, the main research question of this dissertation is: "how do mechanisms and practices of incubation contribute to start-up performance?"

To answer the research question, this dissertation first conducts four qualitative studies to explore different theoretical mechanisms and to identify practices through which these mechanisms are facilitated. Chapter two explores the practices through which the incubation process facilitates access to resources. The incubation process enables start-ups to acquire missing resources in a cost effective and timely manner. Incubators provide direct access to resources and enable start-ups to access resources through the incubator's networks. However, chapter two shows that entrepreneurs do not necessarily take advantage of these resources. This is because entrepreneurs are not aware of the gaps in their resource base. Further, developing resources such as social capital or business knowledge may not yield immediate benefits and are therefore neglected during the hectic day-to-day business. Also, the technological entrepreneurs need to step out of their comfort

zone to engage in coaching and networking activities, which they are hesitant to do. Since entrepreneurs do not necessarily make use of the incubator's resources, incubators take a more assertive role than only providing access to resources. Incubators actively contribute to entrepreneurs' willingness to use the incubator's resources, as start-ups go through critical assessments that make entrepreneurs aware of their resource gaps. Incubators may also require entrepreneurs to achieve certain milestones or to participate in coaching and training sessions. This forces entrepreneurs to develop missing resources.

Chapter three explores the practices through which the incubation process facilitates organizational learning. In doing so, this chapter draws on one of the most important classifications in the organizational learning literature: the distinction between lower and higher order learning. The incubator's networks, mentors and training sessions facilitate lower order learning by enabling start-ups to efficiently address a particular problem or develop a particular skill. The incubation process can also facilitate higher order learning, which occurs when entrepreneurs start questioning and changing the fundamental assumptions and goals underlying their start-up. This may induce radical change as it leads start-ups to experiment with new technologies, markets or business models. Higher order learning can be triggered through rigorous review sessions in which mentors reveal and question and start-up's underlying goals and assumptions. Higher order learning is further stimulated by incubators providing start-ups with small amounts of funding, which creates financial pressures that force start-ups to seek out feedback from investors and customers and adapt their business accordingly. The flexible software start-ups were found to engage in higher order learning relatively often. In contrast, life sciences start-ups primarily relied on careful preparation and optimization of existing practices through lower order learning. This is because life sciences start-ups are more inert (due to e.g. capital requirements and strict regulations), which makes higher order learning relatively costly and risky.

Chapter four draws from the literature on Communities of Practice to explore the practices through which the incubation process facilitates networking in start-up communities. These start-up communities enable start-ups to access resources and they facilitate learning. Further, start-up communities provide start-ups with a shared identity, emotional support and goodwill. Incubators facilitate start-up communities by providing a shared workspace and through various additional practices. First, incubators curate the community's culture by selecting members whose norms and values are aligned with the community's culture. Second, incubators manage the introduction of newcomers, for example by acquainting new members with the 'unwritten rules' of the community or by connecting newcomers to established members who 'show them around'. Third, incubators foster social

networks by organizing events and by providing digital platforms. Fourth, incubators connect demand and supply of knowledge, by acting as knowledge ‘brokers’ and by enabling members to articulate and share their needs. Fifth, incubators stimulate members to share their goals and successes. This creates a culture of ‘healthy competition’ that makes start-ups more ambitious.

Chapter five explores the relationship between incubation practices and the incubator’s context; the entrepreneurial ecosystem. Incubators tailor their resources, knowledge and networks to the local context, as the incubation process allows start-ups to overcome challenges that are specific to the entrepreneurial ecosystem. Chapter five identified five challenges that constrain start-up activity in Western Europe: (1) Lack of market orientation (2) lack of an entrepreneurial culture (3) a small domestic market, (4) lack of early stage capital and (5) lack of entrepreneurial universities. Incubators address these challenges in multiple ways. First, incubators may provide direct access to resources that are missing in the entrepreneurial ecosystem, such as financial capital or knowledge on how to manage a business. Second, incubators play a prominent role in connecting start-ups to other actors in the entrepreneurial ecosystem, thereby strengthening the ecosystem’s networks. Third, incubators enable start-ups to cope with the institutions in the ecosystem. They do so by mediating the impact of unfavorable institutions. For example, the supportive culture in the incubator’s start-up community may compensate for the absence of such a culture in the entrepreneurial ecosystem. Incubators thereby provide symptomatic solutions instead of addressing the institutions that are at the heart of challenges in the entrepreneurial ecosystem. The incubator’s role in strengthening the entrepreneurial ecosystem is therefore still limited.

