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Internal Corporate Venturing as Vehicle for Organizational Transformation:

Different Perspectives on How Incumbent Firms Adopt Entrepreneurial Practices

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Ann-Kathrin Leiting

Master de Droit, Économie, Gestion, Mention Analyse et Politique,
Strasbourg University

born on 11.07.1992

citizen of Germany

accepted on the recommendation of

Prof. Dr. Bart Clarysse
Prof. Dr. Nathan Furr
Dr. Jana Thiel
Volker Adams

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Ann-Kathrin Leiting

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Thesis committee:

Prof. Dr. Bart Clarysse, ETH Zurich

Prof. Dr. Nathan Furr, Institut Européen d'Administration des Affaires (INSEAD)

Dr. Jana Thiel, ETH Zurich

Volker Adams, Robert Bosch GmbH

Chairperson:

Prof. Dr. Stefano Brusoni, ETH Zurich

Chair of Entrepreneurship
Department of Management, Technology, and Economics (D-MTEC)
ETH Zurich

Zurich: ETH Zurich

This thesis is dedicated to my beloved family,

who has always been my source of encouragement and inspiration.

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Abstract

Today's business environment is increasingly characterized by rapid changes. For large companies this implies the need for continuous adaption to the changing conditions to remain competitive. Inspired by the startup ecosystem in the Silicon Valley, a growing number of incumbents have begun to adopt entrepreneurial strategies to facilitate their viability. One element of an organization's entrepreneurial strategy is the creation of internal ventures, a phenomenon that has increased in importance over the past decades. Despite all effort and money that large corporations put into such corporate venturing initiatives, research has consistently reported low success rates of corporations trying to turn corporate ventures into valid business. In particular the successful absorption and scale of venture projects remains a central challenge. Although the difficulties are extensively discussed in academic research, there are still few concrete approaches to solve this far-reaching problem. Moreover, literature on corporate venturing so far remains largely undertheorized. In this dissertation, I set out to explore the challenges of internal corporate venturing and provide different perspectives on how incumbent firms adopt entrepreneurial practices to drive the organizational transformation.

The first paper of this doctoral thesis introduces to the topic of organizational transformation by outlining the implications of the spread of the Internet of Things (IoT) on established firms. While current research mainly explores the resulting generation of new business opportunities, and discusses the changing requirements on a technical level, it neglects the needed changes in the organizational form of an incumbent firm, when it transforms from a product-centric company towards a company offering IoT solutions. We set up a single case study and discuss the implications along the three dimensions strategy, business model mindset, and structural setup.

In particular, we focus on the importance of ecosystem formation and point out the fundamental differences to directional value chains known from traditional business.

The second paper of this doctoral thesis is a teaching case that provides a more general perspective on how incumbent firms can leverage their entrepreneurial potential. The case represents a descriptive analysis of the design of a corporate entrepreneurship system and closely depicts the research context of this doctoral thesis, thus serving as a basis for the following two papers. Core difficulties highlighted by this case are the cultural difference between the established corporate culture and the entrepreneurial approach, the structural positioning of internal ventures, and the effective management of corporate entrepreneurs. The case emphasizes issues of matching different innovation programs such as internal accelerators, incubators, and internal start-up units with the strategic goals of the corporation and specifies how to orchestrate those initiatives. The teaching case is accompanied by a B case, as well as an extensive teaching note, which connects the case to relevant literature

in the field.

The third paper adopts an institutional logics perspective and identifies the contradictions between the entrepreneurial logic of ventures and the corporate logic of established organizations as critical factor that challenges internal ventures when trying to integrate into the core company and scaling the business. While prior literature has described how organizations can effectively blend different institutional logics and proactively use them, we know little about how a new professional logic with its own processes and practices can be introduced into a dominant organizational logic to create new market opportunities – the central research question of this paper. Building on six in-depth case studies within a single company, we find that 'organizational acculturation' plays an important role in enabling ventures that are carriers of a strong entrepreneurial logic to successfully integrate into their mother organization with its own corporate logic. The findings extend the literature on institutional logics towards understanding how a completely new logic can be introduced in additive form to a dominant logic. The study also contributes to the literature on corporate venturing by offering a theoretical explanation why practices and forms adopted from the broader entrepreneurial community might not readily result into businesses that can lead to strategic renewal.

The fourth paper focuses on experimentation as key element of the scientific founder method that has become a broadly accepted means to validate ideas and optimize business models. Experimentation also enjoys increasing attraction in corporate contexts. Recent works have engaged in a critical debate about the potential limitations of scientific entrepreneurship and lean startup experiments. Building on

a qualitative research design, this study provides empirical evidence on the boundary conditions of experimentation. We identify different functions of experimentation, thereby highlighting in particular the importance of the commitment-generating function of experiments and discuss their applicability in dependence on a venture's level of business theorizing. The findings of this fourth paper contribute to the emerging interest in entrepreneurial experimentation and scientific entrepreneurship that represent an important facet of corporate entrepreneurship.

Kurzfassung

Das heutige Geschäftsumfeld ist zunehmend von raschen Veränderungen geprägt. Für große Unternehmen bedeutet dies, dass sie sich ständig anpassen müssen, um wettbewerbsfähig zu bleiben. Inspiriert durch das Start-up-Ökosystem im Silicon Valley, haben immer mehr etablierte Unternehmen begonnen, unternehmerische Strategien anzuwenden, um ihre Überlebenschancen zu sichern.

Ein Element der unternehmerischen Strategie einer Organisation ist die Gründung interner Ventures, ein Phänomen, das in den letzten Jahrzehnten zunehmend an Bedeutung gewonnen hat. Obwohl Unternehmen viel Anstrengung und Geld in solche Initiativen stecken, hat die Forschung vermehrt über die geringe Erfolgsquote von Unternehmen berichtet, die versuchen, neue Ventures zu validem Geschäft zu machen. Insbesondere die erfolgreiche Integration und Skalierung der Ventures bleiben eine zentrale Herausforderung. Obwohl die Schwierigkeiten in der akademischen Forschung ausgiebig diskutiert werden, gibt es noch immer wenig konkrete Ansätze zur Lösung dieses weitreichenden Problems. Darüber hinaus ist die Literatur über Corporate Venturing bisher nur unzureichend theoretisch reflektiert. In dieser Dissertation möchte ich die Herausforderungen von internem Corporate Venturing untersuchen und verschiedene Perspektiven aufzeigen, wie etablierte Firmen un-

ternehmerische Praktiken nutzen, um den organisatorischen Wandel voranzutreiben.

Der erste Artikel dieser Doktorarbeit führt in das Thema der organisatorischen Transformation ein, indem es die Auswirkungen der Verbreitung des Internet der Dinge (IoT) auf die Organisationsform eines Unternehmens skizziert. Während die aktuelle Forschung hauptsächlich die sich daraus ergebende Generierung neuer Geschäftsmöglichkeiten untersucht und die sich wandelnden Anforderungen auf technischer Ebene diskutiert, vernachlässigt sie die notwendigen Veränderungen in der Organisationsform der etablierten Firmen bei der Umwandlung von einem produktorientierten Unternehmen zu einem Unternehmen, das IoT-Lösungen anbietet. Wir stellen eine Fallstudie auf und diskutieren die Auswirkungen entlang der drei Dimensionen Strategie, Geschäftsmodell-Denke und strukturelle Aufstellung. Insbesondere konzentrieren wir uns auf die Bedeutung der Ökosystembildung und weisen auf die grundlegenden Unterschiede zu direktionalen Wertschöpfungsketten hin, die aus dem traditionellen Geschäft bekannt sind.

Der zweite Artikel dieser Doktorarbeit ist ein Lehrbeispiel, das aufzeigt wie etablierte Unternehmen ihr unternehmerisches Potenzial nutzen können. Der Fall stellt eine deskriptive Analyse der Ausgestaltung eines Corporate Entrepreneurship-Systems dar und führt in den Forschungskontext dieser Doktorarbeit ein. Damit dient dieser Artikel als Grundlage für die folgenden Artikel. Kernprobleme, die durch diesen Fall aufgeworfen werden, sind der kulturelle Unterschied zwischen der etablierten Unternehmenskultur und dem unternehmerischen Ansatz, die strukturelle Positionierung interner Ventures und das effektive Management von Corporate Entrepreneuren. Der Fall unterstreicht die Herausforderung, verschiedene Innovationsprogramme wie interne Acceleratoren, Incubatoren oder Start-up-Einheiten mit den strategischen Zielen des Unternehmens in Einklang zu bringen und erläutert, wie diese Initiativen orchestriert werden können. Das Lehrbeispiel wird von einer ausführlichen Lehranweisung begleitet, die den Fall mit einschlägiger Literatur auf dem Gebiet verbindet.

Der dritte Artikel nimmt eine institutionelle Logikperspektive ein und identifiziert die Widersprüche zwischen der unternehmerischen Logik von Ventures und der Unternehmenslogik etablierter Organisationen als kritischen Faktor, der interne Ventures herausfordert, wenn sie versuchen, sich in das Kernunternehmen zu integrieren und ihr Geschäft zu skalieren. Während in der bisherigen Literatur beschrieben wurde, wie Organisationen verschiedene institutionelle Logiken effektiv miteinander vermischen und proaktiv nutzen, wissen wir wenig darüber, wie eine neue professionelle Logik mit ihren eigenen Prozessen und Praktiken in eine dominante Organisationslogik eingeführt werden kann, um neue Marktchancen zu schaffen – dies ist die zentrale Forschungsfrage dieses Artikels. Auf der Grundlage von sechs vertiefenden Fallstudien innerhalb eines Unternehmens finden wir, dass ‘Organizational Acculturation’ eine wichtige Rolle dabei spielt, Ventures, die Träger einer starken unternehmerischen Logik sind, in die Lage zu versetzen, sich erfolgreich in ihre Mutterorganisation mit ihrer eigenen Unternehmenslogik zu integrieren. Die Ergebnisse erweitern die Literatur über institutionelle Logiken, indem sie erklären, wie eine völlig neue Logik in additiver Form in eine dominante Logik eingeführt werden kann. Die Studie trägt zudem zur Corporate Venturing Literatur bei, indem sie eine theoretische Erklärung dafür liefert, warum Praktiken und Formen, die aus der breiteren Unternehmergemeinschaft übernommen wurden, nur schwer zu neuem Geschäft führen, und damit zur strategischen Erneuerung beitragen.

Der vierte Artikel konzentriert sich auf Experimentation als Schlüsselelement der Scientific Founder Methode, die sich zu einem weithin akzeptierten Mittel zur Validierung von Ideen und zur Optimierung von Geschäftsmodellen entwickelt hat und sich auch im Kontext etablierter Firmen an zunehmender Attraktivität erfreut. Jüngste Forschungen haben eine kontroverse Debatte über die potenziellen Grenzen von Scientific Entrepreneurship und der Lean Startup Methode initiiert. Aufbauend auf einem qualitativen Forschungsdesign, liefert diese Studie empirische Evidenz zu den Grenzen von Experimenten. Wir identifizieren verschiedene Funktionen von Experimenten - wobei wir insbesondere die Bedeutung der Commitment-generierenden Funktion hervorheben - und diskutieren ihre Anwendbarkeit in Abhängigkeit von der theoretischen Geschäftsebene des Ventures. Die Ergebnisse dieses vierten Artikels tragen zum aufkommenden Interesse an unternehmerischen Experimenten und Scientific Entrepreneurship bei, die eine wichtige Facette von Corporate Entrepreneurship darstellen.

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Glossary

ABS Antilock Braking System.

AI Artificial Intelligence.

B2B Business to Business.

B2C Business to Customer.

BIF Bosch Innovation Framework.

BMI Business Model Innovation.

CDO Chief Digital Officer.

CE Corporate Entrepreneurship.

CE certificate European Union Conformity certificate.

CEO Chief Executive Officer.

CTO Chief Technology Officer.

CVC Corporate Venture Capital.

DIY Do it yourself.

DNA Deoxyribonucleric Acid.

DSGVO General Data Protection Regulation.

EBIT Earnings Before Interest and Taxes.

ERP Enterprise Resource Planning.

GDPA Global Data Protection Agency.

HR Human Resources.

HW Hardware.

ICV Internal Corporate Venturing.

IoT Internet of Things.

IP Intellectual Property.

IPO Initial Public Offering.

IT Information technology.

KPI Key Performance Indicator.

MVP Minimum Viable Product.

OEM Original Equipment Manufacturer.

R&D Research and Development.

RBVC Robert Bosch Venture Capital.

ROI Return on Investment.

SW Software.

USP Unique Selling Point.

UX User Experience.

VC Venture Capital.

WEEE Waste of Electrical and Electronic Equipment.

"Research is to see what everybody else has seen,

and to think what nobody else has thought"

Albert Szent-Gyorgy (1893-1986)

1 | Introduction

1.1 Motivation

"The greatest danger in times of turbulence is not the turbulence –
It is to act with yesterday's logic."

Peter Drucker, 1980[1]

Today's business environment is increasingly characterized by high complexity and rapid changes. Chances of predicting the next disruptive waves are limited. The effects are particularly noticeable for large companies, which continuously have to adapt to remain competitive and ensure their survival. Whereas traditionally, companies relied on internal research & development departments to come up with inventions, new approaches are needed to be able to quickly respond to a changing business landscape. Inspired by the startup ecosystem in the Silicon Valley, a growing number of incumbents have begun to adopt entrepreneurial strategies, and make use of various innovation-based initiatives such as accelerator programs, innovation labs and incubation platforms to facilitate their viability (Corbett, Covin, O'Connor, & Tucci, 2013).

[1] Drucker (1993)

One important element of an organization's entrepreneurial strategy is the creation of internal ventures (Corbett et al., 2013; Guth & Ginsberg, 1990). Over the past decade, there has been a significant increase in venturing activities, and the phenomenon is said to have entered its golden age (Mawson, 1991). Leveraging the advantages of both extremes, disruptive startups and established organizations, corporate ventures are seen as important vehicle to create new business and drive an organization's renewal. However, being torn between two worlds, internal ventures also involve high risk and uncertainty (Block & MacMillan, 1993; McGrath, 1999; McGrath & MacMillan, 2000). It is therefore no surprise that over four decades of research we have consistently reported low success rates of corporations trying to create and grow corporate ventures into relevant businesses (e.g., Burgelman, 2002; Gompers & Lerner, 1998; Hill & Birkinshaw, 2014). In particular the successful absorption and scale of corporate venture projects remains a central challenge (Campbell & Park, 2005; Raisch & Tushman, 2016), a fact that is clearly corroborated by my own field research. Although the difficulties of internal corporate venturing (ICV) are extensively discussed in academic research, there are still few concrete approaches to solve this far-reaching problem.

In 2017, as part of a research project, I joined an internal corporate venture within a big technology firm. In the past decade, the product centric high tech company experienced the need for transformation. To ensure continuous success, management announced the goal to increasingly digitalize the company's product portfolio and become a major player in the Internet of Things (IoT). To achieve its goals, the company followed a multifaceted strategy. In addition to conventional methods of product development, a venture capitalist arm was introduced to seek for new investment opportunities in the market and establish strategic alliances to complement the core business. Moreover, the company has begun to invest significantly in ICV activities. Employees are encouraged to hand in own ideas and develop them along a specifically designed innovation framework. The framework connects diverse innovation programs such as innovation workshops, an internal accelerator program, and an incubation platform. The company decided to strictly follow contemporary entrepreneurial concepts such as the customer development process (Blank & Dorf, 2012) and lean startup (Ries, 2011), and to use tools such as the business model canvas (Osterwalder & Pigneur, 2010) or the value proposition canvas. Thus, over the past years, the company has explored hundreds of new business ideas.

The venture I joined operated in the area of unarmed aerial vehicles, an unknown but highly promising market for the corporation. Together with a team I took part in the company's accelerator program and conducted different entrepreneurial experiments over a six months period. My findings confirmed the concerns that are increasingly expressed with regards to corporate entrepreneurship: little acceptance for new approaches, rigid processes and excessive need for corporate control, misleading KPIs, as well as a lack of understanding for new business models. To cut a long story short, being an entrepreneur in a corporate setting was frustrating, and although the company has targeted a transformation, it proved almost impossible to bring in disruptive thoughts deviating from the corporate norm. Driven by my own experience, I decided to investigate this problem with an in-depth research. The results form the basis for my PhD thesis.

This cumulative dissertation provides different perspectives on how incumbent firms adopt entrepreneurial practices, and addresses the difficulties encountered in introducing and scaling new business within established firms. In particular I aim at contributing to the literature on corporate venturing as one form of corporate entrepreneurship. Literature on internal corporate venturing has significantly gained in importance over the past 50 years, yet is still fragmented across diverse disciplines and is largely undertheorized (Narayanan, Yang, & Zahra, 2009). In this dissertation I address different aspects that allow us to explain theoretically why many of ICV initiatives remain lackluster at best, and mostly disappoint in their actual contribution. My motivation is to provide solutions to the challenges experienced by corporate entrepreneurs and suggest approaches how internal corporate venturing can be used as an effective means of transformation for large incumbent firms.

1.2 Scope and Objectives

This dissertation is written as a cumulative dissertation, consisting of four papers that all contribute to an improved understanding of successful ICV and its intended corporate transformation processes. Each paper focuses on a specific line of research and thus contributes to a multi-perspective study. While providing findings on the way established firms adopt entrepreneurial practices to drive the organizational transformation, the individual studies also build the foundation for additional research that will further increase our understanding.

The dissertation is structured as depicted in Figure 1.1. This introductory chapter gives a short overview of research in the field of ICV and identifies the research gaps (chapter 1). It concludes with a summary of the four papers comprising this dissertation. The second chapter is a case study introducing to the topic of organizational transformation by outlining the impact of the emergence of the Internet of Things on the organizational form of large incumbent firms (chapter 2). The third chapter is a descriptive study in form of a teaching case and related teaching notes, providing a more general perspective on how incumbent firms can set up an effective entrepreneurship system to leverage its entrepreneurial potential (chapter 3). The main teaching case (A Case) is accompanied by a B Case. The fourth chapter is an empirical research paper that discusses the effective integration of internal corporate ventures into the core business from a logics perspective (chapter 4). In the fifth chapter, I present another empirical research paper that deals with the challenges of scientific experimentation in a corporate setting (chapter 5). The dissertation concludes with a summary of the scientific and practical contributions, as well as an outline of the limitations and potential avenues for further research (chapter 6).

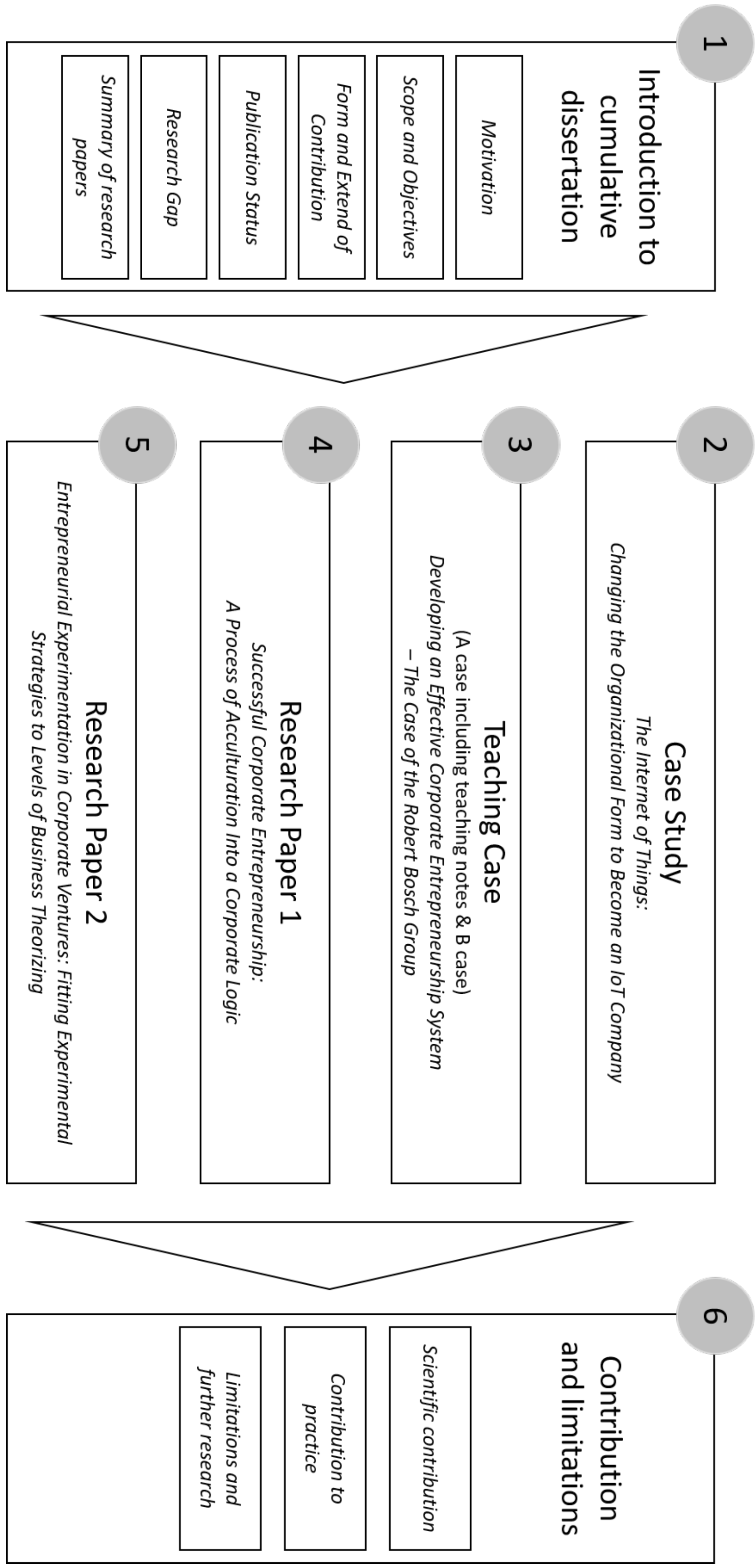

Figure 1.1. *Content and Structure of the Dissertation.*

1.3 Form and Extend of Contribution

Since the individual papers of this dissertation were partly co-authored, I will briefly outline the form and extend of own contributions. The case study on organizational transformation through the emergence of IoT was conceptualized and written by myself, while Dr. Lien De Cuyper from ETH Zurich and Dr. Christian Kauffmann provided some thought-provoking ideas. Furthermore, I collected data, conceptualized and wrote the teaching case (A and B version) as well as the supporting teaching notes, supervised by Dr. Jana Thiel from ETH Zurich. For the empirical research paper, which analyzes the process of organizational acculturation, I assumed the role of first author. I collected and analyzed the data and subsequently developed and wrote the paper together with Prof. Dr. Bart Clarysse. Dr. Jana Thiel supported the refinement of the paper. My contribution to the fourth paper on the challenges of scientific experimentation in incumbent firms equally comprised the collection and analyze of data. Together with Dr. Jana Thiel, I further conceptualized and co-wrote the paper.

1.4 Publication Status

Paper	Title	Authors	Personal Contribution	Conference presentations	Award	Status
1	The Internet of Things: Changing the Organizational Form to Become an IoT Company	Ann-Kathrin Leiting Lien De Cuyper Christian Kauffmann	Study design and implementation, Paper development	-	-	Under Review at Technovation Journal
2	Developing an Effective Corporate Entrepreneurship System: The Case of the Robert Bosch Group	Ann-Kathrin Leiting Jana Thiel Bart Clarysse	Case development	Strategy Science Conference 2020	EFMD Case Writing Competition Winner 2019	Registered at Case Clearing House
3	Successful Corporate Entrepreneurship: A Process of Acculturation Into a Corporate Logic	Ann-Kathrin Leiting Bart Clarysse Jana Thiel	Study design and implementation, Paper development together with second author	Strategic Management Society – Annual Conference 2019 Academy of Management – Annual Meeting 2020 (Real-time open virtual session & symposium on Corporate Venturing)	Best Paper Award AOM 2020, TIM division	Submitted to Academy of Management Journal; To be published in Proceedings of the 2020 Academy of Management Meeting
4	Entrepreneurial Experimentation in Corporate Ventures: Fitting Experimental Strategies to Levels of Business Theorizing	Jana Thiel Ann-Kathrin Leiting Bart Clarysse	Study implementation and paper development together with first author	Strategic Management Society – Annual Conference 2020	-	Under preparation to be submitted to Strategic Management Journal

1.5 Research Gap

Academic research on corporate venturing is usually placed within the larger body of literature on corporate entrepreneurship (Narayanan et al., 2009). Over the past decades, there has been a growing interest in corporate entrepreneurship (i.a. Ahuja & Morris Lampert, 2001; Guth & Ginsberg, 1990; Kuratko, Montagno, & Hornsby, 1990; Kuratko & Morris, 2018; Sharma & Chrisman, 1999; Zahra & Covin, 1995). Aiming on strategic renewal of established organizations which is seen as critical for survival in times of technological change and global development, corporate entrepreneurship facilitates competitiveness and higher performance (Corbett et al., 2013). The phenomenon of CE is generally defined as the acquisition of new capabilities as well as the innovative deployment of resources to create new opportunities in the market (e.g., Burgelman, 1983; Sharma & Chrisman, 1999; Stopford & Baden-Fuller, 1994). Whereas in the beginning, corporate entrepreneurship could be little differentiated from general innovation activities in organizations (Corbett et al., 2013), research then became more precise, taking different aspects of corporate entrepreneurship into consideration. Guth & Ginsberg (1990) state that corporate entrepreneurship encompasses two distinct dimensions which is the creation of new businesses within existing organizations and the strategic renewal or transformation of existing organizations. More recently, the two categories of Corporate Entrepreneurship are known as Corporate Venturing and Strategic Entrepreneurship (Morris, Kuratko, & Covin, 2010; Phan, Wright, Ucbasaran, & Tan, 2009). Even though the two aspects are closely connected, they differ as corporate venturing first and foremost concentrates on the various steps and processes involved in setting up new business opportunities and integrating them into the corporate portfolio (Narayanan et al., 2009), whereas strategic renewal implies the creation of something new through a recombination of resources (Guth & Ginsberg, 1990). In my studies, I focus on corporate venturing as one important path to the evolution of a firm's corporate strategy (Ireland, Hitt, Camp, & Sexton, 2001), the achievement of competitive superiority (Covin & Slevin, 2002; Narayanan et al., 2009) and the enhancement of the firm's profits and growth (Zahra & Hayton, 2008). Literature differentiates between diverging modes of corporate venturing such as dispersed or focused ventures (Birkinshaw, 1997), as well as various forms of corporate ventures such as formal or informal, and internal or external (Zahra, Nielsen, & Bogner, 1999). Whereas the term external ventures describes the investment of corporations in early growth businesses of external parties (Sharma & Chrisman, 1999), internal ventures originate from a pre-existing corporate structure (Covin, Garrett Jr, Kuratko, & Shepherd, 2015). For the purpose of this study I further limit the scope on internal corporate venturing, which I define as the bottom up creation of new business within the boundaries of a company to develop into new fields.

