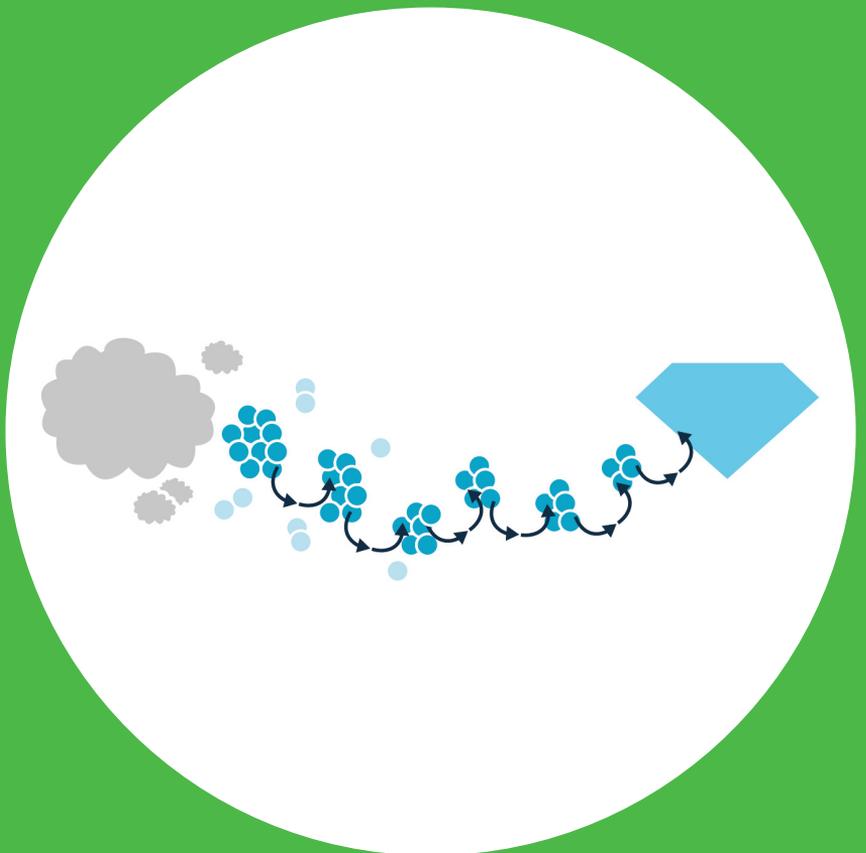


Department of Industrial Engineering and Management

The Dynamics of Proactive Striving

Initiating and sustaining development efforts in product design and entrepreneurship

Tua A. Björklund



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Aalto University
School of Science
Department of Industrial Engineering and Management

Supervising professor

Professor Matti Vartiainen

Preliminary examiners

Professor Ken Friedman, Swinburne University of Technology,
Australia

Professor Martin Steinert, Norwegian University of Science and
Technology, Norway

Opponent

Professor Kees Dorst, University of Technology Sydney, Australia,
and Eindhoven University of Technology, The Netherlands

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Publisher School of Science**Unit** Department of Industrial Engineering and Management**Series** Aalto University publication series DOCTORAL DISSERTATIONS 128/2015**Field of research** Work Psychology**Manuscript submitted** 30 March 2015**Date of the defence** 16 October 2015**Permission to publish granted (date)** 25 June 2015**Language** English **Monograph** **Article dissertation (summary + original articles)****Abstract**

Not even brilliant ideas advance themselves. In all organizations, proactive efforts are required to translate opportunities into actual improvements. However, most research on proactivity in entrepreneurship and product design has addressed dispositional antecedents, and research in general tends to focus on goal setting, idea generation, and decision-making. But what happens after the initial decision to pursue an idea has been made?

In this dissertation, a qualitative approach building on 4566 interview segments from 80 interviews in 13 organizations was used to explore how the process of proactive striving in product design and entrepreneurship is initiated and sustained. The four empirical essays included one experiment on how product design experts and students differed in their interpretations of design briefs. Proactive striving was observed already at this stage: more successful developers had more extensive, in-depth, and interconnected representations. The essays also included three naturalistic studies: idea advancement in two product design projects, attracting resources and other input in creating a new organization, and a longitudinal study of four new companies developing their first offering market-ready. In all of these studies, feedback from the environment emerged as a crucial mechanism for sustaining and even escalating proactive striving behaviors. Sometimes this required time-consuming inclusion and communication practices, creating the need for local inefficiency to produce global effectiveness.

Based on the results, the generic idea development funnel can be modified into a process model of the enactment of proactive striving. In addition to recognizing the need for pruning non-action from fruitful action and progressively specifying actions in concrete iterations, the model makes two key contributions towards understanding the dynamics of initiating and sustaining proactive striving. First, it emphasizes potential discontinuities in efforts due to transitioning between three different levels of proactive effort manifestations: micro-level specific actions, intermediate-level activities, and global-level approaches. Second, it highlights the potential for positive spirals through individual-environment interaction: creating concretizing approximations of the pursued ideas in the form of boundary objects provided feedback on the feasibility of efforts, encouraged initial stakeholder input, and sustained efforts by energizing and committing developers and stakeholders alike. The model also illuminates several opportunities for enhancing development efforts with relatively minor interventions.

Keywords proactive behavior, product design, entrepreneurial behavior, new ventures, idea development, innovation process, boundary objects**ISBN (printed)** 978-952-60-6366-9**ISBN (pdf)** 978-952-60-6367-6**ISSN-L** 1799-4934**ISSN (printed)** 1799-4934**ISSN (pdf)** 1799-4942**Location of publisher** Helsinki**Location of printing** Helsinki**Year** 2015**Pages** 180**urn** <http://urn.fi/URN:ISBN:978-952-60-6367-6>

Tekijä

Tua A. Björklund

Väitöskirjan nimi

Proaktiivisen toiminnan dynamiikka – Kehittämisen käynnistäminen ja ylläpitäminen tuotesuunnittelussa ja yrittäjyydessä

Julkaisija Perustieteiden korkeakoulu**Yksikkö** Tuotantotalouden laitos**Sarja** Aalto University publication series DOCTORAL DISSERTATIONS 128/2015**Tutkimusala** Työpsykologia**Käsikirjoituksen pvm** 30.03.2015**Väitöspäivä** 16.10.2015**Julkaisuluvan myöntämispäivä** 25.06.2015**Kieli** Englanti **Monografia** **Yhdistelmäväitöskirja (yhteenvedo-osa + erillisartikkelit)****Tiivistelmä**

Parhaimmatkaan ideat eivät etene itsekseen organisaatiossa, vaan tarjolla olevien tilaisuuksien hyödyntäminen edellyttää proaktiivista toimintaa. Suurin osa yrittäjyys- ja tuotekehitystutkimuksesta on kuitenkin tarkastellut proaktiivisuutta lähinnä yksilön ominaisuutena, ja tutkimus yleisemminkin on painottunut tavoitteiden asettamiseen, ideointiin ja päätöksentekoon. Mutta mitä tapahtuu sen jälkeen kun päätös idean toteuttamisesta on tehty?

Tämä väitöskirja tutki proaktiivisen toimintaprosessin käynnistämistä ja ylläpitoa tuotekehityksessä ja yrittäjyydessä. Se pohjautuu kvalitatiiviseen tutkimukseen 4566 segmentistä, jotka saatiin 80 haastattelusta kolmessatoista organisaatiossa. Neljästä empiirisestä esseestä ensimmäinen perustui kokeeseen tuotekehityksen asiantuntijoiden ja opiskelijoiden välisistä eroista toimeksiantojen tulkinnassa. Proaktiivinen toiminta nousi esiin jo tässä varhaisessa vaiheessa: taitavammilla kehittäjillä oli kattavammat ja kytketymmät representaatiot. Kolme naturalistista tutkimusta kartoittivat ideoiden edistämistä kahdessa tuotekehitysprojektissa, työpanosten dynamiikkaa uuden organisaation luomisessa ja kehittämisessä, ja pitkittäistutkimuksessa ensimmäisen tarjoaman kehittämistä neljässä uudessa yrityksessä. Kaikissa näissä tutkimuksissa korostui ympäristön palautteen rooli proaktiivisen toiminnan ylläpitäjänä ja lisääjänä. Välillä hyvän kokonaistuloksen saavuttaminen vaati paikallista tehostomuutta aikaavievien ja kattavien yhteistyö- ja viestintäkäytäntöjen myötä.

Kehitystyötä kuvaavasta geneerisestä suppilomallista voidaan tulosten perusteella muokata proaktiivisen toiminnan prosessimalli. Malli korostaa tarvetta tukea konkreettista tekemistä ja tekojen jatkuvaa iteratiivista tarkentamista. Se tuo kaksi keskeistä näkökulmaa proaktiivisen toiminnan dynamiikan ymmärtämiseen. Ensinnäkin malli korostaa mahdollisia epäjatkuvuuskohtia proaktiivisen toiminnan liikkeessä kolmen ilmentymätason (mikrotason tekojen, keskitason toimintojen ja globaalitason lähestymistapojen) välillä. Toiseksi, malli painottaa positiivisten itseään vahvistavien kehien mahdollisuutta yksilö-ympäristö vuorovaikutuksen seurauksena: kehitysideoita konkretisoivien rajaobjektien luominen tarjosi palautetta onnistumismahdollisuuksista, rohkaisi alkuvaiheen sidosryhmien panostusta, ja ylläpiti proaktiivista toimintaa energisoimalla ja sitouttamalla sekä yksilöä itseään että sidosryhmiä. Malli auttaa tunnistamaan useita mahdollisuuksia proaktiivisuuden tukemiseen ja tehostamiseen yksinkertaisilla toimenpiteillä.

Avainsanat proaktiivinen toiminta, tuotekehitys, yrittäjämäinen käyttäytyminen, pienyritykset, ideoiden kehitys, innovaatioprosessi, rajaobjektit

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Behavioral economist Richard Thaler once said in a graduation speech that fun is the best hedge in life. For me, research is fun. I see this dissertation almost as a by-product of my work. Thank you to the entire community of Aalto University Design Factory for making work so pleasant. In addition to Eetu, Miko, Tiki, and Riiku, I would like to thank Maria Clavert, Pia Helminen, Samuli Mäkinen, Heidi Tulensalo, Satu Rekonen, Senni Kirjavainen, Meri-Maaria Eloranta, Viljami Lyytikäinen, and Mikko Reinikainen for their support.

Throughout my life, my father, Professor Jukka Rautonen, has been my most trusted reviewer. He has tirelessly read and given feedback on my very first conference paper, first journal article, this dissertation, and much more. My mother, Nina, has provided both inspiration and practical support. Jaakko, you have been crucial in making my efforts both possible and enjoyable. Last, but not least, I would like to thank my children Lumi and Tarmo for showing me what truly matters in life.

Espoo, August 2015

Tua Björklund

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List of Publications

This doctoral dissertation consists of a summary and of the following publications which are referred to in the text by their numerals

- 1.** Björklund, T.A. (2013). Initial mental representations of design problems: differences between experts and novices. *Design Studies* 34(2), 135-160.
DOI: 10.1016/j.destud.2012.08.005
- 2.** Björklund, T.A., Bhatli, D., & Laakso, M. (2013). Understanding idea advancement efforts in innovation through proactive behavior, *Journal of Research in Marketing and Entrepreneurship*, 15(2), 124-142.
DOI: 10.1108/JRME-01-2013-0001
- 3.** Björklund, T.A. & Krueger, N. (accepted for publication): Generating resources through the co-evolution of entrepreneurs and ecosystems. *Journal of Enterprising Communities*, 10(4).
- 4.** Björklund, T.A. (submitted): Translating venture ideas into specific offerings – discontinuities between perceiving and pursuing opportunities. 22 pages.

Author's Contribution

The author played a major role in planning and conducting the data collection for all of the essays. Essay 1 was initiated when working in the Future Lab of Product Design –project at the Helsinki University of Technology, and fellow team members helped to transcribe some of the interviews. Essays 2 to 4 were prepared while working in the Aalto University Design Factory -project, and fellow project team members were involved in the data collection as specified in Table 1. Transcription services were procured from Tutkimustie Oy for all of the essays.

The author analyzed all of the data, and was the first or only author in all of the essays. Essays 2 and 3 were written jointly with co-authors, with the author writing the first drafts of both essays. Essays 1 and 4 were written by the author alone. For these essays, an independent coder re-categorized 5-10% of data for calculating inter-coder reliability. Reviewer comments have helped to fine-tune all of the essays.

A colleague, Tik Ho Lee, helped to refine and produce the final versions of the Figures 3 to 6 in the summary of the dissertation.

Table 1. Clarification of the contribution of the author in relation to the essays

Essay	Data collection			Data analysis	Manuscript
	Planning and arrangements	Interviews	Interview transcripts		
1	Author	Author	Author, project team, and Tutkimustie Oy	Author	Author
2	Author and project team	Author and project team	Tutkimustie Oy	Author	Author and article co-authors
3	Author	Author	Project team and Tutkimustie Oy	Author	Author and article co-authors
4	Author and project team	Author and project team	Tutkimustie Oy	Author	Author

1. Introduction

In the face of heightened uncertainty, instability, and competitiveness, it is difficult to overemphasize the importance of development activities in the current “innovation economy” (Sawyer, 2006, 41). Company offerings, including tangible products, software, and services, are created and developed by numerous professionals, as are the companies themselves by entrepreneurs, managers, human resource professionals, and so forth. Although it is challenging to draw clear-cut boundaries, some estimate that creating new approaches is the primary task of a third of the US workforce (Florida, 2002). Some degree of development can be argued to be included in all knowledge work, defined as the “creation, distribution or application of knowledge by highly skilled and autonomous workers using tools and theoretical concepts to produce complex, intangible and tangible results” (Bosch-Sijtsema, et al., 2011, 275).

Knowledge workers aim to develop new results based on knowledge, and routinely need to deal with ill-structured, “wicked” (Rittel & Webber, 1973) and “messy situations” (Schön, 1983). Wicked problems are indeterminate problems that lack clear initial states, goals, and possible actions (Reitman, 1965; Simon, 1973; Buchanan, 1992). They have no definitive formulation or solution criteria, and defining the problem and solving it cannot be separated from each other (Rittel & Webber, 1973). Instead, the formulation and solution co-evolve (Dorst & Cross, 2001), making the problem instable (Dorst, 2006). Unlike well-defined problems, each wicked problem is essentially unique in the sense that principles of solution cannot be developed to fit all members of any particular class of problems, as there are no guarantees that the particulars of a wicked problem do not override its commonalities with similar problems (Rittel & Webber, 1973, 164-165). As a result, fruitful actions need to be recognized from a seemingly unlimited pool of possible options (Schunn, McGregor & Saner, 2005).

In addition to attempting to address complex problems, the context of modern development is often complex as well. Knowledge work entails situation-specific, collaborative efforts increasingly conducted in a changing setting of dispersed projects (Bosch-Sijtsema, et al., 2011; Bosch-Sijtsema, Ruohomäki & Vartiainen, 2009). Centrally anticipating all required actions in such work becomes unviable; rather, distributed initiative is required for effectiveness (Griffin, Neal & Parker, 2007). For example, Hargadon and Bechky (2006) found that active help seeking, help giving, reflective reframing, and reinforcing these behaviors were required for continuous collective creativity. Under-

standing such active development efforts becomes vital for practitioners, researchers, and educators alike.