After these four qualitative chapters, this dissertation conducts two quantitative studies to test the importance of the incubator’s resources, knowledge and networks. Chapter 6 tests the importance of these three mechanisms as perceived by entrepreneurs. It reports from a Discrete Choice Experiment in which entrepreneurs choose between two hypothetical incubators. Each hypothetical incubator provides a particular set of practices to facilitate access to resources, learning and networking. As entrepreneurs choose between the two incubators, they make a trade-off between the incubator’s resources, knowledge and networks. This reveals entrepreneurs’ preferences. The heterogeneous preferences of entrepreneurs leads to three latent classes: (1) ‘technology driven funding seekers’ primarily base their choice on the incubator’s funding, (2) ‘individualists’ have an aversion against networking, training and coaching, and (3) ‘balanced decision makers’ consider all of the incubator’s attributes when choosing an incubator. Overall, entrepreneurs find the funding provided by the incubator, as well as its track record and affiliation most important when choosing an incubator. Most entrepreneurs do not consider

the incubator's coaching, training and networks as important when choosing an incubator. This chapter thereby confirmed the findings of chapter two: initially, when choosing an incubator, a large group of entrepreneurs does not perceive the learning and networking mechanisms as important.

Chapter seven tested the influence of incubation on start-up investments. This chapter tested the role of the incubator in providing 'direct support' and acting as a 'broker'. By providing 'direct support', start-ups can access business knowledge through coaching and training. This could help start-ups to develop stronger business propositions, which subsequently helps in attracting investment. By acting as a 'broker', the incubation process enables start-ups to connect to potential funding sources by ensuring that start-ups are visible, aligned and connected to these sources. The results show that the incubation process indeed acts as a 'broker', but the results do not support the incubator's role in providing 'direct support'.

This dissertation makes several contributions to the extant literature on incubation and, by doing so, provides important implications for incubation practitioners and policy makers. First, the findings show that networking is a key, yet underappreciated, aspect of the incubation process. The incubator's networks contribute to start-up performance by enabling start-ups to access missing resources, to efficiently acquire market, business and technological knowledge, to gain legitimacy and to overcome challenges in the entrepreneurial ecosystem. Incubators use a variety of practices to facilitate such networks, both between start-ups and between start-ups and other actors in the entrepreneurial ecosystem. Paradoxically, entrepreneurs may not perceive the value of these networks. Entrepreneurs may be 'unconsciously incompetent', as they are not aware of the gaps in their start-up's resource base that the incubator's networks can address. Further, building networks takes time; entrepreneurs may prioritize activities that yield immediate value. This creates a mismatch between the services that start-ups *want* from an incubator and the services that start-ups *need* to succeed. Policy makers should realize that inexperienced entrepreneurs make poor policy advisors since they are unable to adequately recognize their needs. Since entrepreneurs may not recognize the added value of the incubator's services, incubator managers need to actively stimulate entrepreneurs to take advantage of the incubation process; they can use the practices outlined in this dissertation as a practical guideline to do so.

Second, this dissertation provides deeper insights into the relationship between the incubator and its surrounding entrepreneurial ecosystem. By providing resources, knowledge and networks, incubators have the potential to help individual start-ups and to strengthen the entrepreneurial ecosystem's networks. However, incubators primarily provide symptomatic solutions rather than addressing the institutions that are at the heart of challenges in the entrepreneurial ecosystem.

Therefore, in contrast with policy makers and scholars who perceive incubators as 'ecosystem builders', the current generation of incubators only plays a limited role in strengthening entrepreneurial ecosystems. Policy makers should acknowledge that promoting start-up activity requires greater institutional change to complement the support provided by incubators. Incubator can play an active role in this process of institutional transformation by evolving into a fourth generation of 'systemic' incubators that actively try to create and transform institutions in an effort to strengthen entrepreneurial ecosystems.