Literature on internal venturing dates back to the 1970s. Beside the identification of different forms of internal corporate ventures and debates around the structural setup of ICV activities (e.g., Gibson & Birkinshaw, 2004; O'Reilly & Tushman, 2013; Raisch & Birkinshaw, 2008), a major interest in ICV literature has been venture outcomes such as success or failure (Hill & Georgoulas, 2016).

Albrinck, Hornery, Kletter & Neilson (2001) identified several characteristics that clearly distinguish internal corporate ventures from traditional R&D activities. Above all, they involve high risk and uncertainty (Block & MacMillan, 1993; McGrath, 1999; McGrath & MacMillan, 2000), and lead to an outcome that is difficult to predict. Consequently, setting up new ventures in established organizations comes with severe obstacles, and the probability of failure is inherently high (Christensen, 1997; Garvin & Levesque, 2006; Shepherd, Haynie, & Patzelt, 2013). As access to firm internal data on venture failures is typically limited and no uniform definition of failure exists, it is difficult to determine the exact percentage of venture failure (Block, 1982). Describing success as venture survival with significant return on investment (ROI), Block suggests that the average success rate of corporate ventures is at 10 to 20 percent. Block and McMillan (1993) claim that 90% of corporate venture projects fail to achieve their initially aspired goals. Weiss (1981) compared independent, venture-backed start-ups with corporate start-ups and figured out that they reach profitability twice as fast and end up twice as profitable as corporate start-ups. Burgelman (2002) studied 15 exploratory initiatives of which only one has grown up into a full-scale business. The consequences of high failure rates of internal corporate ventures are drastic. Not only do companies lose tremendous amounts of money, also the enduring emotional implications for individuals should be taken serious (Shepherd et al., 2013).

There have been various approaches in literature to explain the high failure rate of ventures. However, research has mostly been largely phenomena-driven, without revealing a clearly identifiable theoretical approach that contributes to our understanding of firm evolution (Narayanan et al., 2009). MacMillan and colleagues

(1986) for example identify imperfect market assessment, unrealistic expectations of the parent company and the refusal to acknowledge weaknesses of the ventures as major obstacles to the development of internal corporate ventures. Block (1982) reports - among others - political problems, tight corporate control systems, and the lack of top management sponsors as reasons for venture failure.

The challenges of ICV have accompanied me throughout my research process. With this dissertation, I am going to provide different perspectives on how incumbent firms make use of entrepreneurial practices to drive the organizational transformation. I particularly aim on contributing to an increased variety of theoretical perspectives in the field of ICV.

1.6 Summary of Research Papers

The context for all four papers of this dissertation is a single company in the high tech industry that faces the need for organizational transformation, as described in the first paper. To drive the transformation process, the company set up a corporate entrepreneurship system, comprising diverse elements that are largely inspired by the entrepreneurial ecosystem of the Silicon Valley (see chapter 3). Whereas the first two papers provide a more general perspective on organizational transformation and on how incumbent firms can set up an innovation system to leverage their entrepreneurial potential, the two subsequent papers treat specific aspects of the adoption of entrepreneurial practices in more detail, and add a theoretical perspective to the debate. In the following, I will provide a short summary of the individual papers that are presented in this doctoral thesis.

1.6.1 The Internet of Things: Changing The Organizational Form to Become an IoT Company

The first paper of this doctoral thesis introduces to the topic of organizational transformation by outlining the implications of the emergence of the Internet of Things that has been growing in all domains, disrupting existing industries. Current research discusses above all the resulting requirements on a technical level as well as the unfolding of new business opportunities, while neglecting the organizational challenges that occur for incumbent firms when transforming from a product-centric company towards a company offering IoT solutions. New competitors, process alterations, as well as the emergence of entirely new business models lead to important changes in incumbent firms' organizational forms. We use a single case study to analyze how a company adapts its organizational form to transform into an IoT company. The implications are discussed along three major dimensions: strategy, business model mindset, and structural setup. On a strategic level, we outline the importance of an ecosystem approach and describe the different roles a company can assume in an IoT ecosystem depending on its competencies. Furthermore, we analyze changes in the business model mindset of a company. When providing IoT solutions, also companies operating in the B2B business must increasingly focus on the particular needs of the end customers and assume a holistic view of the products life cycle. Finally, we discuss the requirements with regards to the structural set up and the control mechanisms that need to be adapted to the changing conditions.

In the paper we first discuss each of the three dimensions in detail before demonstrating the changes in organizational form with concrete examples from our case company. To conclude, we introduce NEVONEX, an IoT based platform for smart agriculture business, to picture the hurdles a manufacturing company faces when trying to provide an IoT solution in a new field of business.

1.6.2 Developing an Effective Corporate Entrepreneurship System: The Case of the Robert Bosch Group

The second paper of this doctoral thesis is a teaching case that introduces students to the topic of Corporate Entrepreneurship in a highly dynamic environment and provides a more general perspective on how incumbent firms can leverage their entrepreneurial potential. The case represents a descriptive analysis of the design of a corporate entrepreneurship system and specifies the research context of this doctoral thesis, thus serving as a basis for the following two papers, which subsequently add the theoretical perspective to the discussion. The case describes the goals, setup, and challenges of organizing different corporate innovation programs. Typical decisions and dilemmas are discussed that large companies face when trying to develop and introduce new business ideas and business models that do not fit the core business area and could potentially disrupt ongoing activities. Core difficulties raised by this case are the cultural difference between the established corporate culture and the entrepreneurial approach, the structural positioning of internal ventures, and the effective management of corporate entrepreneurs. The case emphasizes issues of matching different innovation programs such as internal accelerators, corporate venture capital (CVC), and internal start-up units with the strategic goals of the corporation and delineates how to orchestrate those initiatives.

The teaching case is accompanied by an extensive teaching note, which is intended to serve as a guideline for teaching purposes. The teaching note indicates the suitability of use, clarifies the teaching objective, suggests questions and answers for class discussion, and connects the case to relevant literature in the field. Since the company has significantly changed its innovation concept in the course of its transformation process, the first case (A case) is followed by a second one (B case) that gives an update on the restructurings and changes that followed in the 18 months after the A case setting. A special focus of the B case lies on the revised innovation funnel as well as on the new setup of the company's incubation platform.

1.6.3 Successful Corporate Entrepreneurship: A Process of Acculturation Into a Corporate Logic

The third paper represents the core research paper of this dissertation. This paper adopts an institutional logics perspective and identifies the contradictions between the entrepreneurial logic of ventures and the corporate logic of established organizations as critical factor that challenges internal ventures when trying to integrate into the core company and scaling the business. Multiplicity of institutional logics has been a cornerstone of the organizational logics' perspective (e.g., Besharov & Smith, 2014). While prior literature has described how organizations can effectively blend different institutional logics and proactively use them (e.g., Pache & Santos, 2013), only recent work has started to take a more agentic view on how logics can be used by organizations to create new opportunities (Dalpiaz, Rindova, & Ravasi, 2016).

So far, little is known about how a new professional logic with its own processes and practices can be introduced into a dominant organizational logic featuring a strong corset of how to create new market opportunities – the central research question of this paper.

This theoretical conundrum of integrating a new professional logic becomes of practical interest in the context of corporate venturing as established corporations have increasingly resorted to importing entrepreneurial practices and methods into their innovation processes, germane to the community of professional entrepreneurs (e.g., Hampel, Perkman, & Phillips, 2020). With this practice new challenges appear as corporate ventures emerge that exhibit a different (entrepreneurial) logic than the focal company. The problems occur especially at a later stage when the ventures move closer to the company to exploit synergies, which clearly exacerbates the traditional integration and scaling issues (Raisch & Tushman, 2016). We conducted a qualitative in-depth study in our case company and conducted 87 semi-structured interviews in two waves, supplemented by a large amount of secondary data, to investigate why some internal ventures successfully integrated while others were stopped.

In analogy to the literature on immigration, we find that 'acculturation' (Berry, 2003; Berry, Phinney, Sam, & Vedder, 2006) plays an important role in enabling ventures that are carriers of a strong entrepreneurial logic to successfully integrate into their mother organization with its own corporate logic. This process of 'organizational acculturation' implies that first knowledge about the corporate logic needs to be 'acquired', then the new project needs to be 'anchored' in the corporate logic, and finally it needs to be shown how the dominant corporate logic ‘accrues’ new and important elements, i.e. gets enriched through this new entrepreneurial project.

The findings extend literature on institutional logics towards understanding how a completely new logic can be introduced in additive form to a dominant logic. The study also contributes to the literature on corporate venturing by leveraging an institutional perspective to offer a theoretical explanation why practices and forms adopted from the broader entrepreneurial community might not easily result into businesses that can lead to strategic renewal. Finally, it adds theoretical nuance to how organizations transform over time as they add new elements to their central ‘character’ (King, 2015; Selznick, 1957).

1.6.4 Entrepreneurial Experimentation in Corporate Ventures: Fitting Experimental Strategies to Levels of Business Theorizing

The fourth paper resulted from observations that were made during the conception of the case study, as well as from own experience during my time as team member of the internal corporate venture. In recent years, experimentation as key element of the scientific founder method has received heightened attention as a vital approach for many innovative industries where outcomes are difficult to predict (Chavda, 2019). While experimentation in entrepreneurial ventures has become a broadly accepted means to validate ideas and optimize business models, lean startup and its scientific underpinnings also enjoys increasing attraction in corporate contexts. A growing number of incumbents have begun to introduce programs and innovation units that are structured around business experimentation (Hampel et al., 2020; Ries, 2011).

Recent works have engaged in a critical debate about the potential limitations of scientific entrepreneurship and lean startup experiments (e.g., Felin, Gambardella, Stern, & Zenger, 2019). The critique maintains that the predominant focus on customer feedback might favor incremental innovation rather than high novelty entrepreneurial ventures. As a lot of the current debate rests largely on theoretical arguments (e.g., Bocken & Snihur, 2019; Contigiani & Levinthal, 2019; Felin et al., 2019; Hampel et al., 2020), further empirical exploration of the practice and limits of business experimentation and the scientific method is needed.

This fourth paper looks at scientific entrepreneurship in the context of established firms and provides empirical evidence on its boundary conditions. We applied a qualitative research design and collected data on 14 ventures within the case company. The findings suggest that venture projects come with different levels of business theorizing and linked levels of uncertainty, which makes it important for entrepreneurs to select and execute experimental strategies appropriate for the respective business goals. We identify different functions of experimentation and highlight that venture teams will need to develop, in particular, a strategic understanding of the commitment-generating function of experiments. The findings of this fourth paper contribute to the emerging interest in entrepreneurial experimentation and scientific entrepreneurship that represent an important facet of corporate entrepreneurship. In particular, the study also adds to a burgeoning conversation about experimentation capability (Shelef, Wuebker, & Barney, 2020).

2 | The Internet of Things: Changing the Organizational Form to Become an IoT Company

2.1 Abstract

The Internet of Things has disrupted many existing industries and provided new business opportunities to new and incumbent firms. Yet the adoption of IoT also comes with certain challenges, in particular for established players that were used to focus on product-centric offerings. We know that on one hand, IoT involves certain technical challenges - such as the introduction of standards for "thing" interfaces and data exchange. On the other hand, IoT has also led to changes in the way companies work and organize themselves. So far however, the impact on a firm's organizational form has remained poorly understood. Therefore, in this paper, we shed light on how a product centric company that has focused on manufacturing for more than a century adapts its organizational form to transform into an IoT company. Based on a single case study of the Bosch Group, one of the largest in-

cumbent German engineering firms, we find that there are three different dimensions of the organizational form that are affected by the firm's transformation into an IoT company: (1) the strategy, (2) the business model mindset, and (3) the structural setup. We further discuss what the implications are along these three dimensions and provide examples of our case to illuminate the challenges associated with the respective dimensions.

2.2 Introduction

The term Internet of Things was originally introduced by Kevin Ashton, who first mentioned IoT back in 1999 (Ashton, 2009). Meanwhile, many definitions for Internet of Things emerged. What all these definitions have in common is the idea that IoT digitizes the physical world by allowing an exchange of information between connected devices, using connectivity technologies and semiconductor elements (Benamar, Balagué, & Zhong, 2020; Whitmore, Agarwal, & Da Xu, 2015). IoT is applied across all industries. Each day, the number of connected devices increases, creating a powerful source of data that allows new applications and services. Forecasts predict that there will be 38.6bn connected devices by 2025 and up to 50bn in 2030 (Statista, 2020). The resulting personal, professional and economic opportunities are infinite. IoT has the potential to disrupt existing industries, offer new market opportunities, and shift the balance of power of existing players as well as new entrants. Especially for incumbent organizations with more traditional business models, the impact is immense. Companies not only have to expand their current product offerings, but also have to find new ways to stay in touch with customers throughout the entire product life cycle (Hunke et al., 2017).

In this paper, we investigate how incumbent firms have to adapt their organizational form when morphing from a manufacturing, product centric company towards a company offering IoT solutions. Our insights are based on a qualitative in-depth case study of a single organization. We collected our data within the Bosch Group, a German engineering and technology company which is the largest automotive supplier and whose traditions reach back to the 19th century. The company was particularly interesting for the investigation as, in light of current changes in the industry, it recently announced its ambition to become a leading IoT company offering connected products and creating additional value by offering digital services. We followed this major transformation over a period of three years and collected data from various sources. Conducting this case study enabled us to have a deeper look at the implications of adopting IoT on a company's organizational form, and in particular analyze the challenges that come with such a transformation.

We find that the capability to provide IoT solutions not only requires technological development – but also calls for decisive changes with regards to three major elements of the organizational form namely the strategy, the company's business model mindset, and its structural setup. First, with regards to the company's strategy, we highlight the importance of adopting an ecosystem approach. This implies forming alliances with partners since a single player can no longer solely cover the entire value chain of IoT-based solutions. Second, we observe significant changes in terms of the organization's business model mindset, as the introduction of IoT requires a rethinking in the way organizations create, deliver and capture value. This includes for example the adoption of a holistic view on the product life cycle as well as the introduction of new metrics for success. Finally, we also find that the structural setup of a company needs to be adapted when the company changes towards a company providing IoT solutions. We discuss the structural arrangement of IoT activities within the organization, highlight the need for intensifying cross-unit collaborations, and point out the challenge of setting up suitable incentive systems that encourage individual units to invest in IoT activities.

In the first section of the findings, we explain the three dimensions that we identified based on our data. We further analyze in detail the changes in terms of the company's organizational form, and we picture the hurdles companies must overcome to successfully drive the transformation into an IoT company. We then underpin each of the three dimensions with examples from our case company, as the company is in the middle of a transformation process towards a company providing IoT solutions in addition to their traditional business. Finally, we introduce one concrete project - an IoT based platform for smart agriculture business – to demonstrate how a product-centric company offers an IoT solution and what the impact on the organizational form is.

2.3 A Changing Business Landscape

The spread of the Internet of Things in recent years has been facilitated by several important technical developments. Key enablers were certainly the rise of communication technology, developments in the semiconductor industry, as well as the changing role of software (Jankowski, Covello, Bellini, Ritchie, & Costa, 2014).

Communication technologies are critical for the development of IoT as they connect devices and allow them to communicate with each other or upload information to a central cloud. Examples are wireless communications such as Wi-Fi, Bluetooth Low Energy, and 5G, as well as cloud and edge computing architectures. To further drive the development of IoT solutions in the future, it will become more and more important to expand networks and increase data rates in order to carry the growing traffic (Akpakwu, Silva, Hancke, & Abu-Mahfouz, 2017).

In the era of IoT, also the semiconductor industry has gained increasing importance (Yeo, Chian, & Ng, 2014). An increasing number of sensors and sensor hubs, as well as microcontrollers and microprocessors are needed to collect, process, and communicate data.

Finally, the changing role of software drives the Internet of Things. Software became indispensable for the delivery of services such as the storing, analysis and visualization of large amounts of data in real or near time. Common standards are needed to allow the communication between heterogeneous devices and create reliable platforms for end users. Normally, open standards win, as they facilitate interoperability, allow for the integration of components and thus attract further developers. However, there are also a few examples such as the tech giant Apple, where customer loyalty and brand power allow the adoption of a protectionist approach with closed standards.

The technological developments that enabled and shaped the Internet of Things, already led to numerous opportunities such as the introduction of new business models and services (Turber, Vom Brocke, Gassmann, & Fleisch, 2014). In some areas, IoT solutions are designed to make people's lives easier by relieving people of thinking, or by turning things more efficient. An often-cited example is washing machines that determine the ideal amount of washing powder and water, and automatically inform the user when a wash cycle is completed (Darianian & Michael, 2008; Tan & Wang, 2010). Through the collection and analysis of huge amounts of data, IoT solutions help humans to anticipate events based on observed behavioral patterns and to take well-informed decisions.

Moreover, also companies benefit tremendously as IoT opens up new revenue streams through additional products and services. Instead of building their business on one-time product sales, companies can expand the scope and offer additional services to generate recurring revenues (Metallo, Agrifoglio, Schiavone, & Mueller, 2018; Turber et al., 2014). At the same time, IoT allows for significant cost efficiencies by improving productivity and identifying opportunities to reduce costs. Even if there is not always a direct revenue flow, IoT solutions help companies to establish direct end-customer contact and collect data to generate significant learnings about their products. This additional information in turn, is very helpful to improve further product development.

The current debate around IoT has thus primarily centered around the technical developments as well as the newly emerging opportunities. Less attention however has been paid to the consequences that the Internet of Things has for incumbent firms that face the challenge of adapting their organizational form to leverage the potential of IoT and survive on the long-term. Yet it is arguable that – beyond technical developments - incumbent firms need to implement changes in the way they organize themselves and do business if they want to develop into an IoT company. Therefore, in this article we address this shortcoming and we focus on how incumbent firms adapt their organizational form when morphing from a manufacturing, product centric company towards a company offering IoT solutions.

There is a plethora of definitions about "the organizational form". An organizational form can be defined as an "archetypal configuration of structures and practices given coherence by underlying values regarded as appropriate within an institutional context" (Greenwood & Suddaby, 2006), as the "combination of an organizational structure and an organizational strategy" (Ingram, 1996, p. 85), or as the "core organizational features involving goals, authority relations (including organization structures and governance arrangements), technologies, and client markets" (Rao & Singh, 2001, p. 244).

Generally, an organizational form refers to a recognized blueprint for action and includes for instance the "biotechnology company" (Powell & Sandholtz, 2012), the "charter school" (King, Clemens, & Fry, 2011) or the "social enterprise" (Tracey, Phillips, & Jarvis, 2011). Each of these forms consists of a specific configuration of organizational elements, including the organizational structure, choice of markets and audiences, and the use of certain technologies (Hannan & Freeman, 1984; Rao & Kenny, 2008). It is the diversity of organizational forms in a society that underpins its capacity to change (Hannan & Freeman, 1989). We focus in this paper on how a firm changes its organizational from being a "manufacturing, product centric firm" into an "IoT company".

2.4 Methodology

As our primary goal is to gather in-depth knowledge in a complex context, we chose a case study method (Eisenhardt, 1989; Patton, 2002) to generate insights in the research issue we identified.

2.4.1 Research Setting

We opted for a single case study (Gerring, 2006) and chose the German engineering and technology company Bosch, where the phenomenon was in particular present as the company had identified IoT as a disruption to all their businesses early on. The company employing over 400,000 people worldwide is a global player in multiple industries including mobility, consumer goods, industrial technology and energy and building technology. Having a legacy as a manufacturing company ever since, it recently announced its ambition to become a leading IoT company, entering into competition with tech giants such as Google, Apple and Microsoft.

The company's vision is to leverage its expertise in products as well as deep domain know-how, to connect all its electronic products, and to apply artificial intelligence (AI) to create additional value for users which benefit from new digital services and additional products. Today already, the company initiated a considerable amount of IoT projects, including agriculture applications, Industry 4.0 solutions and connected parking. The goal is that by 2025, all Bosch products will either contain AI, or AI will have played a key role in the creation of the respective product or service (Bosch Media Service, 2020).

We find that the transformation into an IoT company required decisive changes with regards to Bosch' organizational form. The example of Bosch gives us the chance to have a deeper look at the implications of evolving from a purely manufacturing company towards an IoT company, and to underpin challenges with real examples.

2.4.2 Data Collection and Analysis

Our data collection took place over a period of three years from January 2017 to June 2020. To be able to get deep insights into the company's transformational process towards an IoT company and the ongoing changes with regards to its organizational form, we adopted an "insider-outsider" approach (Gioia & Chittipeddi, 1991), where one author was deeply involved in the context, while the other authors conducted a more objective analysis of the data. One of the authors took a leading role in developing the company's IoT strategy. The IoT strategy highlights the importance for organizational transformation, identifies opportunities for further development, and determines the approach the company wants to take in order to successfully manage the transformation towards an IoT company. The strategy was developed in constant alignment with the board of management and was later rolled out on a company-wide basis.

Beside own experience and observations, we used archival data including internal and external documents. Internally, we got full access to white papers, company presentations, project reports, internal press releases, and company blogs. Externally, we included press articles as well as internet resources. In October 2019, one of the authors co-organized a conference with presentations and discussions focusing on corporate transformation. The conference allowed to collect additional data with regards to the implementation of the IoT strategy, as well as challenges encountered. To complement our data, we equally conducted informal interviews to get further information.

In the next step, we analyzed our data to investigate how Bosch changed its organizational form to develop into an IoT company, and in particular focused on the challenges that the company encountered.

2.5 Findings

We identified three organizational dimensions that are particularly crucial for a company that wants to transition from a product-centric manufacturing company into an IoT company. Table 2.1 gives an overview of these organizational components.

Table 2.1. *Organizational Forms.*

	The product-centric manufacturing company	The IoT company
Strategy	• Inherent strategy • Vertical value chain	• Acquisition of additional competences • Partnering and ecosystem approach • Role definition
Business model mindset	• Traditional business model (e.g. involving one time payment) • Classical performance metrics (e.g. EBIT)	• Holistic view on product life cycle • Additional business models (e.g. multisided platforms) • New metrics for success
Structural setup	• Silo structure	• Cross-divisional collaboration • Internal cost allocation

In what follows, we first describe the individual dimensions and introduce sub-elements, and we then provide concrete examples on how our case company changed its organizational form while morphing into a company providing IoT solutions.

2.5.1 Defining the Scope and Scale of the IoT Strategy

Our findings first show that as IoT solutions fundamentally differ from traditional business, incumbent firms need to redefine their strategy when morphing into an IoT company. Developing an IoT strategy can be challenging because it strongly affects the organizational culture which is often hard to change.

Generally, the adoption of IoT can be achieved in different ways. Either it involves a transformation of the core business, by digitizing the company's existing product offering, or the company decides to complement existing business with digital business and expand the current product range. It is little helpful to have many uncoordinated IoT projects that all move in different directions. A far-reaching reform must not be developed bottom up, but rather be decreed top down in order to be really successful. Leadership and clear announcements are needed so that everyone pulls together and runs in the same direction.

Beside the relevance of effectively defining and communicating the IoT strategy, there are two strategic considerations that we find are important for a company that wants to offer IoT solutions. This includes the importance of partnering and ecosystem building, as well as finding the adequate role in the ecosystem.

Partnering and ecosystem building. IoT solutions usually consist of multiple components, which are typically assigned to different layers, outlined in Figure 2.1.

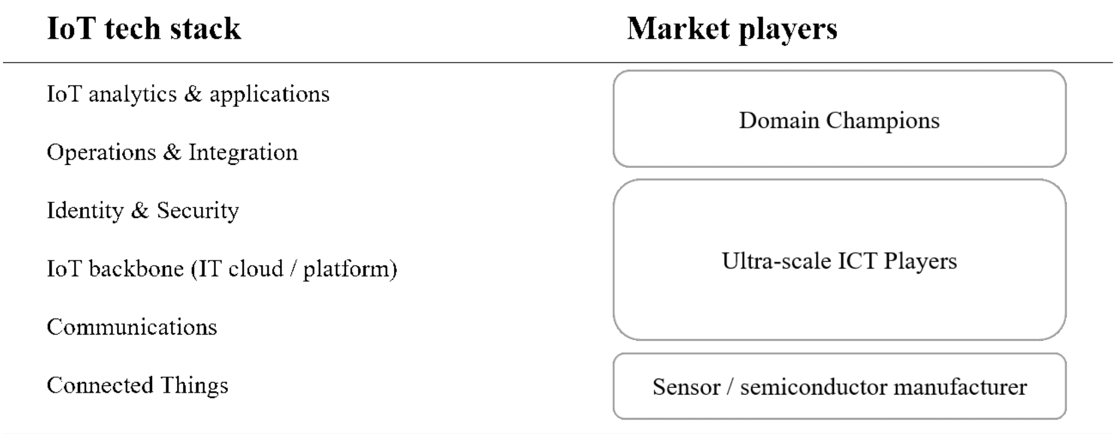

Figure 2.1. *IoT Tech Stack. (Own representation based on internal company documents, adapted from Hunke et al. (2017) and Khan et al. (2012))*

The basis of each IoT solution are “connected things”, which consist of sensors and semiconductors that serve to collect data. IoT solutions equally include information and communication technologies that form the overall infrastructure for each IoT solution. Finally, IoT analytics & applications serve to leverage the core business.

