THESIS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

Developing Entrepreneurial Behavior

Facilitating Nascent Entrepreneurship at the University

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Division of Management of Organizational Renewal and Entrepreneurship

Department of Technology Management and Economics

CHALMERS UNIVERSITY OF TECHNOLOGY

Gothenburg, Sweden 2010

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ISBN 978-91-7385-455-9

Doktorsavhandlingar vid Chalmers tekniska högskola

Ny serie nr 3136

ISSN 0346-718X

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Printed by Chalmers Reproservice

Göteborg, Sweden, 2010

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Abstract

Can nascent entrepreneurs learn how to behave so as to achieve their ambition of creating new ventures? This thesis explores how the development of entrepreneurial behavior can be facilitated through investigating nascent entrepreneurship taking place at the university. The focus is on the influence of environmental factors and the processes involved as a new opportunity-based venture is created need to be considered when addressing entrepreneurial behavior development.

The university is chosen to be an appropriate empirical setting as it is capable of facilitating activity resulting in the creation of new opportunity-based, high-growth potential ventures. An action research approach is used to study an intrinsic case, which is then compared to other environments in order to understand how behavior development is facilitated. A systems perspective allows for study of entrepreneurial behavior through contributions from different levels of analysis in a micro-aggregate mix, from the individual to society. Social Learning Theory, additional learning theories, and Positioning Theory are used to investigate how behaviors are developed and confirmed or rejected during interaction between the nascent entrepreneur and the role-set.

Nascent entrepreneurs are hampered by liability of newness and lack of social networks. They benefit from training and support that facilitates establishing legitimacy as entrepreneur, and reducing uncertainty and ambiguity, thereby preparing for and making decisions as a new venture is created. Both structural and social components of environmental factors facilitate behavior development, as policies or norms are discussed and negotiated with a role-set. Learning through interaction with the role-set also facilitates hypothesis testing and feedback loops, allowing the nascent entrepreneur to take pre-emptive action, and reduce uncertainty and ambiguity. Nascent entrepreneurs can train in future business activities, while in the process of emergence, in order to develop behaviors for an entrepreneurial career.

Keywords: entrepreneurial behavior, nascent, venture creation, university, interaction, facilitation, pre-emptive action, self-efficacy, entrepreneurial education.

To my role-set

&

In memory of Professor Natalie Taylor

Appended papers
This thesis is based on the following papers, referred to by Roman numerals in the text.

Paper I

Lundqvist, M. A. and Williams Middleton, K. (2010). Legitimizing entrepreneurial activity at the university, initially presented at the 5th Triple Helix conference '*The Capitalization of Knowledge'* in Turin, 18-21 May. Submitted to *Research Policy*.

Paper II

Lundqvist, M. A. and Williams Middleton, K. (2008). Sustainable Wealth Creation beyond Shareholder Value. In: Wankel, C. and Stoner, J. A. F. (eds.) *Innovative Approaches to Global Sustainability.* New York: Palgrave MacMillan. p. 39-62.

Paper III

Ollila, S. and Williams-Middleton, K. (2010). The venture creation approach: integrating entrepreneurial education and incubation at the university, forthcoming in a special issue of *International Journal of Entrepreneurship and Innovation Management.*

Paper IV

Williams Middleton, K. (2010). Entrepreneurial positioning, initially presented at 30th Institute for Small Business & Entrepreneurship conference *'International Entrepreneurship'* in Glasgow, 7-9 November. Submitted to the *International Journal of Entrepreneurial Behaviour and Research*.

Paper V

Lundqvist, M. A. and Williams Middleton, K. L. (2010). Promises of societal entrepreneurship: Sweden and beyond, *Journal of Enterprising Communities*, Vol. 4(1), p. 24-36.

ACKNOWLEDGEMENT

It seems all dissertations are a journey, the result of which never fully accounting for the process undergone. My journey, notably influenced by those around me, has certainly shaped my behavior, and to a far greater extent than is illustrated in this collection of words. To the following, I owe my deepest gratitude and appreciation…

To my examiner, Flemming Norrgren for allowing me to explore various paths and then in creative and comprehensive ways helping me to knit the resulting ideas together. Thank you for patiently tempering my frustrations with constructive feedback and advice, particularly in the final stages of production.

Mats Lundqvist has been the main supervisor in the journey of this thesis and has walked the road with me since day one. Thank you for your years of investment and faith in my abilities. You have been my main collaborator, both inspiring creativity and challenging me to test and qualify my creations and positions. You have set high expectations because you believed that I could achieve them and you have allowed me to fail and try again when I did not. You not only invited me to an arena of research, but allowed me to engage in the process and practice of university entrepreneurship at multiple levels. Thank you for the many different ways you have coached and supported me in the creation of this thesis.

I have been privileged to have Sanne Ollila also supervising my thesis work. Thank you for your enduring interest and curiosity into the entrepreneurial world and helping me to bridge understanding between behavior and entrepreneurial action. You have brought a critical voice to my work, enriching the quality and strength of my arguments truly allowing me the luxury of learning and understanding as I have developed into a researcher. I am deeply grateful for your level of engagement and caring nature. Thank you is not enough.

To Sofia Börjesson and Alexander Styhre who in previous stages have taken responsibility in helping to shape and support my research process.

To my previous discussants, Einar Rasmussen and Bengt Johannisson, whose valuable feedback and reflection have improved the quality and clarity of this thesis.

The environment in which this thesis has developed has transformed many times. To colleagues past and present of the schools of entrepreneurship (CSE and GIBBS), Encubator AB, Center for Intellectual Property, and division of Management of Organizational Renewal and Entrepreneurship, thank you for your contributions to my understanding of structure, context and process in your various fields. These few words cannot express how much I have gained from being part of these intellectual and entrepreneurial communities.

To all the nascent entrepreneurs of CSE and GIBBS, past, present and future: you have been the inspiration and motivation for this work. Your willingness to engage and question and courage to act is admirable. I hope that this work can be one small way to pay it forward. And to Boo Edgar, for your energy and enthusiasm of all things entrepreneurial.

To Jonas Berggren, Morgan Skarin, and the growing Encubator family, thank you for years of collaboration and mutual development, and all the ways in which you have supported the work of this thesis.

To Ulf Petrusson and Bo Heiden, for an introduction to a unique network of actors engaging in intellectual property issues, impacting entrepreneurial action and policy, and for taking the chance on a fellow American in the first place. Through CIP, I have also had the privilege to work with a particular set of TTO professionals and academics, notably Karen Hersey, Gregory Graff and Michael Cleare, who have provided insight and knowledge about the changing policies and nuances of entrepreneurial activity and IP rights in the university atmosphere. I am grateful for your adoption of a young fledgling.

To the BCERC Doctoral Consortium 09-ers thanks for the fun, openness and continuing inspiration. And special thanks to Julienne Senyard and Casey Frid for their help and support.

To Per Svensson, Tobias Fredberg and Maria Elmquist for your advice and support. To the MORE doctorands: Anna Yström, Lena Ekelund, Leena Wikmalm, Kristina Henricson, and Martin Lackéus, thank you for being an open, inspiring and caring community of scholars. Leena, thank you for all the discussions and reflections contributing to a better understanding of not only content, but the bigger picture. And to the MORE entrepreneurship research group, including Karl Palmås, for giving energy, motivation and perspective during the final sprint.

Tomas Faxheden, we have survived the German autobahn, 'close talkers' and countless other adventures – thank you for sharing the journey with me and becoming my friend in the process. Anneli Hildenborg, for your unquestioned friendship and honest feedback – thank you for lending your ear. Lars Andersson, for explaining Gnösjö and so many other things to a non-Swede; your advice has been greatly appreciated. Håkan Wall, the wizard of all things technically mysterious, thank you for saving my sanity more than once. And Yvonne Olausson, Susanne Lidhammar, and Anna Tullsten for their help and support in answering all my questions and queries.

To Anne Donnellon, for knowing me before I knew myself. I could not imagine or wish for a better mentor. Your encouragement, sage advice, and infinite generosity have been a blessing that I still do not fully comprehend.

To Helen for our 'ranty' runs and various adventures, giving perspective and understanding to the trials of doctoral studies. And Julie, for being my hero and my friend, always listening, never judging, and knowing when to tell me what a goober I am…you inspire me to be a better person.

To my parents, for a lifetime of support, encouragement, and wisdom – thank you. You have been incredible role models and I cherish the values you have instilled in me. More than I can ever express in words, I am grateful for your love, strength, kindness and quiet gravitas. And the stubbornness…three peas in a pod. And to Jason, you have been the voice of reason, the laughter on a gloomy day, my comfort and mirror… for all the sacrifices you have made, calming support you have given and for your belief in me, I thank you with all my heart. Time for the mountains…

Karen Williams Middleton
Göteborg, November 15, 2010

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ABBREVIATIONS

Bayh-Dole (Act)	U.S. University and Small Business Patent Procedures Act of 1980
CAUSEE	Comprehensive Australian Study of Entrepreneurial Emergence
Chalmers	Chalmers University of Technology
CSE	Chalmers School of Entrepreneurship
CSU	Colorado State University
CTT	Center for Technology Transfer (at the University of Pennsylvania)
EECL	Engines and Energy Conversions Laboratory
GIBBS	Gothenburg International Bioscience Business School
IP	Intellectual property
PSED	(U.S.) Panel Study of Entrepreneurial Dynamics
Teachers exemption	Swedish Law (SFS 1949:345 § 1-10)
TTO	Technology transfer office
VCS	venture creation subunit

1 INTRODUCTION

Individuals embarking on an entrepreneurial journey for the first time are faced with quickly adapting to situations without knowing the 'rules of the game', or more importantly, knowing how to change the rules in order to suit their endeavors. These individuals, defined as nascent entrepreneurs, lack awareness of the ripple effects that policies, norms, markets and numerous other factors can have on their intended actions. Learning how to 'play the game' means learning how to effectively react and even stimulate the ripples in order to not only survive, but thrive in creating a new venture. This begs the question: is the only way to learn how to play through the 'school of hard-knocks' (i.e. real life) where the consequence may be never being able to play the game again? Or can nascent entrepreneurs learn how to behave so as to achieve their ambition of creating new ventures. This thesis explores how the development of entrepreneurial behavior can be facilitated through investigating nascent entrepreneurship taking place at the university.

1.1 A FOCUS ON ACTION

Facilitation of entrepreneurial behavior development requires understanding what entrepreneurial behavior is and how it is developed. This presents a major challenge because behavior that leads to entrepreneurship is not well understood (Aldrich, 1999). A common approach used to research entrepreneurial behavior investigates those intending to take on the role of entrepreneur (for example Shook et al., 2003). The field of entrepreneurship therefore has had a strong association between the phenomenon of entrepreneurship and the individual, with focus on the traits and characteristics of the individual, rather than the surrounding context (Aldrich and Wiedenmayer, 1993). This is illustrated through the 'hero' status often associated to 'the entrepreneur' (Leibenstein, 1987, Schoonhoven and Romanelli, 2001). However, despite extensive investigations into the make-up of individuals in order to identify them as entrepreneurs (see for example Brandstätter, 1997, Kets de Vries, 1977, Rauch and Frese, 2007), researchers still have limited understanding of what leads an individual to become an entrepreneur (Markman et al., 2002). A review of literature regarding research on the characteristics of the entrepreneur found no compelling difference between individuals beyond cognition (Busenitz and Barney, 1997). Based on this, in this thesis I chose to instead focus on how the environment, with which the entrepreneur interacts, can facilitate development of entrepreneurial behavior.

Some researchers, such as William Gartner (1988), argue that the entrepreneurial process is of core interest and research should study the actions taken by individuals engaged in entrepreneurship instead of the individuals themselves. Gartner's behavioral approach is a valuable alternative to a trait approach:

> the "*behavioral approach views the creation of an organization as a contextual event, the outcome of many influences.* (p 22) …"*If we are to understand the phenomenon of entrepreneurship in order to encourage its growth, then we need to focus on the process by which new organizations are created. This may seem like a simple refinement of focus (i.e. look at what the entrepreneur does, not who the entrepreneur is), but it is actually a rather thoroughgoing change in our orientation*" (p 27).

Thus, in order to investigate how entrepreneurial behavior development can be facilitated, I start with the description of entrepreneurial behavior given by Gartner and Carter, stating that it is "an individual level phenomenon, which occurs over time (is a process), and results in an organization as the primary outcome of these activities" (2003, p 196). Entrepreneurial behavior is seen as an individual phenomenon, in contrast to an understanding of the behavior of a firm, involving discrete units of actions which can be observed (Bird and Schjoedt, 2009). It is behavior related to entrepreneurship seen as a process of emergence (Bhave, 1994, Gartner et al., 1992, Reynolds and Miller, 1992), the outcome of which is the creation of a new venture (Gartner, 1988). Thus, entrepreneurial behavior is behavior of individuals engaging in a process of creating new ventures, where the process includes units of actions which can be observed by others. The process of creating new ventures involves a combination of actions including, for example, identifying an opportunity, securing funding, developing technology and determining a legal form, among others (Baron, 2002). Sets of actions found to be important to the creation of a new firm, such as implementing a productive process, establishing firm presence and creating organizational and financial structures (Reynolds, 2007), can thus be initially proposed as potential entrepreneurial behaviors.

1.2 Entrepreneurial Behavior Development

In their description of entrepreneurial behavior, Gartner and Carter include that it is a process that occurs over time. In this thesis, I claim that it is by going through the process that the individual develops entrepreneurial behavior. Of the two main theoretical approaches to entrepreneurship: Discovery Theory (Shane, 2003) and Creation Theory (Casson, 1982, Gartner, 1985), this thesis takes a Creation Theory approach. Creation Theory has three main assumptions. The first is that an opportunity is subjective. Related to this, the second assumption is that individuals (entrepreneurs) create the opportunities (as opposed to recognizing them). These individuals are not necessarily unique, particularly before going through the creation process. Finally, while going through the process, these individuals bear uncertainty, which is the third assumption. Uncertainty means that not only are the probabilities of outcomes unknown, but the outcomes themselves are not known or knowable. The entrepreneurs, believing in an opportunity, test it with potential customers or in the marketplace, getting feedback or reacting to responses, and then progressing to the next testing phase until the opportunity is successful in the marketplace (Alvarez and Barney, 2007).

Linking to Creation Theory, entrepreneurial behavior is seen here as the combination of actions, carried out by the entrepreneur, which continue to adjust and define the opportunity and position it as acceptable to the market, such that a new venture is the primary outcome. The individual exhibiting the entrepreneurial behavior by the end of the process did not necessarily have such behavior to start. Instead, going through the process develops the behavior considered entrepreneurial. The developed behavior then creates the perception of a differentiation between those deemed entrepreneurs and those deemed not to be, such that the differences are the result, or the effect, and not the cause of the entrepreneurship (Sarasvathy, 2001).

However, the process through which the entrepreneur goes when creating the new venture does not take place in a vacuum. Bruyat and Julien (2001) categorize four key dimensions influencing entrepreneurship – individual, environment, resources and process. These dimensions also impact behavior. The influence of the process on behavior has been described above. In this thesis, actors, objects, infrastructure, procedures, various types of resources, etc. are collectively defined as environment[1]. Next I will show how the individual and environment (thus including resources) are developing behavior.

1.2.1 Behavior as a Function of Individual and Environment

Behavior can be seen as a function of individual and environment (Ekehammar, 1974, Heider, 1958, Lewin, 1951, Sansone et al., 2004). Behavior is also considered as socially observable human action influenced by individual processes of cognition, decision and intention (Bird and Schjoedt, 2009). Action cannot take place unless it is carried out by someone. This thesis takes the premise that entrepreneurial behavior is individual action developing through the nascent entrepreneur's interaction with her environment, where environment is understood to include not only structural components and infrastructure, but social components, including human resources and social networks as well (Aldrich and Martinez, 2001, Chell, 1985, Mazzarol et al., 1999).

As a part of Social Learning Theory (1977), Albert Bandura argues that human behavior is developed in relation to one's environment (see Figure 1), in combination with personal variables, through observational learning (1977) and reciprocal determinism (1978). An individual's actions can affect her environment and her environment can affect her behavior, including the way in which she chooses to change the environment, and how those changes impact her reactions. It is in such a way that the individual's environment, including environmental factors, can shape self-efficacy (Bandura, 1982); the way in which decisions are made based upon expectations when interacting with the environment.

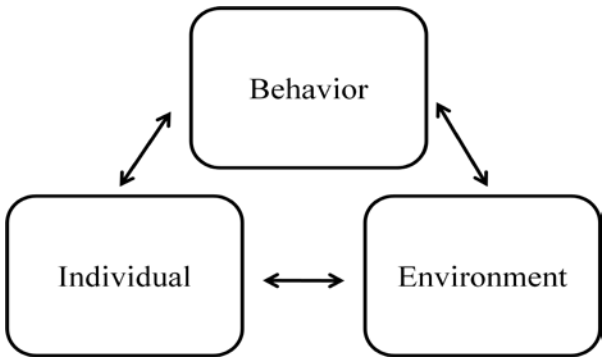


Figure 1. Behavior as a function of individual and environment

[1] Environment, in dictionary terms, is "the totality of circumstances surrounding an organism or group of organisms, especially: a. the combination of external physical conditions that affect and influence the growth, development, and survival of organisms; and b. the complex of social and cultural conditions affecting the nature of an individual or community". (American Heritage, 2006). William Bygrave's (1989) conceptual model of the entrepreneurial process shows resources as categorized under environment.

1.2.2 Behavior which is Opportunity-based and has High-growth Potential

In order to understand how entrepreneurial behavior development can be facilitated, I explore influences of the environment with which the nascent entrepreneur is interacting, within a specified setting (discussed further in Chapter 2). Bird and Schjoedt (2009) argue that entrepreneurial behavior research requires specification in order to understand how actions can be predicted and controlled (changed) towards achieving desired entrepreneurial outcomes. Thus, in this thesis I specify the new venture created as that which is opportunity-based and considered to have high-growth potential (Siegel et al., 1993, Timmons, 1986).

Baumol (1993) summarizes two main trends of entrepreneurship as firm-organizing and innovative[2]. The first is mainly described as repetition of what has been proven to work before, only presented in a new format, where the latter is described as driven by the 'innovative changer of the economy' who is alert to seize upon new opportunities. I relate the latter description, innovative, with Stevenson and Jarillo's definition (1990) of entrepreneurship as pursuit of an opportunity, and thus rather refer to this as opportunity-based entrepreneurship. In relation to description of new firms, Timmons (1999), presents a set of criteria used by venture capitalists for evaluation (p. 86-95), where ventures in the process of being formed are considered to be high-growth potential when they exhibit, among other things, novel offerings that change the way people live and work and have potential proprietary protection. Technology-based entrepreneurship (Hsu, 2008, Roberts, 1990) is often associated with high-growth potential, as the intellectual property (IP) upon which the technology is based is often protected through patent or other IP rights. Technology-based ventures are subsequently seen as opportunity-based.

Developing firm-organizing knowledge and behavior is considered viable through education and experiential learning, as principles from emerging and proven models and methods can be discussed, tested, and analyzed (Baumol, 1993). But to respond to society's fundamental reliance and desire of entrepreneurship which will generate wealth and welfare, what we are really seeking is behavior that allows for the capturing of that which was not there before. This is behavior which transforms ideas into something to which the rest of us can build a tangible association, to the point that we not only perceive value, but are willing to illustrate this through transactions. Therefore, the entrepreneurial behavior explored in this thesis is that which results in opportunity-based firms showing high-growth potential. Thus, using the general framework of Social Learning Theory presented in Figure 1, in this thesis, I specify entrepreneurial behavior as a phenomenon related to an individual acting (and being

[2] William Baumol (1993), taking an economic perspective, outlined two main scientific trends when attempting to define entrepreneurship, personified through the entrepreneur, building from the 'grandfathers' of the field: Say, Cantillon, and Schumpeter. In basic terms, Jean Baptiste Say (Say, 2007 [1863]) defines the entrepreneur as the assembler of capital, knowledge and labor in order to launch, and potentially develop, new business. Joseph Schumpeter (1942), again in basic terms, defines the entrepreneur as an exceptional being who changes the economy by means of an innovation – a process most commonly recognized as Schumpeter's "creative destruction". Richard Cantillon has been interpreted as both supporting Say's 'creator of business' definition (Baumol, 1993), or Schumpeter's 'innovative changer of the economy' definition (Bruyat and Julien, 2001). The two categories of firm-organizing and opportunity-based also broadly align with the general descriptions emerging from more than a decade of Global Entrepreneurial Monitor (GEM) studies. These studies have, since 1999, investigated the phenomenon of entrepreneurship on a country-wide scale and recognized two main stimuli for entrepreneurial action taken by individuals: necessity and opportunity (Reynolds, et al., 2005).

observed) in an environment of opportunity-based high-growth potential new venture creation. This is conceptually presented in Figure 2.

The thesis focuses on how the development of entrepreneurial behavior can be facilitated. This requires synthesis of learning theories, such as "learn-as-you-go" (Collins and Moore, 1970, Gartner, 1985) and learning by doing (Cope and Watts, 2000) skill development and learning spaces (Kolb and Kolb, 2005) in relation to education and training structures. As facilitation is the provision of facilities, learning and development is considered in relation to environmental factors.

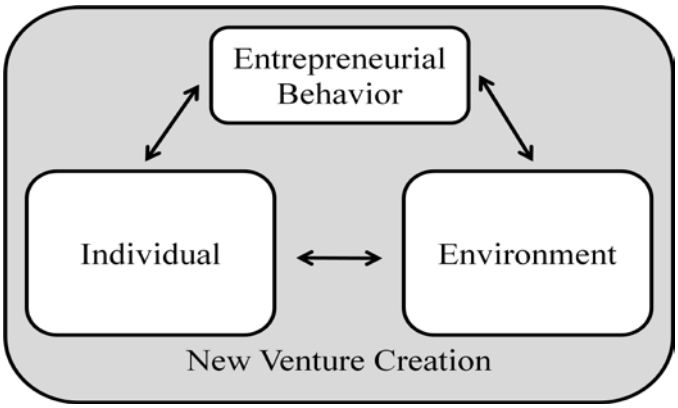


Figure 2. Social Learning Theory adapted to entrepreneurship

1.3 Purpose and Research Questions

The purpose of this thesis is to understand how the development of entrepreneurial behavior can be facilitated. The thesis explores entrepreneurial behavior development from a systems perspective, described in Chapter 4, which recognizes relationships between interdependent parts and their impact on interactions.