Third, this dissertation challenges the dominant discourse on the incubation process. The extant literature perceives incubators as 'safe havens' that protect start-ups when they are most vulnerable. This dissertation shows that incubators not only act as safe havens, but also as 'pressure cookers'. Incubators provide pressure to stimulate entrepreneurs to make use of the incubator's resources, to provide the shock that is necessary to trigger higher order learning and to create peer pressure in the networks of the start-up community. Consequently, incubators are advised to provide 'tough love' to start-ups.

SAMENVATTING

Het stimuleren van jonge technologische bedrijven, start-ups, staat tegenwoordig hoog op de politieke agenda. Eén van de meest gebruikte beleidsinstrumenten zijn incubators. Incubators creëren een beschermde door een breed scala aan ondersteuning te bieden, zoals kantoorruimte, financiering, coaching, training, en toegang tot netwerken met investeerders of klanten. Het aantal incubators is de laatste jaren snel gegroeid; er zijn wereldwijd meer dan 7.000 incubators. Hoewel de incubator tegenwoordig een veelgebruikt middel is om start-ups te ondersteunen, is het onduidelijk of dit middel effectief is. Sommige studies laten zien dat incubators een positieve invloed hebben op de overlevings- of groeikansen van start-ups. Er zijn echter ook studies die geen bewijs vinden voor een dergelijke relatie, of die laten zien dat incubators zelfs een negatieve invloed hebben. Deze tegenstrijdige resultaten worden veroorzaakt doordat de huidige literatuur de incubator behandelt als een 'black box': bestaande studies besteden veel aandacht aan de in- en output van de incubator, maar negeren het proces dat hier tussenin ligt. Doordat het achterliggende incubatie proces onderbelicht blijft, is het niet mogelijk om dit proces te evalueren, waardoor het onduidelijk blijft wat de invloed van de incubator is op het succes van de start-up.

Dit proefschrift opent de 'black box', door de mechanismen en praktijken van de incubator nader te bestuderen. Mechanismen verklaren *waarom* de incubator het succes van de start-up beïnvloedt. Praktijken faciliteren deze mechanismen, en beschrijven *hoe* incubators start-ups helpen. De hoofdvraag van dit proefschrift luidt daarmee: "hoe dragen incubatie mechanismen en praktijken bij aan de prestaties van start-ups?" Om deze vraag te beantwoorden, begint dit proefschrift met vier kwalitatieve studies die verschillende theoretische mechanismen verkennen alsmede de praktijken waarmee deze mechanismen worden gefaciliteerd.

Hoofdstuk twee verkent de praktijken waarmee incubators toegang tot resources faciliteren. Incubators stellen start-ups in staat om op een efficiënte manier resources te vergaren. De incubator biedt zelf resources aan en verbindt start-ups met de resources van externe partijen, zoals investeerders en andere start-ups. Een belangrijke resource is kennis over ondernemerschap. Start-ups worden veelal opgericht door jonge ondernemers met een goed idee en uitstekende technologische vaardigheden. Maar deze onervaren ondernemers vinden het moeilijk om hun technologische idee om te zetten naar een overtuigend businessmodel. De incubator biedt belangrijke resources om ondernemers van deze kennis te voorzien, zoals coaching van ervaren ondernemers, trainingen rondom sales of marketing, en netwerken waarin ondernemers andere start-ups, accountants of