A single player will hardly be able to cover the entire value chain and provide an end-to-end IoT solution, as each layer of the IoT solution involves differences with regards to the required capability as well as the business and monetization logic. For example, a cloud solution is economy of scale driven and requires high cost efficiency whereas IoT analytics & applications depend on strong domain-specific knowledge of the provider. Consequently, the individual tasks are typically performed by different types of market players that are specialized and dominate a specific layer: sensor and semiconductor manufacturers offer connected things; information and communication technology players enable communications, provide platforms or IT clouds, and ensure data security; domain champions integrate the IoT solution and provide applications and analytic services.

Whereas traditional business models can be covered by a single player, IoT solutions require partnering and data exchange across different layers to create added value. Instead of offering the entire solution on its own, a company should concentrate more on those levels in the stack where it can best contribute based on its own strengths.

With the increasing relevance of cooperation and the understanding that a single player cannot build up all skills on its own, an ecosystem perspective is getting ever more important. The creation of ecosystems to benefit from the strengths of others became a basic prerequisite for companies offering IoT solutions. Originating from biological studies, James F. Moore (1996) originally introduced the concept of an ecosystem into a business context. He defined a business ecosystem as a network of interdependent niches that are occupied by different organizations (Moore, 1996). Ecosystems vary in size and can be interconnected among themselves or nested in larger meta-ecosystems. Companies can either participate in an existing ecosystem or decide to establish one on their own.

When morphing into an IoT company, the question of how to leverage the IoT ecosystem to deliver outcomes and solutions thus becomes crucial. To build a dominant ecosystem, a company needs to define its own role, decide how to control data streams, and think about how to effectively manage partnerships within the system.

Defining the company's role within the ecosystem. The first question that needs to be addressed when defining the company's role within the ecosystem is whether to lead or merely participate in the ecosystem. An ecosystem usually comprises three major roles, which are outlined in Figure 2.2.

First, "users" that consume and benefit of a particular solution or service. Users do not necessarily pay for a service, and might even partially co-create content. Second, "contributors" that provide parts of a particular IoT solution such as smart products or apps. Usually they participate in several ecosystems to scale their business. Finally, an ecosystem needs an "orchestrator" that creates and controls the system (Lang, von Szczepanski, & Wurzer, 2019).

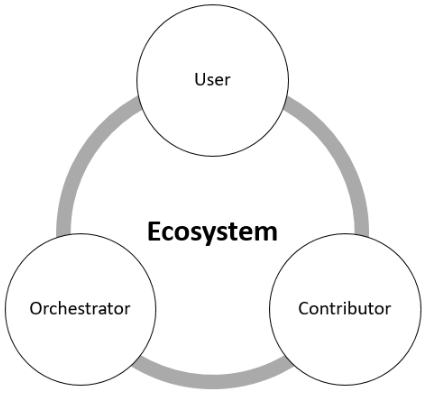

Figure 2.2. *Key Roles in IoT Ecosystems (Own representation based on internal company documents).*

The particular role a company assumes depends on the value that can be added to the ecosystem. Companies that have a strong position in delivering relevant products for example, may opt to act as a contributor. Players that already have a large customer base are destined to take on the orchestrator role. Usually, the greatest value potential exists for the orchestrator who leads the ecosystem. However, also a contributor can benefit as the business easily scales through the introduction of products into further ecosystems. A company can equally take varying roles in different ecosystems, depending on particular competences in the field. Companies waiting too long with defining their particular role in the ecosystem face the risk of being marginalized by other players.

As the orchestrator holds an important position within the ecosystem, it is important to have a closer look at this particular role. Ecosystem orchestrators define the rules and distribute the cash flows. Usually, the orchestrator role is determined either by user access or by data access. User-oriented use cases scale via the number of users. The more users join an ecosystem, the higher the value for each single participant. Platforms such as AirBnB are examples for user-oriented use cases. Thingoriented use cases on the other hand scale via the amount of data. The more data points are available the better the analytics algorithms work and the higher the value for a user. Finally, a distinction is also made between partner-oriented use cases that scale via the integration of relevant partners. In this particular case, data access in achieved through smart devices controlled by other players instead of directly integrating the devices into the ecosystem. Based on the scenario, an orchestrator needs to capture the critical element in the system. Whereas for user-oriented use-cases, orchestrators must control user IDs, for thing- and partner-oriented ecosystems data fusion and analytics represent crucial elements.

IoT ecosystems often stimulate network effects, also known as demand-side economies of scale (Van Alstyne & Parker, 2017). Platform providers that attract more platform participants are able to offer higher value as existing users gain an incremental benefit from each new user joining the platform. As a result, they attract further customers. The same applies to data streams: Platform providers that integrate the highest number of connected things can provide more precise data and thus attract more users as well as players to participate. This involves that the growth of platform business does no longer follow a linear logic, but instead entails exponential growth. As economies of scale are hard to achieve, few large players increasingly dominate the market and monopolistic or oligopolistic scenarios emerge.

2.5.2 Business Model Mindset

Second, the introduction of IoT solutions and the digitalization of ecosystems not only asks for a different strategic approach, but also transforms the way "an organization creates, delivers and captures value" (Osterwalder & Pigneur, 2010, p. 14).

With the advent of IoT, new business potential emerges, in particular since products are increasingly linked with physical and digital services. Recent studies depict that companies are often not able to effectively address those opportunities with their existing business models (Ehret & Wirtz, 2017). Although IoT solutions are still heavily dependent on hardware, companies increasingly have to think software centrically. Non-ownership business models in forms of multi-sided platforms, where value is created by bringing together supply and demand between two or more independent parties are one example of how established companies as well as newcomers adapt to the changing conditions. Whereas platforms in the form of markets or agencies are nothing new in themselves, the growing technical possibilities and reduced transaction costs have greatly widened the possibilities for platform business (Van Alstyne & Parker, 2017). Well-known examples such as Uber, AirBnB and PayPal reveal that it can be economically attractive to forgo physical infrastructure, products or assets for doing business. Companies have to disengage from their traditional way of thinking and start thinking into new directions. An increasing customer centricity is therefore needed to recognize customer needs early on and develop tailored solutions. Methodologies such as lean startup that originate from the startup scene in Silicon Valley can be applied to iteratively build new products and services that meet customer needs (Ries, 2011).

Since most IoT solutions involve a complex interplay of products and services, companies are forced to increasingly adopt a holistic view of the product life cycle. Customer relationships do no longer finish with the delivery of the product in exchange for a one-time payment. Instead, services along the entire product life cycle must be considered right from the beginning, long-term obligations must be met, and costs must be calculated so that the business is profitable over a long period.

New monetization models arise from the emergence of service costs, with two strategies dominating. Either, the IoT solution is first offered free of charge for a limited period, and subsequently charged through a graded system, or different prices are offered based on the chosen breadth of the service (Gunnarsson, Williamson, Buvat, Nambiar, & Bisht, 2014). Both options require a different investment strategy than product-centric companies are used to. Instead of investing in incremental product innovations and receiving a one-time payment in return, IoT solutions often require higher initial investments in exchange for recurring revenues over a longer period of time. To tap into the full business potential, companies need to focus on how to raise the share of predictable annual recurring revenues in the future.

Finally, since new business models have emerged and the rules for success have significantly shifted over the past two decades, established companies are forced to rethink their way of measuring the performance of new business. Classical metrics are no longer sufficient for several reasons. First, they do not account for the value of data. Second, the time span between creation and monetization is often time-delayed in comparison to traditional business models. Very often, digital business models require initial investments generating a large customer basis driving network effects while the generation of revenues only comes later. Traditional evaluation metrics such as earnings before interest and taxes (EBIT) should therefore be complemented by additional metrics to allow the creation of new business in the field of IoT. In a user-oriented business model for example, the number of active users can be added as one important indicator. In a data-driven use case, it would be the amount of data points, and in a partner-oriented case it would be number of involved partners respectively. When sticking to traditional metrics, individual business units with direct profit and loss responsibility would be little attracted to invest in the development of new IoT solutions as the investments have a negative impact on the business result at first. In order to motivate them in a targeted manner, top management must adopt a long-term perspective and set appropriate incentives. Such an incentive system could for example state that individual departments have to invest a certain amount of money in the digitalization of their business models. In return, a reduction in EBIT could be accepted for a certain period.

2.5.3 Structural Setup

Finally, the transformation towards an IoT company not only requires new strategic considerations and a shift in a company's business model mindset, but equally needs a significant restructuring on the organizational level.

First of all, firms need to decide whether to take a centralized or decentralized approach to IoT, meaning that activities are either bundled at a central level or outsourced to individual business units. Usually this is a balancing act. On the one hand, a central and standardized company-wide approach allows for the bundling of competences, the generation of synergies, as well as the drive of efficiency. At the same time, central solutions in large conglomerates usually face the “not-invented-here” syndrome, which can result in poor adoption of the transformative activities. A decentral approach, on the other hand, facilitates a quick and direct response to customer requirements, addresses the specifics of the domain and enables the individual business units to get to market fast. There is no single best solution to the question of organizational structuring. Instead, the structural setup heavily depends on the organizational culture. A company that has opted for a strongly centralized approach over the past years or decades, with little power for business divisions or subsidiaries, would typically build up a central IoT department that takes responsibility for the whole company. This approach should be combined with a strong incentive system for business units to employ the solutions and platforms centrally developed, as well as with a clear approach to integrate their particular requests in the development process. A company with a diversified portfolio, a decentralized approach and individually managed business divisions on the contrary, is well advised to establish IoT departments in each business to help transform the respective business divisions. In the long-term, a company will need IoT capabilities in each unit to empower the business, similar to IT infrastructure today already. Hence, the individual IoT departments would either become highly specialized competence centers or be dissolved and integrated.

Regardless of the decision whether IoT is supported on a central or decentral basis, companies should encourage cross-divisional collaboration to benefit from synergies and provide an even greater value to the customers. As IoT solutions and the digital business models built around them are complex, they require multiple competencies and expertise from different fields. Product development and service design need to be tightly integrated and aligned to cover large parts of the value chain – a major prerequisite for the provision of IoT solutions. A close cooperation between individual divisions is also important to manage partners effectively and thus increase negotiating power towards dominant players. For example, a company that wants to implement a cloud computing platform will have greater purchasing power if the negotiations are coordinated centrally rather than each unit requesting the cloud solution separately.

Finally, internal cost allocations need to be revisited. The development of an internal IT cloud solution to collect and store data for example involves significant pre-investments. Allocating all costs directly to the first project adopting the solution results in a negative business case for this project and causes a "first-adopters"-dilemma: Other business units that adopt later build their products or services on the same cloud solution and benefit from the platform and capabilities financed by the innovator's pre-investments. Such a first comes first pays option is not suitable as in this case, every unit would try not to be the first to adopt centrally developed solutions, which ultimately slows down the corporate innovation process. Instead, pre-investment costs that are needed across different units must be fairly distributed. However, this entails a further challenge. If there is need for a joint solution that is co-financed by everyone, but at the same time meets all individual requirements, development becomes extremely inflexible and time consuming. In this case, internal stakeholders might even prefer an external solution. To counteract this, substantial cost reductions can be attributed to the first units that decide to use the internal solution. These cost reductions could be complemented by additional budget to allow the units to finance the adjustments needed to make the solution best suited to their individual needs. This way, the company creates a strong incentive for other units who see that the internal solution is already being used by others. Furthermore, it is important that a company does not only focus on solutions that are primarily preferred by the central department, but to better involve internal stakeholders to find out about particular requirements and be able to offer an attractive product.

2.6 Changing the Organizational Form: The Case of the Bosch Group

At the engineering and technology company Bosch, the digital transformation and the increasing connectivity of things is considered to be a big opportunity. With its distinct hardware competence, prospects could open up both for traditional business areas as well as for completely new fields. On the technical side, Bosch seems to be able to cope well with the upcoming challenges. A key prerequisite for this is the software and IT expertise, which Bosch has been expanding for several years now. To be able to effectively drive the transformation in the upcoming years, it is a declared goal to modernize the corporate culture and become more diverse, results-focused, as well as less hierarchical (Robert Bosch GmbH, 2017b). In addition, decisive changes in the company's organizational form were needed to morph from a product centric company to a company providing IoT solutions. The company certainly represents a best practice case with regards to certain elements. However, our findings equally reveal several challenges that Bosch encountered while adapting its organizational forms.

2.6.1 Defining the Scope and Scale of the IoT Strategy

To become a successful IoT player, the board of management identified three important steps to be addressed. First, the company needs to be enabled, for example by creating a dedicated center for AI to attract top talents and conduct research that supports the company's transformation and by ensuring that all new electronic products are connected. At the same time, the existing ecosystem needs to become digitalized. Finally, there is a need for cross-divisional ecosystems. Individual business-units must disengage from their restricted view and adopt an overarching way of thinking to allow for cross-divisional ecosystems and provide solutions that bring the greatest possible benefit to the user. Even though the adoption of IoT solutions will have noticeable impact on all business areas, Bosch decided to initially focus on three core domains that provide particular promising business opportunities: "residential IoT", focusing on smart home applications and new data driven services, "connected industry", targeting industry 4.0 solutions, and "connected mobility", driving fully connected, intermodal transportation services and innovative mobility experience. Besides domain specific use cases, the company identified additional cross-domain use cases, providing further business opportunities and added value for users. Nevertheless, the pure communication of an IoT strategy is often too abstract and therefore little understandable for employees who usually do not deal with digitalization in their everyday life. Over the past years, the company has had to learn that it is not enough to simply communicate an IoT strategy and invite employees to provide connected products. It will take some time until all employees have internalized the new strategy and can follow the new direction the company is taking.

Partnering and ecosystem building. For decades, Bosch has had great expertise as a supplier of components. In the course of the transformation towards IoT, however, the company initially tried to not only operate at the bottom level of the IoT stack, but to serve large parts of the value chain itself. With this endeavor, the company has for example developed a proprietary cloud platform for sensitive data to offer new solutions. This had put Bosch in a unique position, as the company was thus active on all three levels of the Internet of Things. The Bosch Group offered key technologies such as sensor technology and software for networking, provided the IoT backbone, and at the same time developed new services based on these technologies.

Over the course of time, however, more and more use was made of external cloud solutions. It was a learning process to acknowledge that an ecosystem approach - meaning the concentration on inherent strengths and the involvement of partners in other areas - brings a clear advantage in the era of IoT. Although the cloud for highly sensitive data is still important to mitigate risk, the company meanwhile focuses on its core competencies – connected things. At the same time, the company is working on a successful partnership management strategy to combine own expertise with the know-how of external partners. Therefore, the relationship with the partners had to be redefined. While Bosch has always striven to establish a contractually secured supplier relationship, the relationship with partners has now developed into a loose partner management system in many areas.

Defining the company's role within the ecosystem. Bosch has recognized the importance of ecosystems and learned that a focus on its own strengths is essential. With this understanding, the company has been considering two potential roles. On the one hand, the company decided to act as contributor, strongly relying on its core competency, which is the provision of the "smart things" such as sensors, semiconductors and other products on which the ecosystem is built, as well as the analytics and applications that enable other players to use the solutions. The company would assume an important role in the ecosystem, offering the interface between physical devices and the internet.

Bosch equally has considered the role as orchestrator as a viable option. With its deep technical understanding and a broad product range, the company is in a good position to ensure value towards the user, and create an attractive environment for all participants of the ecosystem. A clear transformation of the Tier-1 supplier role can be observed, triggered by its neutral position. While original equipment manufacturers (OEM) benefit from scaling individual components across multiple OEMs, they would not buy components directly from competitors. The same applies to data: swarm optimization requires data input from different OEMs. A neutral Tier-1 supplier would be more likely to succeed in merging the data and providing a respective solution than any of the OEMs who are in direct competition with each other.

The respective role taken up by Bosch depends on the specific use case. To identify what role is realistically achievable within an ecosystem, the existing capabilities need to be matched to the capabilities required for orchestration. When assuming the role of the orchestrator, Bosch needs to demonstrate a unique selling point (USP) in the ecosystem, control data flow, and be able to monetize via relevant monetization channels (Robert Bosch GmbH, 2019d).

2.6.2 Business Model Mindset

With regards to the business model mindset, Bosch aimed to completely rethink the traditional way of product and services development. Whereas previously the company was specialized in pushing incremental innovations to the market, the company increasingly recognized the need for customer-centric approaches when developing new products and services. To guide the shift in mindset and introduce the individual departments to the novel approach, a dedicated department was set up, that provided support along the product development cycle and introduced customer-oriented development methods. As time windows to build dominant market positions are rather short, the department encouraged internal players to shorten time to market by applying Minimum Viable Product (MVP) based piloting to test product-market-fit and quickly pivoting if necessary.

Moreover, it became a declared goal of the company to increase the share of annual recurring revenue as well as EBIT on annual recurring revenues by growing scalable service business. These efforts are particularly important in unstable times as recurring revenue stabilizes cash flows, improves the predictability of the business, and improves ROI. The company distinguishes five different service categories ranging from product-driven services to product-independent services. To drive the development, the company has developed specific tools and guidelines to support individual business units in implementing service business.
In recent years, also the discussion on new evaluation metrics was sparked. Although first project specific KPIs have been introduced for explorative projects in new business fields, it is still a long way off until individual metrics considering non-financial aspects become the new standard.

2.6.3 Structural Setup

The stated goal of becoming a leading supplier of IoT solutions could only be achieved through significant structural changes. In comparison to other companies such as General Electrics, who decided to take a highly centralized approach, the Bosch Group followed a decentral approach with different IoT related activities spread across the entire company. In consideration of the company's broad product portfolio, this particular set-up made sense, as it allowed domain specifics to be better addressed. The company implemented dedicated organizational units and in addition launched the subsidiary Bosch.IO, where around 900 employees pool activities around IoT. At Bosch.IO, the company relied on interdisciplinary and agile teams, comprising cloud specialists, solution architects, user experience (UX) designers, as well as software and hardware developers, to develop digital business models and shape connected ecosystems (Robert Bosch GmbH, 2020a). Moreover, a Chief Digital Officer (CDO) was assigned to drive and coordinate the company's global IoT activities. The CDO equally held the position of the Chief Technology Officer (CTO) to ensure that technological products are closely connected with the virtual world.

Today, the company still struggles to align its initiatives and act in concert across different divisions. Since the company incorporates a strong silo thinking with individual business areas being traditionally separated from each other, the encouragement of cross divisional collaboration still presents a challenge.

2.7 NEVONEX- The New Ecosystem in Smart Digital Agriculture

The development from a product-centric company towards a company offering IoT solutions is a lengthy process that requires overcoming challenges and coping with setbacks. However, the company is on a good path and can already show some first successes.

One example where Bosch has taken a leading role and formed an IoT ecosystem is in smart digital agriculture. In previous years, the industry has been characterized by numerous innovations around digitalization, including smart tractors, sensors and intelligent software. So far however, the added value was limited as most solutions were offered on stand-alone base, not being compatible with other services. Bosch has identified Smart Agriculture as an interesting area for future growth, where applying IoT increases efficiency. With *NEVONEX*, the company has designed an open digital ecosystem that brings together different players along the agricultural process chain and enables them to deploy and use digital services. By automating and connecting machinery and workflows, the IoT solution enables agriculture players to increase efficiency and yields while at the same time reducing their costs (Robert Bosch GmbH, 2019b).

Bosch itself acts as orchestrator of the ecosystem. The solution represents a typical platform business that can only scale through the contribution of major players in the field. It is represented in Figure 2.3.

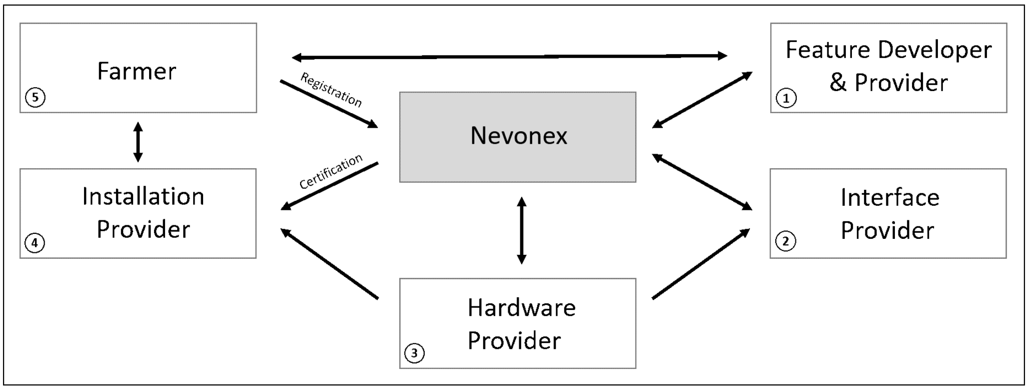

Figure 2.3. *NEVONEX as Ecosystem Orchestrator. (Own representation based on internal company documents.)*

Any partner can develop application software – also called FEATURE - that can be run on the farmers' end user devices or on agricultural machines (1). *NEVONEX* is interesting for feature developers because the platform supports them in scaling their digital services. The recommendations provided do not only appear on the farmer's end user device, but can be directly transmitted to the farmers' agricultural machineries, which then implement the recommendations. *NEVONEX* acts as medium, translating the specific interfaces of machinery manufacturers participating in the ecosystem and providing access to the feature developers (2). A major prerequisite for the automation of work processes and their documentation is standardized hardware that can be easily retrofitted into the electronic architecture (3) (Robert Bosch GmbH, 2019b). In order to enable farmers to retrofit their machines, installation providers who can install the corresponding computing unit must be in the vicinity of the farmers (4). The joint vision of all players participating in the ecosystem is to make farmers' life easier. Due to the open system, the farmers benefit from a large offering along the value chain and can choose a tailor-made package (5). The concept only works if all participants actively contribute and they only do so when they benefit from the solution.

Orchestrating this smart agriculture ecosystem is by far not easy, as a large variety of partners with different demands have to be managed. The case serves as ideal example to show how traditional partner management gets transformed with the emergence of IoT business. It is no longer about concluding contracts and committing on the delivery of a certain product. Instead, the development of IoT solutions requires equal relationships and collaboration. This comprises for example joint ideation sessions for future services or the concrete support of contact persons in other companies in convincing decision takers. There are several reasons why Bosch has opted to act as an orchestrator in this system. First of all, as a technological giant, they are considered a highly competent player with relevant knowledge in fields such as software development, cloud solutions, and control units that are needed for innovations in the smart agriculture industry. Second, the company represents a neutral partner in the agriculture industry that is accepted by all players in the game. Finally, Bosch is a global player that is expected to be able to roll out the platform not only locally, but also on a worldwide basis.

With the introduction of *NEVONEX*, Bosch envisages an entirely new business model. The platform requires high initial investments without bringing direct revenue in forms of one-time payments. Instead, Bosch receives an annual flat fee from the feature developer for the first few years, part of which must be passed on to the interface provider. The business model will be modified over time as soon as the value of the platform is high enough. From that point on, interface providers will no longer be paid for the provision interfaces, but will have to pay to be admitted to the platform.

Over time, the company has learned that it must move away from old structures to promote new concepts such as *NEVONEX*. Existing ways of thinking and operating were too rigid to drive the project forward quickly. Meanwhile the company has decided to choose an agile approach and apply lean startup methods to better meet the customer needs and facilitate the cooperation with partners.

2.8 Great Challenges Ahead: Conclusion and Discussion

In this paper, we discussed several considerations when an incumbent firm adapts its organizational form to transform into a company offering IoT solutions. We find that major changes are needed along three dimensions. First, we discussed strategic implications. IoT solutions heavily depend on an ecosystem approach, since a single player can hardly cover all elements of an IoT solution. Instead, companies need to open up, forge alliances with partners from different industries, and find their particular role in the ecosystem. Second, the transformation into an IoT company implies a major change in the business model mindset. We discussed the need to adopt a holistic view of the product life cycle and address use cases from a users' point of view, not from a purely technological angle. Finally, we emphasized the need for changes in the structural setup of companies, comprising the decision for a central or decentral coordination of IoT related activities, as well as the promotion of cross-domain thinking.

Our intention with this study was to stimulate awareness and draw attention to the individual dimensions in which challenges can be expected when companies change components of their organizational form to accommodate a new technology paradigm, in this case IoT. While we have provided first insights in the components of the organizational form that need change, this study also opens up avenues for future research. First, this paper is based on a single case study and sheds light on how an individual firm changes its organizational form from being a manufacturing company to being an IoT company. However, we mainly focus on the organizational level in this paper and do not address what happens at the level of the organizational collective. Future research could therefore investigate how collective identities and collective forms are being shaped in response to the technological developments of the Internet of Things. Second, as we focus on the organization as such, and do not zoom in on the individual level, future researchers could look into how individual employees respond to the changes that occur in terms of the organizational form.

3 | Developing an Effective Corporate Entrepreneurship System: The Case of the Robert Bosch Group

3.1 A Case

STUTTGART, GERMANY, NOVEMBER 2018. Fog was drifting over the Bosch headquarters as Rainer Simons, Head of Corporate Innovation, sat down in his office to review the different innovation and entrepreneurship initiatives Bosch had started over the past 5 years.

Simons' department was a rather new unit, founded only in 2015 with the aim to bundle attention and resources in an internal competence center for the systematic development and implementation of innovative solutions and new business models. Simons oversaw a range of different initiatives, all designed to foster the entrepreneurial mindset of Bosch employees, and aimed at producing internal startups that would contribute to the company's strategic innovation and corporate renewal ambitions.

As the initial pilot period of Simons' unit was ending, Bosch's Chief Executive Officer (CEO) had ordered a close review. Simons had cleared out his entire afternoon to look in detail at all initiatives, at their interfaces with other company processes, interactions with each other, and achievements to-date. He was asked to present his assessment at the upcoming meeting of all managing directors of the various innovation programs, together with a concept on how to organize corporate innovation at Bosch in the future.

Some issues were clear even without looking at the details: The two central pillars of the corporate innovation landscape were the Bosch Accelerator Program and the startup platform *Grow*. Both ran different services and toolsets to support internal startups in their search for viable and profitable business models. In particular, the Accelerator Program—under the leadership of Rainer Simons—had achieved remarkable traction with Bosch employees across all global sites. Both programs also had attracted a lot of external interest and visibility. Probably once a month, Simons received requests for visits or invitations to speak at corporate innovation and acceleration events. Bosch's comprehensive and multi-faceted approach was clearly seen as a benchmark.