Building upon a view of behavior as developed in relation to both the individual and her environment and through a process of creating a new venture, facilitation of entrepreneurial behavior development is explored through three specific research questions:

RQ1 Which behaviors are developed as part of the process of creating a new venture?

RQ2 How can factors of the environment facilitate the development of entrepreneurial behavior?

RQ3 How can interaction between the individual and her environment facilitate the development of entrepreneurial behavior?

1.4 Composition

In this thesis, I mainly use five terms to demarcate my research into entrepreneurial behavior development and facilitation – nascent, venture creation, opportunity-based, high-growth potential, and university. With these terms, my intention is to describe my area of study as

associated to entrepreneurship taking place at the university, mainly stemming from university-based research, which is patented or patentable and considered to have high-potential for growth. The entrepreneurial process, intending to result in a venture is driven by individuals who do not have prior experience in creating and incorporating a venture. Opportunity-based and high-growth potential venture creation is subsequently seen mainly from within a university environment, further described in Chapter 2. In Chapter 3, nascent entrepreneurship is discussed in relation to existing literature, and in relation to the theoretical premise of the thesis, synthesizing theories on the entrepreneurial process, entrepreneurial behavior, positioning and learning. Chapter 4 addresses methodological considerations and choices made. The specific contributions of appended papers are presented and related to the overall purpose of the thesis in Chapter 5. The discussion in Chapter 6 focuses on the synthesized understanding towards facilitation of entrepreneurial behavior development generated in Chapter 3, integrating empirical insights from the appended papers. Conclusions are drawn in Chapter 7, followed by implications and future research in Chapter 8.

2 BACKGROUND

Accessing individuals as they are engaging in nascent entrepreneurship is one of the primary problems facing the research field in nascent entrepreneurship (Kessler and Frank, 2009, Reynolds et al., 2004). I attempt to address this challenge in my research by investigating nascent entrepreneurial activity within the university. The university may not necessarily seem to be an effective arena for developing the driven, single-minded determination utilized in starting new ventures. University research is often early-stage, knowledge-based ideas, requiring longer gestation periods and multiple stages of capital investment in order to reach the marketplace. However, the university, engaging in research utilization, is a valuable environment for knowledge-based development, sometimes requiring longer-term commitment and inter-disciplinary mechanisms for support. The university is can thus be an appropriate empirical setting as it is an environment capable of facilitating entrepreneurial activity (Brennan and McGowan, 2006, Etzkowitz, 2003, Rasmussen and Borch, 2010, Wright et al., 2004) resulting in the creation of new ventures. Thus, instead of an arena of or for the 'heroic-entrepreneur' (Leibenstein, 1987), the university can be where behavior is in focus, both in relation to the individual and influences of the environment, facilitated through infrastructure (Van De Ven, 1993). The university setting may even facilitate the reduction of risk by providing an enabling environment for entrepreneurial activity (Lundqvist, 2009).

Utilization of the university as the empirical setting allows for exploring entrepreneurial behavior developing as the process of venture creation is on-going. In order to observe how factors and interactions impact the development of entrepreneurial behavior, a systems perspective is taken, recognizing contributions from different levels of analysis in a micro-aggregate mix (Davidsson and Wiklund, 2001, Low and MacMillan, 1988). Organizational boundaries allow for more distinctive entry and exit points and designated role responsibilities than can be determined when exploring nascent entrepreneurial activity in society as a whole. At the same time, the university is understood to exist within the greater context of society, connected through formal rules and regulations, and informal norms.

This chapter presents the empirical landscape and specific setting utilized in the thesis. Three main areas of entrepreneurship taking place at the university – university entrepreneurship, entrepreneurship education and entrepreneurial activity – are discussed in order to understand their potential influence in developing and facilitating entrepreneurial behavior. Finally, the specific structure and attributes of the core empirical setting are discussed.

2.1 EMPIRICAL LANDSCAPE – THE UNIVERSITY AS AN ENTREPRENEURIAL ECOSYSTEM

The university encompasses multiple levels of activity and interacting components. While the university can be understood as having one fundamental purpose – to provide benefit to society – this quickly dissipates into multiple missions and numerous operational objectives across the various organizational and operational levels of the university (Fayolle and Kyrö, 2008). Institutional structures of norms, established practices, and rules are intended to regulate interactivity (Edquist, 2006). A dominant view of university organization is captured in the organizational archetype of the "professional bureaucracy" (Styhre and Lind, 2009). This organizational form implies individual autonomy based upon standardization of inputs in terms of skills, exams and other internalized behavioral patterns. It hires duly trained specialists with internalized norms (professionals in the university case being, for example,

professors) for the operating core, and then gives them considerable control over their own work. However, as more and more universities are expected to take on the mission of research utilization (Etzkowitz and Leydesdorff, 2000, Mansfield and Lee, 1996, Mowery and Sampat, 2005, Rasmussen et al., 2006, Tassey, 2005), a setting is established in which entrepreneurial activity takes place (Etzkowitz, 2003, Rasmussen and Borch, 2010, Wright et al., 2004). Instead of an ivory tower of independent researchers acting autonomously, the university engaging in entrepreneurial activity may be better understood as an entrepreneurial ecosystem (Fetters et al., 2010, Neck et al., 2004, Spilling, 1996), composed of physical infrastructure, formal and informal networks and a community culture. These ecosystems contain multiple organizational boundaries, both stringent and open with varying levels of cooperation and interdependency.

The university, as an entrepreneurial ecosystem, exists within and for the benefit of society. The ecosystem with open boundaries can even be seen to allow for the coming and going of other external actors. Soci(et)al (read: social and/or societal, depending upon the geo-cultural perspective) entrepreneurship can be seen as entrepreneurship taking place within a societal (non-corporate) context providing some kind of societal utility. Societal entrepreneurship is integrated into the thesis due to the interest in interaction between nascent entrepreneurs and the environment with which they interact. Only some members of the role-set are directly tied to the university landscape (through employment or affiliation). Thus the remainder could be seen as members of the entrepreneurial ecosystem, but with other roles in society.

2.1.1 Entrepreneurship at the University – University Entrepreneurship

Entrepreneurship at the university is most commonly understood as the transfer of university research to society through commercialization or utilization activities. These activities can include technology transfer, patenting, venture creation, incubation and science park development, and regional development, among others (Libecap, 2005, Rothaermel et al., 2007, Shane, 2004b). Technology transfer and research commercialization or utilization most often results in the creation of property which is intellectual or knowledge-based, either in the form of a patent or agreement, which can then be transferred into a license, collaboration or venture (for example De Coster and Butler, 2005, Wright et al., 2004). In general, university incubators have the purpose to promote the development of new research or technology-based ideas stemming from the university (Hackett and Dilts, 2004, McAdam et al., 2006). They act as coordinators of research, technology, capital and entrepreneurial drive towards industrial partners or customers through a commercialization process. Thus university business incubators are also involved in new venture creation, assisting emerging ventures through provision of market access, services, support networks and financing (Grimaldi and Grandi, 2005, McAdam and McAdam, 2006).

Research commercialization and utilization activities are recognized as broadly defined under the term university entrepreneurship, structured into four sub-streams: entrepreneurial university, productivity of technology transfer offices, new firm creation, and environmental context including networks of innovation (Rothaermel et al., 2007). Rothaermel and colleagues present a conceptual framework (Figure 3) which illustrates the interaction and integration of the four sub-streams, facilitating the process of entrepreneurship at the university.

The entrepreneurial university represents one way of describing the university which has evolved from a traditional teaching and research institution (Dasgupta and David, 1994, Etzkowitz, 2004, Lambert, 2003, Nelson, 2004, Stevens, 2004, among others) to a commercial actor in society. Many societal factors related to the 'environmental context including networks of innovation' presented in Rothaermel et al. (2007) conceptual framework (see Figure 3) are not specifically addressed. Thus, it is important to point out some of the specific components associated to existing national regulations that impact the empirical setting from the societal level, in the context of this particular study.

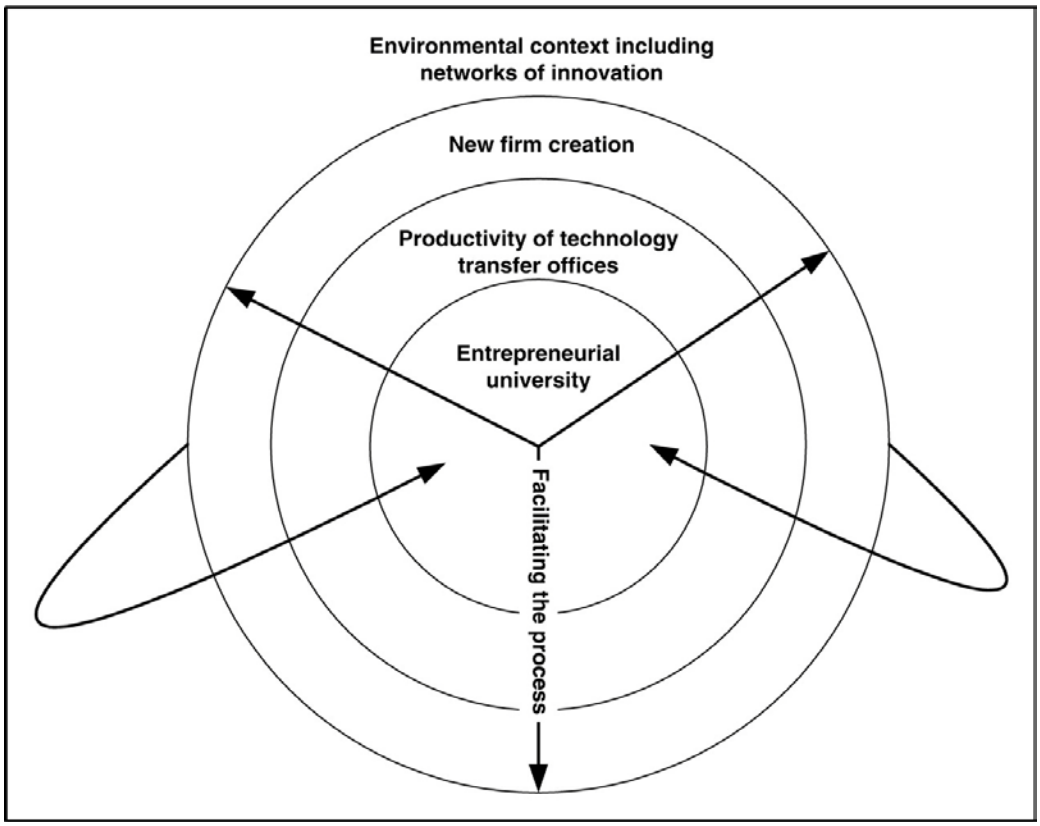


Figure 3. Rothaermel et al. (2007) Conceptual framework of university entrepreneurship

The addition of commercial activity to the university has been explained in certain research literature through the triple helix model where university-industry-government cooperation is intended drive regional development (Etzkowitz and Leydesdorff, 2000, Etzkowitz et al., 2000). Commercial activity has brought regulatory changes. One key example is the governmental regulation regarding ownership of intellectual property at the university. The two national contexts explored in this thesis are Sweden and the U.S. In Sweden, university researchers hold, independently, the responsibility of commercializing their research – this is commonly known as the teacher's exemption or professor's privilege[3]. This differs from the

[3] SFS 1949:345§1-10: This law, known as the teacher's exemption or the professor's privilege, states that the results of publically-funded research are owned by the researcher (usually the professor) and not the research institution at which it was conducted. In Sweden, the scope extends to include teachers, post graduates and doctoral candidates.

more common university regulation utilized in many countries, stemming largely from the model developed in the United States, known as the Bayh-Dole Act[4], and copied in other industrialized countries (O'Connor et al., 2010). These policies stipulate the rights and responsibilities for universities when commercializing federally funded research. Literature has explored the effects and impact of the regulatory changes (Bozeman, 2000, Goldfarb and Henrekson, 2003, Mowery et al., 2001). The regulatory changes are impacting the environment in which entrepreneurial activity is taking place at the university, for example through ownership rights. Financing levels and objectives differ across regions and between nations, in part dependent upon tax structures and regulations. Regional (for example Cooke, 2001, Cooke et al., 1997) and national (for example Edquist, 2006, Lundvall et al., 2002) impact on entrepreneurial activity is an extensive area of research, the details of which are outside the scope of this thesis. Additional legal norms and infrastructure also impact entrepreneurial activity from a societal level. For example, it is generally acknowledged that the legal consequences of bankruptcy in Sweden have a more significant impact on entrepreneurial activity than in other parts of the world.

2.1.2 Entrepreneurship Education at the University

Entrepreneurial education can be understood as a common phenomenon within the university setting (Fayolle and Kyrö, 2008, Finkle and Deeds, 2001, Katz, 2003, McMullan and Long, 1987, Solomon, 2007). University-level entrepreneurial education with emphasis towards venture creation (Menzies, 2004) has implicitly the same intent as the third mission of the university – to contribute to future economic development stemming from new innovations. Combining entrepreneurial education and university entrepreneurship activities (Moroz et al., 2006, Nelson et al., 2005, Pittaway and Cope, 2007, Siegel et al., 2005), allows for using ideas left 'on-the-shelf' by university researchers (Vestergaard, 2007), particularly in the form of venture creation and incubation. However, while it is recognized that university technology transfer and entrepreneurial education may be complementary, relatively little integration of the two areas has taken place (Nelson et al., 2005). Nelson et al. found that, based on three studies at Stanford University, the most effective integration was through soft rather than structured channels, allowing for autonomy and flexibility. This is perhaps due to the potential challenges encountered when combining academic and business perspectives and objectives, such as concerns regarding entrepreneurial activity leading to potentially conflicting roles and responsibilities of university employees (Laukkanen, 2003, Siegel et al., 2007, Tuunainen, 2005).

Research regarding action-based entrepreneurial education at selected Swedish universities, including Chalmers, has been conducted in the past (Jacob et al., 2003, Rasmussen and Sorheim, 2006). However, more longitudinal and in-depth research is needed (Pettigrew et al., 2001). The educational component of the empirical setting is considered important in relation to the objective of studying entrepreneurial behavior as it facilitates a setting intent upon training and development as part of a learning process.

[4] U. S. University and Small Business Patent Procedures Act (The Bayh-Dole Act). This Act is a form of institutional ownership, where publically-funded research is owned by the institution at which the researcher works and conducted the research. Bayh-Dole also extends to non-profit institutions. Generally the Act operates under remuneration, such that a portion of the royalty obtained from marketed items is distributed to the researchers.

2.1.3 Entrepreneurial Activity at the University

While university entrepreneurship covers a substantial proportion of the general entrepreneurial activity taking place at and/or associated with the university, there are some areas of entrepreneurial activity conducted by individuals at the university, which have to a greater or lesser extent been discussed in independently established streams of entrepreneurship research. Louis, et al. (1989) provides an overview of entrepreneurial activity common in the university setting including academic (Glassman et al., 2003, Shane, 2004a), research (Kurek et al., 2007) and institutional (DiMaggio, 1988) entrepreneurship. Academic, research and institutional entrepreneurs differentiate from the majority of university researchers who are not interested in championing their ideas in the marketplace by taking on the role of entrepreneur because they already have a decided career path within academia (Bosma and Harding, 2007). While academic, research and institutional entrepreneurs are not the prime objects of study, they represent other entrepreneurial actors at the university that have the potential to both impact the entrepreneurial behavior of the nascent entrepreneurs, as well as be impacted by systemic factors shaping their own behavior. Kenney and Goe (2004) found that sub-cultures supportive of entrepreneurial activity can counter the disincentives of a university environment ambivalent to entrepreneurial development. These 'other' entrepreneurs may take on responsibilities as mentors and role models in the venture team role-sets of the nascent entrepreneurs and impact the development of their behavior as they engage in the creation of new ventures. There is sparse research regarding the team aspect of entrepreneurship, though with recent work by (Ensley et al., 1999, Ensley et al., 2002), but it is generally recognized that there is a strong team component that contributes to entrepreneurship and venture creation (Davidsson and Wiklund, 2001).

Entrepreneurial activity at the university is not limited to the nascent entrepreneur (whether this be a hired professional, a student, or someone else) and those immediately associated to her, such as entrepreneurial team members. The nascent entrepreneur is associated to a particular social network, called a role-set (Aldrich and Zimmer, 1986, Carsrud and Johnson, 1989). The role-set is a set of individuals that impact the social context of entrepreneurial behavior of the entrepreneur (in this case, nascent), as they partake in defining the social status of the 'role' of nascent entrepreneur. The role-set operates in various organizational configurations, sometimes with local norms and routines separate or even autonomous to those of the nascent entrepreneur. They may be employed within or outside the university, or may have partial employments, introducing multiple role responsibilities. In this thesis, I define the role-set to not only include the family members, financers, partners and distributors suggested by Carsrud and Johnson (1989), but also other advisors and coaches, such as faculty, alumni and board members.

2.2 The Core Empirical Setting - Entrepreneurial Activity at the Subunit

The Venture Creation Subunit (VCS) at Chalmers University of Technology (Chalmers) is the core empirical setting in the thesis. The setting consists of a combined masters-degree entrepreneurial education and an incubator, operating at a technical university, and is considered as an environment in which individuals engage in a process of opportunity-based high-growth potential venture creation. A community of stakeholders, both formally and informally linked to the subunit, described as a role-set, interact with nascent entrepreneurs as they collectively create new ventures. Insider access to the empirical setting allows for real-

time in-depth study, giving deep understanding to interactions facilitating the development of both the new venture and the nascent entrepreneurs. Application and admissions requires that individuals communicate their motivation towards engaging in and learning about venture creation, which is considered to signify intention. Upon acceptance, individuals go through a period of training and development before entering the one-year incubation period. Incubation period entry is again considered to signify intention, this time coupled with signing a contractual agreement. The Chalmers VCS is argued as providing insight into critical junctures (Vohora et al., 2004) during the nascent process, and facilitating the development of entrepreneurial behavior, as the environment produces newly incorporated firms on a yearly basis.

As of February 2010, more than 250 nascent entrepreneurs have graduated from the Chalmers VCS, since its initiation in 1997. The Chalmers VCS has a track record of repeated venture creation and firm incorporation, summarized as 112 ventures attempted, of which 43 (38.4%) were successfully incorporated, and 35 (31.25%) are still in business (as of end of year 2009). This represents an 81% survival rate of incorporated ventures, with approximately 40% of the nascent entrepreneurs engaged in venture creation during the incubation period employed into the venture at time of incorporation. The remaining did not continue with the project at time of incorporation, either due to lack of financing to support their continued involvement or a conscious choice to pursue an alternative employment position. The Chalmers VCS is considered representative of high-growth potential, as the combined portfolio of companies have a shared market value (as of end of year 2009) of 69.6 MEUR, having attracted more than 29.4MEUR in investments, and in total employ 312 individuals (Berggren et al., 2010).

In the Chalmers VCS, there is a need for certain structural designs that establish some boundaries between academic and business activities, due to legal requirements. Academic activities are organized under masters programs while business activities are organized under the incubator (presented as the Education and Incubation “boxes” Figure 4). However, actors working and associated to the academic and business activities are co-located at the Chalmers VCS within which they also conduct combined academic and business activities. Thus, for the most part, both separate and combined activities of the Chalmers VCS are conceptually organized under two entities labeled as schools (represented by the dashed line “box” in Figure 4). Each school has a specific area of concentration: one builds technology-based ventures, ranging from nanotechnology to applied materials, covering all the main engineering sciences and information technologies – called Chalmers School of Entrepreneurship (CSE), while the other builds bio- and life science-based ventures – called Gothenburg International Bioscience Business School (GIBBS).

The university housing the core empirical setting, Chalmers, and its various subsystems and subunits, has been described as an entrepreneurial university (Clark, 1998). As early as the 1980s, researchers were investigating the spin-out company rates at Chalmers in comparison to rates at Stanford University and Massachusetts Institute of Technology, finding that the rates were comparable, though Chalmers companies were smaller and newer (McQueen and Wallmark, 1982). These same researchers then specifically focused on faculty performance in relation to innovation activities, with evidence supporting an increasing rate of entrepreneurial activity in the form of spin-out companies, as correlated to patenting activity (McQueen and Wallmark, 1984). Both studies recognize entrepreneurial activity taking place

at the subunit levels of the university. As these activities evolved at the university, so did the research policy of Chalmers, oriented towards transforming into an entrepreneurial actor, thus drawing attention to the importance of interaction between the national innovation policy, at the societal level, and the organizational autonomy and flexibility at the subunit and other operational levels (Jacob et al., 2003). The Jacob et al. study showed that both infrastructural and cultural changes were necessary to achieve creation of an entrepreneurial university at Chalmers.