Various active change-oriented behaviors have grabbed the attention of organizational and management research that were long dominated by relatively passive constructs (Frese & Fay, 2001; Parker, Bindl & Strauss, 2010). Defined as self-initiated, active, change- and future-oriented behavior (Parker & Collins, 2010), *proactive behavior* offers an integrating perspective for capturing the commonalities of such active behaviors across different applications. Proactivity “has transitioned from novelty to necessity in many modern, dynamic, and global organizations” (Thomas, Whitman & Viswesvaran, 2010, 275), and is required from the entire work force ranging from presidents to call center agents (Parker, et al., 2010, 2). It has been systematically related to performance (Thomas, et al., 2010), and increases work performance of individuals (Seibert, Crant & Kraimer, 1999; Bateman & Crant, 1993; Crant, 1995), self-managing teams (Kirkman & Rosen, 1999), business units (Fay, Lührmann & Kohl, 2004), and small to mid-sized companies (Baer & Frese, 2003; Koop, De Reu & Frese, 2000; Lumpkin & Dess, 2001). Proactive behavior has also been shown to promote a range of other positive outcomes (Fuller & Marler, 2009), such as social integration (Kim, Hon & Crant, 2009), re-employment (Frese, et al., 1997), and life satisfaction (Greguras & Diefendorf, 2010).

There have been several recent attempts to unify previously isolated streams of research into a growing body of knowledge on proactivity (e.g. Tornau & Frese, 2013; Parker, et al., 2010; Parker & Collins, 2010; Thomas, et al., 2010; Grant & Ashford, 2008; Parker, Williams & Turner, 2006; Crant, 2000), gathering together a variety of concepts, such as personal initiative (Frese, Garst & Fay, 2007), taking charge (Morrison & Phelps, 1999), role breadth self-efficacy (Parker, 2000), and active feedback seeking (Ashford & Black, 1996). However, research on proactivity as a process remains relatively scarce, and many questions on the dynamics of proactive processes remain unanswered (Parker, et al., 2010, 24).

There seems to be a general tendency towards studying the formation of intentions over their pursuit, focusing on goal setting over goal striving (Uy, Foo & Ilies, 2015, 377), or making the right decisions rather than acting them out (Glaub, et al., 2014). But good ideas do not equate good actions. Pfeffer and Sutton (2000) found the knowing-doing gap to be pervasive, with actions remaining inconsistent with acquired new knowledge. Proactive striving towards development goals is a crucial requirement for creating successful improvements, but often such efforts are not engaged in. Pfeffer and Sutton further proposed that knowledge gained from action, rather than contemplation or discussion, is more likely to be implemented. Thus initial proactivity could lead to enhanced subsequent proactive development, decreasing the gap between what is known and what is done in development.

In the context of innovations, studies have tended to focus on either antecedents of initial creativity or the eventual innovation-outcomes, with little research on how the initial improvement ideas are developed and implemented in-between these stages (Axtell, et al., 2000; Binnewies, Ohly & Sonntag,

2007; Lempialä, 2011; Shalley, Zhou & Oldham, 2004). The majority of innovation studies have taken the differences between ideation, development, and implementation phases insufficiently into account (Rank, Pace & Frese, 2004; Rekonen & Björklund, in press). Furthermore, while creating ideas may represent largely intraindividual cognitive efforts, implementing ideas requires interindividual, socially embedded efforts (Anderson & King, 1993). While the myth of a lone inventor remains alive and well in the public image of innovations, in reality it seems to be the connections and networks between people, ideas, and objects that better explain success in innovation ranging from Edison to IDEO (Hargadon, 2003). Indeed, Axtell and colleagues (2000) found that whereas making improvement suggestions was primarily linked to individual and job factors, implementing suggestions was more linked to group and organizational factors. As the nature of antecedents can vary in different phases, the need to understand the entire process of engaging in proactive development efforts is highlighted.

If the aim is to enhance proactive improvement efforts, rather than simply choose between particular actors of varied proactivity, we must understand the dynamics of proactivity in development efforts. How is proactive striving towards development goals initiated and sustained? The current dissertation seeks to enrich our understanding of the phenomena in two contexts, chosen for their development-intense, yet complementary nature: product design and entrepreneurship. Both share a focus on creating something new, changing existing situations into preferred ones (Simon, 1969), and the similarities between designers and entrepreneurs in their approaches and thinking patterns have been noted (Dorst, 2015, p.148-149). In addition, product designers may engage in entrepreneurial behavior, and entrepreneurs may design products. On the other hand, product design is often studied in the context of relatively highly organized large ventures, whereas entrepreneurship focuses on less formalized activity in nascent or small ventures. Taken together, product design and entrepreneurship provide a richer image of the dynamics of proactive striving required in successful development efforts in a variety of contexts.

2. Theoretical background

Proactive behavior can be defined as taking anticipatory action to impact one's environment or self (Grant & Ashford, 2008, 4), and has the key features of being self-started, change-oriented, future-oriented, and action-oriented (Bateman & Crant, 1993; Crant, 2000; Parker, et al., 2010; Tornau & Frese, 2013). It is one of the strongest expressions of human agency in organizations (Strauss & Parker, 2014, 50), portraying individuals as active agents who “deliberately plan and act to influence, change and alter their environments” (Grant & Ashford, 2008, 6), by scanning for opportunities, showing initiative, taking action, and persevering until change is brought about (Bateman & Crant, 1993, 105). Not surprisingly, proactivity has systematically been connected to enhanced performance and a wide variety of other positive phenomena (Fuller & Marler, 2009; Greguras & Diefendorf, 2010; Thomas, et al., 2010). However, being proactive does not necessarily lead to favorable end results. Proactive behavior can be costly for both individuals and organizations (Belschak, Den Hartog & Fay, 2010; Bolino, Valcea & Harvey, 2010), and individuals need to have access to resources that allow for making effective judgments on how and when to be proactive (Chan, 2006). Being proactive involves a range of effortful behaviors that require psychological resources that are depleted over time (Hahn, et al., 2012), so one cannot maintain constant, overall proactivity indefinitely. Nevertheless, as an active, change-oriented construct, proactivity is an appealing approach for understanding, and perhaps even characterizing, development efforts in a variety of contexts. Previous research on proactivity in the contexts of product design and entrepreneurship, however, offers limited insight into the process of engaging in proactive striving in these domains.

2.1 Dispositional, behavioral, and process views of proactivity

Recent attempts to unify research on proactivity have distinguished between a number of different approaches. Originally, proactivity was primarily studied as an individual disposition (Bateman & Crant, 1993), and proactive personality remains as a strong dispositional predictor of proactive behavior (Fuller & Marler, 2009; Thomas, et al., 2010). The dominant approach in proactivity research nowadays, however, is that of proactive behavior (Wu & Parker, 2013, 679), which has been found to predict performance better than proactive per-

sonality (Tornau & Frese, 2013). Parker and Collins (2010) distinguish between three types of proactive behavior according to the target of the behavior: *proactive work behavior* changing the internal organizational environment, *proactive strategic behavior* changing the organization's fit with the external environment, and *proactive person-environment fit behavior* changing the individual's fit with the organizational environment. Out of these, the first two types targeted at externalities of the actor are perhaps the most relevant for development efforts.

Finally, proactivity can be conceptualized as a process. Although sometimes presented as a third alternative to personality and behavioral accounts of proactivity (e.g. Wu & Parker, 2013; Strauss & Parker, 2014), the process view is perhaps best described as a complement to the enactment-focused behavioral approach to proactivity (Bindl, et al., 2012). The process view highlights the importance of cognitive processes (Parker, et al., 2010), including anticipating and planning in addition to action (Grant & Ashford, 2008). For example, Parker, Bindl and Strauss (2010) conceptualize proactivity as a process involving anticipating, planning, and striving to have an impact. Although still relatively few in number, process views of proactivity tend to emphasize the goal-driven nature of proactivity, drawing on action theory (Frese & Fay, 2001; Frese, 2009) or goal regulation (Parker, et al., 2010; Bindl, et al., 2012). In the action theory approach, proactive individuals develop goals, collect information, make prognoses of the future, develop plans, execute plans, monitor execution, and gather feedback (Glaub, et al., 2014). The goal regulation approach similarly distinguishes between four phases, namely envisioning, planning, enacting, and reflection (Bindl, et al., 2012), defining proactivity as "a goal-driven process aimed at bringing about a different future that involves goal-generation and goal-striving elements" (Strauss & Parker, 2014, 53). Whereas goal generation involves envisioning and to an extent planning, goal striving includes "the behavioral and psychological mechanisms by which the individuals purposively seek to accomplish proactive goals" (Parker, et al., 2010, 832). The current dissertation focuses on the latter striving phases of the proactivity process rather than goal formation.

Motivation for engaging in the proactivity process can be divided into three pathways: *reason to*, *can do*, and *energized to* (Parker, et al., 2010). In terms of "reason to", Strauss and Parker (2014) argue that autonomous forms of motivation, such as intrinsic, integrated and identified motivation, are more likely to both initially prompt proactive motivation and produce effective results. They tend to involve more complete self-regulatory processes, enhance commitment through engaging the self, and satisfy psychological needs by contributing towards belongingness and personal growth. Initial success then enhances all three pathways of proactive motivation (reason to, can do and energized to), stimulating "the setting of further proactive goals and thus future episodes of individual proactivity" in a virtuous spiral (Strauss & Parker, 2014, 62). For proactive goal striving, the "energized to" pathway can be considered as of particular interest. However, little empirical research exists on sustaining proactive efforts (Strauss, et al., 2015).

The current dissertation adheres to a process view of proactive behavior, viewing proactivity as a set of psychologically based, motivated behaviors. In contrast to dispositional views that mainly enable choosing between actors of different levels of proactivity, the process view of proactivity highlights the malleability of the construct. Any particular individual acting in a particular organization is expected to display various levels of proactivity depending on which process elements are activated. It thus becomes possible to intentionally foster conditions that promote increased proactivity, and understanding the dynamics of initiating and sustaining proactive striving after individuals have formulated initial development ideas becomes an intriguing area of study. Given the shared emphasis of proactivity, product design, and entrepreneurship literature on creating alternative futures, there has been surprisingly little systematic research connecting proactivity to these two domains.

2.2 Proactivity in product design and innovativeness

Product design encompasses a variety of activities and actors aiming to create and improve the offering of companies. Such development actions have been considered as essential for organizational success (Brown & Eisenhardt, 1995), organizational renewal (Dougherty, 1992), and knowledge creation (Nonaka & Takeuchi, 1995). Furthermore, product design tasks are “not only ubiquitous in many professional work endeavors but they are also commonly viewed as prototypical cases of complex and ill-defined problems” (Ball, Ormerod & Morley, 2004, 496). As such, gaining better insights on how to initiate and sustain self-initiated development actions in product design can have far reaching implications for organizations.

While studied since the 1960s (Cross, 1984), product development and design research has not come to any single definition capturing the diversity of behaviors studied in the field (Buchanan, 1992, 5). Research on both new product development (e.g. Brown & Eisenhardt, 1995) and product design (e.g. Lawson, 2004) can be referred to as the science of design (Cross, 2001), studying design as a goal-oriented process aimed at improving situations (Friedman, 2003, 506-7). On the other hand, much relevant research has been conducted under the context-independent headings of creativity (Runco, 2004; Amabile, 1996) and innovation (Hülshager, Anderson & Salgado, 2009; Hargadon & Sutton, 1997). The current dissertation conceptualizes product design as development efforts targeted at improving existing products and creating new products, a context-specific version of innovation efforts. It is an emergent, non-linear process, in which “new knowledge and understandings unfold through action in an uncertain and shifting environment rather than being planned ahead” (Hargadon & Eisenhardt, 1996, 335). Product design is often conducted by interdisciplinary project teams in multiple and parallel projects in complex environments (Artto, et al., 2011; Friedman, 2012, 143), and ideas need to be fostered even before the start of formal development projects (Koen, et al., 2001; Artto, et al., 2011). Hunting for innovations requires abductive “wayfaring” in this ambiguous space (Steinert & Leifer, 2012), and

problems with unclear roles and responsibilities are frequent (Elonen & Artto, 2003). As official roles, means, and even goals leave much unscripted, the need for individual proactivity is highlighted in product design.

While little research has explicitly connected product design and proactivity, proactive behavior has been recognized as important throughout the innovation process (Frese & Fay, 2001), generally thought to include generating and implementing creative ideas (Mumford, et al., 2002; West, 2002; Anderson, Potocnik & Zhou, 2014). Strauss and Parker (2014, 66) go as far as suggesting that innovativeness consists of creativity and proactivity. Indeed, while not all proactive behavior is innovative (e.g. actively seeking feedback), it is difficult to envision innovative behavior that is not proactive at least to some degree (Unsworth & Parker, 2002).

The various phases in the product design and innovation process are different in nature, for example increasing in formality and decreasing in risk and freedom moving closer towards the end product (Aalto, Martinsuo & Artto, 2003; Koen, et al., 2001; Kim & Wilemon, 2002). Since being conceptualized as a funnel by Wheelwright and Clark (1992), depicting new product development, R&D, and innovation with a (series of) funnel(s) has become ubiquitous (e.g. Cagan & Vogel, 2002; Ulrich & Eppinger, 2008). The initial mass of creative ideas gradually converges towards the final offering as the process proceeds – some estimate that only one in three thousand raw ideas ends up being successfully introduced to the market as a new product (Stevens & Burley, 1997). Clearly idea generation cannot explain development efforts alone; rather, proactive striving forms a significant part of the process.

2.2.1 Proactivity and champions

Although seldom explicitly connected to proactivity research, many studies in product innovation highlight the need for champions proactively promoting initial ideas into implemented improvements (Howell, Shea & Higgins, 2005). Few ideas ever progress beyond the idea generator's desktop (Stevens & Burley, 1997), and without a champion, new ideas either die or remain dormant (Schön, 1963; Frost & Egri, 1991). Originating in studies of technological innovation in military (Schön, 1963), champions are conceptualized as informally emergent leaders who have a significant contribution towards an innovation by actively and enthusiastically promoting its progression through the organization (e.g. Howell & Higgins, 1990; Howell, et al., 2005; Taylor, et al., 2011). Several different types of champions (such as product champions, executive champions, new venture creation champions, and network champions) can be at play during the life cycle of the innovation (Burgelman, 1983; Gupta, Cadeaux & Dubelaar 2006; Taylor, et al., 2011). However, although anecdotally critical for success, little empirical research has examined the relationship between championing and performance. While Howell and Shea (2001) found championing behavior to have a positive effect on new product project performance, Walter and colleagues (2011) found only network building to have a positive effect on the sales growth of academic spin-offs. Pursuing innovative ideas was found to have no effect, and persisting under adversity and taking

responsibility for the idea had an inverted U-relationship with sales growth (Walter, et al., 2011).