However, impact rates across all initiatives remained below Simons' expectations. Despite the initial excitement, many of the emerging entrepreneurial projects failed to garner long-term internal support and were ultimately abandoned. This was a concern as the total investment into the programs was substantial. Equally worrying were the motivational consequences for the internal entrepreneurs, who typically spent a lot of time and energy, incurred career risks, and had to sustain a lot of frustration if a project failed to get traction.

As the afternoon turned into evening, Simons was pondering how to best move forward in order to capitalize on the momentum created while also redesigning the innovation and entrepreneurship programs for more impact vis-à-vis the company's innovation goals. Simons knew that he would need to make important adjustments, which would disappoint some of his colleagues. Cutting into budgets and responsibilities was nothing he looked forward to. He was wondering if he was simply too impatient and should look at results over a longer period, considering that only a fraction of entrepreneurial ventures typically succeeded. For now, he only had another couple of days to draw up his final conclusions.

3.1.1 Company Background

The tradition of the Robert Bosch Group goes back to the 19th century.[2] Headquartered in Stuttgart, Germany, the company employed 402.000 associates in 2017, and was one of Europe's leaders in the high-technology industry. Roughly 440 subsidiaries and regional companies were spread over 60 countries. In 2017, the company had generated sales of EUR 78.1 billion (Robert Bosch GmbH, 2017a).

Ninety-two percent of the company's share capital was held by the Robert Bosch Foundation. The majority of the voting rights, however, were residing in the Robert Bosch Industrietreuhand KG, consisting of previous members of the company management, members of the Bosch family, and selected people from industry (Robert

[2] Please refer to Exhibit - The History of the Bosch Group for more details.

Bosch GmbH, 2017a). Being privately-owned and thus not subject to the reporting cycles of public companies, the Bosch Group was able to avoid shareholder pressures that plagued a number of its competitors.

The special ownership structure guaranteed additional freedom: The Bosch group worked with a long-term horizon and typically invested ten percent of its revenue in research and development. Innovative strength was seen as the basis for future growth and sustainable success. In addition, the strategic goals were socially driven: With its ethos "invented for life", the Robert Bosch Group expressed its objective to develop products for improving the quality of life while conserving natural resources.

Current Operations of the Robert Bosch Group

By 2018, the operations of the Robert Bosch Group were divided into four business sectors: Mobility Solutions, Industrial Technology, Consumer Goods, and Energy and Building Technology (refer to Figure 3.1). Mobility Solutions represented the largest business sector of the company, generating 61 percent of the total sales revenue. Numerous central departments and dedicated administrative functions, such as human resources (HR), legal services, and information systems, supported all business sectors. These central departments were equally responsible for realizing new business potential and defining their contribution to the overall corporate strategy. In this context, they also assigned additional money to selected growth initiatives.

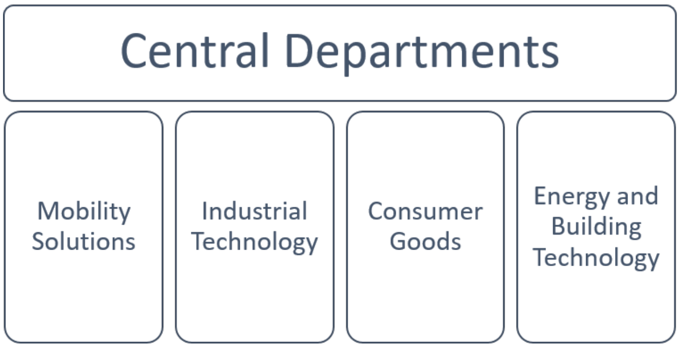

Figure 3.1. *Organizational Structure Robert Bosch Group.*

3.1.2 Responding to a Changing Industrial Landscape

For decades, the Bosch Group had been an important beacon in the German industrial landscape and contributed its fair share to Germany's traditional leadership in high technology based on cutting-edge products at high-quality levels. The electrical and mechanical engineering sectors, in particular, had been the engines of Germany's economic prowess.

Core of the industrial landscape was the automotive industry, employing more than 820,000 people and generating yearly revenues of EUR 423 billion in 2017 (Germany Trade and Invest, 2018). Being the country's most innovative industry sector, it accounted for 35 percent of the total German R&D expenditure (Germany Trade and Invest, 2018). However, in recent years, global competition had gotten stronger. The California-based automotive and energy company Tesla was advancing electrical car manufacturing putting pressure onto traditional car manufacturers as well as their suppliers. At the same time, software companies like Apple and Google were spending billions of dollars in the development of self-driving vehicles, further driving change in individual mobility. The core industrial engine of Germany was looking at upheaval.

The dynamic pressures in the automotive sector trickled down to other industries such as logistics, healthcare, or machine building. The fourth industrial revolution offered a range of new opportunities: AI, the Internet of Things, advanced robotics and renewable energies were listed among potentially disruptive technologies affecting consumers, workers and the economic activity across industries (Manyika et al., 2013). Numerous well-financed startups had entered the market and Asian high-tech companies started to grow at a much faster pace.

New technologies, new business models, and agile new businesses were challenging the traditional supply networks and incumbent players such as Bosch. The giants in the German high-technology industry saw themselves confronted with the increasing need to become much more flexible toward changing consumer demands.

In light of the global industrial dynamics, the emergence of new opportunities, and the strong competitive pressures, the Robert Bosch Group had recognized the need for strategic transformation and new approaches to its innovative capacity. Central to the ongoing change was the trend toward digital transformation that had a fundamental impact on virtually every industry. The CTO explained:

> *By the year 2025, Bosch will be a leading IoT company where all our products exhibit Artificial Intelligence or will be designed, produced and shipped to the customer using these technologies. And innovation will play a crucial role in order to achieve those goals. On the one hand side in our core business, but on the other side also in new business fields, extending our core businesses.* (Robert Bosch GmbH, 2019c)

The transformational process initiated by Bosch as a response focused on five domains: automation, connectivity, electrification, energy efficiency, and emerging markets. The underlying idea was to complement Bosch's traditional strength by the build-up of new capabilities.

First, the company was striving for a leading role in the mobility sector, offering automated, connected, electrified, and multi modular solutions. Second, the company aimed at becoming a leading IoT provider, offering smart solutions to further improve people's quality of life. Finally, the Bosch Group wanted to drive forward cultural change through increasing collaboration across board (Bosch Global, 2018). This was by far not a trivial endeavor as the company had developed a distinctive organizational culture based on its industrial roots, family values, and large corporate processes (Leiting, Clarysse, & Thiel, 2020). Adding new entrepreneurial approaches and experimenting with new businesses models would challenge existing fundamental beliefs and organizational structures.

Robert Bosch Venture Capital

Traditionally, Bosch had relied on its internal R&D departments to drive innovation, and it had used its CVC unit Robert Bosch Venture Capital (RBVC) to source externally for innovations that had the potential to make considerable impact on the market.

RBVC had been founded in 2008 as a 100 percent subsidiary. The aim had been to invest in technology startups and industry-specific venture capital (VC) funds around the world. The creation of an independent unit was considered important to be able to act independently from the main corporation. Investment decisions were thus unrelated from economic conditions of the parent company, as well as individual interests of business units.

The investment goals of RBVC were two-fold. On the one hand, the company was looking for a healthy return on the capital invested. The venture-capital arm aimed on holding a stake of 10 to 20 percent in young companies. On the other hand, having access to disruptive innovations from an early stage on also offered a clear strategic advantage as highlighted by Paul Weber, managing director of RBVC.

> *We're looking for the kind of disruptive innovations that could turn a market completely upside down. We want to make the Bosch divisions aware of them, with the ultimate aim of securing and expanding our innovation leadership.* (Robert Bosch Venture Capital GmbH, n.d.)

By 2018, RBVC was operating out of five locations worldwide, with the Shanghai office having been the last addition to a presence in key global hotspots of entrepreneurial activity. The ability to tap into the talent and ideas of the likes of Shanghai, Silicon Valley and Tel Aviv, were seen to be crucial to the company's long-term success. Each year, RBVC screened more than 2000 startups worldwide, of which about a hundred were shortlisted for further consideration. RBVC not only provided money; it also offered expertise and connected the startups to relevant stakeholders within the Bosch organization.

Within ten years, the RBVC subsidiary had established itself as a major institutional venture capital company. Robert Bosch Venture Capital managed funds with a total of EUR 420 million. In 2018, the portfolio comprised over 35 pioneering startups (Bosch Media Service, 2018a). Most of them involved new technologies and business models that fit particularly well with the Bosch Group. Focus areas were autonomous driving, AI, IoT, Analytics, and Distributed Legers, to name a few.

On the occasion of the tenth anniversary celebration, Dr. Volkmar Denner, CEO of Robert Bosch Group, commented on the CVC unit:

> *RBVC has successfully established itself alongside major institutional venture capital companies. Our VC wing provides us with valuable contacts to the startup scene, and thereby makes a significant contribution to the Bosch culture of innovation, and thus its agility.* (Bosch Media Service, 2018a)

The main role of RBVC was subsequently to create successful collaborations and stimulate general development in areas of technological interest for Bosch such as automated driving or AI-based systems. The portfolio companies were usually not integrated into Bosch but the access to their creative solutions and IP would ultimately allow Bosch to continue its technological leadership position.

The externally focused RBVC unit was of course not designed for a direct impact on Bosch's internal capacity for innovation. Therefore, and in order to support the ongoing change inside the corporation, a wide range of internal innovation programs had been introduced over the past few years to encourage employees to get involved in corporate entrepreneurship.

3.1.3 Building Bosch's Internal Innovation Capacity – A New Business Model Framework

Over the past decade, large corporations had increasingly begun to implement internal entrepreneurship and corporate acceleration programs, often relying on approaches such as lean startup and design thinking, to drive business model changes and capitalize on the digital transformation. Likewise, in Bosch employees were encouraged to create corporate startups, supported by a diverse set of innovation programs.

Apart from individual business divisions that might drive projects of their own interest, internal startup activities were structurally and financially supported through several central initiatives and programs that had mushroomed over the past five years. To foster the successful integration of those programs, Simons' Corporate Innovation Department had strongly driven the creation of the Bosch Business Model Framework (refer to Figure 3.2).

For example, both the Acceleration Program and the *Grow* startup platform had emerged as independent programs, yet fit greatly into different phases of the framework. While the former was more geared toward the customer validation phase, the latter dealt more with the customer creation phase. According to the Corporate Innovation Department, lacing those initiatives into the framework could be a useful first step to align the various programs toward the overarching goals of stimulating more internal high-potential business ideas.

While early on, the process had consisted of only four major phases—ideation, preparation, validation, and scaling—in 2018 the incubation phase was added, when the company realized that additional processes are needed to allow the startup teams more time between the validation of their business model and the scaling of activities.

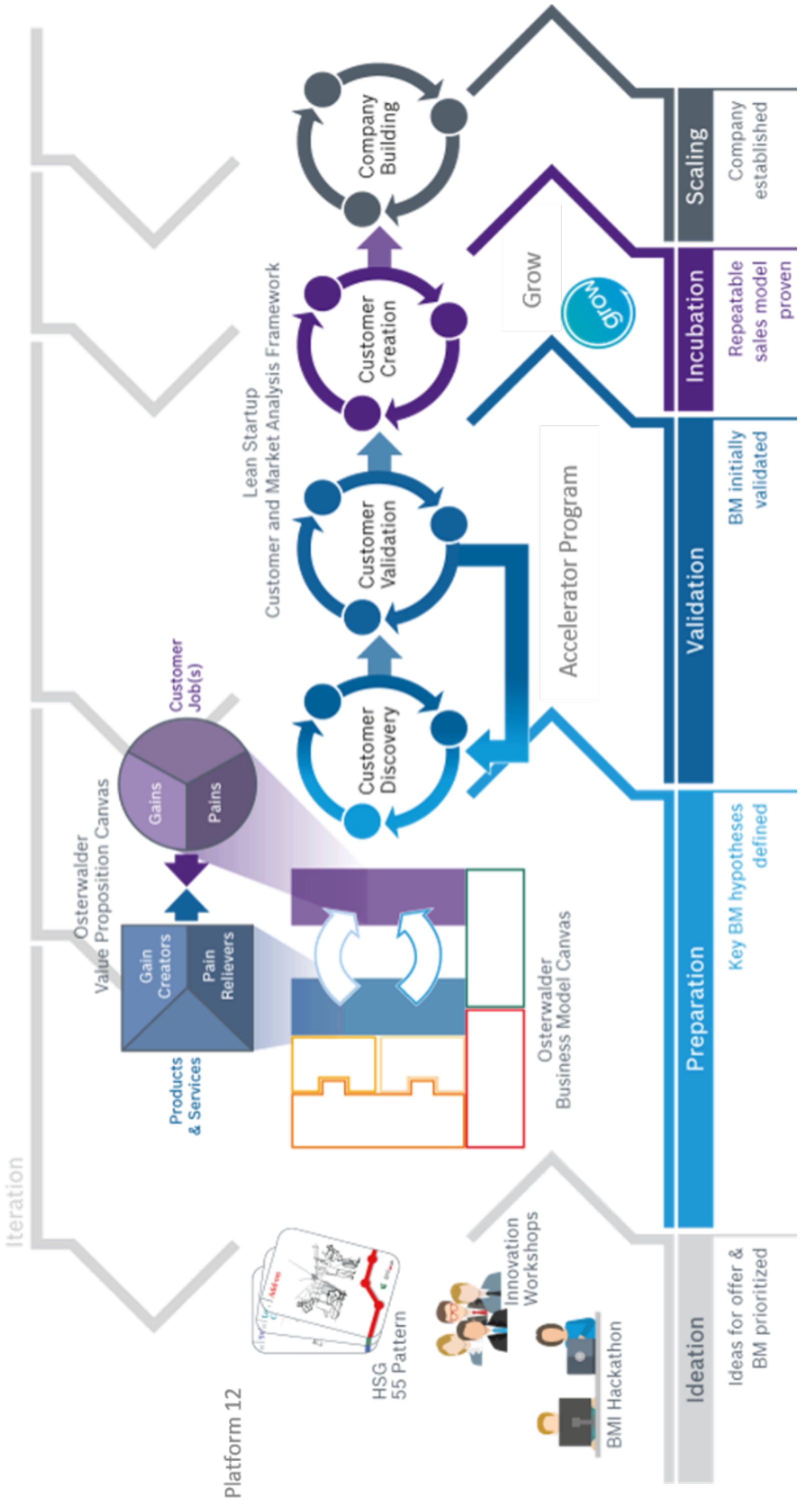

Figure 3.2. *Bosch Business Model Framework. (Robert Bosch GmbH, 2018a)*

As the startup teams were highly encouraged to pivot their ideas along the process, the development framework was not strictly sequential, but could be iterative—much in line with the fast and efficient evaluation philosophy of the lean startup approach. Each phase of the Business Model Framework required specific goals to be reached by the startups. To get there, particular innovation programs offered support to move along the development cycle.

Ideation Phase

Fostering initial idea development and prioritizing ideas were the main tasks in the ideation phase. Broadly defined search fields indicated the strategically interesting areas for innovation. Similar to prominent tech titans from the Silicon Valley ecosystem, employees at the corporate research site were encouraged to spend 10 percent of their weekly working hours on projects that fell outside their ordinary job.

Following the trend of co-working and maker spaces, Bosch had designed Platform 12 at the top floor of the Bosch research campus in Renningen to foster ideation outside of the job environment. The space was optimized for experimentation and creativity (refer to Figure A.1) (Bosch Media Service, 2017). Lego and modeling clay were arranged next to power tools and 3D printers. Quiet corners invited to collect thoughts, whereas a small grandstand offered place for open discussions. Whiteboards helped capturing ideas and LCD screens allowed for presentation of initial findings. Marie Thomson, innovation manager at the Research & Development site in Renningen, commented:

Freedom is a precondition for the stimulation of innovation. At the Platform 12 researchers come up with ideas they didn't even look for.

Employees from all over the company could hand in their ideas. Business Model Hackathons and innovation workshops helped to structure and prioritize those initial ideas.

Preparation Phase

In the subsequent preparation phase, ideas were further elaborated by defining key hypotheses around the business model and developing a first draft of the Business Model Canvas—a one-page summary of business model hypotheses. The canvas—a prominent tool in the wider startup community that allowed visualizing important aspects of a company, divided in nine components highlighting how the company would create, deliver, and capture value (Osterwalder & Pigneur, 2010). Compared to traditional business plans, the Business Model Canvas brought several advantages: it was fast, it allowed to focus on the essence of the business model elements, and it was portable, i.e. easy to share with others.

First customer contacts facilitated the formulation of initial hypotheses. In addition, the Value Proposition Canvas—another toolkit from the Strategizer group, i.e. the same team that also developed and promoted the Business Model Canvas—helped to further structure the ideas around core value creation hypotheses.

Based on the Business Model Canvas and early customer explorations the Corporate Innovation Department would then preselect ideas that could move forward into the validation phase, i.e. enter the Accelerator Program. Upon acceptance, the original idea providers were expected to create a team that would work full-time on driving their project through validation.

Validation Phase – The Bosch Accelerator Program

The goal of the validation phase was to gain specific market knowledge by talking directly to potential customers in the market. Initial business model hypotheses could thus be tested and adapted. This process was mainly supported by the Bosch Accelerator Program that had been launched in January 2017 and was headed by the Corporate Innovation Department. With the introduction of the Accelerator Program, the Bosch Group intended to combine product innovation with a stronger focus on business model innovation.

Dr. Volkmar Denner, CEO of the Bosch Group, highlighted the holistic innovation goals behind the Accelerator Program:

> *We will focus on more than just products. We want to encourage our associates to turn more of their attention to new types of business models. Product innovations are important, but alone won't be enough to ensure our company's continuing success.* (Robert Bosch GmbH, n.d.)

The focus on the idea's business model was an important design element of the Accelerator Program (Robert Bosch GmbH, 2016b). Not only were participants selected based on their initial Business Model Canvas, the program's philosophy centered on core elements of the Lean Startup approach, encompassing the first two phases of Steve Blank's Customer Development Framework (Blank & Dorf, 2012):

- Getting out of the building and talk to customers, suppliers, partners
- Testing business model hypotheses
- Validating a scalable business model
- Building of a minimum viable product demo
- Looking for a repeatable sales process

The program aimed at increasing the attention to the commercial aspects of new products in an environment that was traditionally shaped by engineers and developers. The program design philosophy was to simulate the constraints of a typical startup and thus create an authentic environment for entrepreneurs who needed to validate their business model within a short time.

In terms of structure and support, a hybrid approach was chosen, including on-site support from internal business model experts, as well as off-site support from Berkeley's Haas Business School. Over the course of an eight-week program, the projects were driven to a first go/no go decision (refer to Figure 3.3).

The first phase of the Acceleration Program started with a two-day kick-off meeting, in which an introduction to Lean Startup was given, and the teams pitched their ideas and initial hypotheses. In the following weeks, face to face customer interviews helped to get to know the new markets. Each week, two experts from Berkeley-Haas provided further input with regards to methodology, and the corporate startups had to regularly demonstrate their progress in short presentations. Feedback and further guidance was provided during individual coaching sessions with the experts.

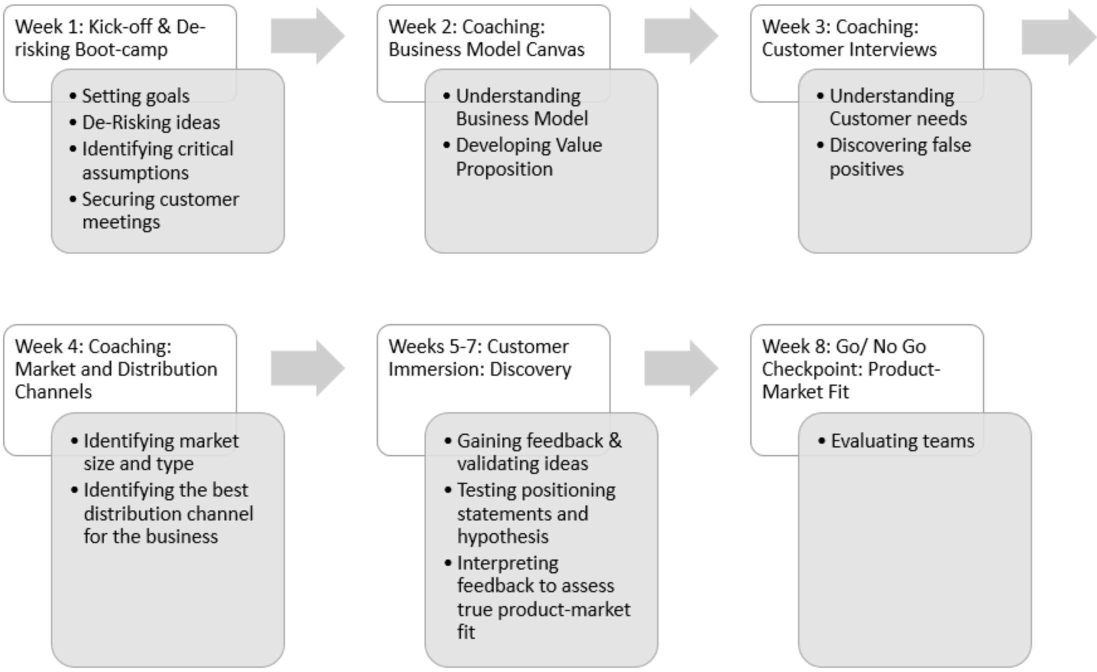

Figure 3.3. *Timeline of the Bosch Accelerator Program. (Own representation based on internal company documents)*

By the end of the initial eight-week long phase, a total of 100 interviews had to be conducted. The result provided a decision basis whether the individual ideas were worth pursuing. At the closing event, the final Go/ No Go decisions were taken. Communication in between the kick-off and the closing event took typically place via Skype to keep the effort low and flexibility high. Teams were thus able to fully concentrate on the project and the customer interviews. It also allowed running the program at scale across all geographical regions of Bosch operations.

Teams that were selected to continue entered the second phase of the program in which a Minimum Viable Product was tested with target customers, and first customers were acquired, all to test core business model assumptions. During the second phase, a total of 200-300 face-to-face interviews had to be conducted. In this phase, the KPIs that determined the decision whether or not to incubate the startup project depended on the following considerations: Is the business model testable? Is the project repeatable, scalable and profitable? Does the project still fit into the strategic portfolio? Is there an appropriate team behind the solution?

In general, the program helped to significantly reduce the time for new product development. Promising ideas were selected early on whereas irrelevant topics were stopped before a high amount of money was invested as Michael Wilson, member of the corporate accelerator team, commented:

> *The main benefits from a strategic perspective of running a corporate accelerator program is that we really only look at ideas that are beyond the core business, and to essentially have a test based strategy. So, strategy is really about choosing where you want to play given the competences you have, and we can test those strategies quickly to see not just if the strategy is accurate, but if we can actually create business models in that space that are profitable scalable and repeatable also from a finance perspective. It's a way to look at ideas beyond the core quickly and efficiently.*

Although the program was originally initiated in Germany, it soon expanded across Bosch globally. Cohorts started several times per year in Europe, South America, and Eastern Pacific. By January 2019, the sixth global cohort would start, making it close to 500 Bosch associates that have evaluated new business ideas.

Each local batch began with around 20 projects. Typically, only one or two projects would survive the two phases of the program, which was not that surprising given the overall low numbers of survival in early entrepreneurial exploration.

Incubation Phase – The *Grow* Startup Platform

Projects that moved into the incubation phase, needed to focus on establishing reliable processes and defining the requirement on the organizational structure. The ultimate goal was to find a suitable exit format for subsequent exploitation.

Projects with strategic fit with a business unit would typically be taken up by that unit and further developed there. Startups that did not have a direct strategic fit with any existing unit within the main company had the option to find a structural home at the Startup Platform *Grow*, a physical startup hub located in Ludwigsburg, Germany, close to the Stuttgart headquarters. While in the initial phases, the startups were usually structurally separated from the core company to allow for greater flexibility and speed, the final goal of the incubation phase was to closer integrate the startups to benefit from synergies with the parent company.

Grow had launched in December 2013 as a 100 percent subsidiary of the Robert Bosch Group. Being physically separated from the main sites, the platform had established an entrepreneurial environment for employees. Flexible workspaces and creative design elements as were characteristic for startup factories and co-working places around the world, helped to create an alternative work environment for the projects at *Grow* (refer to Figure A.2) (Robert Bosch GmbH, 2018b).

The *Grow* building experienced reconstruction in 2018, to offer enough place to its various events and activities and to accommodate several startups at once. In order to make full use of the capacity, remaining places could be rented out to internal Bosch project teams. Culture-wise, the platform differed significantly from the main corporation. There was no such thing as a dress code: jeans and sweater were just fine. In colorful letters, the values of the platform were attached to the wall: open communication with regular feedback, and flat hierarchies!

While being hosted at the platform the startups still had the opportunity to access corporate resources and competencies. In addition, the platform's own service portfolio included central functions that the startups were not yet able to take over in the beginning: e.g., controlling, legal support, HR management, marketing, and office management. Additionally, internal coaches helped to further develop the ideas. The experts together with external mentors were equally part of the startup's steering committee, making decisions about the future directions to take.

As capacity at *Grow* was limited, only few startups were typically selected. Before getting accepted, teams had to run through a *Grow Discovery* program, in which they were taught the principles of running a startup and how to refine their ideas. Emil Meier, CEO of the *Grow* Platform, described the selection criteria for the Startup Platform as follows:

> *Our goal is to develop new fields of business in new markets at Bosch, so the criteria are clear: Interesting for Bosch in the long term, profitable, and globally scalable. In addition, we need a core competence at Bosch so that it makes sense to put the idea into practice here rather than somebody else being better able to do so than us.* (Robert Bosch GmbH, 2017c)

The teams located at the *Grow* platform got a different work contract, signaling their unique status, which both increased flexibility, yet also brought in some pressure onto the teams to solidify the start-up operations for financial sustainability. In 2018, a bonus system was introduced in order to create incentives for corporate entrepreneurs. Having reached a predefined three-year goal, the teams would be able to get an additional bonus on top.

Grow got budget allocated from the Bosch management board to keep its activities running. By the end of 2018, Bosch had invested millions in the startup platform. However, despite the investments and the favorable environment offered, most startups ended up being discontinued after only few years. Together with the *Grow* team, a restructuring of the system was currently under discussion to tackle this particular challenge.