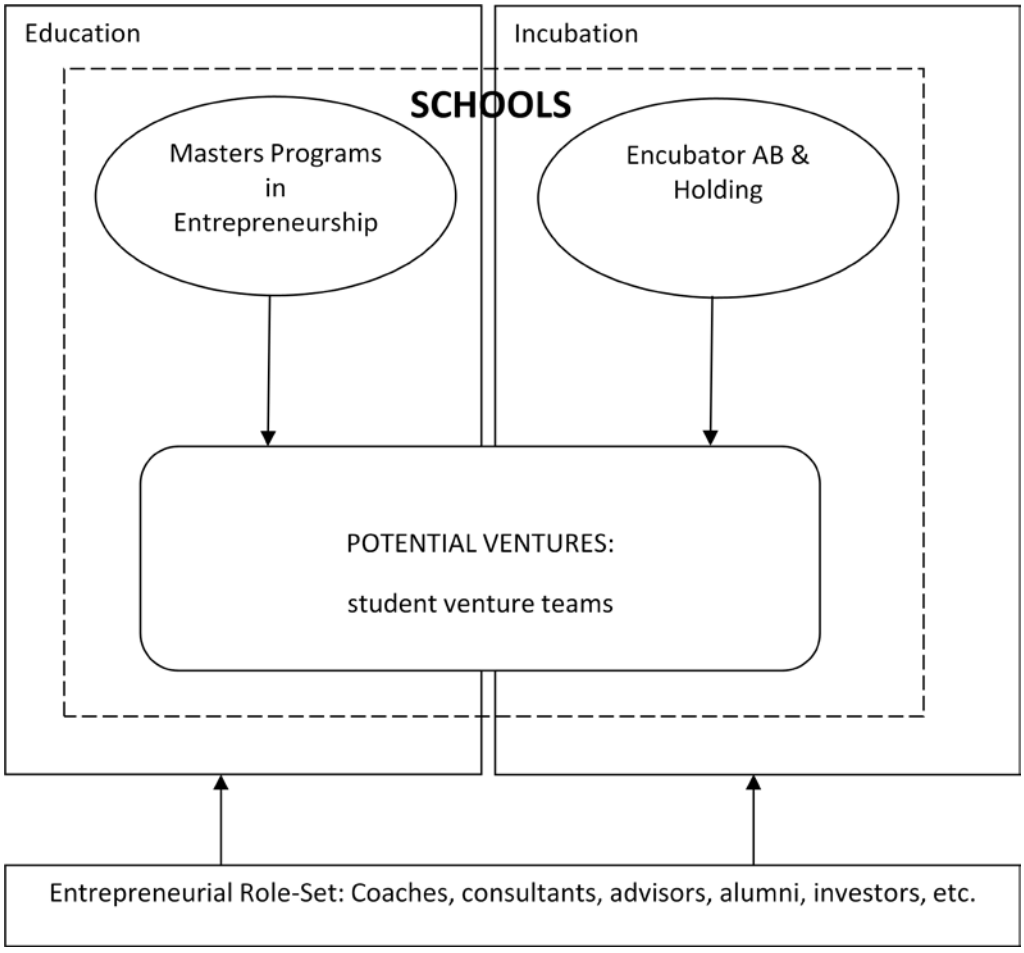


Figure 4. The integrated education and incubation environment

Comparable to the Chalmers VCS are subunits at other universities engaging in entrepreneurial activity, but stemming from different points of departure in regards to their mission objectives. These subunits are also considered to be venture creation subunits as they are environments in which individuals engage in a process of opportunity-based high-growth potential venture creation, supported by additional actors. The University of Pennsylvania Center of Technology Transfer (CTT) case represents a university subunit championing transfer of university technology and research findings, which has reached out to both the research and education communities at the university to develop programs that can facilitate delivery towards multiple missions simultaneously. The Engines and Energy Conversion Lab (EECL) at Colorado State University (CSU) represents a subunit with a steep tradition in

research which has evolved through university-industry collaboration to become a Supercluster™ linking research, education and venture creation. While each of the university subunits have one of the three university missions as their core operating objective, each actively pursues multiple missions through synergized activities at the local level, and in some cases across subunits. The Chalmers VCS is considered the intrinsic case (Stake, 2005) of the thesis, as it is a case in which the phenomenon of study can be investigated in order to gain deeper understanding. The VCSs of University of Pennsylvania and Colorado State University are used as comparison studies, addressed specifically in the first appended paper. The intrinsic and additional cases of the thesis are discussed in detail in Chapter 4, and presented as part of the appended paper discussions in Chapter 5.

3 THEORY AND LITERATURE EXPLORING ENTREPRENEURIAL BEHAVIOR DEVELOPMENT

Stevenson and Jarillo claim that "individuals in our society may attempt entrepreneurship and often succeed even if they do not fit the standards of academic judges as to their entrepreneurial personality" (1990, p 22). Davidsson notes that perhaps there is more value in the question "'How does the process affect the person?' rather than 'How does the personality impact entering the process?'" (2006, p 10). Chapter 1 defined entrepreneurial behavior as an individual phenomenon developed over time through a process of creating a new venture within a structured context. The scope of investigation was refined to the nascent phase with emphasis on opportunity-based, high-growth potential venture development taking place within the university setting. Chapter 3 starts by reviewing literature regarding nascent entrepreneurship and the entrepreneurial process, culminating in a synthesized conceptual model of the entrepreneurial process. Actions related to the process as well as categories of entrepreneurial behavior are then derived from literature. I return to Gartner's behavioral approach (1988) as a basis for connecting the process to the environmental. Using Social Learning Theory (Bandura, 1977), combined with other theories, I translate understanding of how interaction with one's environment can influence the development of entrepreneurial behavior, resulting in a proposed model for facilitation of entrepreneurial behavior development. Finally, I return to the synthesized process model to identify factors influencing entrepreneurial behavior development.

3.1 NASCENT ENTREPRENEURSHIP

Nascent entrepreneurship, also known as firm gestation or organizational emergence, start-up, founding, etc. (Aldrich, 1999, Carter et al., 1996), has recently been thoroughly reviewed by Paul Reynolds (Reynolds, 2007, Reynolds and Curtin, 2008) and Per Davidsson (Davidsson, 2006). The term nascent indicates initial engagement in entrepreneurship, but with lack of prior experience (Rotefoss, 2005). Generally, nascent entrepreneurship regards entrepreneurship up to the point of firm establishment. Reynolds (2000) describes the creation of a new venture as a process in four stages – conception, gestation, infancy and adolescence – signifying development into some form of organizational legitimacy, where the venture becomes recognizable to the marketplace. Accessing the pre-incorporation phase of development, including both of the potential future venture and the nascent entrepreneur(s) championing the process, has proven the main challenge of nascent entrepreneurship research. Furthermore, studies which have addressed gestation have given little attention to environmental factors (Liao and Welsch, 2008).

A growing stream of research is attempting to investigate and better understand nascent entrepreneurship as it occurs, through large scale, systematic studies. These studies, such as the Panel Studies of Entrepreneurial Dynamics (PSED) I and II (Gartner et al., 2004, Reynolds, 2000, Reynolds, 2007, Reynolds et al., 2004), generally attempt to identify individuals that have initiated engagement in the process of entrepreneurship (defined as new firm creation) and investigate factors[5] of the entrepreneurial process that might influence

[5] PSED's 130 factors are not specifically addressed as: 1) PSED studies nascent entrepreneurship in the general population, 2) is recognized as not highly representative of the opportunity-based, high-pot.new venture creation, 3) is mainly investigating the individuals (and their factors), and not environmental factors, and 4) based on partial review of factors, for example as available in appendices of Reynolds (2007) results of PSED, these are considered comparable to the factors identified by Baron (2002) and Bygrave and Churchill (1989) discussed in section 3.2.

their engagement in becoming nascent entrepreneurs. PSED I initiated a broad spectrum screening of a general population by first asking the fundamental question – are you, alone or with others, currently trying to start a business (for yourself or for an employer); or are you currently the owner of a business you help manage – and then investigated more than 130 factors potentially associated with the entrepreneurial process from the entry point to firm creation, as well as creation failure or disengagement. PSED II data built upon the same starting point and the identified respondents as nascent entrepreneurs based on three criteria: (1) they performed some start-up activity in the past 12 months, (2) they expected to own all or part of the new firm, and (3) the efforts could be not be considered an operating business (Reynolds and Curtin, 2009). Initial findings support a behavioral approach to entrepreneurship, stating that it is the actions taken by the individual(s), and not their characteristics, that impacts new firm creation. In particular, developing a productive process, establishing firm presence, and creating organizational and financial structures seem to be the most important actions identified (Reynolds, 2007).

Large scale studies have, however, faced some challenges regarding definitions of entry and exit, heterogeneity of populations, various biases, and under-coverage. Studies often under-represent 'high-growth potential' ventures (Siegel et al., 1993). The comprehensive Australian Study of entrepreneurial emergence (CAUSEE), has attempted to address this issue by establishing specific selection criteria for 'high-growth potential' ventures (in addition to other types of ventures) by specifically targeting university commercialization offices, patent agencies, and innovation and technology networks, among others, to collect data (Senyard et al., 2009). Using this argumentation for selection, the university engaging in a third mission is determined as viable for studying opportunity-based high-growth potential new ventures.

Davidsson (2006) makes the point that nascent is not so much a type of entrepreneur or entrepreneurship as it is a designation of a phase in the process. The nascent phase of entrepreneurship is important to entrepreneurship research because of the emphasis on emergence and the development that takes place as organizations become 'real' (Shane and Venkataraman, 2000). Thus, I review the process of venture creation, including different phases in order to understand the actions and behavior developed as this process takes place.

3.2 The Entrepreneurial Process: Phases and Models

In order to study the facilitation of entrepreneurial behavior development over time, an understanding of the entrepreneurial process is required. Researchers have addressed the process of creating a new venture by asking the questions such as 'how does the organization come into existence?' (Herbert and Link, 1982, Shapero and Sokol, 1982) only to find that a process of entrepreneurship does not follow one distinct sequence of events (Alsos and Kolvereid, 1998, Carter et al., 1996, Gartner and Carter, 2003). Even so, a review of literature results in various conceptual models of the entrepreneurial process, three of which I relate to directly in this thesis (Baron, 2002, Bygrave and Churchill, 1989, Reynolds et al., 2004). Exploring models of the entrepreneurship process in association to the context of the university, I also relate to Rothaermel et al. (2007) to include processes of incubation and technology transfer, as discussed in Chapter 2 (Section 2.1.1). Review of incubation and technology transfer literature results in conceptual models which can be aligned with those of

Baron, Bygrave and Churchill, and Reynolds et al. By relating the different models and descriptions to one another, including the incubation and technology transfer process descriptions, I present a synthesis of models in order to explain the general phases of the entrepreneurial process, emphasizing the emerging (nascent) phase of a new venture being created (see Figure 5).

The Reynolds et al. (2004) model signifies transition into and out of a gestation phase. Transition into the gestation phase is considered a shift from inaction to action, such that nascent entrepreneurship has been initiated. I interpret this first transition point as the identification of the idea as a viable opportunity. The shift into the action, a phase which I term emerging (nascent) phase, allows for investigation of factors associated to the efforts of the nascent entrepreneur, including those through interaction with others, as they attempt to create a venture. The transition point into the emerging (nascent) phase (Transition 1 in Figure 5) occurs when the idea is recognized or conceived in visual or written format such that it can be communicated to another person as a viable opportunity, the idea is selected to be incubated, or the idea is disclosed for intended transference. Thus, activities up to Transition 1 have not specifically focused upon the development of an idea towards the creation of a new venture, but rather have been research or development towards conceptual or applicable problems.

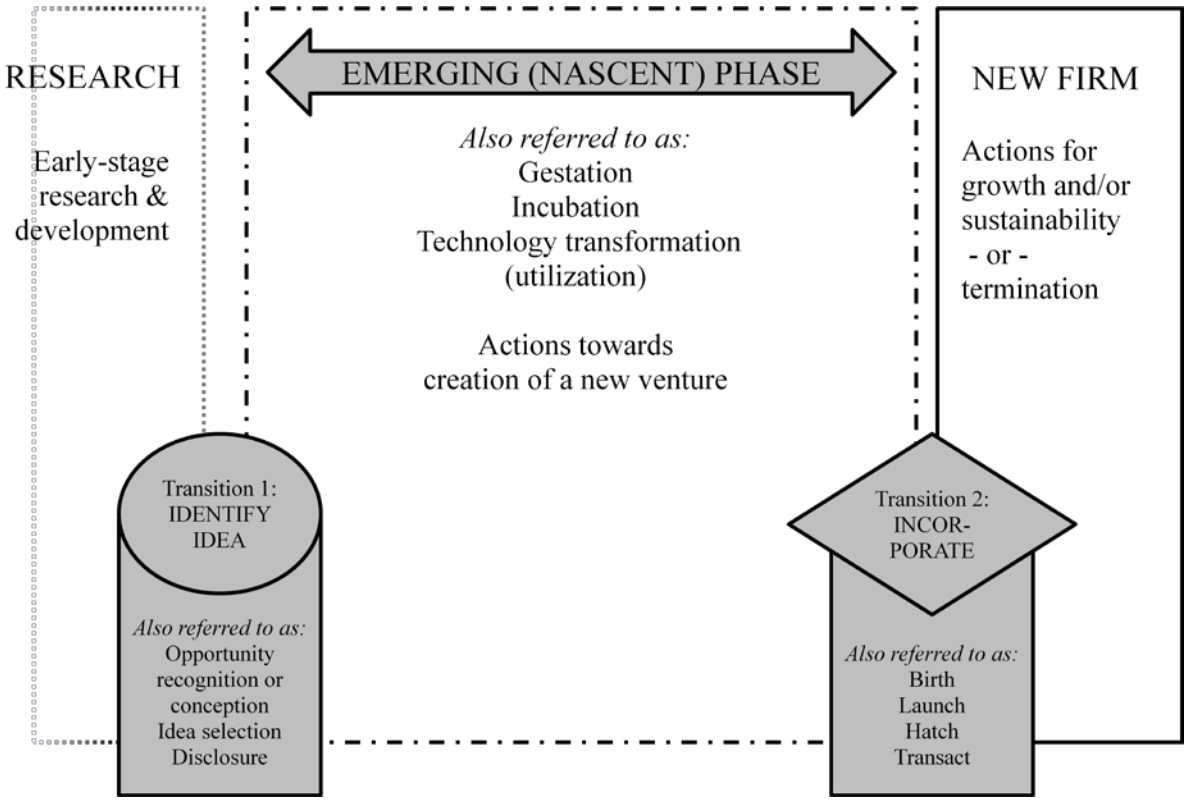


Figure 5. Synthesized model of the entrepreneurial process

The second transition identified by Reynolds et al. (2004) involves the 'birth' of the venture, thus shifting from the gestation phase to an infancy phase. Reynolds et al. describe the

infancy phase as one in which the new venture struggles to establish itself and pursues one of three main paths: growth, stable survival or termination. Based on this, I interpret the second transition point as incorporation of a venture. I propose that Baron's term launch, signifying the event and comparable to the transition point of birth of Reynolds et al., along with the hatch of the incubated firm and the transaction of the technology, are comparable to the incorporation of the venture, Transition 2, as illustrated in Figure 5. In between these points, I argue that the both the pre-launch and launch activities communicated by Baron are in fact associated to the activities taking place in the emerging (nascent) phase, while the post-launch activities are comparable to activities for growth or sustainability of the new firm. Similarly, the activities of the technology transfer process and incubation exist in this phase as they are conducted in order to prepare for transaction or transference out of the university into the market. Hackett and Dilts (2004) summarize (from for example Campbell et al. (1985)) incubation activities to include diagnosis of business needs, selection and application of business services, financing and network access. Harmon et al. (1997) outline models of the technology transfer process to include activities regarding idea generation, disclosure, technology development, patenting, and transference to an actor outside the university. These activities are associated to the emerging (nascent) phase in Figure 5. The activities of the emerging (nascent) and new firm phases are summarized and related to categories of entrepreneurial behavior in Table 1 in the following section.

3.2.1 Process Shaping Behavior – Actions of the Emerging (Nascent) Phase

Liao and Welsch (2008) explore the new venture creation process, differentiating between technology and non-technology based nascent entrepreneurs, defining 26 start-up activities (listed A to Z), including, for example: prepared a business plan, applied for patent/copyright/trademark, sought funds from financial institutions/individuals, etc. Based on a review of start-up process and activity literature, and consistent with Delmar and Shane (2002), they allocate the 26 activities into four categories: planning activities, establishing legitimacy, resource combination, and market behavior (see Appendix A for full list and categorization). Liao and Welsch find significant support suggesting that technology-based nascent entrepreneurs engage in a greater number of activities in the categories of planning activities, establishing legitimacy and market behavior because these activities are more intensive for them in comparison with non technology-based nascent entrepreneurs.

I adopt Liao and Welsch's (2008) categories, which I in turn term entrepreneurial behaviors. I do this based on the definition of entrepreneurial behavior presented in Chapter 1 stating that entrepreneurial behavior is discrete units of actions carried out through a process in which a new venture [organization] is the outcome. The categories are seen to also align with the general behaviors taken from Reynolds (2007), where establishing legitimacy relates to establishing firm presence and the other categories relate to creating organizational and financial structures. The activities identified by Baron (2002) and others, as well as actions outlined in association to incubation and technology transfer[6], are associated to the emerging (nascent) and new firm phases in Figure 5. These are compared to the 26 activities of Liao and Welsch in order to designate the activities as relative to categories of entrepreneurial

[6] Diagnosis of business needs, selection and application of business services, financing and network access, and technology development and patenting.

behavior. This is summarized in Table 1. Subscript letters are used to designate the reference for each action listed.

I argue that the categories proposed by Liao and Welsch are consistent with the choices I have made for my thesis. Technology-based entrepreneurship is designated as comparable to the opportunity-based, high-growth potential focus of my research. Liao and Welsch are building their study on nascent entrepreneurial activity, utilizing PSED data. Finally, they utilize a process approach (Van de Ven and Engleman, 2004) (as compared to an outcome-driven approach), building upon the work of Paul Reynolds, in a fashion considered comparable to what I have proposed.

Table 1. Categorizing actions associated to the emerging and new firm phases

Entrepreneurial Behaviors	**Actions associated to the emerging (nascent) phase**	**Actions associated to the new firm phase**
Planning Activities	Search for opportunity [a,d], identify funding sources [a,c], diagnose business needs [c]	Sales and business development strategies [a], communication with staff and stakeholders [a]
Establishing Legitimacy	Determine legal form [a], determine individual role (title) [b,c,d]	Leadership [a], communication with staff, customers and stakeholders [a], conflict management [a], pay taxes [e]
Resource Combination	Technology development [d], protect/secure intellectual property (patenting) [a,d], secure funding sources [a,c], secure network [c], product or service development [c]	Staffing [a], product or service distribution [c], communication with customers, partners, suppliers and distributors [a,c]
Market Behavior	Identify opportunity [a,d], select application and business model [c,d], secure suppliers and distributors [c], compete [b]	Compete [b], marketing and sales [a], communication with customers, partners, suppliers and distributors [a,c]

a Baron (2002); b Bygrave and Churchill (1989); c Hackett and Dilts (2004); d Harmon et al. (1997); e Reynolds et al. (2004)

3.3 DEVELOPING BEHAVIOR

> *"If my intention was to find answers to issues about how individuals navigated through the complexity of a phenomenon that accounted for aspects of: themselves (the individual), how they went about the process, the kind of business they decided to engage in, and, the context (environment) in which these actions take place, then my quantitative empirical studies[7] were not likely to find answers in the way that my theories and ideas posited. … the nuances of particular entrepreneurial situations, the nuances that actually characterize how individuals go about thinking through, over time, the complications of utilizing their capabilities and resources as they are*

[7] Such as the Panel Studies of Entrepreneurial Dynamics I and II [footnote is not in the original text]

both informed by, and seek to change their circumstances, is 'averaged' away." (Gartner, 2010, p 11)

Entrepreneurial behavior can be seen as action taken in relation to the process endured and the environment that constitutes the contextual events (Gartner, 1988, Gartner and Carter, 2003). Gartner addresses this interactivity as the 'critical mess' (Gartner, 2006) – the nuances of the situation in relation to the process. The interaction with the situation [the environment constituted by context], including both structural and social components, incorporates development of behavior that is both constructing and reactionary, sometimes following the examples of others, experienced members of the role-set, other times leading with independent ideas (Sarasvathy, 2001). To follow Gartner's 'intention to find answers' is to explore the nuances of the actions of the entrepreneur and how her decisions are informed as she attempts to create a new venture. As noted from previous findings mentioned earlier (Reynolds, 2007) and from review of the phases of the entrepreneurial process (section 3.2), it is in the emerging (nascent) phase that actions impact the establishment, or not, of the firm, and thus where entrepreneurial behaviors are tested and either adopted when proven successful, or refined or abandoned if unsuccessful.

"In emerging organizations, entrepreneurs offer plausible explanations of current and future equivocal events as non-equivocal interpretation. Entrepreneurs talk and act 'as if' equivocal events are non-equivocal. Emerging organizations are elaborate fictions of proposed probable future states of existence" (Gartner et al., 1992, p 17).

In this thesis, I argue that the dimensions informing decisions and influencing actions stem not only from the nascent entrepreneur, but her environment and the way in which they interact. Thus, while entrepreneurial behavior is understood as an individual phenomenon, it can be seen as also developed through situational learning and interaction while the individual is engaged in the process of creating a new venture: a 'weaving' of actions and interactions (Bouwen and Steyaert, 1990, Johannisson and Mønsted, 1997). Research has investigated how person and environmental factors influence intention towards behavior (Lüthje and Franke, 2003), but less is known about how social interaction influences observable behavior. Therefore, the development of nascent entrepreneurs' behavior, and how the development can be facilitated in this thesis, is studied by exploring the positioning relative to other actors, impacted by one's environment during the creation of a new venture. I argue that this is an approach that has not yet been significantly studied and which may be enabled by involvement in a venture creation environment. Learning by doing within an environment which allows decision hypothesizing and feedback facilitates the entrepreneur's acting 'as if' during the process of creating a new venture.

3.4 Understanding Behavioral Development in a Social Context

Social Learning Theory states that human behavior is continuous reciprocal interaction between influences of the individual (cognitive, namely attention to and retention of information), her actions, and her environment (Bandura, 1977). Individuals learn from one another as they interact through a mixture of internal and external processes in which they observe and practice behavior. These processes include observational learning, imitation, and

social modeling. Individuals observe and take note of the behavior of others, perceived as knowledgeable or credible, and then practice the behavior and experience the consequences of the behavior. Social learning is dependent upon interaction between individuals and the extent to which they succeed or fail in promoting emotional and practical skills, shaping self-perception and perception by others.