Originally portrayed as a discrete variable of individuals either being champions or non-champions, more recent research has acknowledged that individuals may engage in different degrees of championship behavior (Howell, et al., 2005). Based on a study of what champions actually do to promote innovation in new product development in manufacturing firms, Howell, Shea and Higgins (2005) have developed a 14-item measure of champion behavior, composed of three factors: (1) expressing enthusiasm and confidence about the success of the innovation, (2) persisting under adversity, and (3) getting the right people involved. Walter and colleagues (2011), on the other hand, group champion behaviors based on a literature review into four categories: (1) pursuing innovative ideas, (2) network building, (3) persisting under adversity, and (4) taking responsibility for the idea. In studies comparing matched pairs of champions and non-champions of technological innovations, champions have been shown to pursue more varied influence tactics more frequently (Howell & Higgins, 1990), using more informal selling processes and tying innovations to a broader range of positive organizational outcomes (Howell & Boies, 2004). Champions attempt to marshal support for innovations (Markham & Griffin, 1998; Shane, 1994) with behaviors that tend to be political and highly dependent on the context (Markham, 2000; Taylor, et al., 2011). For example, Burgelman (1983, 238) described that champions initially mobilized resources covertly to demonstrate feasibility, only after which top management was engaged.

In fact, issue selling bridges together proactivity and championship literature. Included in attempts to unify proactivity research (e.g. Grant & Ashford, 2008; Parker & Collins, 2010), as well as recognized as “a form of championing aimed at attracting others’ attention to, and enhancing their understanding of, salient issues” (Howell & Boies, 2004, 125), issue selling is conceptualized as a political commitment-building process by which individuals affect others’ (typically top managements’) attention (Dutton, et al., 2001). Communication channel choices and the “packaging” of information are central in issue selling (Dutton & Ashford, 1993), as are the involvement of others and opportunistic timing (Dutton, et al., 2001). However, both issue selling, and championing in more general, represent only a limited range of proactive striving behaviors, mainly targeted at gaining management endorsement and formal resources for development. The current dissertation is interested in the full range of proactive striving behaviors in developing and implementing ideas, rather than only promoting the ideas to others.

2.2.2 Proactivity, idea generation, and idea implementation

Integration between innovation and proactivity research is largely lacking (Rank, et al., 2004; Unsworth & Parker, 2002). While many studies have investigated producing and evaluating ideas (such as whether one’s own ideas are evaluated more favorably; Nikander, Liikkanen & Laakso, 2014), few studies have investigated actively developing ideas further beyond the champion-

ing approach to promoting innovation. Research on proactivity and innovativeness exists mainly as correlation studies between displaying or being inclined towards proactivity on one hand, and engaging in idea generation or implementation on the other hand.

The organizational level construct of a climate of personal initiative, i.e., the “formal and informal organizational practices and procedures guiding and supporting a proactive, self-starting, and persistent approach toward work” (Baer & Frese, 2003, 48) is correlated to both incremental and radical product and service innovations, (Fischer, et al., 2014). Climate for personal initiative has been shown to predict 25% of variation in radical innovation beyond the often-utilized team climate inventory (TCI; Anderson & West, 1998) (Fischer, et al., 2014). It enhances the positive effects of transformational leadership and encourages the adoption of a new work process in product development (Michaelis, Stegmaier & Sonnentag, 2010). Indeed, most studies on proactivity and innovation seem to be restricted to the context of process improvements. Adopting process innovations only increased firm performance in the presence of a climate of personal initiative; otherwise organizations seemed to fare better without introducing process improvement initiatives (Baer & Frese, 2003).

Having a proactive personality, in turn, correlates with production employees making and pursuing product and process improvement ideas (Parker, et al., 2006), involvement in improvement efforts (Bateman & Crant, 1993), coming up with and attempting to implement new ideas and process improvements by employees (Seibert, Kraimer & Crant, 2001), and introducing process and organizational system innovations in small businesses (Kickul & Gundry, 2002). Dispositional proactivity seems to increase both the amount and quality of improvement ideas pursued: personal initiative enhances both engagement in the preparation of creative ideas and the level of creativity of the produced ideas (Binnewies, et al., 2007), as well as both the amount of process improvement suggestions submitted by workers and the amount of rewarded suggestions (Frese, Teng & Wijnen, 1999). Little is known, however, about the process of engaging in creative and innovative *efforts* (Shalley, et al., 2004), and “potential differential antecedent of specific creativity or innovation phases have received insufficient attention” (Rank, et al., 2004, 519). Many questions remain on the dynamics of proactive processes within the innovation process.

2.3 Proactivity in entrepreneurial behavior

Entrepreneurship represents another example of an active, development-intensive domain that is complementary to product design. While product design may help to renew existing organizations, new enterprises can be a driving force for the development of entire industries and economies (Audretsch, 2002). Action lies at the heart of entrepreneurship – being an entrepreneur “is to act on the possibility that one has identified an opportunity worth pursuing” (McMullen & Shepherd, 2006, 132). Traditionally focused strictly on self-employment, start-ups, and new ventures, entrepreneurship research has

shifted more towards the process of being entrepreneurial. For example, Shane and Venkataraman (2000, 218) define entrepreneurship as a process by which “opportunities to create future goods and services are discovered, evaluated, and exploited”, and Harper (2008, 617) defines entrepreneurship as “a profit seeking problem-solving process that takes place under conditions of structural uncertainty”. Founding a company is no longer a requirement of many entrepreneurial concepts, and Shane, Locke and Collins (2003, 266) point out that defining entrepreneurs as company founders can even distort results: a manager of a fast growing high-tech company might be more relevant for the essence of entrepreneurial behavior than is the founder of a corner grocery shop. The importance of both entrepreneurship and entrepreneurial-like behavior has been widely recognized for economic growth and innovations (Acs & Szerb, 2007; Audretsch, 2002, 2007; Kirzner, 2009; Wiklund & Shepherd, 2005; Zahra, 1996). However, while the importance of proactivity for entrepreneurship is widely recognized and many studies demonstrate the beneficial effects of dispositional proactivity on entrepreneurial outcomes, empirical work on the process of proactivity in entrepreneurship remains scarce.

2.3.1 Proactivity and entrepreneurial action

A relatively stable relationship between proactivity and entrepreneurial performance valid across measurement levels, cultures, and economic environment has been demonstrated (Krauss, et al., 2005, 335). Proactivity of the owner has been connected to entrepreneurial success in North America (Crant, 1995), Europe (Korunka, et al., 2003), Asia (Zhao, Frese & Giardini, 2010), and Africa (Frese, et al., 2007; Krauss, et al., 2005; Koop, et al., 2000; Glaub, et al., 2014). Small-scale entrepreneurs and those intending to become self-employed are more proactive than employees (Frese, et al., 1997), and proactivity tends to be higher for founders than those who have inherited a company (Becherer & Maurer, 1999). Having a proactive personality has a stronger association with entrepreneurial intentions than gender, education or having an entrepreneurial parent (Crant, 1996).

These studies, however, largely adhere to a dispositional view of proactivity, rather than providing insight on the process of being proactive or entrepreneurial. In general, studies on the actual actions of entrepreneurs are scarce and lack an explicit connection to proactivity (Venkataraman, et al., 2012; Mueller, Volery & von Siemens, 2012; Carter, Gartner & Reynolds, 1996; Lichtenstein, Dooley & Lumpkin, 2006). Few measurement criteria have been established for entrepreneurial behavior, with the exception of the entrepreneurial behavior scale of Pearce, Kramer and Robbins (1997) that contains eleven items on the realization of ideas, encouraging others to think of and make improvements, changing course of action in order to achieve results, and acquiring new skills. Thus while proactivity is an appealing construct for entrepreneurship (Becherer & Maurer, 1999), manifestation of proactive processes within entrepreneurial behavior has yet to be clarified. There is a need to better combine contextual factors to currently dominant personal factors in ex-

plaining entrepreneurial success (Gielnik, et al., 2012) and to identify predictors of proactive behaviors in entrepreneurs (Hahn, et al., 2012).

2.3.2 Proactivity and entrepreneurial orientation

In contrast to individual entrepreneurial behavior, widely accepted measurement criteria and an explicit connection exists in terms of proactivity as a component of the organizational level construct of *entrepreneurial orientation* (see Rauch, et al., 2009, for a recent review). Entrepreneurial orientation (EO) refers to the processes, practices, and decision-making styles of firms that act entrepreneurially (Lumpkin & Dess, 1996), or the “approach to decision making that draws on entrepreneurial skills and capabilities” (Lumpkin, Cogliser & Schneider, 2009, 48). Rather than being a unified construct, the dimensions of EO may occur in different combinations (Covin, Green & Slevin, 2006), varying between different countries (Knight, 1997; Thomas & Mueller, 2000), and sometimes even having opposite effects (Hughes & Morgan, 2007). Proactivity is among the three dimensions that are used consistently in EO, along with risk taking and innovativeness (Rauch, et al., 2009). Other dimensions that are sometimes utilized include, for example, competitive aggressiveness and autonomy (Lumpkin & Dess, 1996; Certo, Moss & Short, 2009), and learning orientation and achievement orientation (Krauss, et al., 2005).

Out of the recognized EO dimensions, proactivity has the most robust empirical support as an enhancer of entrepreneurial performance, with inconsistent results on the effects of risk taking and innovativeness (Avlonitis & Salavou, 2007; Krauss, et al., 2005; Hughes & Morgan, 2007). However, the utilized definitions and operationalizations of proactivity in EO are typically focused on competition and company offerings, compared to the notion of anticipatory, change-oriented action in proactivity research (Grant & Ashford, 2008). For example Rauch and colleagues (2009, 763) present proactiveness as an “opportunity-seeking, forward-looking perspective characterized by introduction of new products and services ahead of competition and acting in anticipation of future demand”, and Venkatraman (1989, 949) as “seeking new opportunities which may or may not be related to the present line of operations, introduction of new products and brands ahead of competition, strategically eliminating operations which are in the mature or declining stages”. Furthermore, EO reflects a disposition towards entrepreneurial activity rather than actual behavior (Kollman & Stöckmann, 2014). There are some variations in the utilizations of the measurement scales of the different dimensions (Lumpkin & Dess, 1996; Wang, 2008), and the scales tend to measure potential outcomes rather than the process of having an entrepreneurial orientation (e.g. measuring achieved innovations rather than engagement in innovative behaviors in two out of three innovation items on the widely used scale of Covin and Slevin, 1989). Thus, the current state of EO research again offers limited insight on how proactive processes can be increased or sustained in organizations.

2.3.3 Proactivity and effectuation

Finally, an emerging paradigm shift away from the traditional rational, linear model of entrepreneurship has been suggested (Fisher, 2012). Originating in research on expert entrepreneurs (Sarasvathy, 2001), the *effectuation* approach to entrepreneurship highlights means rather than goals as the starting point of the dynamic entrepreneurial process, with concurrent cycles of acquiring means and constraining goals (Sarasvathy, et al., 2014). According to this approach, entrepreneurs transform, rather than adapt to, existing environments (Dew, et al., 2008) and succeed by actively experimenting (Chandler, et al., 2011; Read, Song & Smit, 2009). Instead of relying on preferences, beliefs, and transactions better suited for steady environments, entrepreneurs employ a logic of identity, action, and commitment (Sarasvathy & Dew, 2005). As a result, entrepreneurial action is enabled even if an opportunity has not been explicitly recognized (Sarasvathy & Dew, 2005), and the purpose of entrepreneurial action becomes to design rather than predict the uncertain future (Dew, et al., 2008). Indeed, the effectuation process has been linked to new frame creation in design literature (Dorst, 2011, 531). This blending of goals and action can be contrasted with traditional conceptual boundaries between goal setting and striving, or idea generation, development, and implementation.

As such, proactivity is inherent in the effectual approach. However, no explicit connection has been drawn between effectuation and proactivity research to date, and empirical research on effectual approaches is largely still at a nascent phase (Perry, Chandler & Markova, 2012). The current dissertation proceeds to empirically study how entrepreneurs proactively attract resources in the opportunity construction process and create new offerings to address perceived opportunities, thus extending understanding on the dynamics of proactive striving in the effectuation process as well.

2.4 Antecedents of proactivity

Although antecedents of proactivity have received extensive attention in research, they have been largely connected to proactive behavior rather than more dynamic process accounts of proactivity (Strauss & Parker, 2014). Antecedents can be divided into *proximal* psychological states, and *distal* individual and situational antecedents (Tornau & Frese, 2013; Wu & Parker, 2013; Parker, et al., 2010). Motivation and self-efficacy have been the most commonly studied proximal antecedents (Tornau & Frese, 2013; Wu & Parker, 2013; Parker, et al., 2010). Self-efficacy and role breadth self-efficacy have been prominent in proactivity models (Grant & Ashford, 2008; Parker, et al., 2006; Frese, Garst & Fay, 2007; Frese & Fay, 2001), with high self-efficacy increasing the likelihood of both initiating and persisting in action (Bandura, 1997). High levels of job satisfaction may also help sustain proactive behavior (Strauss, et al., 2015). In addition, an internal locus of control and responsibility for change have been connected to proactivity (Morrison & Phelps, 1999; Fuller, Marler & Hester, 2006).

Relatively stable individual factors are perhaps the most commonly studied distal antecedents, with findings supporting a positive relationship between proactivity and personality and orientation factors such as conscientiousness, extroversion, desire for control, openness to change and experience, learning goal orientation, future oriented thinking, commitment, and resilience, whereas neuroticism has a negative relationship with proactivity (Tornau & Frese, 2013; Wu & Parker, 2013; Parker, et al., 2010; Parker & Collins, 2010). Knowledge, skills, and abilities have also been studied as antecedents of proactivity in the form of job qualification, education, and domain-specific knowledge (Parker, et al., 2010). Domain-relevant knowledge and contextual knowledge in particular have been found to facilitate idea promotion (Dutton, et al., 2001; Howell & Boies, 2004). Although investigated less than cognitive factors (Hahn, et al., 2012), (activated) positive mood and affect have also been found to predict proactivity (Parker, et al., 2010; Fritz & Sonnentag, 2009; Den Hartog & Belschak, 2007; Hahn, et al., 2012).

Research on situational distal antecedents has also been focused on relatively stable aspects of job characteristics, leadership, and organizational climate (Wu & Parker, 2013). Autonomy (job control) is one of the recurring factors of most models of proactive behavior (Grant & Ashford, 2008; Parker, et al., 2006; Frese, Garst & Fay, 2007; Frese & Fay, 2001), and has been found to influence proactivity both directly and via cognitive-motivational states (Parker, et al., 2006; Parker, et al., 2010; Tornau & Frese, 2013). Other identified situational antecedents include transformational and participative leadership (Den Hartog & Belschak, 2012; Rank, et al., 2007; Strauss, Griffin, & Rafferty, 2009), coworker trust (Parker, et al., 2006) and social support (Tornau & Frese, 2013; Wu & Parker, 2013).

Some advances have been made studying the interaction of individual and situational factors, with Wu and Parker (2013) detailing four possible interaction effects between dispositional and situational factors. Positive situational factors such as procedural justice and job control can either “allow individuals to exhibit their dispositional tendency in being proactive”, or have a stronger effect on proactive behavior when the dispositional tendency is low (Wu & Parker, 2013, 685). On the other hand, negative situational factors can either have a larger decreasing effect on proactivity when disposed towards proactivity, such as in the case of stereotype threat (Gupta & Bhawe, 2007), or be compensated by dispositional factors (Wu & Parker, 2013, 21). Research on the interaction of dynamic individual and situational factors is scarce, if not non-existent.