For the time being, there was little to no direct connection between the Accelerator Program and *Grow*. However, both programs saw opportunities for alignment. *Grow* perceived it as useful to have startups first validate their business model in the Accelerator Program, while the Accelerator Program would benefit from being able to push out more of their projects to the startup platform as intermediary incubation phase between validation and scale.

Scaling Phase

During the final phase of the Business Model Framework, the startup was expected to scale up its activities and set up a formal organization, which would mean that a stable state of operations was established. However, few startups inside Bosch ever reached this stage. There was no dedicated program designed to support startups in scaling. Requirements and needs of each startup were rather individual and very difficult to generalize. Instead, startup teams typically fought hard to find help and expertise throughout the company.

The difficulty of these initiatives to take root were not necessarily surprising.

Over the past decade, the Bosch Group had experienced first-hand that entering new markets and dealing with radical innovation was related to high risk. In particular, for engineering-driven companies that strive for perfectionism with little room for failure, the conditions of extreme uncertainty make potentially disrupting innovation a culturally hard objective to achieve.

3.1.4 Challenges of Corporate Entrepreneurship Within Bosch

In order to be able to make a well-founded decision, Rainer Simons had sent out his support team to conduct a number of interviews with various parties directly and indirectly affiliated with the existing innovation initiatives. He could rely on both reports about exemplary cases that had come out of the Bosch Business Model Framework and interviews with Bosch internal units.

The Case of *Alpha*

Alpha was founded by two engineers that had the vision to create a new approach to last-mile mobility. The team had started at *Grow*. Based on several customer interviews, the first product idea had been quickly developed. However, pressure to swiftly move forward was high, as one of the co-founders explained:

> *We were only about to validate our business model when they already asked us to prove future revenues of 100 Mio Euro. Impossible to predict at this point in time.*

After a few months, the *Grow* platform had decided to stop supporting the team, and the search for alternative exit options had started. Even though the team wished to spin out the company, they were ultimately not able to do so:

> *I have a family and three kids. From a financial point of view this was not possible.*

As investment costs were assumed high and direct strategic fit to other business units inside Bosch were not given, the company's internal interest to acquire the startup was limited. Finally, in 2017, the technology ended up being sold to a development partner. The co-founders agreed to leave Bosch together with their product, to join the new employer in the bike industry. Obviously, the transfer towards an external company did not come without difficulties.

> *Retrospectively, I wished for much more backing up by the company [Bosch]. For someone sharing experiences, in order to prevent us from making some major faults.*

Internally at Bosch, the sale was seen as a very successful exit. However, the company had not only lost promising technology, but above all great employees.

The Case of *Beta*

In the beginning of 2015, a group of five people from the Corporate Research Lab in Palo Alto came up with the idea of creating *Beta*, a technology to enter a completely new market for Bosch—the home robotics market.

Since the early beginnings, the startup team established its own culture and tried to set itself apart from the core company. Additional robotic engineers, as well as a CEO with startup experience were hired. Coming from outside, the CEO brought the needed experience and a different drive to run the business. He shielded the team from any interactions with the main corporation to make sure that the team could fully concentrate on the job:

> *We took the bare minimum of corporate policies that we needed to get along with the main company. We were aware that we technically worked for Bosch, but we weren't really familiar with much of its culture.*

This structural separation brought a range of advantage such as additional speed and flexibility. At the same time, belonging to one of the global leaders in technology, the startup benefited from financial support and guaranteed stability.

The team worked on first prototypes and grew to 15 people. By summer 2016, first products were completed and in 2017 they were presented publicly for the first time. The product attracted a lot of positive attention and was hyped in the media. By the end of 2017, first units were sold.

However, inside Bosch the startup struggled to get continued support. Voices had become louder, disseminating warnings of the missing strategic fit with Bosch's global business units as well as pointing to the high expenses. In July 2018, *Beta* had to announce its closure. At this point in time, the company had already grown to around 70 people.

The Case of *Gamma*

When traveling in 2013, Bosch associate Anna Janssen experienced the pains of people in developing countries not having hot water supply. She wanted to help. Working in the company's Thermotechnology Division at the time, Anna proposed a potential solution to her boss, and got green light to work on the project during her free time. From that point on, Anna stayed in the office for longer working hours, collecting lots of information about hot water in developing countries. As core tasks in the department required her full capacity, the project only moved slowly. In the meantime, the division announced a call for new business model innovations. Anna handed in her idea and got huge support from colleagues. She received budget and authorization to participate in the Accelerator Program to test the initial business model—a process of which she later commented:

> *Then the actual difficulties started. There was no incubation phase planned after the validation of the business model and I was quite on my own. In addition, my short-term assignment for this project officially ended and I was supposed to go back to my prior job*

As her division could not afford spending further capacity and money on the exploratory business, Anna had to search for support on a company-wide base. Budget allocation for growth projects usually took one year, which meant formal procedures were out of question. Due to the high visibility of the project, Anna finally managed to get some seed money assigned to continue the development of the business. However, difficulties continued:

> *Agility met reality: There are so many things that you don't know how to do. How can we register the units in the enterprise resource planning (ERP) system? Who is responsible if anything goes wrong? I had to handle all the questions. The business unit asked me to fill in thousands of lines to prove that everything is save. The team was confronted with all regulations that were not designed for the needs of startups. We had to request exceptions for everything. The creation of a purchasing process for our pilot for example, or the creation of part numbers in the ERP system. I was trying to use the normal processes, but they took too long.*

Given the additional barriers, it became too difficult to move forward with enough speed. The support by internal experts stayed limited with no official allocation. Anna felt left alone with her questions and concerns. By October 2018, Anna had little time left to prove profitability and scalability of her project, a daunting expectation:

> *I feel we are so concentrated on the operative processes that we might not even have the time for thinking about a strategy to scale the project.*

The whole team had put much effort into their startup project. However, being an entrepreneur in a corporate environment proved tough and little rewarding.

Project Integration as a Cultural Challenge

Simons appreciated the insights his team had collected and the honesty with which some of the intrapreneurs reported on their struggles. First and foremost, their stories were a great testimony for the innovative and creative force of Bosch associates. Employees valued the opportunity to get out of their ordinary routine and develop their own ideas, providing encouragement for the continued efforts of Simons' department.

However, people also made clear that often their professional outcomes were not as exciting—a fact also highlighted by program managers like Michael Wilson:

> *It has not been a challenge to get people to think entrepreneurially. Where we run into issues is this second step when moving from validation to incubation and then going back into the organization. You have to start dealing with the core business, core processes and that's where the issues begin. There's a danger or at least a risk that you demotivate your employees if you haven't solved that structural question of how an idea moves back into the core business.*

Subsequently, managing the continued trajectory of projects was a key item that managers like Wilson were working on. The Accelerator Program was looking for new ways to find their surviving projects a structural home within Bosch, in which they could build reliable operational processes and structures:

> *We are working on this actively: What happens after you exit the accelerator? It is not necessarily the case that you're ready to immediately jump into a scaled-up business. We have this incubation space now that we're working to create so that they have time to really build up customer demand, start building this repeatable sales process that later then they could integrate back into a scaled-up business. Bosch does scale really well. The challenge is getting from this early version to scale. I think that is a common problem for a lot of businesses.*

A major headache, for example, for many projects appeared to be the questions of back integrating into one of the corporate business units that would subsequently finance the further development and growth of the project. Many ideas coming out of the different programs were ideas that did not fit the core business model of Bosch. IoT business models, for example, had a tendency to cross several domains, thus making it particularly difficult to garner the interest of a business unit. This posed a challenge for the overall corporate innovation strategy. On the one hand, teams were asked to create disruptive innovation and enter new markets. On the other hand, startups that did not exhibit direct strategic-fit for Bosch were often stopped before the idea could be realized.

Highly innovative projects that were unable to secure a sponsoring business unit could, however, also apply for money from the corporate growth fund. This fund was allocated on a yearly basis by the Bosch management board to development areas of strategic importance. Decision authority over project-level allocations was with the

Strategy Department – New Business. However, as common in corporations, annual budget cycles were applied to most investment decisions, which occasionally led to deadly delays of urgently needed investments. Even if a team successfully validated a new idea and brought evidence of a repeatable and scalable business model, it might still end up having troubles to procure timely funding and meet overly high management expectations, as one of the startup teams pointed out poignantly:

> *They have unrealistic expectations for internal startups. They expect break even within two years and a revenue of 100 Mio. Euros. On the other hand, the company is not willing to invest an adequate amount of money. Looking at the external startup environment that's not how it goes.*

Apart from questions of strategic fit and securing internal growth funds, the corporate environment also created particular challenges for employees to act like entrepreneurs in the first place: hierarchical and political constraints hindered quick decision making, especially as the entrepreneurial spirit and expertise within business units was not as far developed as it was in the various support programs. Several of the intrapreneurs had voiced their frustrations:

> *The continuous control from outside bothers us a lot. You need to grant entrepreneurs enough authority. If you have the courage to be entrepreneur, you don't want people to continuously tell you what to do.*

Entrenched corporate processes that were necessary to guarantee quality and reliability of the core corporation got sometimes in the way of fast progress. One employee described the pains he experienced when ordering parts for the development of a prototype. Being part of the company, the team had to stick to the official purchasing processes. However, as the company had never bought those particular parts before, there was no established process in place. It took several months before the team finally got the needed parts and was able to continue the development. Simons realized that problems always came back to a clash of cultures between the established organization and the newly setup businesses. An employee had commented:

> *At the end it is always culture that decides on the impact of a new business. It determines which innovations go through after all.*

In order to not only see the startup perspective, but also understand how those projects interfaced with Bosch-internal processes, Simons had collected opinions from different departments within Bosch.

For example, the department for innovation accounting and control had provided the typical evaluation criteria for internal startups. In their model, internal investment decisions typically depended on well-established indicators, such as market size in billions of euros, total net sales, payback period in years from project start and synergies with the existing business, corroborating the comments of the corporate entrepreneurs on unrealistic expectations. An employee of the corporate innovation department explained:

> *We still have not been able to come up with a satisfying solution on how to effectively evaluate internal startups. We typically focus more on incremental innovations where we know the market, the customers, as well as the technology. In this case we can assess everything. Of course we can determine how the project develops over the next five years. The risk is low.*

Traditional evaluation criteria derived from incremental projects in the core business no longer held when dealing with radical innovation. Product-market decisions for many of the entrepreneurial projects involved high uncertainty. The management control team was still busy with figuring out how to adapt the indicators to the divergent requirements.

Simons' documents also unveiled the perspectives of several of Bosch's internal business unit owners, who underlined the difficulty for managers to let their staff spend time on innovative projects that were not directly related to their core business. Especially when employees participated in the Accelerator Program the home department suffered from limited capacity, as the missing headcount could not be replaced during this time.

For example, individual business units had profit & loss responsibility, which limited their motivation to spend money and capacity for the development of new products or services that would only pay off in a few years' time. Most investments only paid off in a few years' time. In particular, operative departments barely saw the need for additional innovation programs. Instead, the initiatives were perceived as cost drivers:

> *Business units at Bosch have great problems accepting internal startups, especially when the new business still requires investments and doesn't generate any revenue.*

Simons noticed that his team had focused a lot on the operational challenges and less on the ecosystem impact and internal generation of human capital and entrepreneurial capabilities. In fact, Bosch had accumulated substantial experience and visibility through its various initiatives. Simons clearly saw the spirit and the expertise that the innovation team had built up over the past few years around how to operate and structure internal entrepreneurship and innovation. The multi-year investment had led to tremendous potential and the creation of internal talent that was key for a continued renewal of the corporation.

As a benchmark, Bosch did not need to hide. The successful implementation of a wide range of programs and infrastructure projects had created global visibility—both internally and externally. Bosch was creating intrapreneurs at all of its major sites, and the various programs brought frequently external visitors—both academic and corporate—who were curious to learn about the Business Model Framework. Simons' unit regularly received invitations to send a speaker to a conference or a panel discussion on how to design modern corporate innovation, providing credibility and legitimacy for its collective efforts.

3.1.5 The Future of Corporate Entrepreneurship at the Robert Bosch Group

Rainer Simons was still as enthusiastic as on his first day about the ambition level of his unit and he was proud of the company-wide visibility they had achieved in such a short time. Yet, he wondered whether the positive image and the creation of new talent would be sufficient to further justify the investments that exceeded several millions each year.

One of his biggest concerns, apart from the several operational issues, was that so far, the renewal of the company through radical innovations generated by internal startups remained somewhat elusive. Too many of the projects coming out of the two core programs were not as disruptive as hoped and the survival rate, i.e. a successful back-integration into Bosch core business, was so low that he wondered how to make the case for a continuation.

Simons had to determine what to suggest in the upcoming management meeting. He was acutely aware of any implications that major strategic shifts would bring, not only for himself but also for his employees who had spent a lot of effort on creating and running programs like the Accelerator Program—*the* flagship program for corporate innovation at Bosch. What was the best way forward from here?

3.1.6 Exhibit - The History of the Bosch Group

In 1886, the company was set up by Robert Bosch as "Workshop for Precision Mechanics and Electrical Engineering" in Stuttgart, Germany. Robert Bosch focused on precision mechanical and electrical engineering work and soon presented a magneto ignition device for a stationary engine. The first magneto for automobiles followed, establishing the company as the major supplier for the automotive industry.

When the first Bosch company was founded outside Germany in 1898, the way into the global market was paved. Shortly after, sales offices opened in other European cities and later on, all over the world. As automobiles became more and more popular, Bosch launched new products such as a lighting system to make driving safer, consolidating its position as a technology supplier for car manufacturers.

The First World War interrupted the growth of the company, which switched operations to military production. Numerous associates were sent to the front and never returned. After the war, despite increased competition Bosch worked off its innovative strength and further expanded its product portfolio. From 1925 on, assembly lines were introduced and manufacturing became faster and cheaper. The diesel-injection pump that contributed to the company's great success was invented in 1927.

During the Second World War, Bosch again switched its operations to military production. Forced laborers from the occupied territories replaced the associates that had to fight at the frontier. Many of the production facilities were bombed and Bosch lost the international sites. The post-war period was devoted to reconstruction. In 1942, Robert Bosch had died but left the company with clear vision and wishes how to re-build. It took decades until international sales were back at pre-war levels.

In the 1950s, the company began to sell consumer products such as kitchen appliances or car radios. Bosch also re-emerged as a major automotive supplier through its electronic components.

From 1960 to 1980 the company transformed its structures and turned into a diversified group with different divisions, adding sectors such as packaging technology. The number of employees increased constantly. Bosch invested in a new research center in order to be able to further focus on its innovative strength. Technologies such as the antilock braking system (ABS) and the lambda sensor shaped the company's success until today. By 2018, Bosch faced new challenges: getting prepared for automated driving, smart homes and autonomous communication were of utmost importance to guarantee continued innovation leadership and business (Robert Bosch GmbH, 2016a).

3.2 B Case

At the management meeting Simons presented his proposal as planned. After an extensive round of discussions, the board of management took a number of program alignment decisions, which coincided with a more profound strategic reorganization effort at the corporate level. Over the next year events evolved rapidly and several departments, including Simons team faced fundamental changes to make the innovation system more effective.

3.2.1 Restructuring of the Corporate Headquarter

In January 2019, the Board of Management announced the restructuring of the Bosch headquarter, which equally included Simons Corporate Innovation department. The measures entailed the bundling of several central departments to combine skills and processes.

Simons department was merged with other innovation teams to form a large innovation consulting unit. Under the umbrella of this new consulting unit, the individual teams (e.g., User experience, Business Model Innovation) largely retained their independence, and covered innovation services for different stages of a project's maturity.

Since the Accelerator Program was recognized as a valuable program that had contributed to save a double-digit million euros amount over the past years, it equally remained in place and retained its responsibility for the validation of new business ideas. In addition, a group of experts developed within Simons team whose main focus was on the validation and implementation of digital business models in order to explicitly support the company's transformation towards the IoT domain.

3.2.2 An Upgraded Bosch Innovation Framework

As part of the restructuring, Bosch rolled out the Bosch Innovation Framework (BIF) on a company-wide basis. Most centrally managed innovation programs were now bundled in this joint framework. That also meant that certain additional innovation initiatives at the business unit level were eliminated to ensure a unified process.

The upgraded BIF described the lifecycle of innovation projects. Several departments drove its creation jointly. It was a recombination of complementary approaches, and incorporated knowledge and practices from the participating departments such as user experience, business modeling and engineering. A major advantage of the BIF was to create a common innovation language and make innovation investment decisions more transparent, consistent, and evidence-based. This proved particularly important for cross-unit collaboration.

The new BIF process was organized into eight different phases from *Strategic Framing* up to the successful *Market Introduction* (refer to Figure 3.4). It was intended that each innovation project would run through the entire framework. Maturity and quality gates after each phase ensured the synchronization of parallel processes such as sales, purchasing, and manufacturing, and help comparing the individual innovation projects. Each gate included several criteria that were fully transparent to everyone involved. Ideally, an innovation team was supposed to only enter the next phase if all previous and current criteria were met. However, practically, it would still remain at the discretion of each responsible organizational unit to define how gates and criteria were implemented, and how the assessment was executed.

As a result of this streamlining effort, the new ideal innovation funnel looked as follows:

- During the first two phases of the BIF, strategic search fields were defined and problem spaces were determined, in which unsolved customer problems should be identified. To narrow down the scope of innovations and ensure a fit to the company's future strategy, the corporate strategy department communicated a limited number of clearly defined search fields that were all playing into the company's transformation.

- During the ensuing two phases of concept ideation and concept preparation, specific customer problems were further fleshed out, and newly formed teams began to formulate initial business model hypotheses.

- The concept validation phase served to subsequently test the business assumptions, and allowed the teams to decide whether their business model is repeatable, scalable, and profitable. The validation phase was driven by the Accelerator Program of Simons' department. As envisaged in the previous framework, teams that had successfully validated their business model would move on to incubation. Since the reorganization of the innovation system, the individual program managers worked closer together, coordinated their actions, and even ran certain events together.

- As before, the *Grow* platform took over the incubation phase in which the goals was to build a repeatable sales process, and ultimately find a "happy home" within Bosch before developing the offering for the mass market during scaling phase.

- The BIF ends with the continuous deliverance to the mass market.

An employee who was deeply involved in the creation of the BIF explained:

Over the entire development duration, the framework gives the organization an orientation about the success of the project's business model. This allows us to stop the development early on if necessary, and thus have a higher capital efficiency.

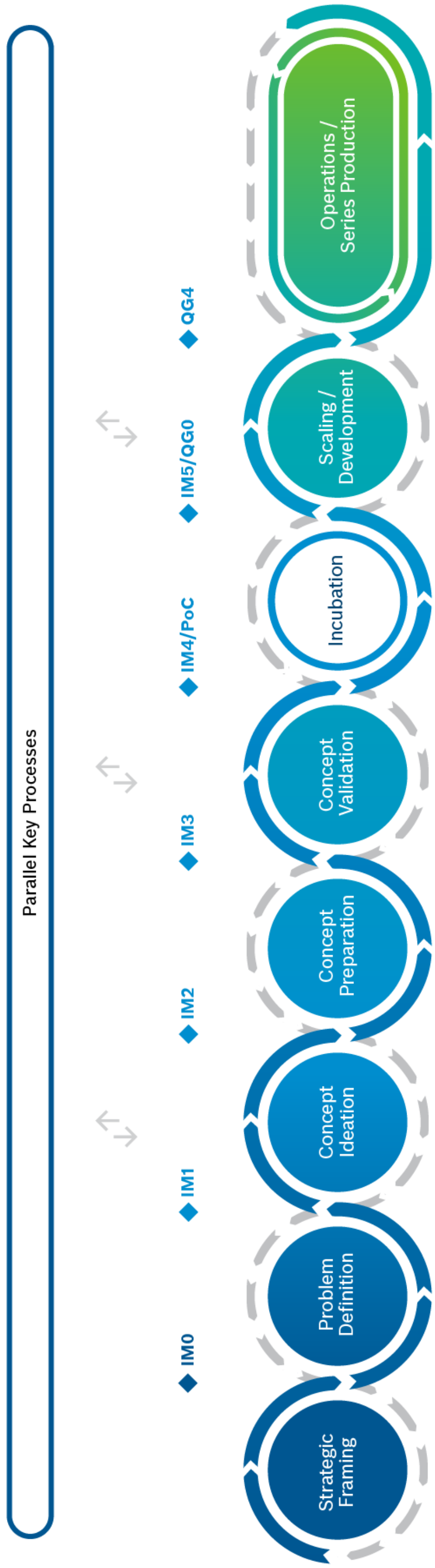

Figure 3.4. *Bosch Innovation Framework. (Robert Bosch GmbH, 2019a)*

Grow 2.0

The Board of Management equally decided to redesign *Grow*, the company's incubation platform. The international innovation hubs in USA, Brazil, India, China, Japan and Germany that had been established since 2012 were joint into a single innovation network (refer to Figure A.3). They were now working closely together in a tight network with a common strategy, funding mechanism and methods.

The newly set up *Grow* program was strictly in line with the BIF. A sophisticated reporting system was introduced to further structure the incubation program. A consolidation of the program brought several advantages such as a global portfolio in strategic fields, the avoidance of duplicated projects, as well as increased efficiency of innovation funding.

In the course of the restructuring, personnel changes were also implemented. An external CEO for *Grow* was hired to manage the newly established incubation platform. As a former serial entrepreneur, the new CEO not only brought in fresh ideas, but also added an external unbiased perspective to the evaluation of internal ventures. Expectations were high that the new platform will finally raise successful business:

> *I think that Grow has the problem that they didn't develop a really successful business yet. That's just the way it is. Everyone is looking for a cool track record to present.* (Internal consultant for digital strategy)

Further Organizational Refinements

At a the level of Bosch's business divisions, efforts were made to further bundle innovation initiatives and become more efficient. Experts from the home of innovation and startup department that used to support the automotive electronics business division, expanded their scope and joined the *Grow* platform to offer their services cross-divisionally.

In parallel to the internal reorganization, Bosch tried to further open up and increasingly partner with startups in the field of sophisticated high technology products. Open innovation experts from Robert Bosch Venture Capital drove this topic with strong enthusiasm. By fall 2019, they had managed to create a community for several hundreds of startup partnerships across the globe. At Bosch's internal innovation conference, a manager for strategic partnerships and innovation proudly proclaimed:

> *Partnering is the new competitive advantage!*

3.2.3 New Challenges Ahead

Despite all preparatory measures, Rainer Simons saw the hard times that lay ahead for Bosch. In 2019, the economic decline of the more traditional elements of the German industry had started to become visible. Consequently, the company's innovation system was further under pressure to deliver while at the same time it became even more difficult to free up money for exploratory projects that would not yield an immediate return. One of Bosch's intrapreneurs explained:

> *Our project died because the division needed a restructuring. They stopped every project that was not generating revenue.*

Entirely new business models with high impact were still rare in Bosch. However, management was still willing to invest in important fields of innovation to secure future developments. AI for example was identified as a key competence field, and a dedicated center for artificial intelligence was established.

There was no doubt that Bosch must brace itself for huge challenges ahead, but Rainer Simons was confident that the company's ability to continuously review and optimize its innovation and entrepreneurship systems would help the company to prevail and remain one of the leaders in the high-tech sector. He planned to initiate a strategy retreat soon to brainstorm with his team what was next on the agenda to assure that his convictions would turn into reality...

3.3 Teaching Notes

3.3.1 Brief Summary of the Case

By 2018, the Robert Bosch Group was widely acknowledged as one of the leading companies in the technology industry worldwide. With its largest business sector "mobility solutions", the company mainly acted as a first tier supplier, offering high quality products to OEMs in the automotive industry.

Recent changes in the main business sector, coupled with the intention to enter into new fields, asked for strategic reorientation of the company. Whereas in the past the company mainly acted as major supplier of components for the high technology industry, the focus increasingly shifted towards supporting traditional products with digital and connected solutions. During the previous five years, the company had thus invested a significant amount of money in corporate entrepreneurship initiatives with the aim to stay at the cutting edge and foster a strategic renewal process. The company's approach to corporate entrepreneurship was two-fold.

Internally, the Bosch Group encouraged employees to think entrepreneurial and develop own ideas in forms of internal startups. Various support vehicles were implemented on a company-wide basis. The case describes the development of the startups along the newly created Business Model Framework that offered different instruments across different phases like ideation, preparation, validation, incubation, and scaling. The most central internal program is the Accelerator Program, a two-phase approach to validating a startup's business model.

Externally, Robert Bosch Venture Capital, the company's venture capital arm, screened the market to invest in promising startups that strategically fit Bosch's portfolio, a rather established mechanism, well known from traditional approaches to corporate innovation.

Contrary to the expectations of management, scaling corporate startups turned out to be highly difficult and so far, most projects ultimately were discontinued. As high amounts of money were already spent and employees involved in respective activities got increasingly frustrated, the company feels pressured to question its current approach.

For a meeting with the managing directors of the individual innovation programs, Rainer Simons, head of Corporate Innovation, was assigned to present a concept of the reorganization of corporate innovation and entrepreneurship at Bosch. A decision is needed whether the company will continue its current approach, or whether a new route must be chosen. Different alternatives will have implications on a company-wide level.

3.3.2 Case Structure

The hook introduces the student to ultimate decision problem and the core problem owner Rainer Simons. From there the main body of the case starts with a brief introduction of the company, followed by the industrial landscape and the positioning of Bosch Group in this context and why the company has embarked in installing a number of innovation and entrepreneurship programs. The case then describes in chronological order how different mechanisms and programs came into existence along the so-called Business Model Framework, and ultimately exposes the expectation-performance gap. Evidence from the view of different stakeholders is provided for different types of problems that may explain part of the performance issues. The case ends with the open question of how to move forward.

3.3.3 Immediate Issue

A revision of the corporate innovation programs in 2018 revealed a lack of performance of the different support vehicles that were initiated within the past five years. Whereas numerous internal startups were created, only few of them scaled. Simons was assigned to develop a concept on how to reorganize corporate innovation in the future. Pressure is high as lack of efficacy and success might not only result in the loss of money, but also in increased frustration of the employees.