Social Learning Theory is linked to the concepts of self-efficacy (Bandura, 1982) and reciprocal determinism (Bandura, 1978). Self-efficacy is an individual's expectation of success in a situation. Levels of self-efficacy equate to the individual's expectation of their contribution to a given setting. Reciprocal determinism is how the individual and her environment affect each other in a way that impacts behavior. Behavior is learned not only through observation of others, but then through practicing the actions required to perform the behavior (Bratton et al., 2010, p 169). Interaction with the environment, including individuals in the environment, affects and provides information about the understanding and practice of behaviors, which can then influence self-efficacy. Relating to the field of entrepreneurship, Carsrud and Johnson's (1989) propose that entrepreneurial behavior is determined by social context and situations, including role-sets (Aldrich and Zimmer, 1986) and patterns of social interaction leading to entrepreneurial self-efficacy (Pruett et al., 2009) in relation to specific resources. As already mentioned in Chapter 2 (Section 2.1.3), I propose a role-set definition that not only includes the family members, financers, partners and distributors suggested by Carsrud and Johnson (1989), but also includes other advisors and coaches, such as faculty, alumni and board members.

Bandura's theories relate to Vygotsky's Principle which states that behavior is developed both on a social level and on an individual level (Vygotsky, 1978, p 57), initiating with the social level, such that behaviors "originate as actual relationships between individuals." Expanding upon Vygotsky, the focus on the contribution of the others in the social interaction can be understood as a mentor-mentee relationship where the less skilled mentee attempts to accomplish a task, supported by the mentor. If the mentee cannot perform the task to completion, the mentor helps to accomplish the task, in a way that the mentee can observe and copy the mentor's actions for future tasks (Harré and van Langenhove, 1999).

The process of entrepreneurship has been seen as depending on human capital (Kim et al., 2006) and team structure (Aldrich et al., 2003), such that the entrepreneur is affected by the interaction of individuals, with regard to roles taken (Shepherd and Haynie, 2009). The role-sets of nascent entrepreneurs are thus seen as contributing to the development associated to the entrepreneurial action. Senior members, actors in the role-set, influence nascent entrepreneurs as individuals have natural tendencies to defer to the beliefs of others, offsetting their natural experimentation and utility (Aldrich and Martinez, 2001). Within uncertain environments social norms are likely to have the greatest impact on behavior (Cialdini and Trost, 1998). In the empirical landscape of the thesis, social norms are mainly orchestrated by the role-set of the nascent entrepreneur.

I relate general Social Learning Theory to Creation Theory used within the field of entrepreneurship in regards to decision processes. In Creation Theory, decision making is seen as testing hypotheses and building argumentation, as compared to a making a decision to bear a certain amount of risk based on analyzing the opportunity to determine probabilities of

success (Discovery Theory) (Alvarez and Barney, 2007). The iterations of the hypothesis testing, through which the viable opportunity emerges, illustrate that behavior is developed through the social interaction with the marketplace. The entrepreneurial process can be understood as continued testing of hypotheses in order to determine how the opportunity is 'best' pursued. This aligns with a perspective of entrepreneurial behavior development, as behavioral learning through experimental and experiential engagement in the process, and utilizing interpretation and feedback from surrounding factors as part of the decision to act in one particular way or another (Anderson, 2000). As engaging in the entrepreneurial process is considered critical to import some of the knowledge, skill and attitude of an entrepreneur (Fletcher and Watson, 2007, Garavan and O'Cinneide, 1994, Rae, 2005, Rasmussen and Sorheim, 2006, Solomon, 2007, Souitaris et al., 2007), learning through experience is considered valuable in shaping behavior (Deakins and Freel, 1998). Furthermore, entrepreneurship education and training has been shown to influence entrepreneurial behavior and future intentions to engage in entrepreneurship (Fayolle, 2005). The next section will review different learning approaches that have been proposed to for developing entrepreneurial behavior.

3.5 Facilitating Behavior Development through Entrepreneurial Learning

Emphasis on developing new entrepreneurs is marked by the continued growth of entrepreneurial education programs (Finkle and Deeds, 2001, Katz, 2003, McMullan and Long, 1987, Solomon, 2007). But developing new entrepreneurs through education has been and can be conducted in different ways, with different objectives and associated results (Kickul and Fayolle, 2007). Learning can be seen as the dynamic process which enables entrepreneurial behavior to be enacted (Rae and Carswell, 2001). However, once again, this simple statement does not provide any simple answers as learning too is designated as a complex phenomenon (Nicolini and Mesnar, 1995). However, prominent researchers within the field of entrepreneurship education (for example Cope and Watts, 2000, Gibb, 1997, Hjorth and Johannisson, 2007) provide a definition of learning as the potential to change behavior based on processing of information. I build on this definition of learning as the potential to change or develop behavior, where the processing of information which is conducted by the individual is impacted by the environment, through both availability of information and interaction around information.

A review of entrepreneurship education literature (Mwasalwiba, 2010) draws distinctions between education conducted *for*, *about*, *in* or *through* entrepreneurship, where the way in which the education is structured is in part contingent upon the intended outcome of the educational process. Education *about* entrepreneurship (Hytti and O'Gorman, 2004) mainly aims to provide general understanding of the subject area. Education *in* entrepreneurship (Kirby, 2004) intends to orient individuals towards entrepreneurial activity in their existing career or working environment. Education *for* entrepreneurship (Henry et al., 2004), providing tools and skills towards starting a business, is recognized as that which would 'create' an entrepreneur, such that the individual had a present or future intention of engaging in entrepreneurship.

Many scholars agree that higher entrepreneurial education has to have an experiential learning perspective together with some kind of interactive pedagogy in order to enhance

learning and innovative capacity (Barrett and Peterson, 2000, Collins et al., 2006, Hjorth and Johannisson, 2007, Honig, 2004, Johannisson et al., 1998, Vinton and Alcock, 2004, Yballe and O'Connor, 2000). Educating *through* entrepreneurship (Kirby, 2004) is recognized as a pedagogic approach to educating *for* entrepreneurship, where educators utilize engagement in new venture creation to provide experiential learning. Experiential learning theory (Kolb, 1984) states that behavior is developed through learning influenced by environmental factors, building from Lewin's understanding of individual and environment as interdependent when shaping behavior (Lewin, 1951, Sansone et al., 2004). Thus, experiential learning is very much in line with Social Learning Theory. Furthermore, Kolb and Kolb (2005) argue that experiential learning uses a learning space, in which learning is influenced by environmental factors in nested arrangements of structures, at macro-, meso-, and micro-levels.

Entrepreneurial education involving experiential learning has also been described as action-based (Rasmussen and Sorheim, 2006). Action-based approaches, such as entrepreneurial-directed approach (Heinonen and Poikkijoki, 2006), often combine experiential and participative learning with traditional classroom teaching and involving co-learning between teacher and student. The main challenge of such approaches is the decrease in predictability and control of the teaching situation. Gibb (1996) proposes an enterprising teaching approach, which he argues is essential for connecting conceptual knowledge to a range of entrepreneurial behaviors. Some of the key elements Gibb proposes are: a focus on process delivery, ownership of learning by participants, learning from mistakes, negotiated learning objectives and session adjustment and flexibility. Gibb claims this approach can facilitate a learning environment which provides ownership, control, autonomy and 'learner'-led rewards. Learning is multi-disciplinary and process-based, employing a wide range of teaching and learning methods such as conventional lectures, seminars, and workshops, focus groups, teaching of peers etc. The focus is on the "internalization" of knowledge and adoption of a definition of real learning as stated by Maples and Webster (1980).

Cope and Watts (2000) argue that developing entrepreneurial behavior is achieved through learning by doing, involving experiential learning methodology, utilizing critical learning incidents from an individual perspective. They emphasize the importance of reflection in garnering learning from experience, particularly through critical incidents, as incidents are often not isolated events, and are impacted by the surrounding environment. Learning approaches including senior mentors or entrepreneurial role models (Sullivan, 2000) are used to provide social learning through observation, imitation and modeling, where mentors facilitate reflection upon actions while nascent entrepreneurs' actively engage in an emerging (nascent) phase of the entrepreneurial process. I see the use of mentors and role models as analogous to Bandura's general explanation of how behavior is developed through Social Learning Theory (Bandura, 1977) using reciprocal determination (Bandura, 1978). Cope and Watts (2000) build upon Sullivan (2000) and Weinrauch (1984) emphasizing the importance of mentors or other actors who can actively listen and give advice regarding the on-going entrepreneurial process.

Based on the above review of learning concepts, I argue that learning by doing combined with mentoring processes can facilitate a decision cycle for testing hypotheses, providing feedback through physical engagement as well as through perception and reaction from the surrounding role-set. I choose to describe this as learning through interaction. Interaction with

the role-set facilitates "generative learning" (Barrett and Peterson, 2000, Gibb, 1997) providing insights into potential future action, including abilities to see possibilities beyond problem barriers. Learning through interaction thus involves experiential learning including reflection-in-action (Schön, 1984) and generative learning based upon cycles of hypothesis testing and feedback between the nascent entrepreneur and her role-set. Positioning theory provides a perspective upon how learning through interaction can be facilitated, building upon conversations between the nascent entrepreneur and her role-set, in which rights and duties regarding the expectations of a role are negotiated and developed.

3.5.1 POSITIONING

According to Katz and Kahn, role behavior is "a process of learning the expectations of others, accepting them and fulfilling them" (1966, p 188) in a repetitive and stable pattern. Harré and van Langenhove explain that "positioning can be seen as a dynamic alternative to the more static concept of role" (1999, p 14) such that "within a conversations, each of the participants always positions the other while simultaneously positioning him or herself" (ibid, p 22). Through discourse, a mutually understood structure for interactions or instigating dialogues evolves in which the roles presented are negotiated, refined or dismissed such that repositioning takes place. This leads to the unfolding of a conversation in which actors determine their own and each other's actions in a social sense through their joint action and narrative (Davies and Harré, 1990). The process can be understood through the notion of a 'positioning triangle': the interplay of the actors' positions, the social impact of what they say and do, and the storylines of each interaction (Davies and Harré, 1990, Harré and van Langenhove, 1999) (see Figure 6). A shift in one aspect of the triangle can affect the others: for example if an actor changes the topic during a conversation, a verbal social force, and the others engaged in the conversation adapt to the change and discuss the topic further, a shift in the storyline has occurred, and the actor that made the change has established a position in relation to the topic.

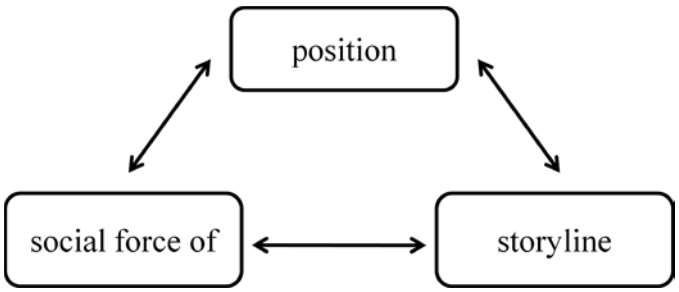


Figure 6. Positioning triangle – a mutually determining triad

Harré and Langenhove state "positioning can be understood as the discursive construction of personal stories that make a person's actions intelligible and relatively determinate as social acts…" (1999, p 18). This recognizes the act of positioning as a communicated process that clarifies the particular 'role' (role is the static description) or interactive relation between those involved. It is important to note that positioning theory is relatively new and not yet established in the field of organizational theory. While I claim that positioning theory can be used as a dynamic analytic scheme to investigate the phenomenon of entrepreneurial behavioral development, it is important to remember that, according to positioning theory,

positioning takes place continually when we interact, and not only when we are in the process of developing behavior. However, it has been proposed that discourse and stories (narrative) can influence construction of entrepreneurial identity (Foss, 2004). Positioning can allow for mutual determination for interaction or can instigate a dialogue or several dialogues in which the 'roles' presented are negotiated and redefined. I see this concept as important to understand the process of developing entrepreneurial behavior because it emphasizes the social interaction that can affect the actions taken by the nascent entrepreneur. I do not specifically apply positioning discursively, but rather recognize the outcomes of discourse in the form of negotiated rights and duties, facilitating (or blocking) positioning relative to a particular role. As the behavior is in the process of development, it is 'tested' and negotiated with other individuals that have definitive 'roles' or are positioned as authorities. In turn, negotiation with these individuals can challenge or change the perception of the individual acting as or aspiring to be the entrepreneur. Applying the concept of negotiated rights and duties allows for exploration of how relationships are formed and developed over time, including understanding of relationship formation and change (Bullough and Draper, 2004).

3.6 Synthesizing Existing Theories

A focus on entrepreneurial behavior allows for a recognition of entrepreneurship as both independent action of one individual and collaborative action based on critical relationships with other actors (Karatas-Özkan and Murphy, 2006). In this thesis, other actors constitute not only the other nascent entrepreneurs in the venture team, but the associated role-set. Development can include the individual developing his or her own behavior, as self-determined or assumed to be entrepreneurial, but this must also be confirmed and appreciated by others. Others include not only the role-set but also additional actors outside the role-set, existent in the greater ecosystem in which the venture creation process is taking place. Thus, while entrepreneurial behavior development is an individual phenomenon, the process in which the development takes place includes a multitude of actors and factors impacting how the behavior is received and affirmed (or not) as it is enacted by the nascent entrepreneur. Thus, the developing process can be further understood through the negotiated rights and duties around the perceived role [of entrepreneur] resulting from positioning. In Figure 7, I illustrate a synthesized understanding of how entrepreneurial behavior development can be facilitated.

As "within a conversation each of the participants always positions the other while simultaneously positioning him or herself" (Harré and van Langenhove, 1999, p 22), positioning theory can be utilized as a tool for understanding the social interactions. Social interactions are then used to facilitate learning related to the development of entrepreneurial behavior. Each event of positioning signifies a change in understanding and action, and a potential for change in behavior, which opens or restricts the ways of making sense about the interaction (Bouwen and Steyaert, 1990). The individual as nascent entrepreneur is accepted, rejected, improved upon and/or in other ways socially determined through the interplay of positions. Rights and duties given, developed, claimed, and championed within conversations in relation to others illustrates the social influence of, for example, the role-set and the various behavioral strategies that are utilized as the individual attempts to fill the aspired role of entrepreneur. Thus, my translation of positioning theory into this conceptual model allows us to examine the interactions of the individuals studied, highlighting how these individuals

communicate their rights and actions in relation to others. Rights, duties, and actions taken evolve into a storyline. The storyline is referred to in order to secure behavior taken and negotiate future action. It is in this way that positioning theory can be utilized to help understand the development of entrepreneurial behavior in individuals engaging in an entrepreneurial process. This is conceptually illustrated in Figure 7, where the interactions are expanded to include an illustration of the negotiated rights and duties that occur through interaction between the nascent entrepreneur and other actors of her environment, most notably her role set.

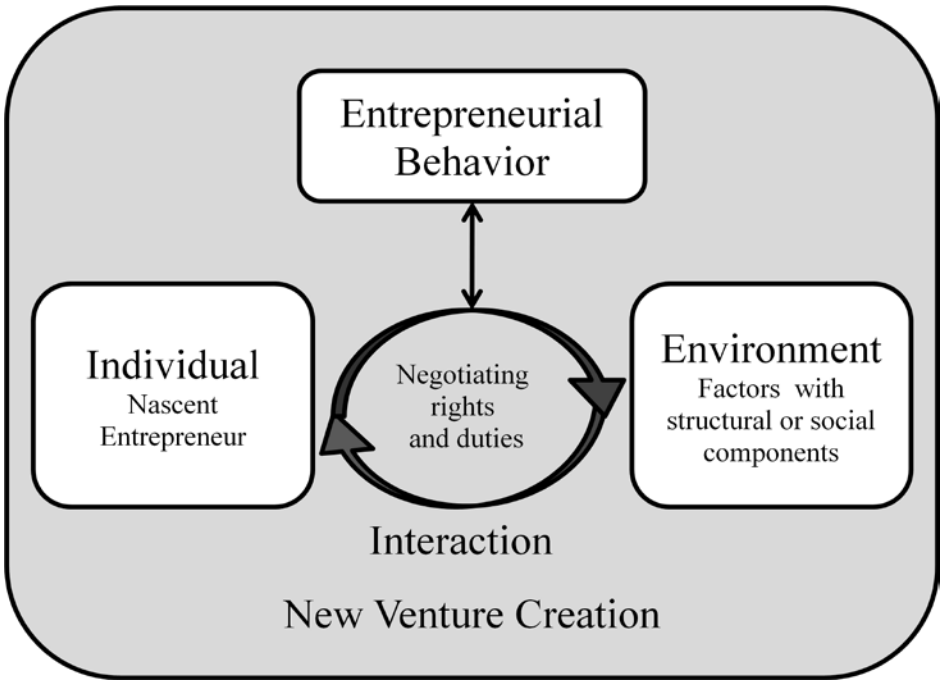


Figure 7. A model for facilitating development of entrepreneurial behavior

In summary, I have now argued for an understanding of entrepreneurial behavior as that which is shaped by engagement in the process of new venture creation; associated to sets of actions regarding planning, establishing legitimacy, combing resources and marketing; and a function of the individual and her environment. The development of entrepreneurial behavior in the nascent entrepreneur involves social interaction with her environment, including observation, imitation and modeling of key actors (her role-set). These actors can engage in discourse with the nascent entrepreneur, allowing for a process of negotiation regarding rights and duties associated to an aspired role. Finally, I will review the factors, particularly those of the environment, identified in literature as impacting and potentially facilitating, behavior development.

3.6.1 Interaction of Individual and Environment Shaping Behavior – Factors of the Emerging Phase

In the models discussed in Section 3.2, some of the authors present not only activities associated to the process, but factors associated to or surrounding the process as well. In his model, Baron (2002) illustrates individual, interpersonal and societal factors that influence the

phases of the entrepreneurial process. Similarly, Bygrave and Churchill's (1989) model illustrates four stages with associated personal, sociological, environmental, and organizational factors. Hackett and Dilts (2004) emphasize that the incubation process is not only entry into a physical locality with access to infrastructure, but is also influenced by the network of individuals and organizations (internal and external to the incubator) facilitating the successful development of a new venture. Factors are summarized in Table 2, with subscript letters used to designate the reference for each factor.

The factors generally identified as traits (including age, gender and race), abilities, skills and cognition, building in part from research as reviewed by Brockhaus (1982), and factors related to motives and goals, building in part from research by McClelland (1961, 1987) are designated factors of the individual. In addition, terms identified as titles used to communicate a role or position, such as leader, manager, etc. are summarized under the term role and designated as an individual factor. Previous literature has not found strong direct correlation between traits and characteristics and successful completion of creating a new venture (Reynolds, 2007), and instead has emphasized the high influence of situational factors (Reynolds, 1995). I do not include traits and characteristics in Table 2 due to the focus on the impact of environmental factors in this thesis.

Table 2. Factors contributing to entrepreneurial behavior development

Behavior as a function of:	**Contributing Factors**
Individual	cognition [a], commitment [b], motives [a,b], values [b], skills (education and experience) [a,b], role (and associated responsibilities) [b]
Environment	***Structural:*** government and institution policy [a,b], legal issues (requirements and regulation) [a], physical resources (facilities, digital networks, equipment) [b,c], capital and labor markets [a], technology [a], exposure to entrepreneurial models (structural models) [b]
	Social: social network (including human capital, social capital, intellectual capital) [a,b,c], support networks [a,b,c], exposure to entrepreneurial models (role models) [a,b], cultural values [a,b], norms [a], competitors [b]

a Baron (2002); b Bygrave (1989) ; c Hackett and Dilts (2004)

Figure 7 indicates that the interaction between the individual and environment is influencing behavior. Individual factors such as skill, motivation and cognition, are seen as relevant in relation to social learning through engagement or intention to engage in the process, and thus included in Table 2. However, these factors are not specifically addressed as the main research question is to understand how entrepreneurial behavior development can be facilitated, where behavior is defined as observable action, in comparison to cognition, motives, values, etc. recognized as contribution to planned behavior (Ajzen, 1991) (or intention to behave). Ensley, et al. (2006) found that behavior in relation to new venture

success is impacted by the dynamics of the environment. Therefore, emphasis is placed upon the factors associated to the environment as these are seen to describe the context in which the entrepreneurial process is occurring. The exception to this is the individual factor of role, as this is recognized as the static equivalent of the negotiated rights and duties determined through positioning.

The factors listed in the referenced literature as interpersonal, societal, environment, sociological, and organizational are designated as environmental. These factors include both structural and social components of the environment, stemming from the definition given in Chapter 1. Thus, societal and most environmental factors, such as government policy, legal issues, capital and labor markets and technology are recognized as structural factors, as they are generally facilitated through infrastructure. Interpersonal, sociological and organizational factors, such as human, social (Coleman, 1990, Davidsson and Honig, 2003) and intellectual capital (Nahapiet and Ghoshal, 1998), and cultural aspects are recognized as social context factors, as they are mediated through interaction. Thus, entrepreneurial behavior is shaped by the interaction between the nascent entrepreneur and her environment as she is going through the process of creating a new venture. The process is impacted by the factors of the environment in which the process is taking place.

This chapter has accounted for received wisdom relating to the development and facilitation of entrepreneurial behavior, per the definition established in Chapter 1. Literature describing nascent entrepreneurship, the entrepreneurial process and its various phases, actions and associated factors, as well as behavior development through learning (including social and pedagogically designed) and positioning, have been reviewed. It has been possible to synthesize an understanding of the entrepreneurial process of new venture creation, and relate the actions, behaviors and factors of this process to a figure illustrating the shaping of behavior through interaction, including negotiated positioning. Learning theories and entrepreneurial education structures propose ways in which entrepreneurial behaviors can be taught and transferred to individuals. However, research regarding environmental impact on behavior has mainly focused on intention to act (Autio et al., 2001, Lüthje and Franke, 2003), and not actual observed behavior. Furthermore, despite this research, there is still a gap in understanding between how the process and factors of the environment of new venture creation shapes entrepreneurial behavior, and how that behavior can be facilitated through interaction and environmental factors. This thesis emphasizes entrepreneurial learning, resulting in the development of entrepreneurial behavior, can be facilitated by learning through interaction. Nascent entrepreneurs are provided an environment incorporating not only a process of venture creation, but associated actors forming a role-set, facilitating learning through interaction, where rights and duties regarding the aspired role are not only observed, simulated or modeled, but also negotiated and tested together with mentors and entrepreneurial role models. This is represented in the Figure 7 model for facilitating development of entrepreneurial behavior by the interaction loop, illustrating the cyclical relationship between the individual and her environment, including her role-set.