The vast majority of the antecedents studied have been relatively stable individual and situational antecedents, and have an effect on general levels of proactivity. More dynamic perspectives are rare, although there are a few recent studies of within-individual variations of proactive behavior. For example, Bindl and colleagues (2012) explored the effect of low and high activated positive and negative moods, finding that activated positive mood promoted proactivity, whereas low activation negative mood increased setting proactive goals but had no effect on pursuing them. Positive mood during one working day has

been found to increase proactive behavior on both the same day and the next (Fritz & Sonnentag, 2009), and Hirschi and Freund (2014) found that higher than average perceived social support and positive emotions during a given week increased proactivity. On the other hand, reporting negative situational constraints on a given day, such as working with incomplete or outdated documents, was found to increase proactive behavior during the day (Fritz & Sonnentag, 2009). These studies offer only a first glimpse on the dynamics of fluctuating proactivity, and more research is clearly needed on the process issues of proactivity (Tornau & Frese, 2013).

3. Aims and research frame of the dissertation

Research on proactivity is abundant, but studies adopting the emerging view of proactivity as a process remain rare. Previous studies have tended to focus on proactive behaviors, with less research taking into account the unobservable cognitive elements (Bindl, et al., 2012). Quantitative questionnaire-based studies have dominated research on proactivity, calls being made to increase interview-based and longitudinal studies (Parker, et al., 2010) and psychological understanding of the dynamic proactivity process (Bindl, et al., 2012; Tornau & Frese, 2013). Most studies focus on relatively stable individual and situational antecedents of proactivity, rather than the fluctuation of proactivity within individuals' work. Furthermore, research on proactivity in development contexts has often been limited to studying proactivity as a dispositional tendency. The current dissertation approaches proactive processes in development from the perspective of cognitive psychology that is primarily concerned with the perceptions of events, rather than the "objective" events themselves (Barrick, Mount & Li, 2013, 139-140), and the influence these perceptions exert on proactive development efforts. Proactivity is viewed as a dynamic process that is influenced by a variety of antecedents, each of which can either increase or decrease further engagement of a particular individual in a particular setting. In other words, individuals are expected to display situation-specific fluctuations in proactivity levels.

Much previous research on development has focused on the initial steps of idea generation and development intentions (Axtell, et al., 2000; Krueger, Reilly & Carsrud, 2000), even though the road from intentions to actions is recognized as less than straightforward, modified by various hindrances and enhancers (Mitchell & Shepherd, 2010; Gielnik, et al., 2014). Longitudinal studies measuring both intentions and actions are invaluable for obtaining valid information on how proactivity is initiated and sustained, as not all factors increasing intentions increase eventual action. For example, Bindl and colleagues (2012) found that low-activated negative mood increased envisioning proactive goals, but was unrelated with actual change efforts. Understanding the dynamics of proactive striving becomes crucial in order to enhance engagement in proactive development efforts, advancing initial ideas into actual, implemented improvements, rather than increasing mere good intentions. Unfortunately, innovation research "appears to have moved away from

process research in general” despite the clear need for the dynamic perspective (Anderson, et al., 2014, 1319).

Product design and entrepreneurship were chosen as the contexts for studying development efforts in the current dissertation for two reasons. First, understanding of development efforts is enriched by studying efforts targeted at a variety of development goals in different settings varying in their degree of organization and formalization. Second, choosing multiple contexts alleviates the traditional problem of proactivity discussions being tied to narrow forms of proactive behavior (Grant & Ashford, 2008; Parker & Collins, 2010). Although both product design and entrepreneurship are inherently proactive efforts, as illustrated by accounts of championship and effectuation, neither domain has quite integrated the perspective of proactive *processes* to understanding the related development phenomena (although there are a few exceptions, such as training entrepreneurs for the process of proactive behavior, Glaub, et al., 2014).

In the contexts of product design and entrepreneurship, the current dissertation studies proactivity as voluntary, self-initiated efforts directed towards a development goal specified by the individual beyond possible mandatory requirements imposed by the environment. The content of the action alone does not provide sufficient grounds to determine whether it is proactive or not, but rather knowledge of its context is required. For example, organizing an ideation session would be considered as proactive if initiated to further develop a colleague’s idea, under the general “orders” from a manager to start a new project, or perhaps volunteering to do so in a team meeting, but it would not be considered as proactive if one had been directly instructed by a superior to do so or was organizing it in accordance to standard procedure demands in a fixed organizational process already initiated.

With the overall aim of enriching current understanding of proactivity as a dynamic process in development efforts, and how this process can be intentionally supported, the following research question can be specified:

RQ: How can the process of proactive striving be initiated and sustained in entrepreneurship and product design?

Based on four essays building on the analysis of 81 interviews in thirteen organizations, the current dissertation investigates this question in a range of development-related activities (see Table 2). Essay 1 studies the very beginning of the proactive striving process related to a development idea, investigating how development expertise affects the interpretation of design briefs. Essay 2 extends to study the perceived antecedents of initiating and sustaining proactive striving efforts in developing and implementing specific development ideas, whereas Essay 3 focuses on the collaborative dynamics throughout proactive striving efforts. Finally, Essay 4 studies the latter phases of the idea development path in more detail, investigating the interplay of perceptions, action intentions, and actions in proactively striving to create and specify company offering. As a result, the dynamics of successful proactive striving towards im-

provement begin to unfold, revealing opportunities for intentionally fostering conditions and skills beneficial for promoting proactive development efforts.

Table 2. Summary of the aspects of proactivity explored in the essays

Aspect of proactivity	Essay			
	1	2	3	4
Context	Representational stage in product design	Idea development and implementation actions in product design	Entire idea cycle in entrepreneurial behavior	Idea development and implementation actions in entrepreneurship
Antecedents	Yes	Yes	Yes	Somewhat
Process	Somewhat	Yes	Yes	Yes
Consequences	No	Somewhat	Somewhat	Somewhat

4. Methods

The current dissertation approaches development efforts from a cognitive psychological perspective. While adhering to a realist ontology in that the researched entities exist independent of subjective identification (Fleetwood, 2005), the cognitive perspective highlights “the fact that everything we think, say, or do as human beings is influenced by mental processes—by the cognitive mechanisms through which we acquire information, enter it into storage, transform it, and use it to accomplish a wide range of tasks” (Baron, 2004, 223). As a result, it is impossible to understand the process without considering the actors (Baron, 2004). What is being studied are the perceptions of research participants, assuming that these perceptions influence behavior but not assuming that they represent an objective or shared reality – for example, reporting a risk does not affirm that such a risk exists in the world or in the eyes of other people, but that such a risk is perceived by the actor, and inferences can be drawn on the antecedents and consequences of perceiving the risk. Although perhaps in-between the traditional objectivist-subjectivist dichotomy in epistemology (Denzin & Lincoln, 2005), this approach leans towards the realist side, assuming that “language reflects and enables us to articulate meaning and experience” (Braun & Clarke, 2006, 85) rather than being a pure social construct created in the interview, as social constructionists would view it.

Similar to critical realism (Fleetwood, 2005), a retroductive research strategy was often employed, asking “what, if it existed, would account for this phenomenon?” (Reed, 2005, 1631). None of the conducted empirical studies for this dissertation follows a traditional hypo-deductive approach. Rather than reasoning forward from existing knowledge to create causal explanations, retroduction involves working backwards from identified patterns to suggest plausible underlying mechanisms (Blaikie, 2004). Abduction in general is the inference to the best explanation, and a cornerstone for forming scientific hypotheses in practice (Harré, 1988; Mantere & Ketokivi, 2013, 72). The findings of the essays result from an iterative process of abduction to form plausible hypotheses from the data and inductive comparison with the data within the analysis to further assess the plausibility of the generated explanations (Mantere & Ketokivi, 2013).

Due to the adopted perspective and the dynamic and embedded nature of the studied development phenomena, a qualitative approach was deemed most appropriate, with its interpretive emphasis on understanding processes

(Gephardt, 2004; Denzin & Lincoln, 1994, 2005; Eisenhardt, 1989; Yin, 1994). Rather than using theoretically bound yet methodologically divided grounded theory (Bryant & Charmaz, 2007), a mixture of different interview-based approaches was utilized in the empirical studies, including experimental, naturalistic, cross-sectional, and longitudinal research designs. While only Essay 3 represents a more traditional (single) case study approach (Eisenhardt, 1989), Essays 2 and 4 were also influenced to various degrees by the approach, studying specified naturalistic development cases.

4.1 Data collection

Different sets of data were collected for each of the essays (see Table 3 for a summary), all primarily based on interviews of different types of developers. In all essays, sampling was purposeful rather than aiming at randomization (Eisenhardt, 1989), maximizing the probability of capturing relevant differences or key characteristics by choosing contrasting participant groups (Essay 1) and projects (Essay 2, Essay 4 to a degree), or extreme (Essay 3) and intense cases (Essay 4) of the phenomenon.

Table 3. Summary of the data collection approaches of the essays

Data collection approach	Essay			
	1	2	3	4
Type of study	Experimental, cross-sectional	Naturalistic, cross-sectional	Naturalistic, cross-sectional	Naturalistic, longitudinal
Focus and context	Comparison of expert and student reflections on five presented design briefs	Activities and perceptions related to idea advancement in two projects in one large company	Activities and perceptions regarding the creation and development of one organization	Activities and perceptions in four start-up companies
Participants	Product development experts and master's level students	Product development professionals	Developers of the organization and representatives of supporting organizations	Entrepreneurs developing their company and offering simultaneously
Interview type	Structured	Retrospective, thematic	Retrospective, thematic	Thematic

4.1.1 Participants

All of the participants in the four studies were practicing developers, with the exception of the student comparison group in Essay 1. The majority of participants were Finnish men, reflecting the dominant demographics of their companies and schools in general.

In Essay 1, seven recommended experts of product development were interviewed from two companies providing business-to-business services for tangible development projects. The experts were identified based on nominations from department managers for especially capable product developers or from peers for especially capable, award-winning colleagues, and had 8 to 15 years of work experience in product development. As a comparison group, seven product development master's level students from one university were inter-

viewed. All of the students were to graduate within a year, and had some part-time work experience. Many product development studies tend to equate such advanced student participants with professionals (Defazio, 2008; Lawson, 2004), thus emphasizing the need to actually compare these two groups to evaluate the validity of such assumptions. The experts were in their thirties and early forties, while the students were in their late twenties, with a ten year difference between the average ages of the two groups. Both participant groups were chosen to represent a particular skill level (novice or successful expert).

The seven participants for Essay 2 also represented professional product developers working on tangible products, from two projects of the same large organization. The two projects were chosen to allow comparison between two development cases of different efficiency and effectiveness: one project had been completed and was a clear success, while the other was still stalling. The participants were chosen to elicit as heterogeneous views of the projects as possible. They represented different positions and had been involved in the projects at different points of time. Both the prospective projects and the prospective participants were chosen by a company manager with the above instructions regarding the nature of the projects and participants. The interviewed participants were all very experienced, having worked for the company for 8 to 42 years.

In Essay 3, the participants had been involved in the development of one organization, Aalto Entrepreneurship Society, rather than a tangible product. The case was chosen due to its fast-paced development success and as an extreme example for understanding entrepreneurial behavior: all of the contributors were volunteers receiving no form of financial compensation for their efforts, despite contributing at least 20 working hours per week towards the society in its early phases. To maximize understanding the development of the society, six participants were selected: all three founders, and three of the most active contributors during the early development of the society. These participants were in their twenties and early thirties and were either master's level university students or recent graduates. A further four interviews were conducted to elicit supplementary outside perspectives on the development of the society from four of the organizations that the study participants from Aalto Entrepreneurship society had named as having supported the society in critical early phases.

For Essay 4, the entrepreneur teams of four new ventures were interviewed. They were simultaneously developing both their companies and their company product offering market-ready. Although some of the offerings were augmented by services, all included software and/or hardware products as well. These cases were chosen as available, representative examples of new ventures with tangible offerings still in the gestation period between forming a company and securing first significant sales. The participants were chosen to maximize insight into the companies, and the entire active contributor entrepreneur team for each company was interviewed. In addition, the companies procured some labor in more-or-less permanent arrangements and some board members had

rather active roles, but they were not interviewed. The majority of the participants were in their thirties and had backgrounds in technology.

4.1.2 Interviews

Interviews have been described as one of the most flexible research methods, as well as one of the most readily accepted ones by participants (King, 2004). Pure observation would have provided little ground for inferring cognitive phenomena related to development efforts, whereas combining observations with think-aloud protocols (Ericsson, 2006) would have been more obtrusive and difficult to arrange due to the collaborative, distributed nature of development efforts across time, actors, and premises. To benefit from the ability of interviews to elicit rich data, all of the conducted interviews were based on generic, open-ended what and how questions rather than domain specific or closed questions (Hoffman, et al., 1995; Shaw & Woodward, 1990), directing the content of the interview responses as little as possible while at the same time eliciting specific situations and action sequences rather than abstractions or general opinions (Kvale, 1983; King, 2004). Essay 1 was based on a structured interview, whereas Essays 2 through 4 were based on in-depth semi-structured thematic interviews, where the specific order and formulation of the questions was varied to fit with the ebb and flow of the participants' responses, and general prompts were utilized to encourage participants to elaborate on their responses.

For Essay 1, interview sessions began with the participants filling a background information form on the type and amount of experience they had in product development, after which the participants proceeded to read the first of five design briefs (see Section 4.1.3 Supplementary materials). The same six interview questions were asked after each design brief. The questions were designed to elicit information on the product development problem representations of the participants, prompting for perceived relevant, important information, possible challenges, and how the participants would continue onwards with the design brief. Reading a design brief took typically one and a half minutes and answering the questions six minutes per design brief. After repeating the process for all five design briefs, the relevance of the participants' previous experience in relation to the utilized design briefs was checked in a more informal discussion (see Section 4.1.3 Supplementary materials).

Essays 2 to 4 all utilized a participant-selected critical incident approach (Cope & Watts, 2000). Originally developed by Flanagan (1954), the critical-incident technique was applied by Chell, Haworth and Brearley (1991) in a qualitative social constructionist approach of studying business development by entrepreneurs, and variations of the technique have subsequently been used several times in studies of entrepreneurship (e.g. Cope & Watts, 2000; Kaulio, 2003; Turcan, 2008) as well as product design (e.g. Doultsinou, et al., 2009; Björklund, 2010; Kraaijenbrink, 2012). Critical-incident techniques have the advantage that when engaging in retrospective reflections, participants are more likely to recall self-selected, meaningful events in detail and accurately (Chell, 2004). They provide "first hand evidence of the relationship between

context and outcome” (Chell, 2004, 47). While the behavioral focus of the critical-incident technique was not adopted, the approach of eliciting participant-selected “extreme” (high and low points) rather than representative events and exploring them in detail was utilized in Essays 2 and 3. Essay 4 utilized the approach to a lesser degree, including questions of high and low points among other key themes.