3.3.4 Basic Issue

The basic issue is to create awareness for the major difficulties that large corporations may encounter when designing efficient and effective innovation programs. Driven by current developments such as growing competition, shorter product life cycles, new business models and an overall threat of potential disruption, companies are forced into constant renewal in order to keep pace. The case underlines the challenge of organizations to transform their traditional culture and develop new processes to encourage corporate entrepreneurship and to create truly innovative outcomes.

3.3.5 Suitability for Use (Audience)

This case is largely aimed at university-level teaching. Typical courses include Innovation Management, Corporate Entrepreneurship, Innovation Strategy, and Management of Technology. General knowledge on entrepreneurship and/or innovation is recommended, which makes the case particularly suited for MBA and MSc students in entrepreneurship and innovation specializations. The case is likewise suited in executive programs.

The case offers a medium level of difficulty. Whereas the problem and the decision situation are well defined, no solution is given.

3.3.6 Feedback from Previous Teaching

This case has been tested several times in different teaching contexts and was adapted on the basis of the feedback received. Overall, the response was extremely positive, as our students could easily relate the case issues with the experience in their own professional contexts. Based on our teaching experience with the case, we strongly encourage a focus on the cultural debate of corporate innovation since it has stimulated interesting discussions during our case try-outs.

3.3.7 Data Collection

The material was collected from more than 80 interviews with company employees who were directly involved in the innovation programs, managers who have a holistic view on corporate entrepreneurship initiatives, as well as external experts who add nuanced view-points. Further information was derived from internal documents such as presentations and white papers, as well as public articles and press releases. To collect background knowledge, the Bosch website (www.bosch.com) was used to supply further details.

3.3.8 Teaching Objective

The case should guide students to understand and learn the following central aspects:

1. **The challenges of corporate entrepreneurship.** Students should recognize the complexity to create internal startups and develop them vis-à-vis corporate constituents. Students should understand that a major difficulty is the cultural differences between the established large corporate culture and the entrepreneurial approach to creating new business through fast and “scrappy” experimentation.

2. **The difficulties of continuous corporate renewal in established industries.** While introducing incremental innovation is perceived as fairly easy, creating fundamentally new products and entering new markets, however, entails a significant risk and the possibility to fail. It also typically is a game for the long haul, requiring substantial investments. Students should realize that the high-tech manufacturing industry is extremely sensitive towards failure; perfection and high standards are important, which poses challenges for entrepreneurial approaches.

3. **The need to have a clear strategy to corporate entrepreneurship.** Students should distinguish between different forms and tools that corporates

can use to stimulate innovation, for example corporate accelerators and incubation programs that have become increasingly popular over the past years. They will also better understand how to leverage these for staying innovative, and what are the typical challenges in that, like missing the expectation to generate truly novel ideas.

4. **The tension of matching innovation management designs and tools to a company's strategy.** Students should understand the underlying goals behind an innovation program (human resource management tool versus strategic innovation) and be able to determine its implications for the choice of high-level means.

3.3.9 Suggested Student Assignments & Class Discussion Questions

1. What are the specific tools Bosch currently uses in its innovation management? How well are the individual initiatives aligned?

2. What does Bosch want to achieve with its entrepreneurial initiatives? How do you evaluate Bosch's current approach? What are strengths and weaknesses? What role does culture play in the development of new business? What kind of innovation is supported through the current approach? How does this match the company's innovation goals?

3. If you were in Rainer Simon's position, what way forward do you see to develop the company's entrepreneurial approach? What are key factors that you would

consider in your decision-making, both from the perspective of Simons and his superiors?

4. How should the company (re-)structure the current system for achieving its goal to introduce truly disruptive innovation and guarantee constant renewal? In your answer, please indicate the main capabilities and processes that Bosch should aim to maintain or build up and specify why.

3.3.10 Optional Questions to Use in Class

Several backup questions can be used to direct the debate in case the discussion slows down:

1. What are current challenges in the high technology industry? Why does Bosch feel pressured to rethink its current approach to innovation?

2. What are challenges and opportunities of corporate entrepreneurship? In your answer, please decide between implications at the organizational level (e.g. rigid processes), as well as on the individual level (e.g. risk aversion).

3. How does the company define its innovation culture? How well are the innovation tools matched to support this culture? (This questions can be asked to support Q2.)

4. How would you prioritize measures to innovate the innovation process? (This question can be asked to supplement the key decision-making question.)

5. What should be the key goals and the philosophy of an established industry player such as Bosch in designing an innovation and entrepreneurship strategy to maintain technology and innovation leadership in today's environment?
   (a) What do you see as key criteria in building innovation and entrepreneurship strategies specific to the nature of an established company?
   (b) Is there a one type solution fits all, or what are key contingencies to take into consideration?

3.3.11 Suggested Readings

In order to support the case discussion and, if intended, to also provide a more academic view on the matter at hand, we suggest that students might want to prepare selected readings from the options provided below. This literature is optional and not necessarily required for the case discussion. The suggested readings may also prove useful when the case is assigned as an analytic exercise with a written assignment.

We created a selection of potential readings with either more academic or more managerial focus, fitting different student audiences. We indicate briefly key reasons for why this paper might be useful. Of course, we recommended picking only a select few from the provided list, depending on the specific focus the class session.

General Motivation and Introduction to Corporate Venturing

Pisano G. (2019). The Hard Truth About Innovative Cultures.

The paper helps students understand the nature of innovative cultures, and why such cultures are indeed desirable but very hard to create and sustain.

Corbett, A. (2018). The Myth of the Intrapreneur.

This paper emphasizes that game-changing innovation needs to be supported by systems, structure, and company culture. Students will read about crucial components of a companywide innovation management system, as well as with the particular needs of innovation professionals.

Pisano, G. (2015). You Need an Innovation Strategy.

The paper underlines that for creating a capacity to innovate, companies need an innovation strategy that is closely linked to the business strategy and the core value proposition. Students will learn that depending on the strategy, a company will focus either on technological or on business model innovation.

On Organizing Different Innovation Vehicles

Shankar, R; Shepherd, D. (2019). Accelerating Strategic Fit or Venture Emergence: Different Paths Adopted by Corporate Accelerators.

This paper explores how firms design and run corporate accelerators and discusses their effects. Two distinct approaches are identified: accelerating strategic fit or accelerating venture emergence. Students can discuss the influences of strategic posture and investment time horizon on the outcome of corporate accelerators.

Brigl, M.; Roos, A.; Schmieg, F.; Watten, D. (2017). Incubators, Accelerators, Venturing, and More.

The paper introduces diverse innovation vehicles that are used to create growth outside the core. Students can discuss the differences between the individual innovation vehicles and their respective application.

Anthony, S.; Duncan, D.; Siren, P. (2014). Build an Innovation Engine in 90 Days.

The paper describes how to set up a reliable and strategically focused innovation system. The students can collect inspiration on how an effective innovation program could look like. Furthermore, the paper sensitized for obstacles that must be overcome.

Burgers, H.; Jansen, J.; Van den Bosch, F.; Volberda, H. (2009). Structural Differentiation and Corporate Venturing: The Moderating Role of Formal and Informal Integration Mechanisms.

This paper discusses the optimal set-up for new businesses in existing organizations. Students will be able to understand the differentiation—integration dilemma and collect arguments for a potentially advisable structural design of internal ventures.

Chesbrough, H., & Appleyard, M. (2007). Open Innovation and Strategy.

The paper demonstrates the importance of complementing traditional business strategy with open innovation approaches. Students could conclude that Bosch needs to open its innovation system to expand into new business areas.

3.3.12 Additional Background Literature

The following books provide further optional background.

1. Gans, J. (2016). The Disruption Dilemma, The MIT Press
2. Christensen, C. M. (1997). The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail. Cambridge, MA: Harvard Business Review Press.
3. Christensen, C.M. and Raynor, M.E. (2003). The Innovator's Solution: Creating and Sustaining Successful Growth, Boston, MA: Harvard Business School Press.
4. Ries, E. (2017). The Startup Way. How Entrepreneurial Management Transforms Culture and Drives Growt, London (UK): Penguin Random House.

3.3.13 Optional Video Material

These are optional videos that the students can watch prior to case discussion. They are not essential to discuss but provide some additional background information to the case.

1. **A culture of innovation – Bosch history** (3:56 min) Available at Youtube - https://www.youtube.com/watch?v=5dEO31vjVGo

   The video shows the company's ambition for a culture of innovation. Students understand the high importance that R&D plays for Bosch.

2. **Bosch Research / Grow – Bosch's Startup Platform** (3:11 min) Available at Youtube - https://www.youtube.com/watch?v=udmZ95pv4LY

   A startup owner reports about his experiences with the Grow platform. Students will see the importance that is attached to market investigation and solving real customer problems.

3.3.14 Potential Teaching Approach and Time Plan

Based on several trial runs we propose the following teaching approach and time plan:

0 - 5 min	Video
5 - 20 min	Case introduction
	PART A:
20 - 60 min	In class discussion Q1 & Q2
	PART B:
60 - 120 min	Group preparation for debate Q3 & Q4
120 - 160 min	Presentation, discussion, and voting round
160 - 180 min	Wrap-up and closing remarks

1. The students are asked to read and prepare the case before class.

2. You can open the class discussion by asking whether students know any Bosch products, e.g., ignition plugs, sensors, injection technology, power tools, washing machines, etc. You may want to show one or two videos to the class, in order to introduce the transformation the company is currently going through:

   The Internet of Things presents – #LikeABosch (1:24 minutes)

   Available on Youtube: https://www.youtube.com/watch?v=v2kV6pgJxuo

   This video presents Bosch as an IoT company with a range of connected products. The video is part of a campaign that aims at modernizing the company's image.

   Dr. Volkmar Denner: Shaping Change (2:21 min)

   Available at Youtube - https://www.youtube.com/watch?v=cKsjlGZPBug

   In the video Dr. Volkmar Denner, CEO of the Bosch Group explains that the digital transformation, affecting markets and competitors, represents an opportunity to shape the future. Students learn that the effects can be felt throughout the whole company.

3. Ask the class for a brief summary of the case and case issues; clarify any open questions.

4. The first two case questions (Q1 & Q2 from the suggested student assignments) should be discussed in class during an open debate. Suggested answers for each question are given in the subsequent section.

5. The next two questions (Q3 & Q4 from the suggested student assignments) can be prepared in smaller groups. This way, students get the opportunity to discuss issues in greater depth and focus on aspects they find particularly interesting. After the groups prepared their arguments they can be asked to present them in class and discuss Q3 & Q4 in the larger class setting. At the end of the debate the students are asked to vote on proposed ways forward.

6. You can wrap-up by summarizing the underlying learnings from the case, and give a short outlook where the journey might go in the upcoming years and introduce the B-Case as follow-up.

Optional Alternative Teaching Approach

As an alternative to the teaching approach proposed above, it is equally possible to discuss Q1, Q2 & Q3 in class and switch to group work for Q4. For this last question, it is suggested to have an even number of groups that are assigned either the role of the board members or the role of Rainer Simons. The small teams prepare the suggestions from the respective points of view and later come together to play the board meeting and discuss.

3.3.15 Detailed Discussion per Question

Question 1

What are the specific tools Bosch currently uses in its innovation management? How well are the individual initiatives aligned?

The first question is a warm up question. Students should mention the Business Model Framework, that guides the startup along the development phases and bring up specific tools used by the company. For a structured discussion, the instructor may use a whiteboard to allocate tools to the individual phases of the Bosch Innovation framework or a more general innovation funnel (refer to Table 3.1):

- **Platform 12:** A creative area on top of a major R&D site. Workbenches, material, and state-of-the-art technology to allow to work on own ideas.
- **(Business Model) Hackathons:** Two day events with the goal to develop new ideas for given topic. Cross-functional teams are working together on customer-oriented products; they exchange, get inspired by experts, and present own ideas.
- **Innovation Workshops:** Individually organized by departments, with a focus on finding answers to specific problems through an entrepreneurial approach.
- **Division of work time:** Employees are allowed to spend 10 percent of their working hour on ideas outside their actual job.

- **Accelerator Program:** A two phase program, based on the lean startup approach, to evaluate the viability and scalability of a new business model. Employees are in particular asked to verify that the product solves a real customer problem.

- ***Grow* Platform:** An incubation platform for startups and Bosch innovation teams, offering an entrepreneurial environment and experience, knowledge and resources.

Table 3.1. *Bosch Innovation Program.*

Phase	Ideation	Preparation	Validation	Incubation	Scaling
Tools	Platform 12, Hackathons, Innovation Workshops, Division of work time	Preparation of business model Canvas	Accelerator Programs (based on Lean startup principle)	Grow Platform (based on contemporary agile and lean startup development methods)	n/a

In addition to the central innovation initiatives, Bosch provides other local offerings, designed to support specific regions or business units. For example:

- **Home of Innovation and Start-ups**, a platform hosted by Bosch's Automotive Electronics unit. Teams benefit from a co-working area and a maker space for prototyping. During its annual pitch night, employees compete for one year of funding and access to the platform's service offering.

- **RADAR (Research And Development Americas Region)**, a regional innovation activity launched by Robert Bosch North America, to investigate new business fields in the respective region.

Students might point out that the initiatives lack an alignment and projects do not easily transition from one support program to the next. That means, for example, startups that completed the two phases of the accelerator program do not automatically get into the Grow platform but might need to find their own way through the corporate jungle.

Closing remark: There are numerous innovation tools available to introduce an entrepreneurial culture. However, the majority of initiatives is offered during the initial development phases only. For later-stage projects, support diminishes.

Question 2

What does Bosch want to achieve with its entrepreneurial initiatives? How do you evaluate Bosch's current approach? What are strengths and weaknesses? What role does culture play in the development of new business? What kind of innovation is supported through the current approach? How does this match the company's innovation goals?

Innovation Approach

In times of quickly changing markets, new competitors, as well as emerging technologies and business models, a company needs to encourage innovation to flourish over the long run. Through various entrepreneurial initiatives, Bosch tries to create radically new ideas, with the aim to diversify from its core business.

As the company recently announced the goal to develop into an IoT company, entrepreneurship helps to build up new competencies. Furthermore, the initiatives support the personal development of employees that get offered additional learning opportunities and have the change to live out their creativity. On the long run, entrepreneurship programs can be seen as chance to attract talents in times of high competition for skilled labor (refer to Table 3.2).

The students should highlight the fact that the company has various approaches to innovation, including technology sourcing (Robert Bosch Venture Capital), the creation of internal startups (Accelerator Program, Grow), and internal R&D.

Table 3.2. *Strenghts & Weaknesses of the Current Corporate Innovation Approach.*

Strength	Weaknesses
• Dual approach focusing on acquisition and internal creation of startups • High internal R&D strength • Employees get the chance and needed freedom to work on own ideas • Availability of supporting programs suсh as Accelerator Program • Structural separation of startups enabled through grow Platform • Stimulation of an entrepreneurial mindset • Recognized the need for business model innovation in quickly changing environments • Innovation programs focus on customer feedback instead of technology-push	• Prioritization of core business over new business when allocating rare resources • Difficulty to find a structural home for disruptive startups, no commitment • No clear communication of strategic search fields that could guide employees in their search for new ideas • Missing coordination of activities. No process that guides startups from one phase to the next • Lack of clear metric for startups with specified deliverables for next stage • Missing incentives for cross-innovation through direct profit and loss responsibility of managers • High financial pressure and time constraints for internal startups

Students should understand the general challenges of entrepreneurship in a traditionally grown and large corporation. Bureaucracy and politics slow down the development process, creating barriers for individuals to develop entrepreneurial capabilities (Kirsner, 2018). Students could bring up *risk aversion, fear of failure, and the fact that entrepreneurship is not yet recognized as career pathway.*

During the discussion, a special focus can be placed on the Accelerator Program praised as flagship of the organization's entrepreneurship initiatives:

- Through the creation of test-based strategies and step-wise processes, the company evaluates ideas quickly and efficiently and removes uncertainties early on.
- However, most projects coming out of the Accelerator Program are not yet ready to actually operate at the scale levels needed for the integration into a particular business unit.
- Additional incubation is needed which requires extra capital. As central funding usually works in annual cycles and with clear budget owning business units, it can become particular difficult for projects to secure timely follow-on funding.
- For IoT business models the problem gets intensified as respective projects usually cross different domains and nobody feels responsible for an idea that goes beyond the core business.

The students should point out that Bosch mainly focuses on its own capabilities when introducing disruptive innovation. Technology acquisition is merely seen as a side activity by the company. The VC branch continuously screens the market and undertakes minority investments in promising companies. However, the outcome is purely financially driven, and startups are usually not incubated into the core organization—an approach students should question. *For extended discussion, the instructor can further address the ideal setup of a corporate venture capital unit (Ernst, Witt, & Brachtendorf, 2005).*

Some students might approach the discussion from a human resource point of view and thus consider the person-related effects of the innovation programs. In this case, the focus will largely be on the positive implications such as the stimulation of an entrepreneurial mindset, as well as the attraction of talent through the company's reputation as an interesting employer. Corporate innovation programs can drive cultural change by fostering learning through failure, and encouraging a good balance between accountability and collaboration (Christensen, Raynor, & McDonald, 2015).

Role of Culture

Culture seems to be a rejecting force within the company. It is defined as a set of shared norms, values, and assumptions (Schein, 1996). Over the past century, Bosch has developed its own culture that is difficult to change. Highly innovative startups on the contrary, follow their own culture that stands in strong contradiction to the established culture. This clash of cultures makes it difficult to integrate the new business into the company. Lou Gerstner once concluded that "culture isn't just one aspect of the game, it is the game" (Gerstner Jr, 2003). Successful ventures usually manage to understand the existing culture, seek anchor points and ultimately enrich the company with their own individual cultural aspects (e.g., Leiting et al., 2020).

Innovation Outcomes

The third part of the question refers to the kind of innovation that is supported through the company's current approach to innovation. The instructor should verify that the participants have a clear and common understanding of innovation and its main categories. Innovation can be defined as "an idea, practice, or material artefact perceived to be new by the relevant unit of adoption" (Dewar & Dutton, 1986), and is broken down into incremental, radical and disruptive innovation.

- **Incremental innovation**: Minor improvements or adjustments in current technology. Examples include the introduction of Coca-Cola Zero as an extension to the current product portfolio.

- **Radical innovation**: Fundamental changes in technology, focusing on long-term impact. Examples include the iPhone which significantly shaped the smartphone market.

- **Disruptive innovation**: Changes in how a technology is used in a business context (Christensen et al., 2015). Examples include video streaming services such as Netflix.

The students should understand that all types of innovation are important, but they have different targets. Incremental innovation for example targets existing customers, while others might aim at an entirely new market (O'Reilly & Tushman, 2013).

The instructor should then ask the students what kind of innovation is supported through the Bosch programs. Here are some potential answers that students can bring up:

- The company wants to implement new ideas, but instead focus on ideas that are close to the core sector.
- A short-term vision to innovation is adopted even though a long term vision is needed for implementing radical innovation.
- A 8-week program is too short to assess whether an idea has the potential to disrupt.

The Bosch Group wants to stay up-to-date with the latest technology and therefore pursues various approaches to introduce innovation. Students should recognize that despite all effort, the company struggles to incorporate truly disruptive business. One could argue that the current approach favors slight changes in the form of incremental innovation.

Closing remark: There are different angles to look at the company's approach to innovation. When considering the innovation tools as a human resource initiative, offering employees the opportunity for learning and creativity, the company is doing a very good job. From a strategy point of view, however, the company does not achieve its goals of creating truly new business, nor address the issues of potential disruption and corporate renewal as stated in the overall motivation.

Question 3

If you were in Rainer Simon's position, what way forward do you see to develop the company's entrepreneurial approach? What are key factors that you would consider in your decision-making, both from the perspective of Simons and his superiors?

Depending on intentions of the session and contributions by the students, we see four major alternatives potentially emerging in the discussion:

1. **Discontinuation:** Close down the internal venturing initiatives and focus on technology acquisition
2. **Continuation:** Maintenance of the current system with more patience and review in a couple more years
3. **Re-focusing & alignment:** Better aligning the internal processes and moving toward more open innovation practices instead of internal only
4. **Re-structuring:** Strictly separate organizationally the venturing initiatives

For each option, we identified challenges and opportunities displayed below. Of course, additional possibilities to develop the corporate entrepreneurship system can be considered and discussed in class, notably how some of these options overlap and require a shift in Bosch's general approach to its corporate renewal.

Alternative 1: Discontinuation and Focus on Technology Acquisition

The company might be better off focusing on its core activities and stop all internal entrepreneurship programs. Instead, it could acquire external startups and technology through the Robert Bosch Venture Capital to introduce radically new innovation.

In that scenario, the current initiative to create internal startups would have been a short-lived experiment to get employees involved and push disruptive innovation based on the company's own resources with the result of abandoning the initiative:

- Ideas submitted by numerous employees would no longer be accepted.
- Simons would need to search for a different position, as the Accelerator Program and all other internal innovation programs would seize to exist.
- Likewise, various program managers would need to find new job opportunities—possibly outside of Bosch.

This would come at the clear risk of ultimately jeopardizing Bosch's reputation as an attractive employer. It would also be a bold move considering that many other companies were building internal corporate accelerator programs and Bosch's program had achieved quite a bit of outreach and setting an example.

Technology Acquisition

The acquisition of small technology firms is an important source of knowledge for established firms (Puranam & Srikanth, 2007), yet often challenging as well (Graebner, Eisenhardt, & Roundy, 2010), so students may also question how this will enable Bosch to pursue its ambitions.

Table 3.3 shows some aspects that students might bring up:

Table 3.3. *Challenges & Opportunities of Technology Acquisitions.*

Challenges	Opportunities
• Might involve high costs • Pressure to detect interesting companies faster than competitors and major venture capital firms • Risk of overpaying for resources • Powerful sellers that can reject unattractive offers • Integration vs. autonomy dilemma • Limits the chance for internal creativity which might affect the employer image	• Avoid time-consuming and uncertain process of internally developing technological resources • Increase market power through new technology • Gain valuable resources • Gain access to new markets • Eliminate potential rivals • Introduce innovative culture of young firm • Focus on the core strengths (exploit)

Ask the students to equally consider the goal of the acquisition. You can point out that acquirers can leverage technology in two distinct ways. They may leverage:

- Existing knowledge ("What they know"), or
- Capabilities for ongoing innovation ("What they do").

As a function of the goal of acquisition, the integration strategy is determined to maximize innovation returns. Structural integration helps leveraging existing knowledge, but limits the exploitation of innovative capabilities (Puranam & Srikanth, 2007). Some products or services can be directly integrated into established business units to leverage existing knowledge; other projects need to stay separated to protect their innovative capabilities.

Students could discuss the consequences of the acquisition of small companies by large firms. What can be done with the fact that the founders will leave the business? How to make sure that the young firm won't be directly killed by the corporate environment?

Alternative 2: Maintenance of Innovation Programs in Their Current State

An alternative is the maintenance of innovation programs in their current state, resting on the hope that it is just a matter of time until the considerable effort and expenses involved would prove worthwhile. Students could argue that:

- Ideas for truly novel and disruptive products and services are rare and need time to be developed and grow. Given the fact that it takes up to 10 years before a startup is profitable (Schroter, 2018) and that in general nine out of ten startups fail (Patel, 2015), the current results of the internal venturing programs are not surprising.
- The company should stick to its two-fold approach of investing in external startups while independently supporting the internal creation of new business.
- To increase the overall probability to find a unicorn, employees might even get encouraged to submit even more ideas.

However, students should point out that the status quo is not sufficient as the board of management had asked for a rational cost-benefit analysis, and a further elaboration of a clear innovation strategy that yields desired outcomes will become essential (refer to Table 3.4).

Table 3.4. *Challenges & Opportunities of Maintenance.*

Challenges	Opportunities
• Board of Management clearly asked for a change of the current system • On the long run, the company might not be able to successfully guide the transformation and lose track of its competitors • Employees might get increasingly frustrated and the company could lose its reputation as an excellent employer	• The company might lose time by changing the status quo • Changing the status quo might confuse employees who got use to the current innovation system • The current system did not yet have the chance to prove itself. It might flourish within a few more years.

<u>Alternative 3: Internal Alignment of Initiatives and Open Innovation</u>

A third alternative would involve the internal reorganization of the innovation programs as well the increasing collaboration with external parties such as partners, customers, educational institutions, and startups.

The company has initiated numerous independent programs to support internal startups in different development stages. However, it seems that there is little connection between the individual programs. Especially during incubation phase, the internal startups are often left alone as there is a lack of expertise within the company on how to proceed.

Clearly, there is a need for internal reorganization of the programs. The company has to adapt the initiatives to the needs of startups. A respective reorganization could include:

- **Creating a flexible stage gate model** with clear deliverables that guides the startups form one phase to the next one.
- **Adaptation of the budget allocation**, decision taking and regulation to the needs of young businesses.
- **Establishing realistic performance expectations** so that startups are not nipped in the bud prematurely.
- **Defining strategic search fields** and clearly communicate to match the innovation outcome to the company's needs (Garvin and Levesque 2006).

Whereas on the one hand, the startups should not focus purely on opportunities that are far from the firm's main business, on the other hand, startups are still intended to generate new business for the company. The balance between the two extremes is seen as key success factor (Hill & Birkinshaw, 2014).

Internal commitment can be encouraged through an early involvement of the acquiring business unit. Managers that allow employees to devote time to the development of new ideas must be compensated. The points mentioned above can be used as starting point for discussion. The list is not complete and should be expanded by the students.

Open Innovation Approach

The discussion should also focus on the implications of a more open approach to innovation. An open approach to innovation could improve the overall quality of the innovation outcome as external knowledge is captured and an entrepreneurial spirit is introduced. The involvement of external parties could be intensified through an increased collaboration with RBVC who had already established valuable contacts.

This aspect becomes particularly important as the company wants to develop towards an IoT company, which asks for increasingly flexible and individualized solutions. Students should discuss the additional value created through innovation communities and collaborative initiatives, and recognize the opportunity for creating new business models through an open-dominated approach (Chesbrough & Appleyard, 2007).

For example, the involvement of external parties could be intensified through an increased collaboration with RBVC and its established contacts. The students could also think about opening the Accelerator Program to external startups who would bring own ideas and get access to experts from the high technology industry. Of course, creating value through collaboration also bring challenges of capturing this value (Chesbrough, Lettl, & Ritter, 2018) (refer to Table 3.5).