Following explanation of the methodological framework and details in Chapter 4, the empirical focus of this thesis, building upon a systems perspective, explores the emerging (nascent) phase of new venture creation recognizing the influence of environmental factors from multiple and interdependent levels in the university landscape. This is done to illustrate

how the learning facilitation equates to the environment of the empirical settings. Action-based, process-oriented learning approaches and educational designs, such as the Chalmers VCS described in Chapter 2, can function as learning spaces (Kolb and Kolb, 2005) where entrepreneurial behavior development can be facilitated through provision of process and management of environmental factors influencing behavior.

4 METHODOLOGY

This thesis aims at contributing to understanding entrepreneurial behavior, in particular how the development of entrepreneurial behavior can be facilitated. I have chosen to recognize entrepreneurial behavior as an individual phenomenon developed through social interaction as part of a process of emergence, where behavior is understood as observable action. I study interaction interpreted not only by the individual acting to create a new venture, but also as interpreted by others questioning, provoking, stimulating and reacting to the actions of the individual, and including the way in which individuals interpret their environment. The research conducted is qualitative, rooted in an interpretative tradition. Action research is used to inquire about and investigate the interactions of a select empirical setting in order to link practice and ideas involving those for whom the questions and issues are significant (Reason and Bradbury, 2008). Additional research using participatory observation is used to compare the core empirical setting to other settings. I begin the chapter by addressing the methodological choices of the intended research and thesis summary, starting first with presenting the intrinsic case chosen for study. This is followed by a description of the specific methodology of the appended papers. The chapter concludes by addressing implications of the choices made.

4.1 THE INTRINSIC CASE

The first choice is the choice of a core empirical setting to be studied. The collective research of the main empirical setting can be as an intrinsic case, as I attempt to gain a better understanding of a specific phenomenon in a unique university landscape (Stake, 2005). This case is then also intended as an instrumental case which potentially contributes to a wider understanding of entrepreneurial behavior development, when placed in contrast to other similar university landscapes, or an alternative environmental setting, as is done through the studies upon which Paper I and Paper V are based.

Determination of the main empirical setting, the Chalmers VCS, as representative of an ongoing entrepreneurial process is based on delivered results assessed relative to the definition of entrepreneurship as a process of emergence (Gartner et al., 1992), a result of which is the creation of new organizations (Gartner, 1988). As described in Chapter 2, section 2.2, the Chalmers VCS delivers sustained process of venture creation with an 80% survival rate for incorporated ventures. Incorporated ventures are legally registered firms, attracting financing, employing additional personnel, delivering to customers just as any start-up. These ventures created are provided specially designed support during an incubation period. Individuals are communicated as nascent entrepreneurs, and enter an entrepreneurial process by engaging in the creation of a venture.

Multiple years of embeddedness, since 2004, as a researcher and member of the university's entrepreneurial community, namely through my role in the Chalmers VCS, allows for comparison of nascent entrepreneurs and their role-sets. Sequential groups of nascent entrepreneurs and role-sets, formed into teams, enter, experience, and then exit the empirical setting on a yearly cycle. My formal employment position, operational responsibilities, and day-to-day activities have evolved, allowing for increased access and influence into the empirical setting. Within the Chalmers VCS, my responsibilities have evolved from delivery

of specific lectures, to program management, course management and design, admissions selection and design, and policy development.

Embeddedness includes participation in planning and execution of daily activities, specific to the design and facilitation of the incubation period of the nascent entrepreneurs, but also in regards to the continuity of the Chalmers VCS across the series of nascent entrepreneurs entering and exiting the Chalmers VCS, such as monthly meetings of the Chalmers VCS staff members. The format of the incubation period allows for involvement and investigation into multiple cycles of essentially the 'same' process 'same' environment. 'Same' is written as such to recognize that the process is never exactly the same, as each cycle involves individuals new to the particular cycle, and ideas upon which the ventures are based are almost always new to the particular cycle[8]. Official protocols from these staff meetings, staff workshops, presentations and other events are coupled with personal observation and notes taken during these events. Staff meetings occur approximately every three weeks during the school year, which generally excludes the end of June, July, and beginning of August. Daily activities of the Chalmers VCS also include both planned and impromptu events specific to the venture creation process of the nascent entrepreneurs, at times also involving members of the role-sets.

The long period of time in the core empirical setting not only allows for continuity in observation of a series of nascent entrepreneurs, their teams, and their role-sets, as mentioned above, but also experiential knowledge and understanding of the structures, norms and routines that govern or influence the nascent entrepreneurs, teams, their role-sets, and associated factors. A potential limitation of this closeness is a risk of bias due to loosing the ability to objectively understand assumptions (Coghlan and Brannick, 2005). The researcher can be challenged to gain distance from the empirical setting, and can feel an obligation, as a member to support the image of the setting. However, this is a weakness if the research is placed in comparison with objectivist research, where the intent is to experiment in order to establish explanations (Shani et al., 2008), as compared to exploratory and descriptive studies. Furthermore, the risk of 'going native' in relation to main approach of the research, action research, is limited, as action research intends the researcher to interact and collectively with others develop research findings in the setting studied. As only one of the 'others', my potential closeness is limited to my interpretation of the nascent entrepreneur and balanced by the influences and interpretations of other actors. In addition, the research and findings have been discussed regularly with individuals outside the Chalmers VCS, as well as challenged and discussed by individuals visiting the environment. In this way, perspectives and interpretations additional to my own have been introduced. Finally, the intrinsic case is addressed through the systems perspective taken, such that the object of study is studied from multiple levels of analysis and in relation to different constructs of actors and components, providing multiple points of view upon the same phenomenon.

4.2 General research approach

Exploration of interaction requires more in-depth and engaged research than is generally conducted when investigating entrepreneurial activity (Gartner and Carter, 2003). As the

[8] Sometimes an idea which has been terminated in a previous year is reintroduced, and selected, into the VCS, often because the either the idea or the market has evolved since the time of termination.

intent of the research is not to explain behavior, but to understand behavior as it is being developed, an interpretative approach is taken (Bryman and Bell, 2007, p 26-27). The ontological and epistemological foundations of this approach in organizational research, as outlined by Burrell and Morgan (1979), build from a subjective understanding of one's social experience due to the way in which the individual makes meaning of the social setting. In order to investigate the development of a phenomenon, it is important to gather evidence within the context of the phenomenon where it is hypothesized that the development is taking place, based on the resulting outcomes. Action research (Coghlan and Brannick, 2005, Reason and Bradbury, 2008) is conducted based on the ability to immerse in the empirical setting, as both a researcher and an actor with a professional role, acting in concert with others. As an action researcher in the Chalmers VCS, I have engaged in multiple annual cycles allowing me to implement developments and changes basically every year.

The methodology chosen involves in-depth longitudinal study (Flick, 2006) of not only the actors developing entrepreneurial behavior, the nascent entrepreneurs, but the surrounding actors, (including a more specifically defined role-set). The research is qualitative, building mainly upon more than six years of observation and embeddedness in an empirical setting determined to engage in high-growth potential venture creation, the Chalmers VCS. The action research approach to the intrinsic case is complemented by a participatory observation approach to two studies, the basis of Paper I and Paper V, used to compare with other VCS settings (Paper I) and environmental settings (Paper V). Historical, observational, and interview methods are blended when gathering and interpreting evidence from quotations, segments of documents, and descriptions (Hammersley, 1990). Data collection methods include various types of interviews, documentation, participant observation, and archival material, and are discussed relative to each study associated to the appended papers.

The thesis uses multiple levels of analysis, both micro and aggregate (Davidsson and Wiklund, 2001). Different levels are specifically addressed through the independent papers appended to the thesis, while contributions from the papers (and the analysis perspective) are combined in the thesis. Thus, the systems perspective I take in the thesis intends to investigate development of entrepreneurial behavior in relation to a conglomerate of interacting and influencing factors from multiple levels.

4.2.1 Action Research

As research based on an interpretative approach requires that understanding is based on the experiences of the individuals working within the social interactions, the main method utilized is action research, particularly stemming from the Lewinian understanding. Lewin is said to view action research as part of a cyclical process involving social planning, reconnaissance (evaluation of action informing next steps), review and iteration (Adelman, 1993, Bradbury et al., 2008). Lewin's understanding of action research is utilized as this is seen to align with the theoretical foundation used in the thesis regarding Social Learning Theory and behavioral development as influenced by one's environment (Lewin, 1951).

Action Research provides knowledge of living and evolving processes rooted in everyday experiences (Reason and Bradbury, 2001). The methodology is most appropriate to studies involving research studying phenomenon concerned with human interaction from an insiders'

perspective, observed from within an everyday life setting, such that the researcher is able to access such a setting, and of a certain size and scope so that the phenomenon can be studied as a case using qualitative data collected by direct observation and other field setting methods (Jorgensen, 1989). A particular specialization of Action Research, Insider Action Research (Coghlan, 2007, Roth et al., 2007), refers to research conducted upon activities within a setting as they take place by a researcher who is part of the setting in which the action is taken (Coghlan and Brannick, 2005). This type of approach is utilized in order to capture the in-depth dynamic of the object of study, not observed by outside researchers. Insider status provides access to the broad spectrum of information that, due to sensitivity, degree of trust, articulation, and other environmentally-based challenges, outsiders would not have access to, decreases reliance upon espoused-theories (Argyris, 1991).

4.2.2 PARTICIPATORY OBSERVATION

For the studies not only investigating the intrinsic case of the Chalmers VCS, participatory observation has been the main methodology utilized. Participatory observation, is understood as a process, in three progressive phases, descriptive observation, focused observation and selective observation (Spradley, 1980), each allowing for deeper access, insight and understanding into the phenomenon studied. Raymond Gold (1958) classifies the role of 'participant-as-observer' as a complete participant in the social setting, regularly engaging and interacting in daily activities, but where the members of the setting are aware that the researcher is conducting research and thus that they are being observed for research purposes. The details participatory observation of the Paper I and Paper V are discussed in section 4.3.

4.2.3 A SYSTEMS PERSPECTIVE

Exploring *inter*-action influencing entrepreneurial behavior development requires a perspective that accommodates the interconnectivity or interdependency of various parts. I describe this as a systems perspective[9], exploring various relationships and interdependent parts such that this perspective recognizes that the interactions of the various actors and components are collectively contributing to the empirical setting. While recognizing entrepreneurial behavior as an individual phenomenon, the systems perspective attempts to capture the structured context, illustrating that the individual does not act independently in a vacuum, but rather is inter-dependent in relation to other actors, components or a combination thereof when involved in the process of new venture creation. This can be seen as analogous with the concept of embeddedness. "The concept of embeddedness expresses the notion that social actors exist within relational, institutional, and cultural contexts and cannot be seen as atomized decision-makers maximizing their own utilities. Embeddedness approaches prioritize the different conditions within which social action takes place." (Ghezzi and Mingione, 2007, p 11).

[9] A systems perspective is not to be confused with system theory; the intention is not to describe the process or the empirical setting as a system. Actors of the role-set are not necessarily employees of the empirical setting, and may have other professional roles, thus being only be associated to, or even independent of the empirical setting or organizing context. Similarly, different structural components, designs, routines, etc. may be either common to the entire empirical setting, or specific to certain parts. The empirical setting may be better understood as an ecosystem of actors, structures and procedures that interact as part of a learning process in order to develop meaning and identity.

A systems perspective is also intended to allow for study of entrepreneurial behavior development from different points of view, while still maintaining a holistic view of a "set of elements connected together … showing properties which are properties of the whole, rather than properties of its component parts" (Checkland, 1981, p 3) and that there exists interaction between these parts and the regulatory framework which guide the organizational activity (Edquist, 2006). A systems perspective is a conceptual framework to allow for aligned study of entrepreneurial behavior through contributions from different levels of analysis in a micro-aggregate mix (Davidsson and Wiklund, 2001, Low and MacMillan, 1988), from the individual to society.

A simple illustration of the systems perspective taken upon the empirical setting of this thesis is presented in Figure 8. Figure 8 is not intended to explain or depict relationships, but simply to illustrate different 'levels' impacting the nascent entrepreneur and the way in which behavior is being developed in that individual within the 'organizing context'. The 'organizing context' of the empirical landscape is represented by different levels, each of which includes actors and components potentially influencing, shaping and developing entrepreneurial behavior due to the way in which they affect interaction with the nascent entrepreneur. The nascent entrepreneur is the focal point of the interdependent action.

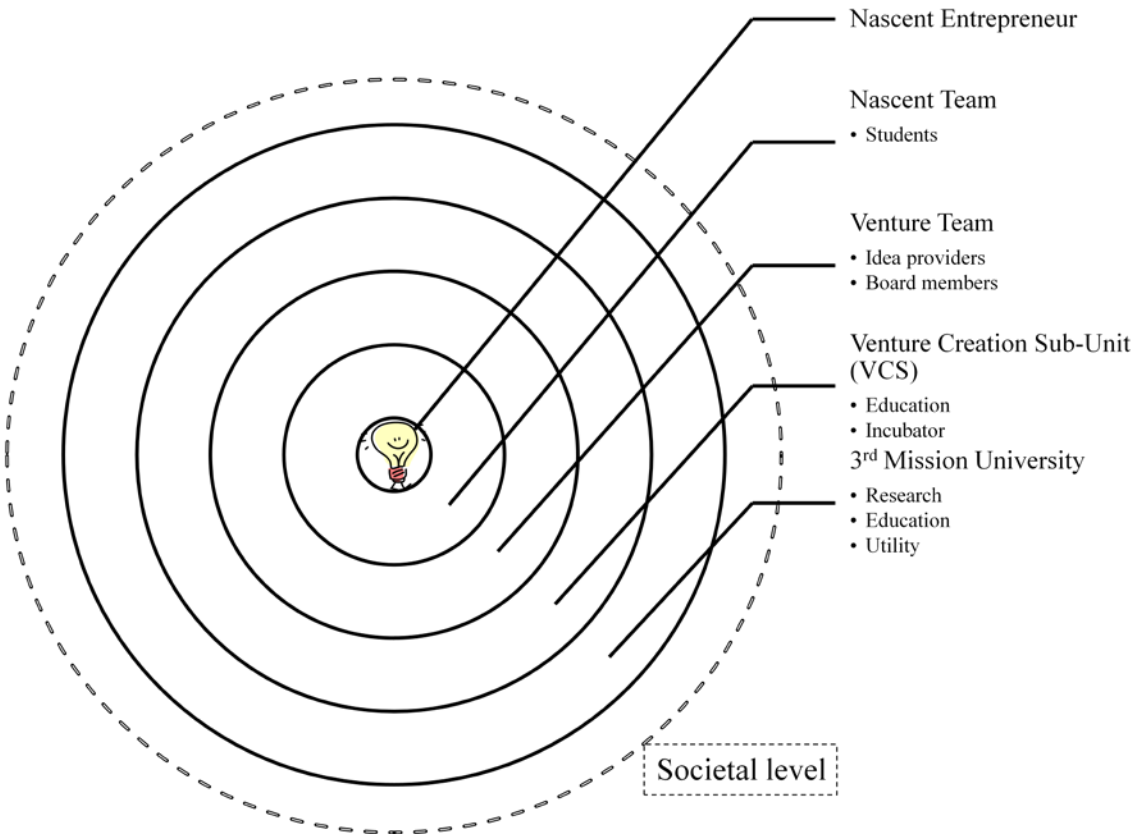


Figure 8. A systems perspective of nascent entrepreneurship at the university

A systems perspective approach to investigating a specialized VCS allows for inclusion of resource accumulation factors, institutional factors, and interaction factors, among others. A systems perspective has the possibility to add richness to large scale studies into nascent entrepreneurship, by recognizing a more homogeneous environment, though still investigated longitudinally, but at varying levels of analysis. The university engaged in a third mission of research utilization in this thesis has been established as a specific bounded condition.

4.3 Specific data collection and analysis of the paper contributions

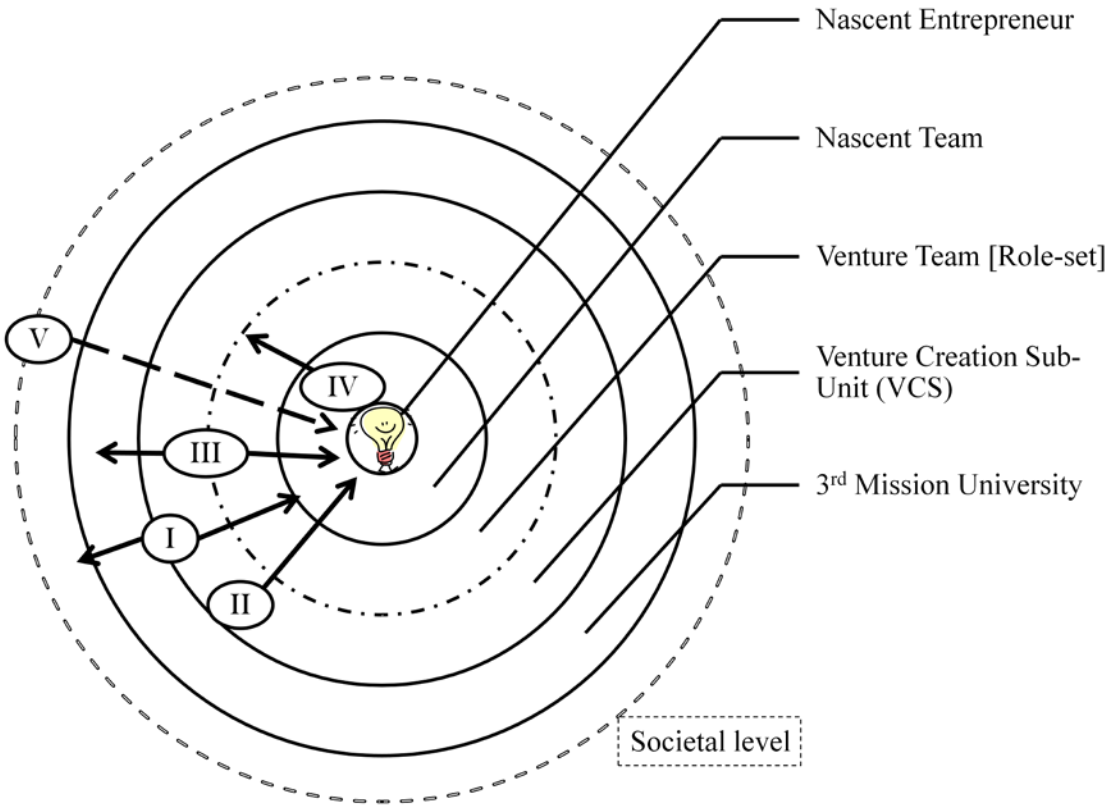
The five appended papers contributing to the thesis are based on independent studies utilizing varying collection and analysis methodology. The data collection and analysis methods utilized for each contribution are presented in Table 3.

The appended papers build upon case studies within university settings engaging in entrepreneurial activity, with the exception of Paper V, which is utilized as a comparison to the university setting. Paper I builds upon case studies of three different subunits (two U.S. and one Swedish) partially or completely embedded in a university engaging in utilization of university research. Papers II, III and IV are independently conducted but interrelated studies of the intrinsic case of the Chalmers VCS. Paper V combines a conceptual model describing societal entrepreneurship with empirical evidence of individuals engaging entrepreneurially beyond their organizational boundaries.

Table 3. Data collection and analysis methods of contributing papers

Paper	Empirical description	Participatory	Non-participatory	Interview	Document/ Archival	Level of Analysis from Systems Perspective
Paper I	Case studies of VCS subunits at three independent universities	Research groups	Observational data	Chalmers (2), Colorado State University (2), University of Penn. (1)	Documentation including annual reports, etc.	University and subunit
Paper II	Case study of Chalmers VCS and 4 nascent venture cases	Focus groups	Experiential data	4 interviews resulting in case vignettes	Reports, press, etc.	Subunit, venture team, nascent team, nascent entrepreneur
Paper III	Multi-year case study of Chalmers VCS	Staff meetings, education, email correspondence	Reflections from students, informal meetings	Staff interviews	Journals, reflection papers, etc.	Subunit, nascent team, nascent entrepreneur
Paper IV	14 month case study of two venture teams in Chalmers VCS	Focus groups; group meetings; staff and management meetings	Observational data	Select venture teams: group and individual	Application information, journals, reflection documents.	Venture team, nascent team, nascent entrepreneur
Paper V	8 month explorative study	Focus groups, study visits, and interactive workshops		59 interviews	Reports, literature review	Society, nascent entrepreneur

As the previous section explained, a systems perspective is used in order to gain a more comprehensive understanding of the impact of environmental factors and general position of relationships influencing interaction. Thus, the general level of analysis and social interaction (as illustrated by the arrows) of the appended papers is presented in relation to the systems perspective in Figure 9.



Paper I: Legitimizing Entrepreneurial Activity at the University
Paper II: Sustainable Wealth Creation beyond Shareholder Value
Paper III: The Venture Creation Approach: integrating entrepreneurial education and incubation at the university
Paper IV: Entrepreneurial positioning
Paper V: Promises of Societal Entrepreneurship: Sweden and Beyond

Figure 9. Paper contributions to provide systems perspective

Paper I is based upon qualitative case studies from three universities. Three cases of university subunits engaging in entrepreneurial activity are selected from an established network, based on their successful achievement in utility creation through integrated activities. Each case represents a subunit having one of the three university missions as their core operating objective – research, education and utility creation – but actively pursuing multiple missions through synergized activities at the local level. Initial comparison of the university settings in which the subunits operate is based on ranking and statistical information. Site visitations and interviews allow for focused investigation into how activity

integration is performed and championed. These are complemented with documentation and other independently available information.