The retrospective interviews in Essays 2 and 3 began with introductory background questions to put the participants at ease (Rubin & Rubin, 2011), after which the participants were asked to describe freely how the project (Essay 2) or organization (Essay 3) had proceeded and what the participants’ roles had been. After establishing a basic timeline of events that the participants perceived as significant, the interviewer proceeded to ask open, generic questions on a number of pre-selected themes (thematic interview guide) withdrawing presuppositions about the projects, organization and/or themes in a strategy of deliberate naïvete (Kvale, 1996). In Essay 2, the interviews covered the pre-selected projects as well as other significant (as judged by the participants) development-related experiences, with critical-incident inspired themes such as exciting and exhausting moments, conflicts, and turning points, as well as reflections on the received support. Similarly in Essay 3, where the interviews were focused on the Aalto Entrepreneurship Society, the organization developers were asked about the critical-incident themes and the received support in relation to the organization. The four interviews of the representatives of supportive organizations were also prompted to reflect on the critical-incident development paths of the society. In addition, these four interviewees were asked what had made the organization interesting in their point of view, what expectations they had had, and what potential benefits and shortcomings the society had had in relation to the participant’s organization. In Essay 2, the interviews lasted for an average of 89 minutes, whereas in Essay 3 the average for Aalto Entrepreneurship Society interviews was 94 minutes and for supportive organizations interviews 37 minutes.

In Essay 4, three waves of interviews three months apart from each other were conducted with the same participants. The aim was to study the intentions and activities and related positive and negative perceptions in the four companies in the developmental stage. As in Essays 2 and 3, the first wave of interviews began with personal background questions and accounting how the company of the participant had evolved to its current state. The second and third interviews began by asking the participants to briefly recount what had happened since the last interview. The interviews then proceeded to prompt for current strengths, opportunities, weaknesses, risks, activities, events and action intentions. If asked to specify the target of the question, the interviewer would state that the participant could decide what seemed most relevant, and if further pressed, would give a list of alternatives (such as “strengths related to your working, the company, the team, the offering – whatever strengths you think there are”). To wrap up the interviews, the participants were asked to sum up their current situation in three adjectives in waves two and three. The interviews lasted 60 minutes on average.

In all of the essays, the interviews were conducted individually and audio-recorded with the permission of the participants. Participants were explained that the interviews were confidential and that the presented results could not be traced back to any particular person. All interviews were concluded by asking if the participants had anything further to add, or any questions regarding the interview or research process. The audio-recordings were transcribed verbatim for further analysis.

4.1.3 Supplementary materials

The interviews formed the main body of data, but some supplementary materials were utilized as well in Essays 1 and 3. Five design briefs, based on five real design projects, were created for Essay 1: an electronic voting booth, a fire-safety solution for saunas, an easy-to-open coffee package, a wireless charging solution, and a half-pipe grinder (see Appendix 1 for an example). These aimed to provide a range of different cases of developing physical products (Hoffman, et al., 1995) in terms of task, industry, and project phase in order to improve generalizability and relevance to the experience of the expert participants. The design briefs were created based on interviews of the project manager or designer of each project, and the created design briefs were checked for accuracy by these interviewees. The design briefs were approximately three fourths of an A4 sheet each, averaging 250 words, and one included a picture of the product after pre-testing had indicated possible difficulties in understanding the product in question. Furthermore, the validity of the design briefs as testing materials in relation to the level of product design expertise of the participants was assessed in a more informal discussion after the conducted structured interviews, asking the participants about the understandability and difficulty of the design briefs, and whether they had relevant previous experiences. All of the experts reported the design briefs to be similar to those they worked with in their employment, and that all of the projects presented in the design briefs would have benefited from their expertise. The students had more limited experiences of the presented types of design briefs. Thus the division between the expert participants and novice student participants could be justified in the specific tasks.

In Essay 3, archival data of newsletters, news clippings, internal publications, and minutes of meetings of the studied Aalto Entrepreneurship Society were collected and read to enhance understanding of the case organization. These materials were not, however, utilized directly in the analysis of the case.

4.2 Data analysis

As the interview questions were designed to restrict the content of the responses as little as possible, adopting a data-driven, grounded approach for analysis was deemed as beneficial (Cooke, 1999). All of the essays utilized a similar data analysis approach, segmenting the transcribed interviews, categorizing the segments based on thematic similarity, and drawing inferences based on the content and distribution of the segments within and between

categories. In all of the essays, the emergent categories themselves represent a part of the contribution of the essays, being based on bottom-up analysis. The distribution and content of the segments within and between these categories provide further contributions to the essays, with the numerical values of segment amounts and descriptive statistics from the two larger data sets of Essay 1 and 4 providing further indicative reliability of the obtained results.

Essays 1 and 4 (and 2 and 3 to a lesser degree) represent quantified qualitative analysis (Chi, 1997), which, though labor-intensive, aims to enhance the transparency and reliability of the researcher's interpretation of the data. Research still relies "strictly on the qualitative data", examining it for patterns, developing codings to capture the patterns, and then analyzing the codings quantitatively (Chi, 1997, 281). Essay 3, seeking to understand the specific, extreme case of Aalto Entrepreneurship, adopted a more traditional case study design, basing much analysis on the constructed case (see Table 4 for a summary of the data analysis approaches utilized in each essay).

Table 4. Summary of the data analysis approaches of the essays

Analysis approach	Essay			
	1	2	3	4
Segmentation	Entire data set	Part of the data set	Part of the data set	Majority of data set
Procedure of dealing with repeated ideas	Counted as one segment	Counted as one segment only if expressed in close temporal proximity	Counted as one segment	Counted as one segment only if expressed in close temporal proximity
Amount of segments	1760	147	223	2436
Causal map and/or case description	Neither	Causal map	Both	Causal map for each company
Quantitative analysis	Inter-rater reliability, Mann-Whitney <i>U</i> tests	None	None	Inter-rater reliability, Chi squared tests

4.2.1 Segmenting

In Essay 1, the entire data set was segmented, whereas in Essays 2 to 4 causal maps of the development cases were first constructed, after which only interview responses pertaining to specified themes were segmented for further analysis. Essays 2 and 3 segmented a smaller proportion of the data (related to idea advancement in Essay 2, and enablers and hindrances in Essay 3), whereas in Essay 4 the majority of data was coded (portions including events, actions, positive perceptions, negative perceptions, and action intentions).

Data can be segmented in varying grain sizes (Chi, 1997). In all of the present studies, segmenting was conducted based on semantic features so that one segmented represented one expressed idea. A typical length was one or two sentences. For example the following excerpt was identified as one segment in the study of Essay 4: *"It's been a bit, especially with [one team member], it feels like he would like to take on a much bigger role than what he currently has, and it then, it stresses at least me pretty much at the moment."*

If the same idea was repeated in consecutive sentences, both sentences were included in the same segment to reduce the bias of more talkative people producing more output (Chi, 1997). Sequencing was not taken into account in the segmenting and coding process that was geared towards understanding the perceptions of the participants – “all utterances are taken to reflect the underlying representation, to some degree, irrespective of when exactly they were uttered” (Chi, 1997, 279).

In data resulting from the interviews of Essay 1, where the purpose was to study the design brief representations of the participants, and Essay 3, where segments complemented the case description by portraying the dimensions of enablers and hindrances, multiple segments conveying the same idea were counted as one, irrespective of when they were communicated in the interview. For example, in the study of Essay 1, both the segment “*(it would be good to know whether we) are developing the [voting device] as well or just the booth*” and the segment “*I would still check that, do they want to do the voting device as well, in the same project*” expressed within the same interview essentially the same concern of whether or not the project scope included the voting device, and the segments were thus only counted as one occurrence in the category of identifying missing information. However, in Essays 2 and 4 repetitions of the same idea were counted separately (unless occurring in back-to-back sentences), since repeating the same idea in several phases of the semi-structured interviews was taken as an indication of the perceived relevance and/or importance of the communicated perception to the interview participant. As a result, 1760 segments were included for analysis in Essay 1, 147 in Essay 2, 223 in Essay 3, and 2436 segments in Essay 4.

4.2.2 Causal maps and case description

In order benefit from the rich context of the naturalistic interviews (Essays 2 through 4), understanding of the context of the segments was enhanced by creating holistic causal maps or development paths before the categorization process. Flow chart style causal maps were created for both of the projects discussed in Essay 2, the development of Aalto Entrepreneurship Society in Essay 3, and for the four companies in Essay 4, although none of them are presented in the essays themselves in order to protect the anonymity of the participants. The three chains of Essays 2 and 3 were organized in a time-line (see the example excerpt in Figure 1), and shared with some representatives of the organizations. In Essay 4, the map of each company was a web of several individual chains of activities and related perceptions, as well as thematically similar but unconnected activities and perceptions (see the example excerpt in Figure 2). These maps were only used to enhance the researcher’s own understanding of the company cases and contexts.

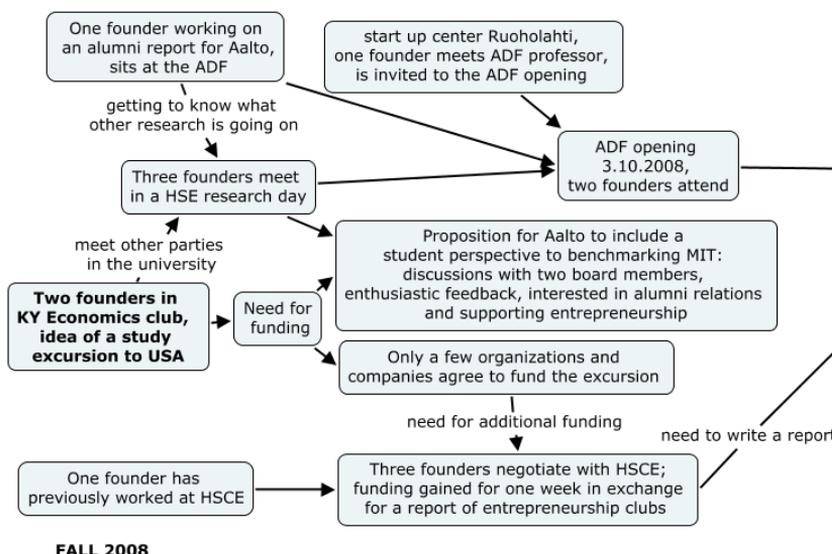


Figure 1. The beginning of the causal map of Aalto Entrepreneurship Society (of Essay 3)

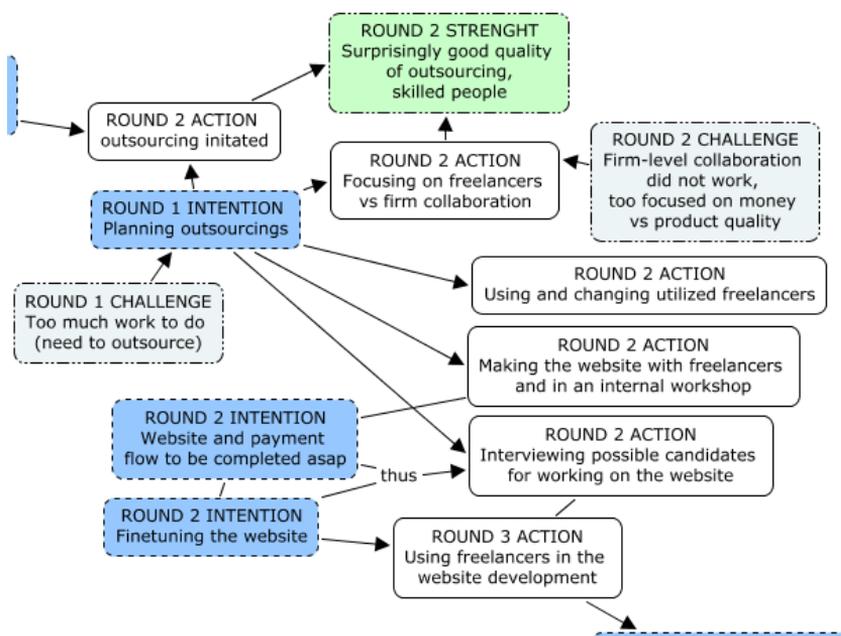


Figure 2. An excerpt of the web of actions, perceptions, and intentions of Play (one of the companies of Essay 4)

In addition, a textual case description was created and presented in Essay 3. This description was validated by sharing and discussing it with the six Aalto Entrepreneurship Society interviewees (as well as the chairman of the board of 2010), aiming to correct any misunderstandings or omissions. Several elaborations were subsequently made to the description, but no misunderstandings were identified.

4.2.3 Coding and categorization of the segments

All coding and categorization was done manually in a highly iterative, data-driven style. Semantic-level thematic analysis, a widely used method to identify patterns within data that is tied to no particular theoretical or epistemological position (Braun & Clarke, 2006), was chosen due to its flexibility. Coding was conducted on a semantic level (Braun & Clarke, 2006), searching for repeated ideas to base emergent codes on. These ideas were successively categorized into larger groups based on the thematic similarity of content, creating subcategories, categories, and classes for data into a final, taxonomic coding scheme (Chi, 1997). For example, the following segment was first found to express the adverse effect of not having a deadline, grouped with similar segments into a category on the effects of the “presence of deadline”, which was finally grouped into the work organization level of antecedents in Essay 2: *“I mean deadlines, no one ever gave any time limit. This [development target] is just like, let me know when it’s done. If someone gave a date, it would be done before that date, if it were at least approximately realizable.”*

In Essays 2 and 3, where the segment amounts were smaller (147 and 223, respectively), the coding was a more straightforward process, but with the two larger data sets (1760 segments in Essay 1 and 2436 in Essay 4), multiple iterations between various types of categorizations were made.

In Essay 1, where the entire data set had been segmented, the final categorization included only those that had 15 segments or more. Although more detailed coding was done, Essay 4 reported in the end only the division of segments between three alternative targets for activities and perceptions, and three alternative types of action intentions.

Once the final coding schemes had been created, all segments were re-checked against it.

4.2.4 Quantitative analyses

The two larger segment sets of Essays 1 and 4 utilized supplementary quantitative methods to further assess the validity and reliability of the obtained results. For both articles, and independent coder re-classified between five to ten percent of the segments. Inter-coder reliability (Cohen’s Kappa) was calculated separately for each category in Essay 1, and the two different coding schemes in Essay 4. With values ranging from 0.83 to 1, reliability was deemed sufficient in all categories.

In Essay 1, two-tailed, non-parametric Mann-Whitney *U*-tests were used to assess the significance of the differences between the expert and student segments in the four classes of segments (Needed information, Problem structuring, Process, and Presentation of the problem). As this covered the entire categorization, the resulting *p*-values were adjusted for multiple comparisons by the Bonferroni method. As four pairwise tests were performed, the *p* values were considered statistically significant if they were smaller than the adjusted alpha of 0.0125.

In Essay 4, Chi squared tests were performed to assess whether the distribution of perceptions across interview waves differed in terms of positive versus negative perceptions, and perceptions related to the internal enactment versus the company offering or external enactment. These two p values were not adjusted for multiple comparisons.

All calculations were made manually or using basic spreadsheet functions.