Table 3.5. *Challenges & Opportunities of Open Innovation.*

Challenges	Opportunities
• Disclosure of internal information • Might involve high costs • Difficulty of attracting and retaining contributors • Main focus might remain on incremental innovation • Capturing the value that is created through collaboration	• Brings in data, information and knowledge to improve quality of innovation outcome • Speeds up the innovation process • Recruitment option: bringing in new talent • Projects that do not solve a concrete customer problem are stopped early on as customers and partners give feedback • Creation of new business models

Alternative 4: Strict Separation of Startups in an Independent Unit

Students could also consider the strict separation of the startups from the core business through the creation of an independent unit and a spin-off option for employees (refer to Table 3.6).

Through an independent unit the company would radically reorganize its current innovation structure and find a new approach to corporate venturing:

- Support could be provided through the different innovation programs that would be revisited and adapted.
- An integration mechanism would ensure that the startups would find a happy home inside the company.
- If reintegration was not an option, the startup could spin-off and look for external investment. In this case, the founders would leave the company and

pursue their startup activities with a personal stake in the outcome. A license agreement would regulate the ownership rights of the technology.

The instructor should ask students for the ideal set-up of an independent venture unit (integration versus separation):

- Structural differentiation facilitates the creation of new businesses in existing organizations. The parent company might be forced to increasingly view the acquisition process through the lens of a venture capitalist, who invests and competes for startups. Students can argue that separating corporate ventures from the parent organization protects them from any obstructive influences. Ventures benefit from greater flexibility and local adaptability (Burgers et al., 2009).

- Students could point out that a strict separation might lead to diverging goals and prevent synergies with the parent company as well as mutual learning (Jansen, Simsek, & Cao, 2012). The challenge of developing ventures in separate units comes when integrating the new business into the company and new cultures clashes with the old (Garvin & Levesque, 2006).

- Game-changing innovations might require a holistic approach across the organization, not isolation from the rest of the organization (Corbett, 2018).

In this connection, the spin-off of startups should be equally discussed. A spin-off is a "new business formation based on the business ideas developed within the parent firm being taken into a self-standing firm" (Parhankangas & Arenius, 2003, p. 464). Students should point out the difficulties of searching for external funding.

In addition, employees would need to resign and leave the company in order to further build up the new business. Considering the fact that employees usually seek for security and stability, there might be resistance among the employees towards a spin-off strategy.

Table 3.6. *Challenges & Opportunities of Independent Venture Units.*

Challenges	Opportunities
• Implies high risk for employees • Integration dilemma • Loss of talent in case the team decides for a spin-off • External investors are resistant to invest in corporate startups • Startup team might need to pay high licensing fees as the technology officially belongs to the parent company • Loss of technology and knowledge in case the startup is pursued outside the company • More to benefit from synergies between startup and parent company	• Protects startups from parent company and gives the needed freedom to prosper • Avoids not invented here syndrome as business units are no longer forced to take up the startups • Startup teams have a personal stake in the outcome • Possibility to find the best organizational set-up to grow the business • Startup is not pressured to match the current competencies of the company which might produce more disruptive outcome

Considering the Interests of Different Internal Parties

After discussing different alternatives, the students should have a good notion of different options and their particular implications. Of course, the path forward is also impacted by the interest of different parties:

- **Rainer Simons:** Rainer Simons generally wants to continue the Accelerator Program. He appreciates the high motivation that employees have put in the innovation activities. However, Simons might think about adding a third phase in the form of an incubation program to further guide the startups after the validation phase and help them scaling their activities. Moreover, the program could be opened to external startups in order to introduce more entrepreneurial spirit, having the opportunity to learn from other entrepreneurs and interesting startups. Involving customers and partners in the innovation process would further increase speed and might provide higher quality products.

Students should map out the opportunities offered by restructuring the current approach to innovation and adding further elements.

- **Board of Management:** Simons superiors will be more concerned with seeing commercial output with respect to the investments taken. Despite the fact that they are not satisfied with the internal initiatives, they know about the high costs occurring when purely focusing on the acquisition of external technology. On the flipside students might bring up the internal resources that present a great potential. The company employs thousands of highly talented engineers, as well as business model and market experts that contribute to the development of new products and services. Students could argue that those competencies should be strategically deployed to enhance the company's innovative strength.

Closing remarks: Considering the points that will come up during the discussion, it will be difficult to find an optimal solution. Students should be able to conclude that the various alternative has pros and cons. They should further be aware of different interests being involved in respective decision taking processes, and the resulting political constrains.

Question 4

How should the company (re-)structure the current system for achieving its goal to introduce truly disruptive innovation and guarantee constant renewal? In your answer, please indicate the main capabilities and processes that Bosch should aim to maintain or build up and specify why.

Make sure that the students understood the implications of the individual alternatives and took different perspectives to the decision making process. At this point of the discussion, you can ask the students to vote.

Key Discussion

Underline that it is difficult to decide for a "one fits all" solution. Instead, a mixture of the four alternatives proposed might be the best choice.

Companies often aim at building innovation on their own. However, some capabilities are better acquired from the outside (Garvin and Levesque 2006). Students should point out that the company needs to clearly define which innovation is intended to be developed in-house, and what can be acquired. For the introduction of truly radical innovation, the company should increasingly focus on the acquisition of external technology. When recognized early, investments in potentially radical innovations can easily be used to support strategic renewal.

Students could argue that the company needs to take on a long-term perspective on innovation. A period of four years is too short to finally tell whether the individual programs turned out to be successful or not.

Students could recommend creating an open innovation program and encourage early cooperation with external parties to improve the entrepreneurial process.

A further option is to place the ventures in a separate venture unit in order to protect them during the initial stage. As soon as a venture has reached a certain maturity stage, it could either be integrated into the core company, or sold to an external party.

Considering the Type of Innovation Being Sought

When letting employees develop own ideas, it is essential to narrow down the search fields in order to somewhat guide the venturing process (Garvin & Levesque, 2006). Students need to understand the importance of such a clearly articulated innovation strategy that defines the type of innovation the company wants to pursue. A successful innovation strategy is linked to the company's business strategy and value proposition (Pisano, 2015).

The type of innovation sought by companies usually depends on different factors such as the industry the company is acting in. The speed of technology lifecycles for example significantly differs within various industries. Whereas some industries are fast moving, others are characterized by slow development cycles and incremental innovations; Some industries are driven by technological innovations such as blockchain or AI, others are rather driven by new market opportunities.

Considering the Alignment of Innovation Vehicles

The respective type of innovation being sought should be accompanied by an appropriate innovation vehicle. Innovation vehicles can be strategically classified depending on the proximity to the core business, as well as the time to impact (refer to Figure 3.5).

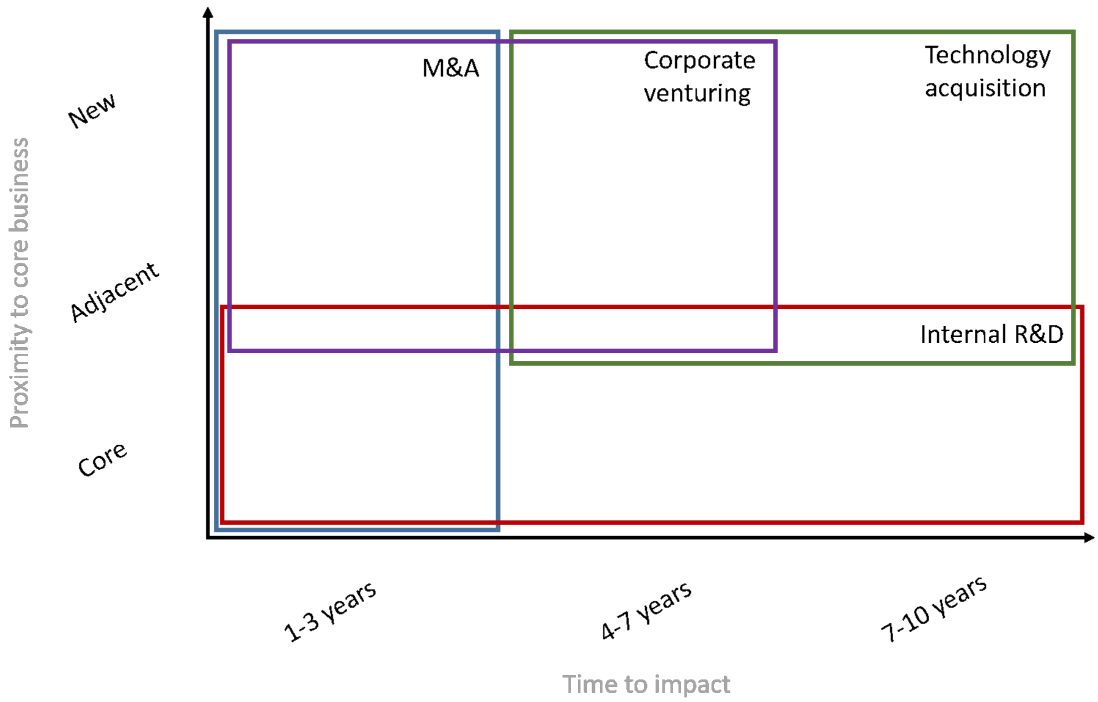

Figure 3.5. *Innovation Vehicles. (Simplified own illustration based on Brigl, M. and Roos, A. and Schmieg, F. and Watten, D. (2017).)*

- It can make sense to encourage the creation of internal startups in areas adjacent or new to the company, where the opportunity arises from a changing society and the focus lies on the development of new business models. In this case, the company has numerous experts at hand that know the company's main industries and are aware of the ongoing changes as well as the tools needed to respond to the particular developments. The Accelerator Program further helps to evaluate different ideas and creates a profitable and scalable business model around the new business.

- Internal product development on the contrary might be better suited for business that is close to the core, thus for innovation with an incremental character. Bosch has an extremely strong R&D department. As indicated in the case and in the video, the company has a "culture of innovation" and spends around 10 percent of its annual revenue on innovation. This set up allows the company to cover the development of certain products and services with its existing competencies.

- The cooperation with and acquisition of external startups is recommended for radical innovation, in areas adjacent or new to the core business that have a longer time to impact. Investments are made in an early stage. The sponsoring company is typically granting office space, technical support, mentoring and networks, as well as funding. Over time, the startup can be slowly integrated. On the contrary, when time to impact is close, the acquisition of developed companies with existing business is recommended.
- Finally, merger and acquisitions of established companies is recommended in areas adjacent or far from the core business, and with a time to impact that lies in the nearer future.

Typically, in established companies the different approaches to innovation often get mixed. Subsequently a one fits all program is developed, that is little adapted to the actual needs.

Closing remarks: Students should understand that companies do not need to exclusively decide for one approach or the other, but instead to find an equilibrium. Introducing a small number of disruptive innovation and simultaneously improving existing products might be a good way to keep pace with current developments on the market. Different types of innovation need to be leveraged through different innovation vehicles. A clearly defined innovation strategy helps employees to understand *the search fields for corporate venturing and develop ideas that are highly attractive to the parent company.*

3.3.16 Epilogue

In times of quickly changing environments and increased competition, established companies need to maintain a strategically valuable portfolio for long-term competitive advantage and performance. Bosch takes the upcoming challenges seriously. Different innovation initiatives such as the Accelerator program or the Grow platform reveal that the company is well on the way of driving the necessary changes forward.

Looking at the current innovation approach from a human resource point of view, the company already does a great job. Individuals are given the freedom to be creative and develop their own ideas. The high level of employee responsibility, coupled with the support provided through innovation experts, has a highly motivating effect. Although few ideas reach the stage of commercialization, the entrepreneurial initiatives bring great learning effects and support the personal development of Bosch's employees. To some extent, the acquired knowledge can even be applied to other areas in the core business. Not only internally, but also externally, the company is considered an excellent employer. The image video ("Like a Bosch") was another important step in attracting young, highly qualified talent, looking for a creative working environment.

From a strategy point of view, the company still needs to further define its goals regarding corporate innovation and adjust the applied tools accordingly. Over the last century, the individual divisions internalized a certain way of thinking that is limited to their particular “silo”. Bosch will need a more holistic approach to successfully drive innovation. The company needs to dissolve rigid structures, collaborate and exchange more, and build upon synergies. In order to align the company-wide innovation strategy, the central department has already decided to closer collaborate with other internal innovation leaders, such as Robert Bosch Venture Capital. Within the upcoming years, the innovation systems are expected to grow closer together.

The company used to have the tendency to shield itself from the outside world in order to protect internal research. Only recently, the advantage of incorporating external knowledge has been recognized. Especially in connection with the ongoing digital transformation, startups play an increasingly important role. First initiatives launched at Bosch include the creation of “Startup Harbor” or the grant of the open Bosch award. Startup Harbor is an incubation program located in Berlin, focusing on IoT business. The program aims at supporting talented external founders and building up bonds to young businesses early on. In 2018, a new subunit of Robert Bosch Venture Capital has been created. Goal was to particularly focus on open innovation and closer partnerships with external high-tech startups. One of their first initiatives was the introduction of the open Bosch award, which aims at awarding collaborations with external startups. Beside a financial reward, the winners attract high top management attention. A growing degree of openness will help the company when redefining their strategy to innovation.

First steps have been taken. Taking it up from there, Bosch will certainly remain one of the leading high technology companies of the 21st century.

4 | Successful Corporate Entrepreneurship: A Process of Acculturation Into a Corporate Logic

4.1 Abstract

Incumbent firms increasingly employ practices derived from the global entrepreneurial community to develop new innovative projects geared toward strategic renewal. Typically, the imported practices and logics differ substantially from traditional corporate logics. While prior literature has described how organizations can effectively blend different institutional logics and proactively use them, we know rather little about how a new professional logic with its own processes and practices can be introduced into a dominant organizational logic with corporate shackles regulating the creation of new market opportunities. We study this complicated process within the context of a large engineering and electronics company that has invested in corporate entrepreneurship programs to deal with the opportunities and threats of technological change in its industry sector. We find that a successful re-integration of

corporate ventures into a business unit depends on the capability for organizational acculturation. This research contributes to the literature on institutional logics by adding a new concept together with micro-level mechanisms that help explain the successful integration of new logics into an organization. We also add to the corporate venturing literature by offering theoretical insights on why practices and forms adopted from the entrepreneurial community do not easily result in new business.

4.2 Introduction

In today's world of digitalization, established corporations that have been successful over many years in their respective industries are challenged to engage in new models of innovation and to embrace completely different business models with new competencies. Incumbents experience pressure to compare their performance to businesses that have emerged from the community of digital entrepreneurs with valuations easily exceeding their own. Hence, many incumbents have begun to introduce practices from the entrepreneurship community to re-design or enhance corporate innovation and ultimately foster corporate renewal (Shankar & Shepherd, 2019; Weiblen & Chesbrough, 2015). Corporate accelerators and incubators that build on methods and tools inspired by the 'lean startup' movement have mushroomed (Felin et al., 2019; Hampel et al., 2020). These new organizational units subsequently impart design elements and decision heuristics on internal venture projects that represent the emerging professionalism in the entrepreneurship community, which has been called 'scientific entrepreneurship' in the academic literature (Camuffo, Cordova, Gambardella, & Spina, 2020; Grimes, 2018; Leatherbee & Katila, 2019).

However, in adopting these practices from the entrepreneurial community, new corporate units and their "offspring" projects significantly contrast the ingrained corporate DNA with its established sets of material practices, assumptions, and beliefs—typically shaped over the long history of the corporation. Based in the perspective of institutional logics (e.g., Friedland & Alford, 1991; Thornton, Ocasio, & Lounsbury, 2012) such grown organizational logics encompass a coherent set of assumptions and beliefs about what constitutes meaningful and appropriate action for and within an organization. Most of the received management literature on institutional logics takes either a resource dependency approach to describe how organizations are impacted by the logics of the institutes on which they depend (e.g., Pahnke, Katila, & Eisenhardt, 2015) or a contingency approach to describe how they cope with logics that compete (e.g., Pache & Santos, 2013) or complement each other (e.g., Besharov & Smith, 2014). None of these approaches is adequate for the described contemporary organizational challenge of creating and implementing highly entrepreneurial projects to renew a historically grown corporate business, i.e. the successful introduction of organization elements and practices based in a professional logic completely foreign to the central character and practices of the focal organization. Recent work in the inhabited institutions perspective, in which individual organizational members interpret and act upon logics (Binder, 2007) and purposefully use field logics to advance own goals (McPherson & Sauder, 2013), has shown that top management can strategically combine different institutional logics for organizational renewal (Dalpiaz et al., 2016). However, we lack a micro-level understanding of effective mechanisms through which organizational members can successfully interpret and act upon a novel (emerging) field-level logic (here, the logic that drives entrepreneurial ventures) and leverage it into successful projects within a dominant traditionally grown corporate logic (through integrating these ventures back in the company). This is the central research motivation in our paper.

We used the context of a large German engineering and electronics company to study this challenge. Due to significant technological and societal change in the automotive sector over the past decade, the corporation felt pressure toward strategic renewal. In particular, it aimed at building new business opportunities in the field of IoT—a sector with many players associated with the entrepreneurship community, such as Google and Apple vying for platform leadership in different IoT application domains. The corporation set up different acceleration and incubation initiatives inspired by scientific entrepreneurship tools, which allowed us to gather primary data on 31 internal corporate ventures. Interviews with various stakeholders as well as internal documents were used to describe the entrepreneurial logic of the projects and its deviation from the perceived corporate logic. In a second phase, we used an in-depth comparative case method (Eisenhardt & Graebner, 2007) on six extreme cases of very successful and unsuccessful cases to induce insights about how these ventures succeeded to create legitimacy amongst proponents of the corporate logic for a project that followed an entrepreneurial logic.

In analogy to the literature on immigration, we find that 'acculturation' (Berry, 2003; Berry et al., 2006) plays an important role in enabling ventures that are carriers of a strong entrepreneurial logic to successfully integrate into their mother organization with its own corporate logic. This process of organizational acculturation implies that first knowledge about the corporate logic needs to be 'acquired', then the new project needs to be 'anchored' in the corporate logic, and finally it needs to be shown how the dominant corporate logic 'accrues' new and important elements, i.e. gets enriched through this new entrepreneurial project. As a result, sources of legitimation of entrepreneurial projects for continued growth are derived from a skillful and agentic use of corporate material and symbolic practices. At the same time, applying the professional logics of the entrepreneurial community is necessary for receiving initial support—a challenging tension for corporate entrepreneurship leaders.

Developing new insights into this particular challenge allows improving our understanding of corporate innovation but also adds theoretical nuance to how organizations transform over time as they add new elements to their central 'character' (King, 2015; Selznick, 1957). Our findings extend the literature on institutional logics towards understanding how a completely new logic can be introduced in additive form to a dominant logic and which micro-level mechanisms play a role, i.e. we aim to build more knowledge about how organizational actors engage in activities that help change organizational practices. Through leveraging an institutional perspective, we also offer a theoretical explanation why practices adopted from the broader entrepreneurial community might not easily result in businesses that can lead to strategic renewal, a pertinent research problem in the corporate venturing literature.

4.3 Theoretical Background

Over four decades of research into corporate venturing and the adoption of entrepreneurial approaches to facilitate strategic renewal in corporations have consistently reported low success rates of corporations trying to create and grow corporate ventures into businesses (e.g., Burgelman, 2002; Campbell & Park, 2005; Gompers & Lerner, 1998; Hill & Birkinshaw, 2014). Our field research corroborates that the successful absorption and scale of corporate venture projects remains a central challenge. Surprisingly, only a handful of studies address this conundrum. Early works in the strategy literature have zeroed in on strategic fit, highlighting the necessary contextualization of venture versus corporate strategy and the role of 'entrepreneurially inclined technologists' and 'company sponsors' (Burgelman, 1983). More recently, Raisch and Tushman (2016) integrated the strategy perspective into the organizational ambidexterity literature to show how to orchestrate the structural interplay between entrepreneurial subunits, business units, and corporate headquarters. They propose that early on, corporate venture projects should emphasize differentiation from the corporate strategy while alluding to similarity in activities and capabilities of business units for which they might depend for resources. Later on, it becomes more important to emphasize the strategic alignment with the corporate while differentiating from the originally sponsoring business unit.

Collectively, the research has generated important insights into the structural aspects of the managerial challenge but has offered little theoretical underpinning of successful micro-level practices to sustainably grow corporate ventures. Furthermore, these lines of inquiry remain silent on the recently emerging quest for corporate renewal through introduction of projects with an explicit "misfit" with the existing corporate business model. Or, in the terminology of the institutional logics perspective, we know little about how to legitimize projects with very different logics vis-a-vis the corporate DNA, a traditionally grown corporate logic.

4.3.1 Institutional Logics and Organizational Processes of Transformation and Renewal

Along with the burgeoning pressure to develop new business models and expand their business activity to address technological and societal trends, established corporations have increasingly resorted to importing entrepreneurial practices and methods germane to the community of professional entrepreneurs into their innovation processes (e.g., Hampel et al., 2020). This means that corporations today do not only face the traditional challenge of finding structural homes for their new venture projects but also willingly import potential conflict through multiplicity of institutional logics—a cornerstone of the organizational logics perspective (e.g., Besharov & Smith, 2014).

The institutional logics perspective as a meta-theoretical approach has received heightened attention in contemporary research on the evolution of organizations and organizational forms as well as on decision-making in organizations (e.g., Almandoz, 2014; Besharov & Smith, 2014; Dalpiaz et al., 2016; Thornton et al., 2012; Tracey, Dalpiaz, & Phillips, 2018). Defined as 'socially constructed sets of material practices, assumptions, values and beliefs that shape cognition and behavior', institutional logics are 'taken for granted understandings of what is meaningful and appropriate in a given setting' (Thornton, 2004; Thornton et al., 2012). Different institutional orders such as 'professions', 'markets', 'families,' or 'corporates' are associated with their own logics, i.e. material practices, symbols, and narratives (Thornton et al., 2012, p. 11) that feed the specific logic of a focal organization (Dalpiaz et al., 2016). Typically, organizations need to respond to a multitude of institutional orders with their respective logics (Besharov & Smith, 2014), which most commonly presents integration challenges. Subsequently, much of the initial organization level research on logics has focused on how organizations successfully deal with competing logics (Pache & Santos, 2013), logics of different levels of importance (Jones, Maoret, Massa, & Svejenova, 2012), or complementarities (Besharov & Smith, 2014). In particular, the hybridization of logics, notably social and commercial, has spawned considerable research interest (e.g., Battilana & Dorado, 2010; Pache & Santos, 2013).

Recent works have begun to examine a larger theoretical bandwidth of how different institutional logics shape organizational processes. (Besharov & Smith, 2014), for example, distinguish logic centrality and compatibility, which individually and in combination have different impact on conflict or coexistence of multiple institutional logics within a corporation. In their empirical work, the authors show how structural flexibility enables long-term successful hybridization in its different forms (Smith & Besharov, 2019). Taking an agentic approach, the inhabited institutions perspective has studied how individual organizational members interpret and enact upon logics in organizational contexts (Binder, 2007; McPherson & Sauder, 2013). For example, Dalpiaz and colleagues (2016) found that organizations use different logics also proactively as opposed to only responding to logic multiplicity. In their study, the Italian manufacturing company Alessi used the professional logics of the art community and the market logic of the industrial manufacturing sector to successfully develop new market opportunities. Through embedded agency Alessi's management operationalized a recombinant strategy of different professional logics to transform the business of the corporation over three decades. The literature remains silent, however, regarding which micro-processes enable the material practices and artefacts of an institutional logic to be additively integrated into another dominant one.

4.3.2 Introducing Entrepreneurial Logics as a Mechanism to Corporate Renewal

Over the past decade, with the increased interest in structured approaches to entrepreneurship in the practicing community (e.g., Blank, 2013) and university-level education (Bergmann, Geissler, Hundt, & Grave, 2018), methods and tools have converged toward standard global practices (McDonald & Gao, 2019). The infusion of additional ideation and development methods such as design thinking, agile development, and venture capital screening has further contributed to the professionalization of the field (Grimes, 2018), crystallizing into a concrete set of tools and processes that aids the socialization of aspiring entrepreneurs into a common way of thinking—their own professional logic. Inspired by the Lean startup movement that is predominantly based on fast business experimentation (Felin et al., 2019; Ries, 2011) and guided by common structuring tools such as the Business Model Canvas (Osterwalder & Pigneur, 2010), this globally diffused philosophy has most recently been referred to as the "scientific founder method" (Camuffo et al., 2020), denoting the increased formalism in the entrepreneurial profession.

The central embodiment of this professionalism can be seen in the emerging organizational form of the venture accelerator (Shankar & Shepherd, 2019; Tracey et al., 2018). Accelerators typically imbue their tenants with lean startup methodology through their extensive process focus, accompanied with mentoring and coaching (Cohen, Bingham, & Hallen, 2019a). The rigorous process toward "scientific" idea validation aims to prepare ventures to attract venture capital at the end of the acceleration period (Drori & Wright, 2018). Since the initiation of the first accelerator Y Combinator in 2005, the number of US-based accelerators has grown to more than 1,200, and almost a third of all Series A start-ups has previously completed an acceleration program (Hathaway, 2019). As a result, many of the more successful entrepreneurial ventures are not only role models but have also become visual artifacts of a growing professionalization in the field. With heightened pressure on the innovation and renewal capability of large incumbents, it comes with little surprise that these corporations start importing common structures and practices from these accelerators (Hampel et al., 2020; Shankar & Shepherd, 2019). In fact, corporate accelerators are the driving force in the growing number of accelerator programs (Hathaway, 2019).