The book chapter (Paper II in the thesis) is based upon action research, from a facilitator perspective on an educational program utilizing research-based venture creation, the Chalmers VCS described in Chapter 2 (section 2.2). The facilitator perspective is complemented with short case vignettes of alumni: one of an individual who later independently started a business, and three regarding ventures incorporated through the Chalmers VCS. The book chapter is mainly descriptive, building upon insider understanding and complemented by historical documentation regarding the different evolutionary phases of the Chalmers VCS.

Paper III is based on a case study of the Chalmers VCS. Insights into the environment, gleaned through insider action research are complemented by participatory observation of three consecutive years of venture creation in the empirical setting. This is complemented by student and organization documentation as well as student and staff interviews in order to explore the ways in which learning is facilitated and received.

In Paper IV, two nascent teams (made up of three nascent entrepreneurs with associated role-sets) are observed throughout a one-year incubation period, during which the teams incubate new ventures, with the intention to incorporate, should the venture be viable. A series of interviews are conducted with the nascent entrepreneurs as a team, coupled with individual interviews with each team member, as well as interviews with select members of the role-set. Interview and observational data are coupled with written documentation including meeting protocols from facilitating staff and board meetings, as well as venture newsletters and nascent entrepreneur journals. From this information, narratives are emploted and analyzed using positioning theory in order to identify communicated rights and duties, and storylines, in relation to social forces.

Paper V builds upon a study designed to explore how the terminology 'societal entrepreneurship' could be interpreted, from a Swedish perspective. Of 176 initially identified actors, 59 (33.5%) were interviewed. Interviewees were asked to identify themselves relative to existing terminology, describing how they understood such terminology, and then explain their understanding of societal entrepreneurship. Observed focus groups of interviewed actors complemented interview data. From data collected, interviewees were independently categorized by the authors and then compared and analyzed. Categorization was compared to definition terms resulting from a literature review.

4.4 Methodological considerations

The limitations of the thesis stem from the theoretical and empirical choices made. The theoretical limitations of the thesis include ramifications of building from Creation Theory and Social Learning Theory, in which the development of entrepreneurial behavior is discussed in relation to the social construction of behavior through interaction. The empirical limitations of the thesis build upon the empirical landscape chosen and defined and then the way in which the landscape was investigated.

The university as the empirical landscape in which the development of entrepreneurial behavior can be investigated potentially limits the applicability of the conceptual findings towards other settings, such as the general population or community settings. However, this choice was made to counter the problems encountered in the large scale studies due to broad and heterogeneous data. The defining criteria of the university landscape studied are relatively specific, dealing mainly with knowledge and/or technology-based opportunities, and university infrastructure that support the mission of utilization of university-based research, including commercial methods. Clearly defined criteria may enable better understanding of the phenomenon of facilitating entrepreneurial behavior development, which can then be tested and compared across other research and development settings.

While the core empirical setting is a select VCS at a technical university in Sweden, this environment is also placed in comparison with investigation into other university VCSs, intending to provide basis for comparison and some generalization. Recognizing and referring to previous, independently conducted research on the same environment, particularly in reference to a common factor (ex. entrepreneurial education) allows for testing of general concepts brought forward in previous research, as well as testing through investigation on the "same" object of study, thus allowing for alternative perspectives. Within the Chalmers VCS, respondent data is also placed in perspective through the integration of interpretations from other actors in the same environment and process, where observed data also can be questioned relative to documentation, thus increasing or correcting the level of reliability of the initial data.

In hindsight, if I were to conduct the research again, I would include more quantitative or outcome-driven research to complement the qualitative interpretative research and event-driven. However, the level of fragmentation in the field was significant enough to require explorative research to establish richer explanations of how behavior can be understood, developed, and development of behavior facilitated. The research could have also been conducted in a way to more concretely illustrate the interactions of the role-sets in the environment. I would also have utilized the cyclicality of the venture creation periods to a greater extent in order to draw comparisons of venture teams and role-sets from one year to the next. This could have potentially provided insight into various factors impacting the phenomenon which are only intrinsically understood.

5 SUMMARY OF APPENDED PAPERS

The thesis builds upon five appended papers. Table 4 provides an overview of the appended papers, including author contribution and status as of November 2010. Each paper contributes to the thesis as positioned from systems perspective, as illustrated in Figure 9 in the previous chapter. The papers are presented in sequence, Paper I through V, first reviewing the initial purpose and findings of the paper and then presenting findings from the papers relative to the core purpose of the thesis. Facilitating entrepreneurial behavior development is addressed relative to the three research questions: RQ1 - the actions of the entrepreneurial process, using terminology from Table 1 (section 3.2.1); RQ2 - the contributing factors of the environment, using terminology from Table 2 (section 3.5.1); and RQ3 – the influence of interaction, through theories of learning and positioning. Findings from the papers are used to substantiate facilitation of entrepreneurial behavior development in relation to the model presented in Figure 7 (section 3.6). The chapter concludes with a summary of contributions stemming from each paper associated to entrepreneurial behaviors, presented in Table 6.

Table 4. Summary of contributing papers

Paper	**Main Title**	**Author(s) Contribution**	**Status**	**Empirical data**	**Interaction position**
Paper I	Legitimizing entrepreneurial activity at the university	Lundqvist and Williams Middleton (50/50)	Submitted to *Research Policy*, October 2010	3 subunits at independent universities	Subunit and university; Subunit and nascent entrepreneur
Paper II	Sustainable Wealth Creation beyond Shareholder Value	Lundqvist and Williams Middleton (50/50)	Published in *Innovative Approaches to Global Sustainability* Palgrave Macmillan 2008	Chalmers subunit and 4 nascent cases	Subunit and venture team; Subunit and nascent team
Paper III	The Venture Creation Approach	Ollila and Williams-Middleton (50/50)	Accepted to *IJEIM*, March 2009; to be published 2010/2011	Multi-year analysis of Chalmers subunit	Subunit and nascent team; Subunit and nascent entrepreneur
Paper IV	Entrepreneurial positioning	Williams Middleton (sole author)	Submitted to *Intl Journal of Entrepreneurial Behaviour and Research*, October 2010	1 year analysis of 2 venture teams at Chalmers subunit	Nascent entrepreneur and nascent team; Nascent entrepreneur and venture team
Paper V	Promises of Societal Entrepreneurship	Lundqvist and Williams Middleton (50/50)	Published in *JEC*, 2010	59 interviews; interactive workshop	Nascent entrepreneur and society

5.1 PAPER I: LEGITIMIZING ENTREPRENEURIAL ACTIVITY AT THE UNIVERSITY

Recognizing that universities are held responsible for a third mission regarding utilization of research findings, this paper aims at understanding how to legitimize entrepreneurial activity resulting in utility creation in the university setting. Defining of the third mission of the university as utility creating allows for the acceptance of activities associated to achieving this mission as core to the university, compared to the more peripheral add-on (technology transfer and similar) or hands-off (academic entrepreneurship) activities. The paper investigates subunits engaged in entrepreneurial activity at three independent universities – two in the United States, one in Sweden. Each of the subunits must adhere to the research utilization (technology transfer) policies of their university, impacted by the societal (regional/national) governing system. However, the social norms of the subunit and its actors also guide the governance and policy structures of the subunit. The main finding of this paper is that entrepreneurial activity is legitimized through organizational routines that integrate activities which can fulfill multiple missions of the university, namely research, education and the third mission defined as utility creation.

5.1.1 CONTRIBUTIONS TO FACILITATING ENTREPRENEURIAL BEHAVIOR DEVELOPMENT

In this paper contribution, behavior leading to entrepreneurial activity is seen as facilitated mainly through establishing legitimacy in the form organizational routines. As the Chalmers VCS is one of the three cases studied, this paper also provides comparison between the core empirical setting of the thesis and other examples of university subunits facilitating nascent entrepreneurial activity. This paper, positioned at the subunit level illustrates how environmental factors from various parts of the university ecosystem impact how venture creation environments are able to facilitate development of entrepreneurial behavior. The governing policies of the university, influenced themselves by the societal (regional/national) policies regarding research utilization set guidelines and initial routines, often intended towards a specific mission in order to transparently deal with conflict of interest. Different subunits have designations for areas of operation: for example research departments responsible for identifying an opportunity and technology development; or business schools focusing on diagnosis of business needs, sales strategies and communicating with customers. Entrepreneurial behavior development is facilitated through integration across the different subunits to complete a process of venture creation. This is exemplified in the three cases.

At the University of Pennsylvania, the newly appointed TTO director of the CTT starts by negotiating what the duties of the office ought to be by redefining the reporting structure. Instead of measuring the number of invention disclosures, emphasis is placed on the number and quality of agreements completed. Thus the measured action of the office shifts from entry into the emerging (nascent) phase – the disclosure of an invention – to completion of the emerging (nascent) phase – transfer into an existing company through license or transformation into a new venture (the latter being the focus in this thesis). Integration of activities between the office of technology transfer and the research units, through outreach programs and fellowship programs, and with educational units, through combined efforts with the business school, form a role-set around the nascent entrepreneurial idea, sometimes championed by the academic, sometimes transferred to another actor. The role-set includes actors not only investigating actions of the emerging phase, such as technology application, claiming of IP and ownership structures, but also new firm actions, such as marketing and

business strategy. The integrated activities across the different subunits can be seen as creating an experiential learning space for not only the academics initially disclosing the idea, but also the business students and fellowship actors.

At Colorado State University, utility creation is facilitated through an engines research laboratory, the EECL, having research as its core function and legitimized activity, as recognized by the university. However, the core objectives of the research lab, to 'put discoveries into products and products into production', align with venture creation actions described by Reynolds (2007) as developing a firm presence or organizational and financial structure. The lab created an organizational culture that facilitated not only technology development, but also financing and organizational structuring, as well as shaping role-sets to support development. Role-sets included not only researchers and industry partners, but involvement of undergraduate and graduate students gaining experiential learning in not only engineering sciences but business as well. The value of joint activities of the laboratory is eventually recognized and legitimized by the university in the formation of the Supercluster™, which then allows for specialized employment and financing structures, bringing additional actors into the role-set to help manage venture creation through provision of business and legal advice and services. The Supercluster™ facilitates development of entrepreneurial behavior not only in the academic researchers but also the undergraduate and graduate students.

The Chalmers VCS, which is the third case of the paper, operates in a similar way to the EECL at CSU, except that the initial framework is an educational platform, using the core mission of education as the initial method for legitimization, into which utility creation is integrated, through the involvement of researchers contributing ideas with potential utility. The different actors interact in an environment facilitating the development of new ventures. The initial concept of combining university researchers and their projects with an education program is redesigned to include incubation, which introduces contractual agreement around ownership of intellectual property and provision of initial financing.

While the three cases exist in different settings, impacted by the specific policy, infrastructure and norm factors of their environments, they all illustrate how entrepreneurial activity at their university is legitimized through integrated activities, embedded in one mission objective, but addressing the other missions of the university as well. Entrepreneurial behavior is facilitated through combining resources provided by different actors, organized into a role-set. Actions include identifying the opportunity and developing the technology, often requiring input from researchers; securing IP, determining the legal form, and managing conflict, often requiring input from transfer or incubation professionals; and diagnosis of business needs, sales and business development and communication with customers, which can be part of business development responsibilities of students. Thus, the actions also focus on business planning and marketing needs of the future venture. The interaction of the researchers, professional and students through various educational, fellowship and internship programs facilitates experiential learning and mentorship of the more experienced individuals towards the less experienced, that can be understood as the learning through interaction contributing to entrepreneurial behavior development, as presented in Figure 7. Illustrating the mutual benefit of these combined actions towards the different missions to the extent that they are routinized helps to legitimize entrepreneurial activity.

5.2 Paper II: Sustainable Wealth Creation beyond Shareholder Value

This paper, in the form of a book chapter, argues that the university can be an arena for generating returns on investment beyond financial returns from entrepreneurial activity. This position is investigated through two research questions: how do you secure educational objectives while also building ventures, and what returns on investments, other than financial, result from the Chalmers VCS. Educational objectives are secured through communicating expected learning outcomes that students are to achieve and then facilitating learning mechanisms, such as role-plays or business plan presentations, through which the learning outcomes can be demonstrated, in addition to more traditional measurement systems such as exams or reports. Assessment mechanisms are complemented with other mechanisms, such as development talks, designed to provide space for reflection and feedback in order to facilitate learning around the on-going creation of the venture. Finally, the Chalmers VCS reserves rights such as right to termination of a developing venture, should it become counterproductive to learning.

Financial value occurs when ventures are created and succeed in the marketplace. Additional returns on investments include societal and educational benefit. The return to society includes evaluation and development of research ideas to determine and even capitalize on potential utility, which might otherwise have remained in the university setting. In this way, the Chalmers VCS then also plays a contributing role to a greater entrepreneurial ecosystem. In turn, the Chalmers VCS, and through it, the students gain access to a broader network of innovation development. Students gain experiential learning as nascent entrepreneurs within a learning environment, sheltered from the risks associated to venture failure. Learning gained can be applied to future ventures or entrepreneurial activity in other arenas.

5.2.1 Contributions to Facilitating Entrepreneurial Behavior Development

The book chapter contributes to how entrepreneurial behavior is developed through a method of ‘testing the water’, allowing for learning about creating a new venture by doing the actions that create the ventures. Entrepreneurial behavior development is seen as facilitated through four main environmental factors: a masters-education program, a pre-incubator, the venture teams, and an entrepreneurial network. The masters-education and pre-incubator provide key structural components contributing to entrepreneurial behavior development such as a structural framework and design involving contractual engagement, governance structures, financing, working facilities and set milestones for delivery. Designating rights and duties guide engagement into the Chalmers VCS. Securitizing rights and duties is done not only through ownership distribution, stipulated at the beginning of the venture creation process, but regarding engagement and decision making, including space for reflection and hypothesis testing through feedback loops. This is done through interaction with other actors.

Structural components are complemented by social components, such as social networks including the role-set, cultural values and exposure to entrepreneurial role-models that facilitate interaction, learning and reflection. The nascent entrepreneurs are provided rights to drive the potential new venture. The associated actors contributing the idea upon which the venture is based, providing guidance once the entrepreneurial team is formed. A role-set is formed around the venture to facilitate the process through the emerging (nascent) phase.

The ownership designation factor was not initially designed into the Chalmers VCS until 2001. It is recognized that the designation of potential ownership, through contractual agreement has proven to be critical towards the successful development of new ventures. Designation of ownership structure helps to securitize the legitimacy of acting as the nascent entrepreneurs for the students when they first start working with the project. Ownership rights can even be used to influence others in the role-sets in relation to their responsibilities to the project, for example around hours of engagement in the new venture creation process.

However, while accessibility to resources is facilitated to a large extent, attention is paid to avoid over-saturation of resources to the nascent entrepreneurs and ventures. The resources provided to the ventures are purposefully limited in order is to establish planning and decision making processes dependent upon lean and agile operation activities. This creates a feedback loop between the nascent entrepreneur and the role-set regarding allocation of funds, time and energy in order to plan and act during an ambiguous process. Monitoring resource allocation is also done in order to stimulate the nascent entrepreneurs to independently attract and combine resources, beyond those provided through the environment. This is intended to strike a balance between providing enough resources to avoid the process becoming stagnant while at the same time forcing decision-making. Thus, the book chapter illustrates how the structural and social components of environmental factors are used to facilitate entrepreneurial behavior development through stimulation of actions towards venture creation and learning through interaction.

5.3 Paper III: The Venture Creation Approach: integrating entrepreneurial education and incubation at the university

Recognizing a gap in the literature between university entrepreneurship and entrepreneurial education, Paper III illustrates the potential of integrating venture creation and entrepreneurial education in an academic environment, thus also proposing how entrepreneurial education can contribute to the field of university entrepreneurship. The Chalmers VCS is the chosen empirical setting. The potential of integrated venture creation and education is explored in order to investigate which teaching approaches and learning philosophies can facilitate learning which develops both entrepreneurial behavior and venture creation.

A venture creation approach is presented as a new learning approach combining different philosophies for learning through entrepreneurship and facilitating learning while creating a new venture. The approach results in a list of key elements, building from conventional and enterprising approaches (Gibb, 1996), emphasizing integration and co-creation of knowledge, involving not only the students and the educators, but also other, complementary actors to provide learning and reflection regarding real-world situations. The paper finds that a venture creation approach requires going beyond stimulating entrepreneurial behavior to include the real-world context in order to provide ‘internalization’ (Gibb, 1996) of knowledge regarding the urgency, prioritization and pressure created by real-world situations. Problem-oriented learning philosophies allow for the development of more traditional academic knowledge, while solutions-focus philosophies allow for practical knowledge through ‘generative’ learning (Barrett and Peterson, 2000, Gibb, 1997). A venture creation approach demands a learning environment that is ‘reality’, where real ventures are used as a core learning object, while still balancing problem-oriented and solutions-focused learning philosophies in order to

maintain space for reflection. The main challenge is finding the balance between engagement and reflection. Letting the student loose to only focus on business activities in the venture takes away the value and credibility of the educational system, including the space for reflection in order to internalize knowledge (Maples and Webster, 1980). Too much restriction of business activity through the venture limits the venture as a learning object involving real-world situations.

5.3.1 Contributions to Facilitating Entrepreneurial Behavior Development

Relating to the purpose of the thesis, facilitating the development of entrepreneurial behavior, using the venture creation approach, is done through an educational platform which includes a venture creation process. From a systems perspective, the paper is mainly addressing the interaction between the role-set within the Chalmers VCS and the nascent entrepreneurs, both individually and as a team. The environment, in which the education is provided, the Chalmers VCS, is impacted by various factors, having both structural and social components. The factors also influence the process of venture creation facilitated in the Chalmers VCS. Governing policies and regulations of the university, and the society in which it operates, impact the rights and duties of the various actors facilitating learning within the Chalmers VCS.

By incorporating different perspectives and utilizing various learning philosophies, a venture creation approach facilitates entrepreneurial behavior which can be considered sustainable, such that the behavior is retained beyond the immediate time frame in which the learning takes place. The approach mixes academic perspectives and business perspectives to support learning about venture creation, most importantly including mentors and role models that provide feedback loops regarding hypothesis testing of decisions. Students are supported in the role of nascent entrepreneur, and through experiential-based pedagogies practice venture activities, acting as nascent entrepreneurs. Nascents interact with the role-set who utilize the inherent tension of mixed objectives and perspectives to introduce learning around business activities introduced during the emerging (nascent) phase of the ventures. Actions such as sales strategies and customer communication are integrated into the emerging (nascent) phase in order to allow for testing, evaluation, adjustment, practice and redesign, sometimes resulting in decisions, documents or presentations. Facilitating the process requires development of entrepreneurial behavior not only in the nascent entrepreneurs, but in role-set members as well, in order to adjust to the needs and demands of the nascent entrepreneurial teams and enable them to fit within the organizational confines of the university. Therefore, paper III emphasizes the learning gained through interaction with the role-set, including not only testing of current and future actions, but reflection upon mistakes made and successful decisions in order to shape behavior.

5.4 Paper IV: Entrepreneurial positioning

Paper IV investigates the development of entrepreneurial behavior as the nascent entrepreneur engages in an entrepreneurial process and interacts with a surrounding role-set. The role-set includes the nascent entrepreneur's teammates, the provider of the idea on which the venture is based, a representative of the incubator in which the venture is housed and from whom the venture has received seed financing, educators and advisors, and board members. As they engage in the venture creation process, all actors have designated rights and duties. Behavior

development is studied through interaction, focusing on how the nascent entrepreneurs position themselves, through negotiation of rights and duties, often in respect to roles, relative to their role-set as the venture is created. The descriptions, rights and duties of the nascent entrepreneur(s) and the role-set are presented in Table 5.

The paper illustrates how nascent entrepreneurs engaging in venture creation develop entrepreneurial behavior through a series of situational interactions involving discussion and negotiation with their role-set. Nascents utilize their initial positions, stipulated by contractual agreement as required by the Chalmers VCS, as a springboard for action. As nascent entrepreneurs take on their responsibility of developing a new venture, they test their initial positions by proposing and testing decisions with their role-set. Rights and duties are re-negotiated with the role-set in regards to areas of application, operative roles and business strategies. As rights are negotiated and acted upon, the nascent entrepreneurs establish legitimacy as being capable of performing the role of entrepreneur. Thus, interactions also facilitate experiential learning regarding the positions proposed and decisions made that inform the nascent entrepreneurs and can increase confidence in taking future actions.

5.4.1 Contributions to Facilitating Entrepreneurial Behavior Development

Facilitating entrepreneurial behavior development is addressed by specifically focusing on the interactions taking place between the nascent entrepreneurs and their role-set. The initial position of each actor is designed through contractual agreement, allocating ownership distribution, and policies of the Chalmers VCS, stipulating the rights and responsibilities of each actor in relation to the creation of the venture. These are the key structural factors of the environment that are used to legitimize the students in the role of nascent entrepreneur and potential future entrepreneur of the venture, should it be incorporated. Legitimization is not only about giving the nascent entrepreneurs rights, but also monitoring the influence of members of the role-set, in particular the idea providers, as they at least initially are perceived as having expertise and control regarding the initial specification of the venture.

The social and support network factors provided through the Chalmers VCS, more directly consolidated into a role-set, facilitate learning through interaction. Feedback loops in which nascent entrepreneurs can test hypotheses regarding decisions for the development of the venture are used to, for example, determine an application area or business model, or shape partnership agreements. Role-sets influence the nascent entrepreneurs and the collective nascent team through provision of expertise, but also by presenting multiple perspectives upon key issues, thus requiring the nascent entrepreneurs to establish their own argumentation and decision making procedures. Thus, not only does the role set provide feedback and learning through imitation or modeling, but they also facilitate as space for the nascent entrepreneurs to reflect upon the decisions they are intending to take. The information gained through learning and reflection is used by the nascent entrepreneur to negotiate rights and duties in association to roles or areas of responsibility. Cycles of negotiation, as illustrated in Figure 7, help the nascent entrepreneur to claim and be recognized in the entrepreneurial position in relation to the role-set surrounding them based upon how they interact and negotiate the ‘terms’ of the position. Recognition gained from the role-set also allows the nascent entrepreneurs to communicate legitimacy towards actors and environments outside the Chalmers VCS.