5. Results

The empirical research of this dissertation comprised four original studies reported in or submitted to four peer-reviewed journal publications. These essays investigate how proactive striving is initiated and sustained in product design and entrepreneurship, aiming to understand the dynamics of successful self-initiated development efforts. To gain a comprehensive view, the four essays targeted multiple phases in the idea development funnel (see Figure 3), overall accounts being complemented by more detailed studies in both the beginning and towards the end of the idea development path. As a result, they yield a rich understanding on the dynamics of successful proactive striving towards improvement in a variety of contexts.

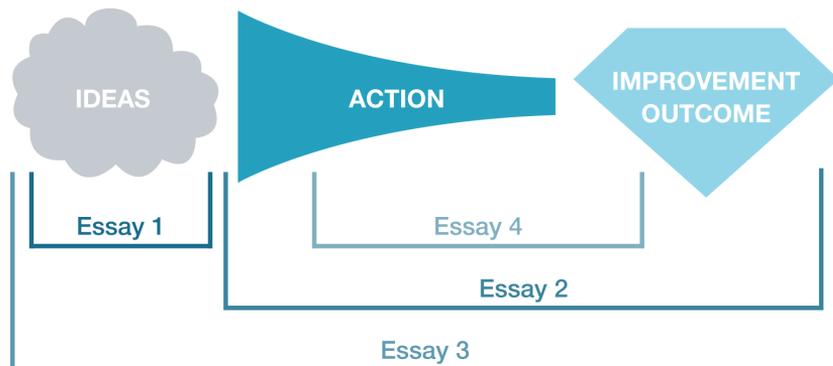


Figure 3. The empirical studies in relation to the idea development funnel

5.1 Essay 1: Skill-based proactivity differences in interpreting development tasks

One way to approach the skills and practices required for successful behavior is to investigate those who systematically perform well at the task, namely experts. Defined as a domain-specific adaptation based on practice and experience (Feltovich, Prietula & Ericsson, 2006), expertise has been extensively studied in many fields (e.g. Ericsson, et al., 2006; Chi, Glaser & Farr, 1988). However, not only is such research scarce in the domain of product design, but most studies are based on students or individual designers (Cross, 2003; Defazio, 2008; Lawson, 2004). As a result, little is known of how design experts operationalize initially vague, ill-structured design problems, even though un-

derstanding of the problem and solution co-evolve (Rittel & Webber, 1973; Cross, 2004) and thus successfully operationalizing, or *framing*, the problem is strongly associated with design expertise (Lawson & Dorst, 2009). The process of design briefing between the client and the designer plays a large role in the framing and reframing of the problem, a key component of both professional design (Paton & Dorst, 2011) and design thinking in general (Dorst, 2011, 2015). Experts in other domains tend to be more proactive than novices, and Essay 1 explored whether such differences can be observed in product design already at the representational phase, as problem formulation and interpretation play such a significant role in the overall process (Dorst & Cross, 2001; Chakrabarti, Morgenstern & Knaab, 2004).

Segments elicited in structured interviews of seven successful experts and seven students on five design briefs were categorized into 14 categories reflecting elements in the design brief interpretations of the participants. These categories were grouped into four classes - needed information, problem structuring, process, and presentation of the problem – and the amount and type of segments in each class and category were compared between the two groups.

Even though prompted by exactly the same stimuli, experts produced from 109 to 297 segments (eliminating for reoccurring ideas), whereas students produced only 61 to 97. Experts were found to have more extensive, in-depth and detailed representations of the development problems. They had statistically significantly more segments related to needed information, i.e. identifying missing information, important information, and relevant outside information. For example, when asked if any information was missing from the design brief regarding a half-pipe grinder, one expert replied: *"I don't know, this didn't say, are the competitors' products patented, so that that's why they can't be copied, or do they just not want to make the same kind."*

Experts also had higher numbers of segments related to problem structuring (defining the problem, expressing new requirements and sub-goals, and initial idea generation) and the process (naming sources of information, expressing what should be done next, evaluating the project, and identifying potential challenges). The experts were more attuned to the information needs of the subsequent problem solving process, and were able to identify more sources for such information. Furthermore, the experts interconnected information to a larger extent both within the problem representation and between the representation and outside knowledge. Experts would deduce the scale of the project based on the design brief information, or contextualize the project by drawing on outside knowledge such as voting patterns in the case of the electronic voting booth.

The only class where students had more segments was the presentation of the problem, including segments evaluating the design brief text itself, identifying needless information provided in the briefs, and asking design task clarification questions. Only students demanded ready answers from the clients, whereas the experts saw themselves having a more active role in seeking the needed information. In addition, experts' problem representations were more

geared towards action. Thus, proactivity differences between experts and novices do emerge already at the representational stage of development activities.

Essay 1 concluded that these observed differences lead to a two-fold advantage for experts in initiating and sustaining proactive development behavior. First, richer mental representations increase the amount of observed options for action, making proactive behavior more likely through increased perceived opportunities. Second, they allow developers to target their efforts towards more fruitful actions, making any pursued proactive behavior more likely successful. Taking into account the interconnections, consequences, and context of the development problems allows identifying both more and better points of leverage, creating the possibility for a virtuous spiral where initial progress due to proactivity encourages further proactivity.

Main findings on initiating and sustaining proactive striving:

- Subsequent differences between student and successful expert developers in levels of proactive behavior manifest already in differing task representations. Experts' representations are more geared towards action.
- Perceiving more interconnection within the development problem and also between the problem and its context can allow identifying more numerous and fruitful courses of action. This, in turn, can enhance both the perceived possibilities for and the consequences of subsequent proactive striving.

5.2 Essay 2: The different roles of personal, interpersonal, and work organizational antecedents of proactive striving

In innovation literature, much of idea promotion and idea selling behavior has been studied as the actions of individual champions (distinct from non-champion employees and managers; Howell, 2005; Kelley & Lee, 2010; Shane, 1994). Essay 2 argues that successful development efforts require such proactive behavior regularly from all development professionals. The paper defines idea advancement behavior as *actions targeted at gaining and sustaining resources for developing and implementing generated innovative ideas, where resources refers to both the required material and immaterial contributions, including (but not limited to) gaining permission, cooperation, support and input to further efforts to realize ideas into innovations* (Essay 2, 128). Unlike most studies in championship and issue selling, such behavior is perceived to be required towards all stakeholders (project team, clients, etc.) rather than only towards the higher levels of management. The article complements the more narrow construct of champion individuals by studying the intermediate-level, dispersed acts of idea advancement in critical-incident based interviews of seven professional product developers of a large international company.

From these interviews, 106 segments regarding idea advancement antecedents were identified, and 41 segments describing idea advancement practices. Antecedents for proactive advancement behavior were identified at three different levels in the work of product development professionals who were engaged in various formal and informal development projects. First, on a personal level, the advanced idea needed to have intrinsic value for the developer, who needed courage and grit to persistently engage in self-directed advancement efforts. Second, on an interpersonal level, the developer needed to interpret that others perceived the idea as important and were more or less favorable towards development in general. Third, on a work organization level, general conditions of fragmented work and lack of organizational clarity were perceived to quell idea advancement efforts, as responsibilities became unclear: *“We have skilled tennis players in this organization, they always know how to then hit the ball to someone else.”* On the other hand, the presence of deadlines and engaging with the idea in intermittent spurts in the specific development cases had seemed to enhance idea advancement behavior.

The identified personal level antecedents seemed to act more as necessary preconditions for engaging in idea advancement efforts, rather than explaining differences between effective and stalling advancement efforts. The importance of the development target or idea inferred from interest expressed by others, the presence of deadlines, and prioritizing the development project, on the other hand, marked clear differences between successful and stalling efforts. Furthermore, maintaining efforts required occasional rest periods and successfully changing the primus motor of the projects. The identified antecedents thus highlight the dispersed and context-specific nature of proactive idea advancement.

The idea advancement behaviors reported by the interviewees centered around two interpersonal questions: including others to a suitable degree and choosing appropriate communication strategies in terms of communication channels and persuasion tactics (largely in line with issue selling literature, e.g. Dutton, et al., 2001). Global effectiveness often required local inefficiency, for example by travelling to enable face-to-face conversations or including “unnecessary” people at various phases. Direct contact with customers helped both to persuade different stakeholders and to discover opportunities for testing and implementing ideas.

Main findings on initiating and sustaining proactive striving

- Although individual-level factors are a prerequisite for proactive idea advancement efforts, sustaining proactive striving is largely an interpersonal process.
- Proactive striving hinges on interpersonal communication of desirability and feasibility and on organizing efforts in spurts.
- Communication and inclusion practices are perceived as crucial for effectiveness.

5.3 Essay 3: Individual-ecosystem dynamics in attracting resources for proactive striving

Essay 3 studied the process of constructing the opportunity of Aalto Entrepreneurship Society [hereafter Aaltoes] and its implications for acquiring and sustaining a variety of resources for development work. While the creative acquisition and utilization of means has a central position in emergent entrepreneurial approaches such as effectuation and bricolage (Fisher, 2012), empirical research remains scarce on the topic. As a purely volunteer-based organization initiated on a zero budget, Aaltoes offered an intriguing case to investigate the dynamics of entrepreneurial and stakeholder inputs in the development of the opportunity. Specifically, the essay argues that co-evolution between the individual (in this case entrepreneur) and the surrounding occurs in the opportunity creation process.

Based on the case description of the development of Aaltoes, formed from the interviews of six Aaltoes founders or early key team members and four representatives of supporting stakeholder organizations, two key mechanisms in acquiring and sustaining resources were identified: proactive concretization and (re)formulating for synergy. While the latter laid the groundwork for eventual mutual benefit, proactive concretization efforts were the primary mechanisms in both attracting and sustaining development input, whether tangible (such as facilities) or intangible (labor, mentoring, etc.). Concrete opportunities of limited and specified scope and schedules, such as planning an event, encouraged various stakeholders to initially provide input. These same tangible instances then served to inform on the effectiveness of efforts, motivating stakeholders to continue providing resources.

Categorizing the enablers and hindrances of the development explicitly expressed in the ten interviews further highlighted the energizing and encouraging effect of demonstrating action and receiving feedback. For example, after initial difficulties to attract people to help to create the organization, the founders created a Facebook page called Aalto Entrepreneurship Society and soon issued an open invite to come join a two-hour meeting to create the first event. *"I think that was a turning point in a way, founding the Facebook-group. That way we got new people and it was easy to, people saw in a concrete manner that people are joining, and saw who were there."* In effect, initial proactivity that was expressed towards tangible goals attracted further proactivity, creating virtuous spirals of development efforts. These spirals spanned across Aaltoes members and other stakeholders, resulting in co-evolution of further mutual benefit. The essay argues that these positive individual-environment development activity spirals can be intentionally fostered by relatively small interventions. Systematically demonstrating action and seeking feedback can enhance and sustain proactive efforts, affirming both the desirability and the feasibility of the pursued global-level opportunity. Again, the situated and dynamic nature of proactive striving efforts is highlighted.

Main findings on initiating and sustaining proactive striving:

- Events that were seemingly serendipitous were actually based on aggregates of proactive behavior governed by (re)formulating for synergy and proactive concretization.
- Demonstrating action and gaining feedback can form a positive spiral of engaging in proactive striving, escalating the development activity displayed by both the individual and the surrounding environment.

5.4 Essay 4: Disconnections between perceptions, action intentions, and actions in proactive striving

Entrepreneurs have been repeatedly characterized as proactive, adaptable and opportunity-centric (e.g. Chandler, et al., 2011; Frese, 2009; Haynie, et al., 2010), but studies of actual actions of entrepreneurs are rare (Venkataraman, et al., 2012). In order to investigate the process in which entrepreneurs operationalize global-level perceived opportunities into tangible offerings, Essay 4 describes a longitudinal study of four new ventures in the midst of trying to develop their offering market ready. Three interview rounds were targeted at all active entrepreneur team members, and were conducted at approximately three-month intervals.

The reported activities, action intentions, positive perceptions and negative perceptions were divided into 2436 segments related either to the company offering, internal enactment (e.g. team, working methods) or external enactment (e.g. clients, funders). Company offering accounted for the smallest proportion of segments. Outward interaction was a valued source of positive feedback, and progress was also highly valued. Both of these served to affirm the desirability and feasibility of opportunity pursuit, increasing commitment to the pursued direction. As one entrepreneur described: *“Well it was in the beginning a bit that we had other ideas as well, but pretty fast this one, the pitching competition strengthened it and it became, we were able to cut all of the rest and concentrate on this one. (...) The [funding] was a big deal, not really because of, or the financial aid was nice, but more of the, in a way when having this environment, community, going there to pitch ideas, pursuing it for a while, then after taking it past a certain point, you become married to [the idea] in this environment already.”*

On the other hand, interaction was a major source of negative perceptions, especially due to the delays caused by (potential) collaborators. The importance of longitudinal studies was also highlighted, as the ratio of positive to negative perceptions decreased and the ratio of internal enactment to external enactment and company offerings increased after the first, introductory interview round, possibly reflecting the entrepreneurs’ reduced attempts to portray the company favorably to the interviewer with whom they became more familiar.

The 380 action intentions expressed by the interviewees were also divided according to their level of detail and time-frame into specific (specified time,

narrowed target and/or method of action), general (high-level target but no method or time-frame for taking action) and conditional intentions (to be pursued after some later developmental stage, in the unspecified future, or only hypothetically under different circumstances). Hypothetical intentions seemed to be more frequent in the two companies where the majority of entrepreneurs were engaged in other, outside-company, pursuits as well. Specific intentions were relatively rare in all companies, with an average of only 4.4 specific intentions being reported per interview. Furthermore, the connection between perceptions, activities, and action intentions was relatively weak. The reported perceptions were rather static, mainly expressing content in the current situation or discontentment in some “necessary evil”.

Based on the results, Essay 4 makes three propositions: (1) entrepreneurs are more prone to proactivity and opportunity-centricity on a global, company-level than on the level of weekly operations targeting a specific manifestation of the opportunity, (2) entrepreneurs find it difficult to commit to such a specific manifestation, preferring to maintain several concurrent, parallel or even competing streams of pursuit at the expense of delaying progress in any of them, and (3) commitment to a particular manifestation can be enhanced and sustained by making the pursued direction tangible to allow for regular feedback on progress, desirability and feasibility.

Main findings on initiating and sustaining proactive striving:

- Global, company-level proactivity does not automatically lead to proactive opportunity pursuit.
- Perceptions of global-level opportunities can deplete energy from proactive behavior towards any one particular manifestation.
- Commitment and energy towards translating global opportunities into specific company offerings can be fueled by making actions tangible to outsiders, thereby concretizing progress and attracting feedback on desirability and feasibility.

5.5 Summary

The findings of the four empirical studies portray proactive striving as a highly situated and pervasive process in product design and entrepreneurship. As expected, the level and success of proactive striving efforts were found to vary within individuals, as some efforts were fruitful and sustained, while others were discontinued or stalled (Essays 2 and 4).

The basis for proactive striving seems to emerge already at the stage of representing development problems, where more successful developers have more extensive, in-depth, and interconnected representations, allowing them to identify more numerous and fruitful possibilities for action (Essay 1). Personally perceiving the target of efforts as valuable (Essay 2) and formulating the opportunity for potential synergy with other actors in the ecosystem (Essay

3) emerged as necessary preconditions for engaging in proactive striving, but insufficient by themselves.