juristen om hulp kunnen vragen. Hoofdstuk twee laat echter zien dat start-ups niet altijd gebruik maken van deze resources, en geeft drie verklaringen hiervoor. Ten eerste zijn oprichters van start-ups vaak 'onbewust onbekwaam': zij beseffen niet dat zij de begeleiding en netwerken van de incubator hard nodig hebben, en kunnen pas achteraf hun incubator op waarde schatten. Ten tweede zijn de resultaten van het schrijven van een business plan of het volgen van een training vaak niet direct zichtbaar. Ondernemers stellen dergelijke activiteiten daarom vaak uit. Ten derde vinden veel technologische ondernemers het simpelweg niet leuk om aan de 'zakelijke' kant van hun start-up te werken; zij verdiepen zich liever in de technologie of het product. Omdat het niet vanzelfsprekend is dat ondernemers gebruik maken van de resources van de incubator, is het niet voldoende wanneer incubators deze resources alleen maar beschikbaar stellen. Incubators zijn een stuk assertiever. Door de strategie van een start-up kritisch tegen het licht te houden, maken incubators ondernemers bewust van de resources die zij missen. Daarnaast kunnen incubators ondernemers ook dwingen om deel te nemen aan het incubatie proces en bepaalde resources te ontwikkelen, bijvoorbeeld door participatie in coaching sessies verplicht te stellen, of door te eisen dat start-ups bepaalde milestones behalen.

Hoofdstuk drie verkent de praktijken waarmee incubators organisatorische leerprocessen faciliteren. Dit hoofdstuk maakt gebruik van één van de belangrijkste concepten van het organisatorisch leerperspectief: het onderscheid tussen 'lower order' en 'higher order' leren. De trainingen, netwerken en mentoren van de incubator faciliteren een proces van incrementeel, lower order leren, doordat zij start-ups in staat stellen om een bepaald probleem op te lossen of een bepaalde vaardigheid te leren. De incubator kan ook higher order leren faciliteren, wat inhoudt dat ondernemers de onderliggende, fundamentele doelstellingen en aannames van hun start-up ter discussie stellen. Higher order leren kan grote veranderingen tot gevolg hebben, want het kan ertoe leiden dat start-ups deze doelstellingen en aannames gaan veranderen, en gaan experimenteren met nieuwe technologieën, markten en business modellen. Higher order leren wordt gestimuleerd door mentoren, die met hun kritische vragen de onderliggende aannames zichtbaar maken en ter discussie stellen. Higher order leren wordt verder gestimuleerd wanneer incubators start-ups slechts een kleine hoeveelheid financiering bieden. Hierdoor worden start-ups gedwongen om feedback op te zoeken van investeerders en potentiële klanten, en hun product aan te passen aan de wensen van de markt. Doordat start-ups in de software industrie relatief flexibel zijn, kunnen zij relatief makkelijk radicale veranderingen doorvoeren, en dus veel gebruikmaken van higher order leren. Start-ups in de life sciences zijn relatief inflexibel, doordat zij te maken hebben met hoge investeringen en strikte regelgeving. Hierdoor is radicale verandering en

higher order leren relatief risicovol en duur. Deze start-ups kiezen er daarom voor om bestaande technologieën en processen te optimaliseren via lower order leren.

Hoofdstuk vier maakt gebruik van de literatuur over 'Communities of Practice' om de praktijken te verkennen waarmee incubators netwerken faciliteren in start-up communities. Deze start-up communities stellen ondernemers in staat om resources en kennis met elkaar te delen. Daarnaast bieden start-up communities emotionele ondersteuning en legitimiteit. Incubators faciliteren start-up communities via zes praktijken. Ten eerste bieden incubators een gedeelde werkplek, waardoor start-ups makkelijk met elkaar in contact komen. Ten tweede bewaken incubators de interne cultuur van start-up communities door alleen start-ups toe te laten wiens normen en waarden overeen komen met de cultuur in de community. Ten derde zorgen incubators ervoor dat nieuwe start-ups sneller in de community worden opgenomen, door nieuwkomers bekend te maken met de ongeschreven regels van de community, en door nieuwkomers te koppelen aan bestaande leden van de community om hen te introduceren. Ten vierde versterken incubators de onderlinge netwerken tussen start-ups door evenementen te organiseren en digitale platformen aan te bieden. Ten vijfde koppelen incubators vraag en aanbod van kennis door op te treden als 'kennismakelaar'. Tot slot worden start-ups in de incubator gestimuleerd om hun ambities en voortgang met elkaar te delen. Hierdoor ontstaat een 'gezonde onderlinge concurrentie', waarin start-ups elkaar inspireren en uitdagen om sneller te groeien en ambitieuzere doelen te stellen.