Table 5. Rights and duties of individuals engaging in venture creation

Role	**Description**	**Duties**	**Rights**
Nascent entrepreneur	Student communicating entrepreneurial intent and engaging in venture creation	learn how to create a new venture; apply learning to developing venture with intention to incorporate; attract financing, develop business, represent venture towards market	3,33 to 5% initial ownership claim; skills and knowledge as part of packaged education; support including access to staff, advisors and coaches;
Idea provider	professor, researcher or industry actor providing an idea or invention with perceived commercial value	provide the idea and associated intellectual property; 8 hrs per week of advice and support to the team, often particularly regarding technical development	up to 45% ownership claim; considered expert in field and allowed to continue research/work activities as primary focus
Incubator	business actors providing initial investment and resources for the ventures	initial screening of ideas; team formation; investment and management of incubated ventures; partial management of incorporated ventures up to point of exit	20% ownership claim; manages 10% used for attraction of additional competencies; can reject termination request (from nascent entrepreneurs) if argumentation not valid or can enact termination based on policy issues; controls seed-capital distribution
Education Management	university actors and educators responsible for the program structure, through which the new ventures are to be developed	team formation; facilitate and assess learning at individual and team level; scheduling activities; general guidance, advice and support	design of overall process; can enact termination if project negatively influencing educational objectives
Board member, including chair	individual with business, industry or research expertise; idea providers and incubator (see above) are specialized board members	guide the venture towards incorporation by meeting at regular intervals and approving key decisions, including approving budget allocations	oversee decisions regarding direction of venture, including selection of nascent continuing with venture should it be incorporated; no initial ownership claims
Advisor	coach or consultant that provides specialized information to the team	general or specialized advice regarding business development information, sometimes provided at specific structured points through the incubation period	freedom to disengage; no initial ownership claims

5.5 Paper V: Promises of Societal Entrepreneurship: Sweden and Beyond

Paper V aims to interrelate various terminologies used to describe the development of new organizations with a societal purpose within Sweden. Seven societally-oriented entrepreneurship discourses with various geographical origins are identified and conceptually and empirically investigated. Characteristics for interrelating the different discourses are based on type of actors (individual or collective) and purpose (socio/ecological or economic). Interactions of discourses across the actor/purpose characteristics indicate a potential for a unifying concept of societal entrepreneurship, recognizing the potential for changing perceptions towards entrepreneurial activity as a mechanism for renewal and experimentation in a welfare setting. The study upon which the paper is based found that examples of societal entrepreneurship in Sweden often included individuals engaging into projects or ventures while maintaining some level of employment in established organizations. Existing discourses did not readily account for these 'engaged professionals'. The conceptual mapping of the discourses thus enabled recognition of the collaborative and collective action towards entrepreneurial activity.

5.5.1 Contributions to Facilitating Entrepreneurial Behavior Development

In the previous four paper contributions, facilitation of entrepreneurial behavior development has been addressed within the confines of the university, with emphasis on venture creation involving actors within or associated to the university and factors stemming from its structural and social framework. In Paper V, the university is instead one of many potential contributors to entrepreneurial activity. The main contribution of Paper V in regards to the facilitation of entrepreneurial behavior development is an emphasis on collective action towards an entrepreneurial process resulting in societal utility. Once again, actions and decisions towards creating societal utility in the form of new ventures, projects or other organizations is facilitated through a role-set around the main driving force – in the context of the thesis, the nascent entrepreneur. The role-set, including for example the engaged professionals, activists, community members and/or industrial actors, in interaction with the nascent entrepreneur, test different hypotheses regarding ways in which actions such as business models, legal forms, or securing funding can be conducted to achieve societal utility. The actors in the role-set operate across organizational borders, either utilizing their professional role or acting despite their role in order to help enable an emergent opportunity having a societal objective.

Nascent 'societal' entrepreneurs are challenged with determining their positions or roles in relation to existing terminology and legal forms. Different interpretations of the various societal 'types' and the greater ambiguity of the fundamental purpose of not only contributing to economic development but also societal development, or even societal development in place of economic development. Interaction with a role-set can also become collective action. In either case, the role-set helps to establish legitimacy through shaping the position of the individual (the "societal entrepreneur") based on activities determined to deliver societal utility. Collective action can also indicate two levels of entrepreneurship – the economic understanding, but also the general collective action towards disruption about a social idea or social structures. Negotiated rights and duties include not only economic but social value.

The term ‘societal’ potentially influences the impact that policy has on the entrepreneurial activity and behavior of the societal entrepreneur. Individuals engaging in societal entrepreneurship (engaged professionals) may have more freedom or rights to operate because of the public service provided through their actions and the positive cultural values associated to these actions. This can call attention to the establishment of social norms that allow entrepreneurial behavior in individuals that have an existing position in society with established responsibilities. In particular, social acceptance of their entrepreneurial behavior may increase if they are able to synergize the behavior with their existing duties, thus delivering not only expected value to their various constituents, but delivering beyond expectations based on multiple roles.

5.6 Actions and Factors Impacting Entrepreneurial Behavior Development

In each of the sections of this chapter, discussing the contributions to the thesis, I have explained how the actions, factors and the process of learning through interaction facilitate the development of entrepreneurial behavior. The summaries of contributions in Table 6 and Figure 10 are used to exemplify the actions and factors across multiple levels of analysis in regards to the main empirical setting, the Chalmers VCS, and comparison of this setting to other environments.

In order to illustrate how actions of the empirical settings of the papers facilitate entrepreneurial behavior, I have used the logic presented in Table 1 – Categorizing actions associated to the emerging and firm phases. Action examples from the paper contributions are compared to both the emerging (nascent) and new firm actions in Table 1 in order to determine a category of behavior. The association of action example and entrepreneurial behavior category is presented in Table 6. The logic presented in Table 2 – Factors contributing to entrepreneurial behavior development – is used to determine environmental factors from the contributing papers by comparing examples identified in the paper contributions to table factors. Environmental factors are then presented relative to the systems perspective in Figure 10 in order to illustrate the impact of these factors at different levels.

The appreciation of actions leading to the facilitation of establishing legitimacy through factors of the environment and interaction has been prominent across all the papers. Establishing legitimacy can be seen as developed as part of the process of new venture creation, facilitated through initial allocation of rights and duties, in relation to core missions, such as in all the subunits of Paper I, or through securitization of ownership, as discussed in Papers II and III. Legitimacy established in relation to ownership is mainly facilitated through various structural components of environmental factors, such as policies and legal structures occurring at various system levels. The papers also illustrate that establishing legitimacy is facilitated through interaction with a role-set, which can be understood as legitimacy established in relation to a role. In the cases of the Chalmers VCS and the CSU EECL (also a VCS), the role-set is part of the design of the environment. But the UPENN case in Paper I as well as the findings of Paper V illustrate that the role-set can exist across organizational boundaries.

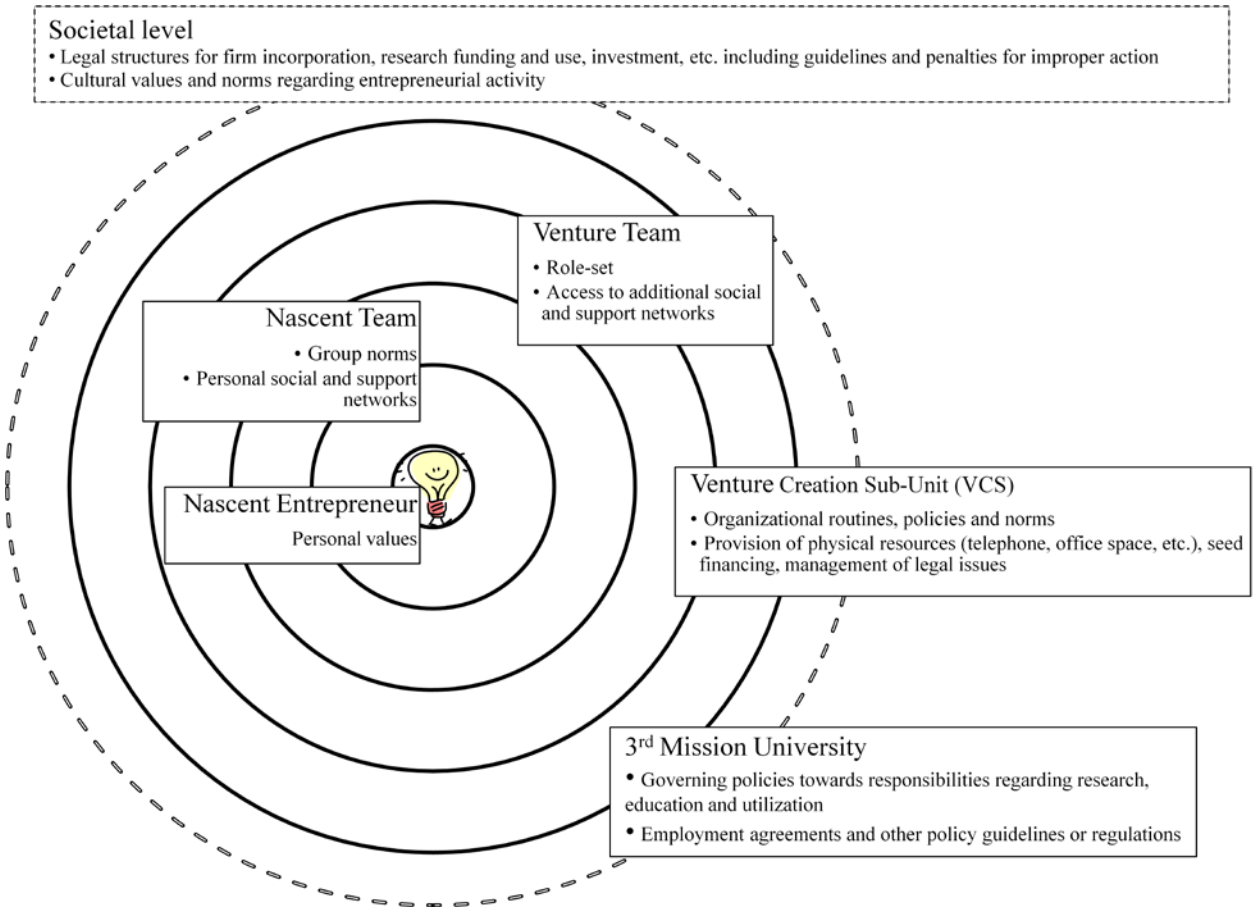


Figure 10. Environmental factors of the paper contributions impacting development of entrepreneurial behavior

The papers also illustrate actions leading to the facilitation of the other three behaviors categorized – planning activities, resources combination and market behavior – through factors of the environment and interaction, but to a lesser extent. Physical resources, capital, social and support networks and exposure to both structure and role models are provided as part of the environment, which enable initial action to take place. The learning that takes place through interaction with the role-set, and others, facilitates testing various decision hypotheses regarding both current and future actions. The role-set not only provides feedback, but helps the nascent entrepreneurs to reflect upon the outcomes of the tested hypothesis or the consequences of decisions taken, such that the nascent entrepreneurs gain experience around planning, resource combination and market behavior. Finally, actions taken as the venture is created are not only associated to the emerging (nascent) phase, but also the new firm phase.

Table 6. Summary of identified actions from contributing papers impacting development of behavior

Paper	Planning Activities	Establishing Legitimacy	Resource Combination	Market Behavior
Paper I	*identifying the opportunity; diagnosis of business needs … business development responsibilities*	*organizational routines; determining the legal form and managing conflict*	*combining resources provided by different actors; technology development … securing IP; interaction of researchers, professionals and students*	*Sales and business development and communication with customers*
Paper II	*allocation of … time and energy in order to plan and act during an ambiguous process*	*designation of ownership structures … used to influence others in the role-sets in relation to their responsibilities*	*role-set formed around the venture; allocation of funds … in order to plan and act; independently attract and combine resources*	*independently attract and combine resources*
Paper III	*sales strategies … are integrated into the emerging (nascent) phase*	*students are supported in the role of nascent entrepreneur … practice venture activities, acting as nascent entrepreneurs*	*mentors and role models that provide feedback loops regarding hypothesis testing*	*customer communication integrated into the emerging (nascent) phase*
Paper IV		*initial position of each actor…allocating ownership distribution…stipulating rights and responsibilities; monitoring the influence of members of the role-sets; nascent entrepreneur negotiate rights and duties in association to roles or areas of responsibility*		*feedback loops … are used to determine an application area or test a business model*
Paper V		*challenged with determining their positions or roles in relation to existing terminology and legal forms; shaping the position of the individual based on activities determined to deliver societal utility*	*role-set, including for example the engaged professionals, activists, community members and/or industrial actors; securing funding [which] can be conducted to achieve societal utility*	*role-set … in interaction with the nascent entrepreneur, test different hypotheses regarding … business models*

6 DISCUSSION

In this thesis, my purpose has been to understand how development of entrepreneurial behavior can be facilitated by investigating the interactions between an individual, the nascent entrepreneur, and her environment. To investigate this purpose, I have posed three research questions: RQ1 Which behaviors are developed as part of the process of creating a new venture; RQ2 How can factors of the environment facilitate the development of entrepreneurial behavior; and RQ3 How can interaction between the individual and her environment facilitate the development of entrepreneurial behavior. This chapter will propose an understanding of how entrepreneurial behavior development can be facilitated. I discuss the research questions, starting with the entrepreneurial behaviors to be developed, followed by behavior development facilitated through interaction and finally how factors can facilitate the development of entrepreneurial behavior. This implies answering the research questions in the order RQ1, RQ3, and RQ2.

The discussion is structured around a set of propositions. In answering research question RQ1, I propose that entrepreneurial behavior of the nascent entrepreneur mainly comprises of two 'meta' behaviors: establishing legitimacy and reducing uncertainty and ambiguity. In answering research question RQ3, I propose that interaction between the individual and her environment, particularly her role-set, facilitates the development of these behaviors by learning through interaction and pre-emptive action. Pre-emptive action is described as introducing actions associated to the phase in which a new firm already exists, into the emerging (nascent) phase. Finally, environmental factors identified at different levels are proposed to facilitate learning through interaction and pre-emptive action through the creation of a learning space (Kolb and Kolb, 2005) – answering research question RQ2. These propositions are incorporated into a revised model for facilitating entrepreneurial behavior development, Figure 11.

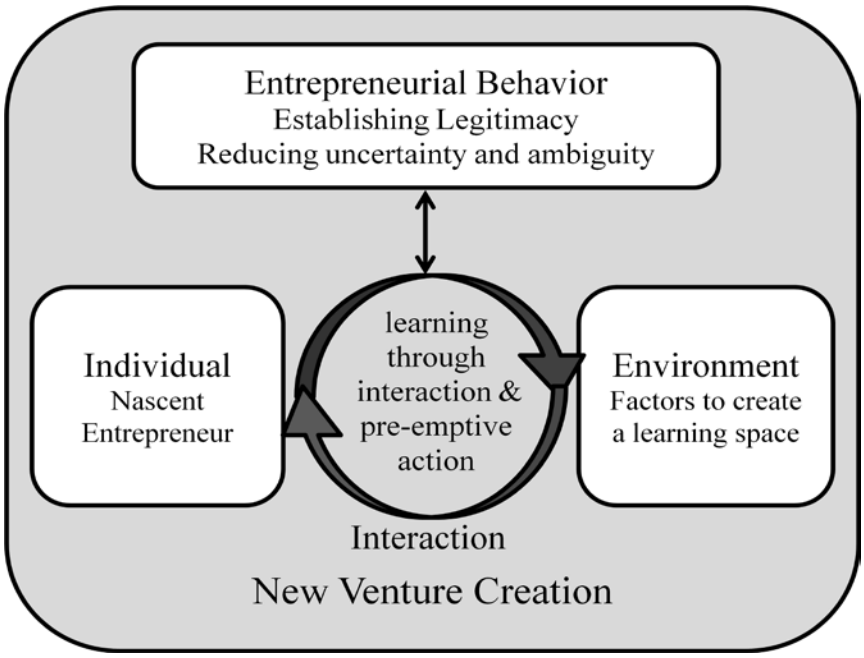


Figure 11. Revised model for facilitating entrepreneurial behavior development

6.1 WHICH BEHAVIORS? ADDRESSING THE FIRST RESEARCH QUESTION

As I stated in the beginning of the thesis, in order to understand how to facilitate the development of behavior, I needed to understand not only how behavior can be developed, but understand which behaviors are developed. Based on my findings, I propose that two key 'meta' entrepreneurial behaviors be developed in nascent entrepreneurs – establishing legitimacy and reducing uncertainty and ambiguity.

Building from a process perspective, in Chapter 1, I defined entrepreneurial behavior as the observable sets of actions of an individual occurring over time (through a process) resulting in the creation of a new venture. A literature review in Chapter 3 of nascent entrepreneurship and the entrepreneurial process resulted in actions seen as belonging to the emerging (nascent) and new firm phases. These were associated to the categories by Liao and Welsch (2008), based on the argument that the actions could be understood as behaviors as they are observable, conducted by individuals over time, and in a process. This resulted in Table 1. I then compared actions found in the empirical studies to the actions in Table 1 in order to associate the actions of the empirical studies to the categories of behavior. This resulted in Table 6.

A common theme found in my empirical studies is nascent entrepreneurs acting in order to position themselves in the role of entrepreneur, in association with a venture, with legal stature. Individuals identify themselves as entrepreneurs when communicating with fellow nascent entrepreneurs, stakeholders and external actors. This illustrates behavior to establish legitimacy, not only establishing firm presence in a legal form and determining the role as the individual leading the firm being established, but acting as an entrepreneur executing business, as if the new firm already exists. The other categories of behavior stemming from Liao and Welsch (2008) – planning activities, recourse combination and market behavior – are actions taken, often in counsel with others, to identify, diagnose, secure and communicate ideas, needs, and resources as the venture is being created. All of these actions can be seen as conducted in order to reduce uncertainty and ambiguity regarding available and unavailable information relating to the venture in order to make decisions and move forward to the next step in the process of creating the venture.

6.1.1 ESTABLISHING LEGITIMACY

Suchman defines legitimacy as "a generalized perception or assumption that the actions of an entity are desirable, proper or appropriate within some socially constructed system of norms, values, beliefs and definitions" (1995, p 574). I argue that establishing legitimacy is a key entrepreneurial behavior of the opportunity-based, high-growth potential venture creation process, building on the findings of the papers. This confirms with Reynolds (2007) findings from large scale studies that establishing firm presence is important to the birth of new firms. This also aligns with the findings of Delmar and Shane (2004) who argued that legitimacy activities are important to the sustainability of a venture. As indicated in Chapter 5, initial legitimacy of the venture can be established through the use of contractual agreements. It can also be reinforced through norm structures or policies of the immediate environment, such as the integrated research and venture development activities of the EECL at CSU, or adapt to

policies of other subunits, such as the outreach programs to the research units at University of Pennsylvania, which the CTT did in order to build trust with researchers.

Another way in which legitimacy is enabled is through the policies of the greater ecosystem. For example university missions towards utilization can be seen as guidelines towards determining an entrepreneurial role for employees of the university and managing conflict of interest in relation to fulfilling multiple roles. As illustrated in the findings from Papers II, III and IV, the example of an initial ownership claim established within the VCS for the nascent entrepreneur helps to determine a role – that of entrepreneur for the venture being developed – as well as provides a position from which the nascent entrepreneur can act to carry out other behaviors, such as diagnosis of business needs, securing IP or funding, and communicating with customers and other external actors.

The importance of establishing legitimacy in the chosen university setting may be partially context dependent, and as such the need for legitimacy establishment may be experienced differently in other environments. The university setting has pre-existing expectations of roles and responsibilities, such as conducting research and providing education. However, even nascent entrepreneurs creating new ventures free of existing organizational boundaries need to establish a presence and legitimacy as individuals conducting business in order to gain recognition from customers, stakeholders and others. For this reason, establishing legitimacy is likely a valid behavior beyond the empirical landscape of this thesis – i.e. the university.

6.1.2 Reducing ambiguity and uncertainty

Actions associated to categories of planning activities, resource combination and market behavior can arguably be seen as associated to making and preparing for decisions regarding the way in which the business is to be modeled, relative to potential or accessible resources and in anticipation or response to the marketplace. In order to make decisions regarding these actions, I therefore propose that the second key 'meta' entrepreneurial behavior of nascent entrepreneurs is to reduce uncertainty and ambiguity regarding information about the venture. In Creation Theory, entrepreneurs are identified as willing to bear the uncertainty of the process they are undertaking (Alvarez and Barney, 2007). I argue that the nascent entrepreneur bears uncertainty by taking action to reduce uncertainty and ambiguity.

Uncertainty can be defined to mean that "the list of possible events is not predetermined" such that "some relevant information cannot be known, not even in principle, at the time of making many important decisions" (Dequech, 2003, p 520). Ambiguity, in turn, can be seen as "uncertainty about probability, created by missing information that is relevant and could be known" (Camerer and Weber, 1992, p 330). Dequech adds that even when all the possible events are not completely known (i.e. 'uncertainty'), "the list of all possible events is already predetermined" by the decision maker (Dequech, 2003, p 520)[10]. In this way, the nascent entrepreneur, in interaction with others and using factors of the environment, can be seen as

[10] Definitions of uncertainty and ambiguity are not definitive (see Camerer and Weber (1992)). Criteria such as the field of science in which the terms are applied, the order level of probability considered and objective/subjective perspective impact the way in which the terms are utilized. I choose a Dequech's definitions of ambiguity and uncertainty as these are the definitions Alvarez and Barney utilize when discussing Creation Theory. This is done in order to remain consistent with argumentation presented in the thesis.

testing hypotheses, for example regarding business models, and gathers information in order to establish a predetermined list of possible events, thus reducing uncertainty to ambiguity. Furthermore, the nascent also takes action to seek missing knowledge, for example, the likely success of each business model, in order to reduce ambiguity.