After initial engagement, interpersonal and organizational factors were more useful than personal factors in differentiating between successful and unsuccessful efforts (Essay 2). Particularly individual-environment interaction through tangible approximations of efforts emerged as a crucial factor for both initiating and sustaining proactive striving in all of the naturalistic studies (Essays 2, 3 and 4). Making efforts tangible or observable to outsiders helped to create virtuous spirals of proactive development activity (Essays 3 and 4) by concretizing progress to the entrepreneur and other stakeholders (Essays 3 and 4), by providing easy opportunities for new stakeholders to join improvement efforts (Essay 3), and by eliciting feedback from the environment (Essays 2, 3 and 4). Successful collaboration with relevant stakeholders sometimes required time-consuming inclusion and communication practices (Essay 2), creating the need for local inefficiency to produce global effectiveness.

Finally, concretizing actions helped to develop the initial efforts towards successful implementations. Direct feedback generated through the ease of constructing tangible approximations and indirect feedback from the elicited environmental reactions provided information on what actions were fruitful (Essays 2, 3 and 4). Furthermore, creating tangible approximations seemed to serve a committing function, helping entrepreneurs to shift from generic action to specific action, translating global-level opportunities into specific offerings (Essay 4).

6. Discussion and conclusions

Although proactive development is arguably crucial for organizational survival, little research exists on the dynamic process of acting in a proactive manner. Most studies of proactivity have been conducted using cross-sectional questionnaires, attempting to establish correlations between hypothesized variables rather than to prompt in-depth reflection in the study informants. On the other hand, dispositional accounts of proactivity dominate innovation and entrepreneurship literature, and studies have largely ignored the implications of phase differences in innovation (Rank, et al., 2004). As a result, little is known on the *dynamics* of initiating and sustaining proactive striving towards development goals.

The present dissertation highlights the fluctuations in proactive striving due to the situated, dynamic nature of efforts. Overcoming the limitations in the methodology and scope of previous research, it offers several insights into the dynamics of proactively striving towards improvement. After discussing key contributions in more detail, recommendations are made for practitioners and educators of product design and entrepreneurship.

6.1 Theoretical implications

The dynamic process view of proactivity emphasizes that the decision to engage in proactive striving is not a one-off occurrence, but a recurring event. While relatively static individual and situational factors, such as extroversion or job control, are certainly influential, they offer little explanation for within-individual differences in proactive striving in the same environment. Since proactive behavior is effortful, a stream of energizing input is needed to sustain proactive striving. Based on the four empirical studies, the generic idea development funnel can be modified into an idea development path better reflecting the proactive striving efforts required in the process (Figure 4):

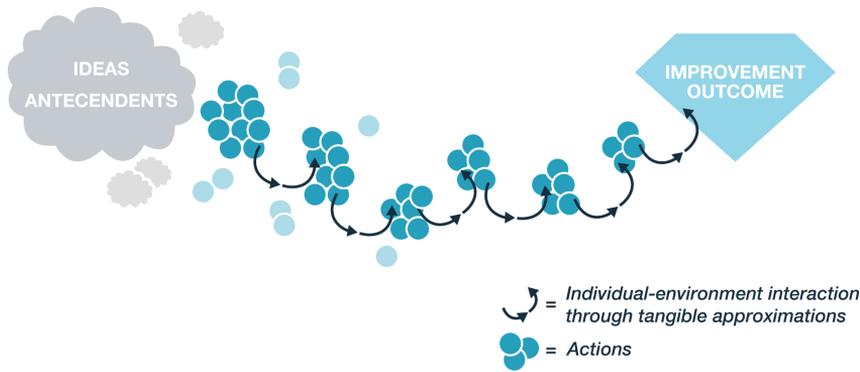


Figure 4. The dynamic, situated idea development path

The modified development path emphasizes the need for pruning non-action from fruitful action, as well as progressively specifying actions in concrete iterations. Interaction between individual efforts and the surrounding environment plays a key role in sustaining and informing this process of progressive productive specification, and occurs through tangible approximations of development efforts. This modified funnel illustrates the process of *enacting* proactivity through striving efforts, and can be seen as a complementary, situated and context-specific model to previous psychological models of proactivity as a regulated, goal-directed process (e.g. Parker, et al., 2010; Bindl, et al., 2012; Glaub, et al., 2014). Through this model, two key contributions are made towards understanding the dynamics of initiating and sustaining proactive striving: identifying potential discontinuities in efforts in transitions between different levels of manifestation, and potential positive spirals of striving efforts created by individual-environment interaction.

6.1.1 Potential discontinuities in efforts due to transitions between manifestation levels of proactive striving

The range of manifestations of proactivity demonstrated in the essays, from representing design problems to creating new organizations, already implicitly suggests that there are several levels of proactive striving relevant for development efforts. The longitudinal study of Essay 4 explicitly calls attention to different levels of manifestation, as the findings suggest that global, company-level proactivity, in terms of creating a new organization, securing funds for it, et cetera, does not necessarily translate into very proactive pursuit of any specific offering idea. Proactivity consumes finite psychological resources (Hahn, et al., 2012), and the current findings suggest that excessive attention to global-level opportunities may reduce commitment to operationalizing them. As a result, specifying the level of manifestation of proactive efforts can be useful for identifying potential discontinuities in the idea development and implementation process.

The lack of differentiation between manifestation levels is perhaps not unexpected in studies of proactive behaviors of specific forms (such as feedback

seeking or issue selling), but rather surprisingly none of the attempts to clarify and unify proactivity research that the author is aware of have drawn attention to the scale of efforts either. For example, Grant and Ashford (2008) identify five dimensions of proactivity: form, target, frequency, timing, and tactics. While several of these dimensions may differ between levels of manifestation, none captures this aspect of proactivity directly. Based on the current results, a scale of at least three relevant levels is suggested:

1. Specific micro-level *proactive actions*, describing manifestations of proactive striving on the scale of specific, individual representations and actions, such as how an individual seeks or interprets a particular instance of feedback on a specified development idea.
2. Intermediate-level *proactive activities*, describing manifestations of proactive striving on the level of behavioral patterns engaged in, such as the various advancing practices utilized to promote a particular development idea.
3. Global-level *proactive approaches*, describing manifestations of proactive striving on the level of general behavioral approaches to more abstract development opportunities, such as career and company strategy alterations made by individuals to pursue new categories of development ideas.

These levels are hierarchical in the sense that approaches comprise a range of activities, which are carried out as a set of actions. However, keeping in mind the perspective of proactivity as a situated process, proactive striving on one level does not need to manifest as proactivity on a higher nor on a lower manifestation level (although some specific actions clearly are needed to carry out higher manifestation levels). A developer can be highly proactive on the micro-level in one particular situation, but not in any other, leading to low levels of intermediate and global level proactivity. On the other hand, a developer can be proactive in initiating global-level striving, but exhibit low levels of proactivity in the related intermediate activities and micro-level actions. Finally, pursuing a particular proactive activity on the intermediate level does not necessitate global-level proactivity, nor high proactivity in any given opportunity for potential action.

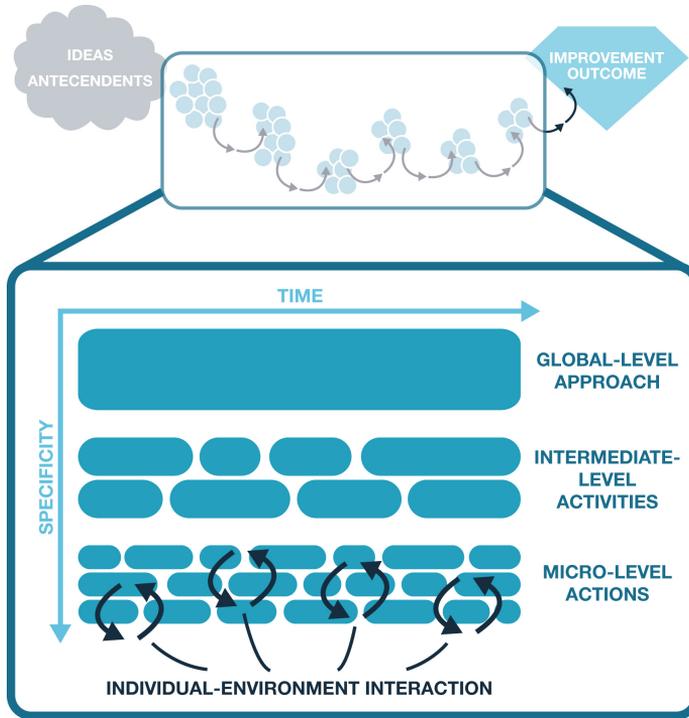


Figure 5. Different manifestation levels of proactive efforts within the process of proactive striving

The three complementary levels of action, activities and approaches, are not meant as a discrete scale for classifying proactive efforts, as the scale of manifestations could be divided into more levels. Instead, the three different levels reflect key transition phases in the process of proactive striving, identifying potential effort discontinuities in the idea development and implementation process in transitioning striving efforts across levels (Fig. 5). Figure 5 also emphasizes that effort interaction between the developer and the environment related to developing the idea only occurs on the manifestation level of specific actions.

While the suggestion that individual proactive striving actions do not necessarily translate into overall, cohesive activities and approaches is perhaps intuitive, the finding that downward transitions from approaches to activities and actions are problematic is less so. Essay 4 suggests that global goals can deplete energy from specific actions, in line with a recent entrepreneurship study which showed that while mental contrasting between the current and desired situation can increase proactive striving towards the desired improvement, visualizing goal states can actually reduce efforts (Gielnik, et al., 2014).

On the other hand, previous research has found that reporting implementation intentions can increase the probability of acting accordingly (Gollwitzer & Brandstätter, 1997). The current results suggest another mechanism for enhancing transitions between different manifestation levels: the act of specifying a global approach in speech, in writing, or as a tangible representation, even if just as an example, can facilitate further downward transitions in the

level of effort manifestation and commitment towards the striving process. In such acts of concretization, knowledge is not only transferred to other stakeholders, but it is transformed and clarified in a process of perspective making (Boland & Tenkasi, 1995). The current dissertation emphasizes the importance of individual-environment interaction already on quite a cognitive level of proactive striving, with interaction creating opportunities for and requiring concretization of one's own development intentions. Indeed, expert developers are more sensitive to problem context and potential collaborators already in their very first interpretations of design problems (Essay 1), laying the foundation for successful proactive striving.

6.1.2 Potential virtuous spirals of efforts through individual-environment interaction in proactive striving

In all of the three naturalistic empirical studies (Essays 2 to 4), the reactions and feedback gained from the environment emerged as a crucial mechanism for sustaining and even escalating proactive striving behaviors. Interaction provided a source of information on the desirability, feasibility, and progress of proactive striving and development goals – factors previously identified as important predictors of, for example, entrepreneurial intentions (Krueger, 2000) and motivation for creative work (Amabile & Kramer, 2011). In the current dissertation, the information on desirability, feasibility, and progress obtained through interaction served to both identify fruitful avenues for development and sustain ongoing efforts. Co-evolution of the individual and environment produced positive spirals of increasing engagement in proactive efforts towards a development target, with initial displays of proactivity breeding further proactivity both from the individual and from other stakeholders in an interactive process. These beneficial mechanisms for sustaining improvement efforts have gone unnoticed in intraindividual accounts of proactive striving.

The reported interaction between the individual and external environment was carried out through objects, conversations, and actions, which can be labeled as *boundary objects*. The concept of boundary objects originates from science and technology studies (Star & Griesemer, 1989), and has since been widely used in studies of learning (e.g. Engeström, Engeström & Kärkkäinen, 1995; Wenger, 1998, 2000). On the other hand, the importance of physical artifacts and activities such as prototyping and modeling are widely recognized in both academic and practitioner literature on design and design thinking (Brown, 2009; Clark & Wheelwright, 1995; Hargadon, 2005; Iansiti, 2000; Leifer & Steinert, 2011; Leonard-Barton, 1995; Schrage, 1999; Vinck, Jeantet & Laureillard, 1996). These artifacts not only represent knowledge, but also transform it and facilitate collaborative design across work practices (Carlile, 2002; Vinck, Jeantet & Laureillard, 1996). Hargadon and Eisenhardt (1996, 337) summarize that frequent prototyping increases development speed and quality in product design by accelerating learning processes through learning-by-doing, facilitating communication, increasing decision making speed and confidence, improving decisions making by testing alternatives, and allowing to identify potential problems and misassumptions early on.

While often only physical artifacts are considered (Akkerman & Bakker, 2011), the current dissertation subscribes to the wider definition of boundary objects as tangible artifacts, discourses, or processes (Wenger, 2000), and applies it to the boundary between the individual and environment, rather than between two or more social groups as in the original definitions (Star, 1989; Wenger, 1998). The concept of boundary object is utilized to emphasize that interaction does not occur between ideas and intentions, but between specific representations expressed and (re)interpreted by different individuals. Although existing objects, such as design briefs in Essay 1, naturally influence the development-related perceptions of the individual and act as boundary objects when utilized in collaboration, particularly the act of *creating* boundary objects seemed to play a key role in sustaining proactive striving. It was incomplete instances of epistemic objects, rather than complete and fixed technical objects, that were often in the center of interaction, raising “questions which turn into avenues for further exploration” (Ewenstein & Whyte, 2009, 12). In creating such objects or representations (artifacts in the wider meaning of the term; Friedman, 2007), intangible development intentions are approximated in tangible form. In fact, being proactive seems impossible without engaging in concretizing acts.

The current findings specify three ways in which creating boundary objects can enhance proactive striving (see also Figure 6):

1. The degree of ease in creating boundary objects themselves offers feedback on the feasibility of efforts, and encourages “the formulation of the distinct perspectives” (Akkerman & Bakker, 2011, 145).
2. Reactions and feedback from the environment are elicited through boundary objects, such as presentations, prototypes, and websites. They form a communicative connection required for coordination (Akkerman & Bakker, 2011, 143), allowing the environment to interact with the individual efforts in a visible manner, potentially energizing the actor – although negative feedback can in fact lessen striving behavior.
3. In addition to eliciting reactions, concretizing development efforts as boundary objects seemed to encourage further stakeholder input on the object, making proactive striving a collaborative process at least temporarily. Indeed, Essay 3 highlighted the significant contribution of environmental stakeholders towards the Aaltoes opportunity, and interpersonal idea advancement efforts were crucial in Essay 2. It is in the interaction between the individual and the environment where the potential for self-sustaining or virtuous spirals of development efforts exists.