Hoofdstuk vijf verkent de relatie tussen de incubator en haar omgeving; het 'entrepreneurial ecosystem'. Omdat incubators de barrières in het lokale entrepreneurial ecosystem proberen weg te nemen, moeten zijn hun resources, kennis en netwerken afstemmen op hun omgeving. Hoofdstuk vijf identificeert vijf barrières voor start-ups in West Europa: (1) een gebrek aan markt oriëntatie, (2) een cultuur waarin risicovol en ambitieus ondernemerschap niet gestimuleerd wordt, (3) een kleine binnenlandse afzetmarkt, (4) een gebrek aan 'early stage' financiering en (5) een gebrek aan ondernemerschap bij universiteiten. Incubators nemen deze barrières op verschillende manieren weg. Ten eerste geven incubators direct toegang tot resources die missen in het entrepreneurial ecosystem, zoals financiering. Ten tweede spelen incubators een belangrijke rol in het verbinden van start-ups met andere partijen, waardoor incubators de netwerken van het ecosysteem versterken. Ten derde beperken incubators de invloed van ongunstige instituties. Zo kan de inspirerende cultuur van de start-up community het gebrek aan een ondernemende cultuur in het ecosysteem compenseren. Over het geheel genomen bieden incubators symptomatische oplossingen, want zij veranderen niet de instituties die barrières in het entrepreneurial ecosysteem veroorzaken. De rol van de incubator in het entrepreneurial ecosystem is daarmee nog steeds beperkt.

Na deze vier kwalitatieve hoofdstukken volgen er twee hoofdstukken waarin het belang van de resources, kennis en netwerken van de incubator worden onderzocht. Hoofdstuk zes test de mate waarin ondernemers de resources, kennis en netwerken van incubators belangrijk vinden. In een keuze experiment worden ondernemers gevraagd om te kiezen tussen twee hypothetische incubators met verschillende eigenschappen. Door de keuzes van de ondernemers te analyseren worden de belangrijkste aspecten zichtbaar. De resultaten laten drie typen ondernemers zien: (1) de 'technologische geldzoeker', die met name kijkt naar financiering; (2) de 'individualist', die een afkeer heeft voor incubators die training, coaching en netwerken aanbieden; en (3) de 'allrounder', die een weloverwogen keuze maakt. Over het geheel genomen blijkt financiering het belangrijkste aspect, gevolgd door de staat van dienst en eventuele partners van de incubator. Het aanbieden van training, coaching en netwerken heeft weinig invloed op de keuze van de ondernemer. Integendeel, dergelijke diensten schrikken sommige ondernemers zelfs af. Hoofdstuk zes bevestigt hiermee de bevindingen van hoofdstuk twee: wanneer een ondernemers een incubator kiezen, vindt een groot deel kennis en netwerken niet belangrijk.

Hoofdstuk zeven test de mate waarin de resources, kennis en netwerken van incubators de prestaties van start-ups beïnvloeden. Deze prestaties worden gemeten aan de hand van de investeringen die start-ups hebben opgehaald. Het binnenhalen van investeringen is een belangrijke mijlpaal voor veel start-ups, en is een waardevolle indicator voor de toekomstige prestaties van de start-up. De hoeveelheid opgehaalde investeringen is daarom een veelgebruikte indicator voor de prestaties van start-ups. Hoofdstuk zeven test twee manieren waarop de incubator deze investeringen kan beïnvloeden. Door 'directe ondersteuning' te bieden, geeft de incubator start-ups toegang tot training en coaching. Hiermee kunnen start-ups in potentie een sterkere waarde propositie neerzetten, wat helpt in het aantrekken van investeerders. Als 'tussenpersoon' verbindt de incubator start-ups met potentiële investeerders in haar netwerk. De resultaten bevestigen de rol van de incubator als 'tussenpersoon', maar vinden geen bewijs dat de 'directe ondersteuning' van de incubator helpt bij het ophalen van investeringen.