Reducing uncertainty and ambiguity allows the nascent entrepreneur to progress in the creating of the new venture, in a way which similar to how Gartner and colleagues (1992) described entrepreneurs talking about non-equivocal events in order to propose probable future states. For example, at the University of Pennsylvania, the CTT redefined communication to focus on quality of agreements. In order to do this, a role-set was formed around the nascent entrepreneurial idea to gather information regarding marketing needs (from the business students), definitions and development of technology (from the researchers) and options for IP protection and security of financing (from TTO staff). The champion of the nascent entrepreneurial idea interacts with the role-set to gather different information and test different hypotheses about the potential progressive steps for the venture. The information is acted upon to reduce uncertainty and ambiguity to facilitate making decisions.

Reduction of ambiguity and uncertainty can be seen to be as more vital for opportunity-based, high-growth potential venture creation, as this form of venture creation often stems from new inventions or discoveries, not yet tested, or even understood by the general population. For nascent entrepreneurs building new ventures based on existing ideas implemented in new markets, or establishing lifestyle ventures, there often exists information not only about the full list of potential outcomes when making decisions, but significant information about the probability of success. As Katz and Gartner (1988) discuss, creating something new may involve variations of existing forms, such that there is likely to be information available about the likelihood of various actions. Furthermore, this behavior may not be as critical as the venture matures. However, for early stage research or technology based ideas, where freedom to operate and intended market is unclear, behavior which reduces uncertainty and ambiguity can be critical to the ability to bring a new venture to fruition.

6.2 How interaction can facilitate entrepreneurial behavior development

I initially adopt Social Learning Theory as a basis to explain how behavior is developed, and then suggest additional learning theories and positioning theory to further reason around how behavior is changed, resulting in a model for facilitation (Figure 7). Based upon my findings, I argue that the establishment of legitimacy and reduction of uncertainty/ambiguity is not only affected by cycles of interaction between the nascent entrepreneur and actors of her environment – described as learning through interaction in Chapter 3 – but also through the introduction actions associated to the phase in which a new firm already exists into the emerging (nascent) phase – described as pre-emptive action.

6.2.1 Understanding learning through interaction

Learning through interaction can be seen as taking place in the moment, relative to a particular event or incident. However, while the experiential learning gained in each interaction is unique, it is not independent. Experiential learning changing behavior in one interaction can be utilized to influence structures and positions as new interactions are

encountered. For example, each of the nascent entrepreneurs studied in the Chalmers VCS has an initial claim to ownership in the venture through a structured agreement, though not enacted until the point of incorporation. The first interaction relative to the initial ownership claim becomes the starting point for establishing legitimacy in relation to the role of entrepreneur. Each interaction with the surrounding role-set involves positioning, where the nascent entrepreneur negotiates through actions and communicatively with the role-set actors regarding actions being taken or to be taken. It is through these communications and negotiations with the role-set and other actors that the nascent entrepreneur also reduces the uncertainty/ambiguity of the emergent process of creating a new venture, by testing hypotheses in feedback loops, facilitating both observed and experiential learning and reflection in action. The criticality of these events depends upon the outcome or the importance of the reflection or learning taking place. The interactions allow for the determining of new information about likely outcomes, and enriching existing information about the probability of likely outcomes. Additional information informs preparing for and making decisions, which can lead to the enactment of a framework into a legitimate action.

In the case of the Chalmers VCS, the interaction is facilitated through the design and engagement of the role-set around the nascent entrepreneurs, with both scheduled interactions, such as board meeting, development talks, or project presentations, but also with room for spontaneous interactions initiated through nascents making phone calls or asking for a meeting with an advisor, etc. In the other cases of Paper I, this is through designed internship programs or agreements with other subunits to work collaboratively (at UPENN) or the integration of many different actors with different roles into a Supercluster™ at CSU, with a specially designed culture to encourage mentorship and collective action.

A potential limitation of the empirical research is not directly observing all of the interactions taking place between the nascent entrepreneurs and all the different actors of the role-set and thus not necessarily observing behaviors as they are taking place. However, as a member of the Chalmers VCS, the environment for the majority of the studies, as well as a member of the research project discussed in Paper V, I was able to discuss second hand accounts of observed behaviors, from multiple sources, as well as utilize documentation, illustrating, for example, other results of actions which can be observed. As a member of the environment, in many cases, I also am an acting member of the role-set. While this allows for direct observation of behavior, it also introduces that I am, in my responsibility within the role-set, influencing behavior. My influence is however only one of a minimum of ten actors in each role-set, and an even greater set of immediate social and support networks. However, I must also recognize that my position also influences my view on the behavior developing. Again, this can be seen as balanced by the perspectives of the actors of the role-set.

6.2.2 Pre-Emptive Action facilitating entrepreneurial behavior development

When looking at the actions communicated as taking place as part of the venture creation process in the paper contributions, a key insight is that many of the actions are actually actions that are normally associated to the new firm phase, as compared to the emerging (nascent) phase. The nascent entrepreneurs, and their facilitating subunits or role-sets, are not just talking ‘as if’ (Gartner et al., 1992), but engaging in practicing and carrying out actions ‘as if’ they were already business owners and their firms were already established as

incorporated firms. Facilitation of pre-emptive action allows for informing and making decisions based on hypothesis testing in an environment that has a learning objective. Actions associated to 'firm activities', such as staffing, marketing, sales strategies, conflict management, leadership, communication with staff, customers, and stakeholders, are introduced into the design of the environment and facilitate development of behavior towards future entrepreneurial activity related to planning, marketing and resource combination. In some cases, these new firm actions are integrated with emerging (nascent) phase actions, as seen in findings not only from the main empirical setting in Papers II, III and IV, but also in the other subunit cases in Paper I.

The nascent entrepreneur can be seen as developing behavior towards future entrepreneurial actions by practicing in interaction with the role-set. This can be seen as developing behavior which can reduce uncertainty and ambiguity, by facilitating learning regarding future actions in the emerging (nascent) phase. The actions normally attributed to the new firm phase but practiced in the emerging (nascent) phase inform decisions that will be necessary in the later stages of venture development. Ambiguity about how to act can be seen as reduced, as the feedback loop informs the nascent entrepreneur how better to act in order to achieve the objective of starting a new firm. Pre-emptive action also allows for legitimizing behavior in the role of entrepreneur even before the legal form of the business is in place through interaction with the role-set, in which rights and duties claimed by the nascent entrepreneur are negotiated, challenged, recognized or rejected. West and Wilson (1995) find that ventures often fail because nascent entrepreneurs do not properly monitor information and opportunities, because their perspectives are limited to their previous experience. Facilitating pre-emptive action can allow the testing of potential future scenarios while the nascent entrepreneurs have access to the interactive learning provided through the role-set, and is particularly beneficial if the factors of the environment facilitate some protection from failure consequences.

A potential weakness in my argumentation is that pre-emptive action is dependent upon demarcation between the emerging (nascent) phase and the new firm phase. There are many differing opinions regarding the point at which a new organization has emerged (Reynolds and Miller, 1992), in part determined by when a 'new firm' is an active participant in the economy. This may be first tax payment, associated with incorporation or legal status, first financing, first hiring or first sales. However, the general premise of pre-emptive action, integrating likely future actions of the potential firm into the current actions carried out in order to test and train in the actions, is relevant independent of the definition of the phase shifts. As long as the actions practiced are understood to precede the point in which they are expected to occur, the action can be understood as pre-emptive and therefore facilitating training and developing self-efficacy for future actions.

6.3 How environmental factors can facilitate entrepreneurial behavior development

In Chapter 3, I argued that experiential learning and learning by doing, particularly through co-participation can develop entrepreneurial behavior. Furthermore, learning was found to be influenced by environmental factors in nested arrangements of structures in what Kolb and Kolb (2005) call a learning space. Based upon my findings, I propose that environmental factors facilitating the development of entrepreneurial behavior basically have in common the

realization of such a learning space, enabling interactive learning and pre-emptive action which in turn establishes legitimacy and reduces uncertainty and ambiguity.

Both structural and social environmental factors can be seen to shape a learning space in which entrepreneurial behavior development can take place. Environmental factors with structural components, such as policy or legal requirements, physical resources, technology, and structural models, are (relatively) static and often designed with a particular intention of use or to achieve an expected outcome. Factors such as incubation facilities, seed financing, or initial 'title' as an 'entrepreneur' can be used to facilitate establishing legitimacy and reduce uncertainty or ambiguity as they provide a working space, with designated rights to act, which can be communicated to others, as well as enable action, through purchase of materials or access to resources. The factors of the environment with social components,, such as networks of actors with knowledge, networks of actors who provide support, mentors or role models, competitors, etc., are more fluid factors which can be used to facilitate a forum for communication and interaction. Facilitation of social and support networks, such as a role-set, can enhance new venture survival as they help to overcome the liability of underdeveloped social ties between new ventures and their external stakeholders (Stinchcombe, 1965, Stuart et al., 1999).

In regards to large scale studies investigating nascent entrepreneurship, Reynolds found that the two main factors impacting actions towards the creation of a new firm were education and experience (2007). However, these factors were factors attributed to the individual, not the surrounding environment. There are many studies which have addressed environmental impact in relation to behavior, but these addressed how factors influence entrepreneurial intention, not observed action (Autio et al., 2001, Fayolle, 2005, Lüthje and Franke, 2003). Limited research has addressed how environmental factors impact the learning environment in which behavior is developed, especially including not only the perspective of the nascent entrepreneur, but also the way in which factors impact other actors also involved in the development of behavior, such as the role-set in the case of this thesis. This thesis addresses this need, communicated by Gartner and Carter (2003) among others.

This thesis has built upon the work of Gartner, looking not only at 'what the entrepreneur does' (Gartner, 1988), but how the entrepreneur behaviors in concert with others, within a 'contextual event', as part of a process in relation to the environment in which actions occur. An in-depth look into the 'critical mess' (Gartner, 2006) has illustrated the importance of social interaction with a role-set within a learning space (Kolb and Kolb, 2005) in shaping entrepreneurial behavior.

7 CONCLUSIONS

I have chosen to investigate the entrepreneurial process in the nascent phase, building from a Creation Theory approach, where the result of the entrepreneurial process is the creation of a new venture, and the creation is dependent upon the subjective action of the entrepreneur bearing uncertainty. With the interest of investigating interaction and factors impacting interaction, I adopted a systems perspective in order to recognize the impact of contributions from different levels of analysis in a micro-aggregate mix, from individual to society.

7.1 FACILITATING THE DEVELOPMENT OF ENTREPRENEURIAL BEHAVIOR DEVELOPMENT

Nascent entrepreneurs of opportunity-based, high-growth potential ventures need to develop behavior to establish legitimacy and reduce uncertainty and ambiguity, which can potentially decrease failure associated to liability of newness, liability of underdeveloped social ties between new ventures and their external stakeholders, or lack of self-efficacy. These behaviors can be developed through social interaction with a key set of actors, the role-set. Behaviors are developed through learning, including cycles of interaction where nascent entrepreneurs not only observe, imitate and model mentors and role models with experiential or expert knowledge, but also engage in testing hypotheses and negotiating actions and positions while engaging in creating a new venture. The learning is facilitated through both organic interactions that naturally occur between the nascent and the role-set while undergoing the venture creation, but can also be triggered through designed interactions, where communication is facilitated and feedback stimulates reflection in action and negotiation. Interaction can also be triggered through introducing and integrating actions which are associated to future expected actions or needs of the venture during the emerging (nascent) phase, allowing for testing of hypotheses and feedback.

Learning through interaction and pre-emptive action facilitate establishment of legitimacy for the nascent entrepreneur. Legitimacy is developed through interaction with the role-set as the nascent emulates or gains recognition from the role-set in the role of entrepreneur. This can then be used as a platform towards other actors, such as customers, suppliers, or financers. Pre-emptive action allows the nascent entrepreneur to practice future action, developing better understanding of expectations based on behavior, thus increasing self-efficacy. Interaction and pre-emptive action develops the behavior of reducing uncertainty/ambiguity as the nascent entrepreneur, in counsel with others, gathers, tests, analyzes and determines information to shape or inform decisions, either through establishing predetermined outcomes where none existed (reduction of uncertainty), or improving information about the likelihood of predetermined outcomes (reduction of ambiguity). Interaction and pre-emptive action can be facilitated through the creation of a learning space (Kolb and Kolb, 2005), particularly when involving a role-set. The framework of a learning space is facilitated by a multitude of environmental factors on different systemic levels.

Factors of the environment impacting the learning space have both structural and social components. Structural environmental factors, such as office space, initial financing, or initial ownership rights, may be provided in order to facilitate initial action and interaction, or identify, develop and or purchase additional resources. Structural environmental factors may be used to facilitate guidelines or regulations regarding expected action and behavior in the

learning space. Social environmental factors, particularly the role-set may be specifically assembled to address different perspectives determined as important for interactive learning.

The reasoning of this thesis builds strongly upon Social Learning Theory, understanding that the interaction between the individual and her environment are contributing to behavior. However, this thesis has mainly focused on the environmental factors influencing the development of entrepreneurial behavior through facilitation, thus not addressing individual factors such as traits, attitudes and factors leading to entrepreneurial intention. In part this is due to the significant amount of research already addressing some of these areas in relation to behavior, such as the research of Bird (1988, 1992), Shapero (1982), Autio and colleagues (2001), and others. However, research has also shown that intention is a poor predictor of actual engagement into a venture creation (Katz, 1990), and Reynolds (1995) emphasizes the high influence of situational factors.

7.2 Self-efficacy and entrepreneurial careers

Increased legitimacy and reduced uncertainty/ambiguity can be seen as affecting self-efficacy in the nascent entrepreneur, as she feels more confident in the expected outcome of her actions. Although beyond the purpose of the current thesis, increased self-efficacy of actions can also be understood as impacting the way in which the nascent entrepreneur interacts and negotiates with the environment, potentially influencing change in environmental factors, such as the proposition of new polices, or introduction of new social norms and values, thus increasing self-efficacy about engaging in the process of venture creation.

Individuals interested in careers in entrepreneurship can seek out learning spaces capable of facilitating interacting with entrepreneurial communities or designed role-sets, as these allow for development of entrepreneurial behavior. As the behavior is developed through a learning process while the venture is created, prior to the 'success' or 'failure' of the venture, it is proposed that the behavior developed is not specifically contingent on the venture success. This can be seen by studying alumni of the Chalmers VCS, who have transitioned from engagement in one start-up process to leading another start-up, either by shifting from one venture to another at the end of the incubation period, or starting firms independently after leaving the Chalmers VCS.

7.3 The choice of the university

The university engaging in entrepreneurial activity is underutilized as a setting for researching the nascent entrepreneurial process, which can otherwise be challenging to identify (Aldrich and Martinez, 2001, Kessler and Frank, 2009). Furthermore, as the university is a setting for research discovery and development, it also has the potential to provide more focused access to technology and knowledge-based entrepreneurial opportunities (Senyard et al., 2009, Siegel et al., 2004). The potential of the university setting comes not only from its engagement in research utilization and entrepreneurial activity in conjunction with research activity, but also as a provider of entrepreneurial education, housing the ability to teach, facilitate and nurture the development of entrepreneurial behavior in individuals (Gibb, 2007, Johannisson et al., 1998, McMullan and Gillin, 1998). One way in which universities can be more productive in facilitating entrepreneurial behavior development is to provide entrepreneurial education involving nascent entrepreneurship.

Engagement in venture creation not only allows for entrepreneurial learning through interaction, but illustrates how universities may more effectively contribute to venture creation, particularly opportunity-based ventures (technology-based and IP-based), deemed as having high potential for growth and economic contribution to society. These contributions may provide information that can aide more effective direction of funding and use of resources, as well as increase integration and synergy across university activities and responsibilities.

8 IMPLICATIONS AND FUTURE RESEARCH

Understanding the way in which structural design can influence the development of entrepreneurial behavior may have policy implications regarding university commercialization not only for the university but even for regional and national policy regarding entrepreneurship and innovation. And, because some research and policies claim that investing into research leads to development, which in turn leads to regional (presumably economic) development through increased employment opportunities, tax, etc., then effectively dealing with the process of transforming research into tangible economic results is critical. The amount of investment going into the entrepreneurial process is significant if one considers investment into research and development, investment into entrepreneurship and business education, as well as specific policies and investments for entrepreneurship activity. Whether or not this is effectively assessed is an important question, because while there may be integration and synergy of action, perhaps not all the benefits are recognized, or perhaps the benefits are not allocated to the actual source, but associated to something else. The university setting, particularly when viewed as an ecosystem, includes phases peripheral to the emerging (nascent) phase, involving academic and research entrepreneurs, and phases following the emerging (nascent) phase, such as new or even small firm activity at university science parks and elsewhere. Furthermore, as the university setting can include multiple phases of entrepreneurial development, it may be valuable to investigate the development of entrepreneurial behavior across multiple phases, to further understand the dynamic between individual and environment, and process.

Integrating entrepreneurial education with university based venture creation shifts the university from a transferor of technology to a transformer of technology. The learning process of transforming the idea into a venture, as illustrated by going though the emerging phase towards achieving organizational legitimacy (Reynolds, 2000), helps to also transform the capacity of the individual, so that both the idea and the individual are transformed. There is therefore potential for new pedagogic models towards integrated entrepreneurial activity and education in the university setting (Kickul and Fayolle, 2007), allowing for greater utilization of resources available. Structural design creates the ability to more easily identify and control the entry and exit points of the nascent entrepreneurial process, and reduce some of the complexity of the impacting factors. There is potential to increase the output of entrepreneurship through investment and support of such environments, and thus the potential for entrepreneurial behavior development to take place.

This thesis has argued that development of entrepreneurial behavior is not contingent on whether or not the venture created is successful, but on the interactions involved during the attempted creation of the venture. It would be interesting to explore the behavior development further, to determine if there is some differentiation in behavior developed between those that only experienced successful development of one venture, those that experienced failure and then success with ventures within the same environment, those that experienced failure in one environment but success in another, and those that only experienced a failed attempt to develop a venture. While this has not been the research focus of this thesis, observation of multiple cycles of venture teams throughout the years of involvement and engagement at the VCS has shown tendencies of more tangible learning after the nascent entrepreneurs have experienced venture failure. While failure can impact

motivation, as communicated by one of the individuals interviewed in Paper IV, many of the nascent entrepreneurs have communicated greater self-efficacy in decision making after failure, in part due to a better understanding of what kind of factors and influences impact their decisions. To some extent this can be seen even in the two cases presented in Paper IV, though this is not placed in comparison to venture teams that only experienced success.

8.1 SUGGESTIONS FOR FUTURE RESEARCH

The thesis has specifically investigated nascent entrepreneurship within a university setting. Additional research ought to investigate the impact of interaction between individual and environment on behavior in other settings, as defined by other forms of entrepreneurship, or in other phases of entrepreneurship. Other settings could include privately funded research institutions, research and development units of large corporations, and innovation systems, as these could facilitate entrepreneurial activity impacted by identifiable role-sets. How do the environments, including the associated role-sets impact entrepreneurial behavior in these settings, and how does it differentiate from the entrepreneurial behavior created in the university setting, or does it? For example, does a more corporate setting develop behavior that is comparable to behavior developed in the university setting, is it dramatically different, or somewhere in between?

Investigation into structural design factors and impact may also help answer additional questions common to the field of new venture creation: Is there some special sequence of activities that should be followed in order to develop entrepreneurial behavior (as opposed to successful creation of a venture)? Is the business idea a spontaneous flash of insight or a product of data collection and careful assessment? How long does the process take? What is the proportion of start-up efforts that actually become new firms?

Another future question regards exploring training for entrepreneurial careers: Does the potential to develop entrepreneurial behavior enable a specific educational track for an entrepreneurial career, in which entrepreneurial behavior through entrepreneurial action is the key contribution to program design? Fayolle (2005, 2007) finds that just the presence of entrepreneurship education programs and a positive image of entrepreneurs within the university incentivize students to choose an entrepreneurial career. Thus, the first step is just to make the environment in which venture creation and learning take place visible and legitimate, such as was discussed in Paper I regarding entrepreneurial activity and Paper V regarding societal entrepreneurship. Facilitating learning through interaction which can increase self-efficacy also promotes a positive image of entrepreneurs, and illustrating this image as it is developing also allows for individuals to identify with entrepreneurship even if they don't associate to the 'heroic' entrepreneurial story. Entrepreneurial behavior, and perhaps even an entrepreneurial career, can be conducted by individuals having other primary roles or employments, and can be done as part of a complex and collective effort. Nascent entrepreneurs, through on-the-job training (in other words through action-based, learning through interaction, entrepreneurship education) can become more fluent in their entrepreneurial behaviors, building self-efficacy for future entrepreneurial activity.

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APPENDIX A: Refined organization of 26 events for start-up allocated to categories as defined by Liao and Welsch (2008), from Table 1. A list of startup activities and timing

Categories	Events*
Planning Activities	A Spent time on thinking about business idea? B Has a business plan been prepared for? C Has a start-up team been organized? J Developed projected financial statements? K Saved money to invest in the business? O Arranged child care or household help to allow more time on business? T Taken any classes/workshop on starting a business?
Establishing Legitimacy	R Opened a bank account exclusively for this business? U Listed new business in the phone book? V Installed a separate phone line for business? W Paid state unemployment insurance tax? X Paid federal social security taxes (FICA)? Y Filed a federal tax return? Z Listed with Dun & Bradstreet
Resource Combination	F Application for a patent/copyright/trademark? G Purchase of raw materials, inventory, supplies? H Purchase/lease/rent of equipment/facilities/property? I Defined market opportunities? L Invested your own money in this business? M Asked financial institutions or other people for funds? N Established credit with a supplier? P Devoted full time to the business (N35 h/week) Q Hired any employees/managers?
Market Behavior	D Developing models and procedures? E Have marketing or promotional efforts been started? S Received money for the sales of goods/services?

* The labels A, B, C, etc. are the designation of the 26 events used in the Liao and Welsch (2008) article