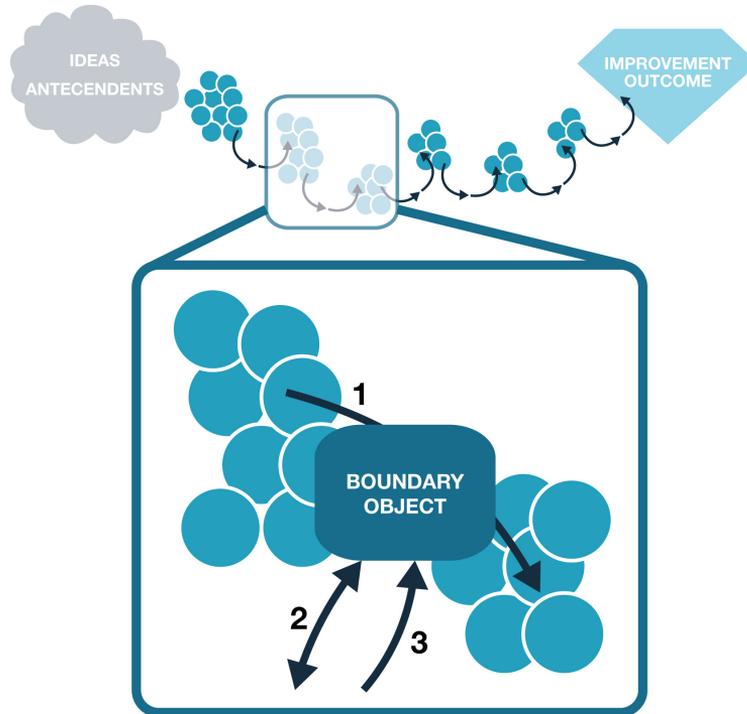


Figure 6. The three mechanisms of individual-environment interaction through boundary objects in the process of proactive striving: feedback and perspective making in the act of creation (1), feedback to and from the environment (2), and stakeholder effort input (3).

The obtained findings on the role of boundary objects in sustaining and escalating proactive striving complement previous academic discussion on the role of creating a steady stream of “small wins” instead of large breakthroughs, which are, by definition, rare (Weick, 1984, 1986, 2001; Amabile & Kramer, 2011). Small wins can scale down what is at stake, mark progress, and collectively legitimize change (Reay, Golden-Biddle & Germann, 2006), attracting allies, deterring opponents, and lowering resistance to subsequent proposals (Weick, 1986). In addition to providing concrete opportunities for other stakeholders to join development efforts, making development goals and attempts to pursue them visible may enhance stakeholder (motivation for) input by implicitly priming stakeholders for compatible goals (e.g. Aarts, et al., 2005). The current dissertation suggests that boundary objects are a fruitful tool for promoting and making visible such small wins in order to sustain and increase effortful proactive striving towards improvement.

6.2 Practical implications

The current dissertation highlights proactive striving efforts as a requirement for the entire workforce rather than a few emerging champions or entrepreneurs. Even brilliant ideas do not advance themselves; proactive efforts are required to translate opportunities into actual improvements. The observed

dynamics of proactive striving posit several implications to both practitioners and educators of development professionals and entrepreneurs.

First, the results caution against overemphasizing idea generation and evaluation. Too often organizations focus on generating masses of ideas through various idea systems and on choosing the best ideas and projects to pursue. Proactive striving is required to develop initial ideas further and implement them, and success in these latter phases can require locally inefficient collaboration practices, such as face-to-face communication of geographically dispersed individuals. The risk looms large that attempts to increase resource-efficiency may accidentally undermine development success if the dynamics of proactive striving are not understood.

The findings on the process of proactive striving also illuminate several opportunities for enhancing development efforts with relatively minor interventions. Interaction between the developer and environment creates possibilities for virtuous and vicious spirals alike. Positive signals, such as small wins and favorable initial reactions, played a large role in energizing efforts. Positive reactions needed not to refer to overall positive reactions from the environment, but rather to individual positive reactions, whether from key stakeholders or random encounters at key phases of the process. Various artifacts can be utilized to make progress visible, providing a steady stream of motivating small wins.

Due to the prominent role of feedback in sustaining efforts, individual practitioners and organizations alike should aim to develop their efforts and environments to systematically elicit such information as effortlessly as possible. Concretizing efforts as various specific approximations, such as presentations and prototypes, seems to be a key mechanism for both eliciting feedback and supporting collaboration in general. While the role of various facilitating physical artifacts is well established in product design, they are less used in other types of development efforts. However, physical modeling can be useful in efforts aimed at developing services and intangible processes as well, for example in explicating the various perspectives of different stakeholders (Helminen, Mäkinen & Holopainen, 2015). Furthermore, the concretizations need not be physical representations, but can comprise any action that makes efforts visible to others. Creating specified, concrete instances from perceived global-level opportunities can initiate stakeholder input and provide multiple types of feedback. Due to the dual effect of such action on both shaping and clarifying the development target and stakeholder willingness to expend development effort, concretization emerges as a key skill and practice.

On the other hand, the findings remind us that successful development is rarely in the hands of one individual, as proactive striving is highly effortful and requires a variety of skills. Although collaboration was frequently both laborious and problematic, it was necessary for eventual success. Initiating, specifying, and implementing development may require different primary skills, with individuals varying in their proficiency in each. Inventors, entrepreneurs, and managers may have complementary sets of skills, all required along the development path of the improvement idea.

All of the above findings have implications on how development professionals, such as product designers and entrepreneurs, should be educated. A wide variety of learning and leading skills and knowledge are required in successful practice (Friedman, 2012, 144). Clearly, skills in concretizing efforts and building feedback mechanisms into one's work should be practiced already during training. On the other hand, the situated and interactive nature of proactive striving efforts emphasizes the importance of addressing development problems in their context. Often education utilizes well-defined sub-problems devoid of their context. While useful for fine-tuning many domain-specific skills, such problems typically offer little opportunities for practicing individual-environment interaction. In fact, one of the most valuable contributions of education could be offering a feedback-rich environment for students of development, promoting a wider range and more detailed feedback than what typical working environments provide.

6.3 Evaluation of the dissertation

While many feel qualitative work is primarily assessed in terms of its theoretical contribution, the need for transparency and justification throughout reporting the research is recognized (Pratt, 2008, 2009). However, there is no consensus on specific evaluation criteria appropriate for qualitative research (Johnson, et al., 2006; Pratt, 2008).

In the context of qualitative work, credibility may be a more appropriate concept than internal validity (Lincoln & Guba, 1985). Thus methodological fit, or the "internal consistency among elements of a research project" (Edmondson & McManus, 2007, 1155) is a key consideration. As research on proactive processes is largely nascent, a corresponding strategy was adopted in Essays 2 to 4: open-ended inquiry about the process of proactive striving through qualitative data, aiming at pattern identification, while avoiding hypothesizing specific relationships between variables in advance (Edmondson & McManus, 2007). Essay 1 represents an inquiry into a domain better characterized as being in an intermediate state, as more established theory from the domain of expertise was applied to the context of product development. Hence, qualitative content analysis was used to explore the relationship between expertise and representing design briefs, supplemented by exploratory statistics (Edmondson & McManus, 2007). All four studies can be considered as consistent with and fitting to the level of maturity of research on the studied phenomena.

Sampling is another key issue in qualitative research, where random or purely convenience-based sampling is rarely appropriate (Pratt, 2008, 2009). The contexts of entrepreneurship and product design were chosen for their prevalence of development activities and complementary nature in terms of, for example, organization size and degree of formality. All sampling was purposeful (Eisenhardt, 1989), and each essay utilized multiple informants, representing various positions and perspectives.

In Essay 1, sampling was targeted at people: participants with two different levels of product design skills, but otherwise similar backgrounds were sought.

Experts were chosen based on a combination of two criteria: recommendations or awards won to reflect skill, and a minimum number of years of experience. The student group was chosen from the schools where the expert participants had been educated, and a maximum cut-off level of experience was set. (There was a ten-year difference in the average age between the two groups of participants, due to the experience criteria.) Furthermore, testing material was based on actual product design briefs to improve the validity of the task, and the difference in skill level of the two participant groups was checked during the conducted interviews, validating the applicability of the design experience and skill levels of the participants in relation to the testing material.

In Essays 2 to 4, sampling was primarily targeted at cases: critical events in two development projects of different degrees of success (Essay 2), critical events in an extreme case of utilizing voluntary resources in successfully creating an organization (Essay 3), and four development-intense cases of start-up organizations from four different industries developing their first offering (Essay 4). These choices were made to increase the likelihood and perceptibility of proactive striving within the studied cases. Secondary sampling choices were made when choosing interview participants from the cases. Essay 2 aimed to maximize the heterogeneity of perspectives of the key informants, whereas Essay 4 included the entire active entrepreneur team of each organization. Essay 3 represented a combination of these two sampling aims, including all three founders, but increasing heterogeneity by including key contributors (as identified by the original three founders) during the initial development phases both within-Aaltoes and from stakeholder organizations.

The chosen samples of the four essays have major implications for the external validity, or generalizability, of the results (Cook & Campbell, 1976). As the majority of interviewees were Finnish men in their thirties, the results cannot be freely generalized into different populations. However, although small compared to quantitative studies, the total of 81 interviews conducted in thirteen organizations for this dissertation is a fairly large sample for qualitative studies. Further, the multiple settings of proactive striving sampled in the current dissertation provide a strong case for the prevalence and applicability of the proactive striving process in other, unsampled, development contexts as well. Even though frequencies of proactive striving cannot be generalized from the findings, Yin (1994) suggests the very goal of case studies is analytical generalization, with findings being generalizable to theoretical propositions rather than populations.

While sampling can be considered as a strength of the current dissertation, the chosen methodology had some other inherent limitations. First, although the in-depth interviews elicited rich data on the process of proactive striving, they did not offer grounds for analyzing frequencies or magnitudes of the obtained findings, nor for testing the causality of the proposed dynamics or their effect on performance. Furthermore, two of the three cross-sectional empirical studies were based on retrospective interviews, potentially suffering from recall bias (Eisenhower, Mathiowetz & Morganstein, 2004). Attempts were made to reduce the effect of any such bias by focusing on relatively recent events

(Essay 2), or self-selected critical events (both Essays 2 and 3), generally accepted to be recalled more reliably and in more detail than past events in general. Essay 4 was a longitudinal study focusing on concurrent perceptions and actions, but the first interview included a retrospective account of the formation of the company (spanning up to a year before the interview in one of the companies), and the latter two interviews included retrospective accounts of what had happened in the three months between interview rounds. Thus, the main focus was on concurrent events, and even the included retrospective accounts in Essay 4 were relatively recent. Essay 1 was more or less concurrent, with participants reflecting on their initial interpretations of design briefs that they had just read. Thus, best reasonable attempts were made to minimize the effect of recall bias in the essays.

Finally, the dependability and confirmability (Lincoln & Guba, 1985) of the studies should be considered. Inter-rater reliability, a traditional approach to assessing construct validity in terms of the reliability of data classification, was calculated for all of the categorization systems utilized in Essay 1 and Essay 4, where the total amount of categorized segments were large. Rather than ask the independent rater to identify themes, they were perhaps more suitingly asked to assign segments to the described categories, thus assessing the reliability of the categorization rather than the themes themselves (see Armstrong, et al., 1997). The categorization process and criteria were explained in detail in each essay, along with “proof quotes” (Pratt, 2008) and segment counts, to help also the reader to evaluate the process. In addition, Essays 1 and 4 utilized descriptive statistics afforded by the larger data sets.

6.4 Implications for future research

The current dissertation explored the process of voluntary, self-specified proactive striving towards development goals in product design and entrepreneurship based on qualitative data gained through a total of 81 interviews in thirteen organizations. The repeated occurrence of key findings in multiple contexts and phases in development efforts suggest certain robustness, even if the results are to be treated more as propositions than completely validated evidence. As previous research on proactivity is largely quantitative and questionnaire-based, the utilization of qualitative, interview-based methodologies in the current dissertation was a valuable addition in itself.

Understanding proactivity as a process rather than a trait necessitates adding a temporal dimension in studies. In cross-sectional studies, the bias of retrospective sense-making looms large. Personal experience of this author, accumulated when conducting the four empirical studies of dissertation, suggests this to be particularly risky when interviewing entrepreneurs, accustomed to selling their ideas to varying audiences. First-time interviews were statistically significantly more focused on opportunities and strengths than subsequent rounds in the longitudinal study of Essay 4. Further, compared to product developers in Essay 2, the entrepreneurs in Essay 3 identified only a

few hindrances retrospectively. Introducing more variety in terms of methodology utilized in proactivity research seems prudent.

Investigating proactivity as a dynamic process yielded several insights in the current dissertation. For example, sometimes locally ineffective practices seemed crucial for global effectiveness. However, only anecdotal evidence on the effects of proactive striving on performance was provided, and more research is needed to systematically study the effects of the various identified proactive striving practices on development success.

The process approach also highlights that even if interactional and organizational factors remained relatively stable, perceptions of them could vary at any given moment as a result of exposure to different concepts and experiences, modifying interpretations of otherwise similar events. One avenue for further clarification of the process account of proactivity would be to specify the level of manifestation of proactivity addressed in studies – micro-level actions, intermediate-level activities, or global-level approaches – and to investigate transitions between the levels in terms of both intentions and actions. Furthermore, as individual-environment interaction was emphasized in all of the three naturalistic studies, it clearly warrants more attention. The utilization of boundary objects seems to be a promising avenue for further research, as these tangible approximations provided a mechanism for both encouraging initial stakeholder input and sustaining efforts, energizing and committing developers to continue striving towards the desired improvements.

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Appendix. An example of the design brief testing material

Essay 1 utilized five design briefs as testing material. Design brief 1 (on an electronic voting booth) is presented below in its original font style and font size, translated to English from its original presentation language of Finnish. Information potentially aiding in identifying the client has been omitted from this version (omissions are marked).

The Parliament considered a bill on electronic voting, [*one line of information omitted on the design purpose*]. At least in the beginning, the voting booths would be placed in the polling stations like the traditional booths.

Voting booths are erected temporarily for the duration of the elections, and they do not serve any other function in-between elections. Polling stations have 1-3 voting booths and the distance between the booths is usually approximately two meters (with a passage between them). Polling stations avoid influencing voting behavior, so the booth should be relatively neutral as well.

The usage must be possible for all voting citizens. The voting booths are used in presidential elections, parliamentary elections, municipal elections, referendums and potentially also in church elections. The list of candidates varies between elections and election districts – the smallest list of candidates is approximately the size of an A3 sheet, the largest approximately 120 cm x 75cm. Municipal elections are the hardest to realize, as the amount of candidates is the largest and thus the list of candidates is long. Municipalities are responsible for the storage of the voting booths. The booths are stored indoors.

The voting booth should be affordable and easy to store, as the voting booth is used for only a couple of election days a year. One person should be able to assemble the voting booth at the polling station. The erection and control of the booth need to be easy, and it has to be done without separate written instructions. The voter needs to be provided with peace and a visual shield, voting confidentiality must be secured. The booth does not have to have a door or a curtain to confine the voter in the booth.

On the other hand, something different from the traditional voting booth is sought after, something that would support the launch of electronic voting. [*two lines of information on the scope of the pilot project omitted*]

Not even brilliant ideas advance themselves. In all organizations, proactive development efforts are required to translate opportunities into actual improvements. Based on 80 interviews conducted in 13 Finnish organizations, this dissertation investigates how the process of proactive striving towards development can be initiated and sustained. A model for supporting key transitions in the process is presented, drawing attention to the substantial role of interaction and co-evolution between the developer and surrounding environment and stakeholders. Making development efforts tangible through various boundary objects creates the basis for successful improvements by helping to both specify and encourage further input from the developer and stakeholders alike.



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