De bevindingen van dit proefschrift dragen bij aan de bestaande literatuur over incubators, en bieden belangrijke implicaties voor incubator managers en beleidsmakers. Ten eerste laten de bevindingen zien dat de netwerken van de incubator een belangrijk, maar ondergewaardeerd aspect zijn van het incubatie proces. De netwerken van de incubator dragen bij aan de prestaties van start-ups doordat ze start-ups in staat stellen om resources te verzamelen, kennis te verwerven, legitimiteit te verkrijgen en barrières in het entrepreneurial ecosystem te overwinnen. Incubators gebruiken diverse praktijken om deze netwerken te faciliteren, waarbij

ze start-ups verbinden met elkaar en met externe actoren. Paradoxaal genoeg weten ondernemers deze netwerken vaak niet op waarde te schatten. Ondernemers zijn vaak onbewust onbekwaam; zij beseffen zich niet dat hun start-up bepaalde resources mist die de incubator kan aanbieden. Daarnaast zijn ondernemers vaak niet bereid om de tijd te investeren die nodig is voor het ontwikkelen van netwerk relaties. Hierdoor ontstaat er een verschil tussen de services waar ondernemers om vragen, en de services die ondernemers nodig hebben. Beleidsmakers moeten zich realiseren dat onervaren ondernemers slechte beleidsadviseurs zijn, omdat ze onvoldoende in staat zijn hun eigen behoeften in te schatten. Aangezien het niet vanzelfsprekend is dat ondernemers gebruik maken van de ondersteuning die incubators aanbieden, is het belangrijk dat ondernemers gestimuleerd worden om deel te nemen aan het incubatie proces.

Ten tweede biedt dit proefschrift nieuwe inzichten in de relatie tussen de incubator en het entrepreneurial ecosystem. Door resources, kennis en netwerken aan te bieden kunnen incubators individuele start-ups helpen en de netwerken van het entrepreneurial ecosystem versterken. Incubators bieden hiermee vooral symptomatische oplossingen, want zij veranderen niet de instituties die barrières in het entrepreneurial ecosystem veroorzaken. In tegenstelling tot beleidsmakers en onderzoekers die incubators zien als bouwers van het entrepreneurial ecosystem, concludeer ik dat de huidige generatie incubators deze rol slechts in beperkte mate vervult. Het stimuleren van start-ups vraagt om institutionele verandering. Incubators kunnen een belangrijke rol spelen in dit proces, door uit te groeien tot een vierde generatie van 'systemische' incubators die een actieve rol spelen in het creëren en transformeren van instituties met als doel het versterken van het entrepreneurial ecosystem.

Ten derde neemt dit proefschrift afstand van het dominante beeld dat is ontstaan van incubators. Incubator betekent letterlijk couveuse. En zo wordt een incubator vaak gezien in de literatuur: als een beschermde omgeving waarin kwetsbare jonge bedrijven kunnen aansterken. Mijn bevindingen laten zien dat incubators ook het tegenovergestelde doen, door start-ups onder druk te zetten. Deze druk is nodig om ervoor te zorgen dat start-ups gebruik maken van de incubator's resources, om de schok te geven die de impuls geeft voor higher order leren, en om een cultuur van gezonde onderlinge concurrentie te creëren in de netwerken van de start-up community. Een incubator is dus niet alleen een couveuse, maar ook een 'snelkookpan', die de ontwikkeling van start-ups versnelt door een omgeving te bieden waarin start-ups continu worden uitgedaagd om het maximale uit zichzelf te halen.

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CURRICULUM VITAE MARIJN VAN WEELE

Marijn van Weele (1988) obtained both his Bachelor's degree (2009) and Master's degree (2012, cum laude) in Science and Innovation Management at Utrecht University.

His master's thesis introduced Marijn to start-ups and incubators, and eventually led him to start his PhD research on this topic at the Innovation Studies group at Utrecht University. During his PhD, Marijn studied incubators in Europe, Silicon Valley, Israel and Asia. He presented his findings on various international conferences, on radio and on TV. In September 2015, *het financieele dagblad*, the foremost Dutch financial newspaper, invited Marijn and two of his colleagues to write a weekly column on start-ups and innovation.

After finishing his PhD, Marijn wanted to apply his knowledge to practice. As a freelance consultant, he supports an investor and a multinational corporation in establishing a start-up incubation program.

LIST OF PUBLICATIONS

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