However, with importing these practice new challenges appear as corporate ventures emerge that exhibit a different (entrepreneurial) logic than the focal company. Whereas corporate ventures are typically kept separate from the parent company in the initial phase to allow them unfolding their potential, the problems occur especially at later stages when the ventures need to move closer to the company to exploit synergies. This clearly exacerbates the traditional integration and scaling issues (Raisch & Tushman, 2016). Our mentioned research question is meant to shed light onto the resolutions of these pressures: *How can corporate ventures that are purposefully created based on an institutional logic foreign to the focal corporation be successfully integrated into the corporate's dominant logic?*

4.4 Method & Data

4.4.1 Research Setting

Given the limited theory in the domain of our inquiry, we opted for a qualitative in-depth study of corporate entrepreneurship within a single large corporation. We conducted our research in a large German engineering and electronics company with origins going back to the 19th century. In 2018, this company employed over 400,000 people in more than 150 countries and reported a turnover of 78 billion Euro, of which 60 percent were in the automotive sector. The company reflects a strong engineering spirit with a high-quality focus. Following the philanthropic legacy of its founder who transferred the majority of the company to a foundation, the company is not only a powerful engine for the German economy but also plays an important role in society. However, in recent years, the automotive industry worldwide, and in Germany in particular, has suffered from major shocks, and the unprecedented change in technological paradigm toward electric cars has begun to redefine the entire industry, requiring new competencies for continued success (Gao, Kaas, Mohr, & Wee, 2016). Furthermore, the wave of digitalization has been pushing toward new business models. Backed by deep pockets of private equity, digital players such as Uber capitalized on the digital 'platform' model and through their entry have begun to change the power relations in traditional value chains of the automotive industry. These developments do not only apply to the automotive sector; other industries in which the company is active are also facing increasing pressure from a changing business landscape.

Against the backdrop of these global dynamics, the company's executive committee recognized the need for strategic renewal and for new approaches to innovation beyond its traditional R&D department. In 2015, inspired by the successes of digital companies nested in the San Francisco ecosystem, the company begun to introduce entrepreneurial logics in a structured way. It initiated collaborations with pioneers such as the Haas School of Business (UC Berkeley) and connected with local experts in the entrepreneurial ecosystem to engineer a process-oriented framework to develop entrepreneurial projects inside the company (Figure 4.1). Much of this framework rests on the established toolsets around Lean startup and the Business Model Canvas within time-bound acceleration models as the above outlined cornerstones of a global professional logic in entrepreneurship.

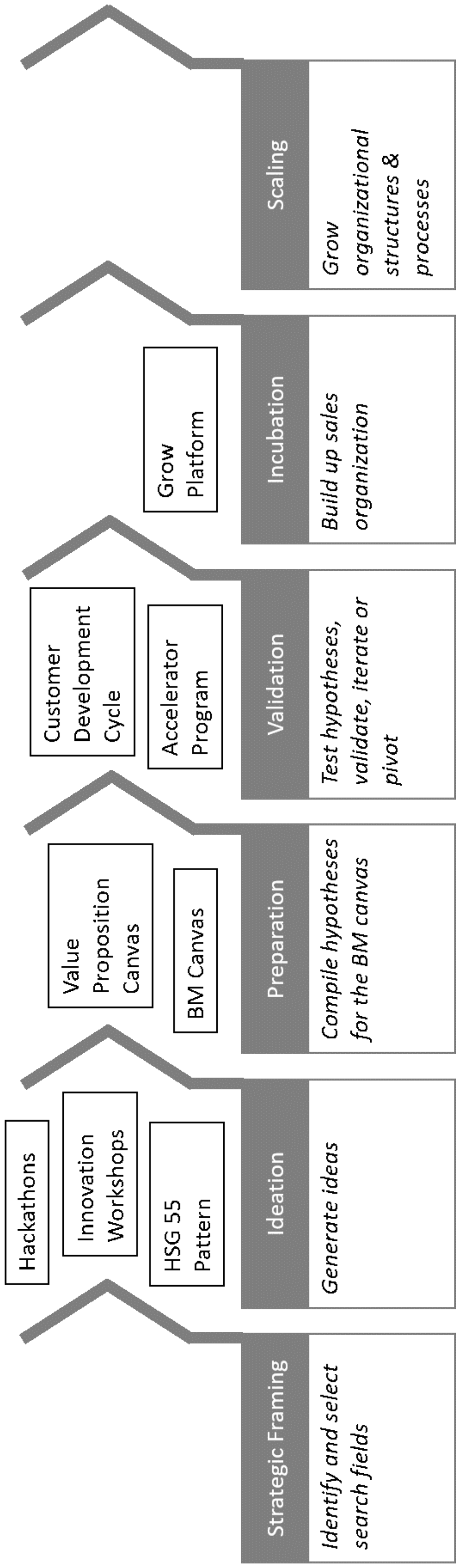

Figure 4.1. *Activities Along the Corporate Innovation Framework. (Own representation based on internal company documents.)*

The described setting of a single company is particularly suited for our type of research question (cf. Pettigrew, 1990) and has been employed in comparable inquiries (e.g., Dalpiaz et al., 2016). The company's decision to bring in practices and structures from the entrepreneurial ecosystem for strategic renewal makes our research problem particularly salient. In other words, senior management strategically created the issue of multiplicity of logics (Besharov & Smith, 2014), notably the challenge of integrating projects that follow a very different institutional logic. The company employed high professionalism in implementing practices and structures from the entrepreneurial community, including close collaborations with key constituents of the Lean startup movement and with skilled professionals in the accelerator scene in San Francisco. This purposeful endeavor adds confidence that the entrepreneurial logic was regarded as a separate logic, yet intended for implementation with strategic purposes. At the same time, the company comes with a distinct organizational character (King, 2015)—a dominant corporate logic that is the result of a long history and has served as a successful foundation for decades. Hence, introducing an entrepreneurial logic is not just a question of blending different logics as typically discussed in institutional entrepreneurship (Tracey et al., 2011). We can expect the problem to be more intricate around a successful infusion and additive absorption of the foreign logic.

4.4.2 Sampling

We started our research in January 2018 by identifying all accessible internal corporate ventures. We selected cases in which the phenomenon of our study was particularly prominent (Miles & Huberman, 1994), based on two main criteria: (1) the venture needed to fall outside the funnel of innovative projects that is used to process manage incremental innovations for the existing customer portfolio, and (2) a validated business model based on customer feedback had been created, which guaranteed sufficient maturity level of the project. We ended up with 31 internal corporate ventures to conduct exploratory interviews. The initial insights gathered from these cases served as our first running exchange with the literature (Burawoy, 1998). Upon identification of institutional logics as a useful lens, we reduced our sample to six extreme cases—a number that would allow for theoretical saturation (Eisenhardt, 1989; Eisenhardt & Graebner, 2007). They were extreme along performance dimensions such as being stopped despite initial customer validation and significant financial investments in the project, or being continued despite low expected financial return and meager customer reactions. This variation in financial performance and outcomes in terms of being continued or stopped by the company's management allows us to get deeper insights in the underlying mechanisms. Table 4.1 provides details on the performance of these six cases.

Each of the six ventures had been initiated by employees and benefited from the entrepreneurial initiatives the company had set up. During their initial development phase, the projects were kept largely separate from the running company activities,

Table 4.1. *Case Overview.*

Venture	Project start	Short description	Business idea	Status (by end of data collection)
Venture A	2015	Platform for e-scooter sharing	The startup provides a mobility platform to rent out e-scooters. The initial idea came up in July 2015. Two months later, a small team started to work on the development of the product. In July 2016, the venture was officially founded and one month later already, the product was launched.	Integrated - Despite high investments needed, the company decided to further pursue the business. Meanwhile the service is offered in four cities and the number of customers continuously increases.
Venture B	2009	Pedelec components	Provision of drive unit (motor and gearbox), high-quality batteries and cycle computers for pedelecs. Whereas the initial idea came up in corporate research, the idea was later transferred to the Automotive Electronics division.	Integrated - Over the past years, the pedelec market has grown significantly, and the bikes became a modern means of transportation. Meanwhile the company provides components for more than 70 leading bike brands in Europe and employs around 650 employees worldwide.
Venture C	2016	Ceramic injection molding	Full service provider for technical ceramics. Through Ceramic Injection Molding complex parts are produced in large quantities with highest precision.	Continuation - Due to considerable number of customers, the startup can already cover parts of its running costs. However, a suitable business unit for integration still needs to be found.
Venture D	2016	Water heating system for Kenya	Provision of a solar-based water heating systems based on micro payment for rural areas in Kenia. The idea was validated during the corporate Accelerator program.	Continuation as a strategic project - First units are sold and customer feedback is extremely positive. On the long run, the startup will further expand the business within the African market.
Venture E	2014	Home robot	An intelligent robot for home that is only half a meter tall. The robot was designed without a display and it doesn't talk. However, it comes with a personality and uses noises, its head and eyes to communicate and connect.	Discontinued - The startup grew to 70 employees. However, as no unit was willing to further finance the activities, the startup had to cease all operations by October 2018.
Venture F	2015	Mobility platform	Platform to make mobility as easy as possible and connect different shared mobility services.	Discontinued - Large players entered the market and the startup grew less dynamically than expected. Discontinuation of the activities was decided in 2018.

with the intention to later integrate and leverage resources in existing business units to scale the new businesses.

Despite the fact that all ventures were created out of the same parent corporation, they exhibited different outcomes. We considered a project successful when it received sustained support for at least three years from a strategic unit in the organization, or when it became integrated into a business unit after leaving its sheltered place in the incubator or accelerator program. Unsuccessful projects were those stopped within the first three years without business unit integration despite positive signals in the market, as for example the following quote from the head of the corporate incubation platform highlights for Venture E:

> *There were 2,000 pre-orders. There were interested customers; there was a big media echo, and very good feedback. Customer demand was there, and they did a lot of customer testing. They had about 200 pieces out in the field being tested in customer households.*

Selecting ventures with a negative outcome despite clear market demand instills confidence that the challenge was indeed in the integration, not in the nature of the idea itself.

4.4.3 Data Collection

We adopted an "insider-outsider" approach (Gioia & Chittipeddi, 1991), where the first author became deeply involved in the context, being active in the company in addition to collecting data, while the other authors conducted a more objective analysis of the data. Our data collection took place over a two-year period between

January 2018 and December 2019. We collected retrospective as well as real-time data from several sources as shown in Table 4.2. Our primary source were 87 semi-structured interviews (Gioia, Corley, & Hamilton, 2013), collected in two waves. During the first wave, we conducted 53 exploratory interviews to identify all ongoing and recently stopped activities within the company. Amongst these interviews, we conducted 9 general interviews with expert informants, 38 interviews with members of the ventures that were not selected for our in-depth analysis, as well as 6 interviews with members of ventures that were later selected as focal group in our comparative caste study. Each interview lasted between 30 and 115 minutes, during which we asked mainly open-ended questions to understand the path and challenges the venture had gone through and identify solutions developed by the venture.

In the second wave of interviews, upon reduction of our sample to the six extreme cases, we adopted institutional logics as central theoretical lens guiding our questions. To obtain in-depth insights and to have a more substantial and richer picture of reality (Kumar, Stern, & Anderson, 1993) we reached out to multiple informants: (1) venture leaders, typically the ideator; (2) team members of the selected venture teams; (3) decision makers with authority over resource allocation towards the venture; (4) corporate experts who consulted the venture teams. We conducted 23 focused interviews that lasted between 30 and 80 minutes. In these interviews, we specifically focused on the differences between those projects that successfully back-integrated and those that did not, notably aiming to gather in-depth account of the challenges encountered and practices employed by the corporate entrepreneurs. Follow-up emails and conversations helped us keep track of recent developments

Table 4.2. Data Overview.

Data source	Data type	Use of Data
Interviews	**Preliminary interviews (53)** with innovation experts, team members, project leaders, and internal consultants to investigate significant differences between successful an unsuccessful startups.	Familiarize with the organization, select the sample, and get a first idea on the company's logic.
	Focused interviews (23) with venture leaders, team members, and decision takers on the corporate logic.	Investigate the mechanisms used by venture leaders to legitimate the entrepreneurial logic in corporate ventures.
	Complementary interviews (11) on the company DNA.	Confirm the cultural logic of the organization.
Archival data (internal)	**Project related documents:** internal presentations of the project, client's presentation, correspondence with project team, process flow chart, budget application documents, sales plans.	Familiarize with the project, Triangulate data received from interviews and observations.
	Secondary interview data	Familiarize with the project, Triangulate data received from interviews and observations.
	Internal news articles used to raise awareness about the product	Familiarize with the project.
Archival data (external)	**Journal articles** from local, national, and international journals and newspapers.	Familiarize with the project, Investigate external presentation.
	Project websites used for communicating product and establishing sales channel.	Analyze customer interactions and external presentation.
	Video clips containing product presentations and interviews.	Investigate external presentation.
Observations	**Field notes (592 pages):** record of internal conversations, meetings, social interactions over a period of two years.	Collect further project insights, triangulate data.
	Informal conversations: Informal talks with employees.	Clarify uncertainties and open questions, track the development of individual projects, collect further opinions and project insights.

during our research period. To triangulate our data, we conducted 11 additional interviews with internal experts that know the selected ventures but were not directly involved in any activities or strategic decisions related to those ventures.

All interviews were transcribed, resulting in 945 pages of interview data. To get unembellished results, we ensured anonymity to our informants(McDonald & Eisenhardt, 2020). We complemented our primary data with 592 pages of field notes from internal conversations, meetings, and social interactions over the period of two years. The direct observations and additional discussions enabled us to develop an extremely deep understanding of the corporation. In addition, we used archival data from both internal documents (team presentations, project reports, internal press releases, and company blogs) and external documents (press articles and internet resources) to allow for triangulation (Denzin, 1978). A full overview of the data used for the detailed analysis of the selected six cases is presented in Table 4.3.

Table 4.3. *Detailed Data Overview of the Selected Cases.*

Cases	Formal Interviews	Informants	Secondary Data (Internal)	Secondary Data (External)
Venture A	4 interviews	Project leader, Business Model Consultant, Marketing manager, Business Developer	Internal announcements, internal newspaper articles, interview transcripts from 3rd parties	Web page, numerous newspaper articles, videos
Venture B	4 interviews	Former project leader, development manager, Business developer, Head of product development	Internal announcements, internal newspaper articles	Web page, numerous newspaper articles, videos
Venture C	6 interviews	Project leader, Co-founder CTO, Member of Steering board	Project presentation, Business Model Canvas, internal announcements, presentations derived from intranet	Newspaper article, web page, video
Venture D	8 interviews	Project leader, Project Analyst, Vice President Sales African region, Project coordinator, Head of African region, Business Developer, Member of Steering board	Full access to all presentations and internal data, internal announcements & comments of employees, project presentation, business model canvas, internal newspaper articles, budget application document	
Venture E	4 interviews	Member of Steering Board, Head of Incubation, Team member (AI Scientist)	Internal announcements, internal newspaper articles, budget information	Newspaper articles, web page, videos
Venture F	4 interviews	Co-Founder, Project leader, Marketing and Communication Manager, Member of Steering board Project	presentation, internal announcements, internal newspaper articles, blog	Instagram Account, newspaper articles, former website

4.4.4 Data Analysis

To familiarize ourselves with the context of our research we first developed a fine-grained description of the entrepreneurial practices and structures set up by company to introduce the entrepreneurial logic. We then independently reviewed the transcripts and archival material for each of the 31 ventures that had gone through various stages of these programs (refer to Figure 4.1). We had asked our respondents about the challenges they were facing to move their projects forward. They described significant tensions and repeatedly referred to the 'corporate culture' as being different from the 'entrepreneurial logic' in the ventures as the following general quote by one of the external business model consultants highlights:

> *A venture always has to first develop a business model and find out what the customer really wants. This is contradictory to the corporate DNA. And that's exactly why we see all the problems with corporate venturing.*

Consistent with prior works that distinguish norms and beliefs induced by field-level logics (Thornton et al., 2012) from instantiations in guiding organizational principles and practices (Besharov & Smith, 2014; Dalpiaz et al., 2016), we began to identify systematically potentially relevant field logics. Through contrasting archival materials with our primary reports on what our informants found important in their corporate experience, we selected a set of four field logics that form the basis of the blended corporate logic at the focal company (as discussed in more detail in the next section and depicted in Table 4.4). For identifying the entrepreneurial logic of the corporate venture projects (summarized in Table 4.5) we resorted to the literature on contemporary processes and practices in entrepreneurship. We validated our list against the documented practices in the corporate entrepreneurship programs and reports of corporate venture leaders. A structured discussion at the corporate head-quarter in Spring 2019 allowed us eliciting first reactions on our preliminary findings, which helped corroborate our model of contrasting institutional logics between the corporate venture projects and the parental organization. From this exchange, additional formal interviews as well as further informal discussions emerged, which all together proved sufficient to reach theoretical saturation (Glaser & Strauss, 1967).

Based on a detailed case write-up for each of the six ventures we conducted a cross-case analysis to search for patterns in the actions taken by the venture teams (Eisenhardt, 1989), always going back and forth between data and literature on institutional logics and work. Our running exchanges (Burawoy, 1998) pointed us to process of integration between different cultures as described in the extant immigration literature (e.g., Berry, 2003). We subsequently engaged in open and axial coding (Locke, 2001) to induce key mechanisms on how some projects became successfully integrated despite carrying entrepreneurial logics foreign to the parental organization. This allowed us to identify the process of organizational acculturation as an important vehicle for strategic renewal through successful integration of corporate entrepreneurship projects with different field logics into the guiding practices and elements of the focal corporate logic.

4.5 Contrasting Entrepreneurial and Corporate Logics

4.5.1 The Focal Corporate Logic as a Blend of Logics from Different Institutional Orders

In the context of organizations, institutional logics manifest in unique organizational arrangements depending on how organizations combine elements from different institutional orders and professions (e.g., Dalpiaz et al., 2016), instantiated through the social interaction of organizational members over time (Binder, 2007). Our analysis shows that in our case the focal corporate logic is a blend of four field-level logics: the professional community of engineers, the family logic that provided a founding imprint of the company, the industrial manufacturer logic, and finally the logic of a large firm as a social actor. Over time, the constituents in our case company made sense of these logics and combined them into a unique corporate logic that guides the current structures, values, and actions of its organizational members. Table 4.4 summarizes along the analytic structure used in prior works on organizational logics (Dalpiaz et al., 2016; Thornton, 2004) how those field-level logics manifest and ultimately blend into the unique corporate logic in our focal company.

Table 4.4. *Ideal Type Logics Recombined Into the Focal Corporate Logic that Guides General Business and New Projects. (Based on three core elements of a business logic as derived from Thornton (2004) and Dalpiaz et al. (2016)).*

	Engineering Profession	**Corporate Family**	**Automotive Supplier**	**Large Firm**	**Guiding Principles for Corporate Projects Derived from Focal Corporate Logic**
Mission *Instantiated in guiding principles about goals*	Find qualitative solutions upon customer requests	Be a sustainable, family-oriented company	Deliver high quality in large volume	Be a market leader and generate sustainable profits	• Generating at least 100 million of annual revenue upon breakeven within 3 years (profitability) • Leverage unique technology at the company • Fit the corporate business models & related processes • Enable market leadership with premium pricing
Basis of Legitimation *Instantiated in guiding principles about how to do business and develop new business ideas*	Sophisticated technology makes the competitive difference Be a technology leader in the engineering community	Be a life time employer that provides a good quality of life balance Consensus driven decision making and sense of unity	Customer Specification driven Scalable B2B business	Rigid Processes and reporting structure Plan-oriented Professionalism and credibility Highly specialized organizational structure	• <u>Shows clear de-risking strategy</u>: (a) through partnership with a (corporate) customer; (b) demonstrate other players have entered the domain • <u>Demonstrate interesting technical challenge</u>: patents encouraged, signaling technological innovativeness, difficult to imitate, emphasize technological novelty in the business case • <u>Respect corporate decision-making</u>: respect hierarchy & do not upset people (in other words, a 'no' is only accepted in case of detailed motivation), broad consensus building required to move a project forward; • <u>Adhere to internal policies</u>: follow (a) budget cycles for financing (there is a two-week window to raise money each year) and (b) strict HR policies in line with legislation and industry practice • <u>Employ process standards</u>: use of the process tools and templates; conform to the corporate expectations of look and feel; follow strict HR policies in line with legislation and industry practice • <u>Exhibit company attitude</u>: provide down to earth business case, no dreaming or futuristic scenario; deliver calm presentations void of emotional elements
Sources of Legitimacy *Instantiated in guiding principles about how the referent audience sees corporate*	Receive critical acclaim from members of the engineering profession (Prospective) employees regard technical sophistication & quality in their job	Be acknowledged in core geographic & local communities as reliable employer (Prospective) employees value security & job environment standard	Customers recognize company as a reliable supplier that delivers Other suppliers regard the company as standard setting and technology referent	Positive and respectful recognition by a broad audience, both nationally and internationally Regarded by the media as an important contributor to German economy	• Products/services need to be perfect before being introduced into the market to preserve the brand: Quality standards and gates need to be passed according to plan • Products/services need to fit the design and engineering rules to safeguard the external image • Projects need to fit the societal expectation onto the company (e.g. legally, family friendly, …)

Engineering logic. Our interviewees often referred to the norms, values and practices of 'engineers' as main influenced in the company—notably in decision making—as illustrated in the following quote by one of the internal business model consultants:

> *Technology fascination is very important. Better, be an engineer or at least a controller. Everyone else has little to say.*

The goal of engineers is typically to solve problems in a very efficient and planned way (Dunbar & Fugelsang, 2005), which is reflected in how our respondents referred to what are considered ideal projects. Also, in that engineering community, being regarded as the leader in advanced, novel technological solutions is an important basis for legitimation:

> *You need a perfect plan, with a perfect answer.* (Business model consultant)

> *It should be clearly delineated. It should be easy to understand, and the solution should be clear.* (New business expert)

> *[This company] is the wrong company to implement good ideas that are technically not demanding.* (Head of Corporate Technology & Engineering Methods)

This logic becomes instantiated also through many highly visible research collaborations with leading technology universities and notably the contracting of an institute like the Haas School of Business, which significantly shaped the Corporate Accelerator Program.

Family logic. Families are an important institution in society and, while the company is more than 120 years old, the founder's family is still connected with the company. Longevity and sustainability are central characteristics of doing business in this organization, which is demonstrated, for example, by the fact that the company had only four CEOs in the previous 35 years. Through the foundation that holds the majority of shares and supports numerous social projects and institutions, the philanthropic legacy of the founder has been maintained for decades.

The values of the corporation favor building a sustainable business over any short-term gains, as put into perspective by one of our key informants "the company has a red imprint." We found many examples of how the family logic influences the mission, the basis of legitimation, and the sources of legitimacy of the company (cf. Dalpiaz et al., 2016; Thornton, 2004). For instance, the company wants to be seen by its stakeholders as very family friendly:

> *An important goal of our company personnel policy is to improve the compatibility of work and family or private life. We support you in this demanding and individual task by offering various working time models, care options for children and relatives in need of care as well as comprehensive advice and care on the subject of parental leave.* (Company guideline)

This logic manifests in key philosophies and heuristics that underlie the central decision-making in the corporation: (a) a strong consensus-based model, and (b) long-term, risk-minimizing, value-based trade-off model that has led to potentially profitable opportunities not being seized due to perceived risks:

> *Consensus is key—conflicts must be avoided at all costs.* (Internal document)

> *You risk to violate the corporate name by providing a product that is not perfect. There's good reason in the early stages not to use the brand name.* (Head of the incubation platform)

Automotive (supplier) logic. Although about 40 percent of its sales are not in the automotive industry, the company considers itself as an "automotive" company and more specifically an "OEM supplier in automotive." The mission of OEM suppliers is to sell large quantities to other companies. In automotive, these large quantities need to be of excellent quality. In one of our interviews, we confronted the respondent with the fact that the company also sells power tools to Do-it-Yourself stores. He answered:

> *We sell large quantities to a few customers only. At the power tool division this is not any different. They also prefer to sell to DIY chains and do little direct B2C business. This is what we do.* (Founder, internal corporate venture)

An interesting characteristic of the automotive industry is that suppliers can typically rely that their customers (automotive assembly companies) know exactly what their customers want. Hence, in ingrained logic of our focal corporation is its ultimate reliance on its customers to provide clear specification of the problems that require solving:

> *You do not question any requirements in the automotive industry. At least 90% of all specifications in the automotive industry are given and implemented accordingly. Questioning the business objectives behind the individual features and functions, or even questioning the customer benefit is certainly not in our DNA.* (Founder, internal corporate venture)

Large firm logic. Not surprisingly, the company also strongly exhibits elements of a large incumbent firm logic. It has pressure to create profitability in all units, as high overhead cost, including R&D, require each project to generate enough revenues to be interesting enough:

> *100 million revenue that is not a magic number, that's actually what management expects every business to make.* (Founder, internal corporate venture)

Obviously, the company has developed a whole range of structures and rules to make sure that such revenues guarantee enough profit at minimized liabilities. Processes and adherence to them are of high value and imminently important in this setting:

> *It is a huge Excel list that you have to go through. CE certificate, WEEE approvals, GDPA, DSGVO, EU data protection. It's crazy, 40 percent of our time we developed the software and 60 percent of our time was taken by this Excel list, all the certificates, security tests, penetration tests.* (Project leader)

In summary, the focal corporate logic of our case company presents itself as a blend of four different field-level logics that ultimately lead to a set of guiding principles for the internal ventures concerning objectives, image, managerial practices, and key performance indicators they would be typically measured by, as highlighted in Table 4.4. The combination of economic requirements with adhering to both explicit and implicit rules and expectations is noteworthy for the evaluation of corporate venture projects. At the same time, the social responsibility towards the community of the parent organization is also an important aspect that may be prioritized over economic logics as one of our key informants shared.

4.5.2 Importing Entrepreneurship Logics for Corporate Renewal

As discussed above, over the past decade, entrepreneurship has moved from a rather intuitive endeavor to standard practices and procedures contained, amongst others, in the scientific founder method (Camuffo et al., 2020). The field has developed its own values, norms, and beliefs—central pillars of an emerging institutional logic of this profession, with its most prominent proponents being the mentioned accelerator programs (Cohen, Fehder, Hochberg, & Murray, 2019b). These shared practices and tools not only inform the design of corporate entrepreneurship programs and notably corporate accelerators (Shankar & Shepherd, 2019) but also importantly imbue corporate ventures and their teams with those logics. In Table 4.5 we summarize the field level logics derived from the literature on entrepreneurship and the resulting guiding principles from those logics as we identified in our data.

All of the ventures in our study made use of different elements of what we refer to as the entrepreneurial logic. During our study we observed significant divergences between the prevailing corporate logic of the company and the entrepreneurial logic of the ventures. The overall goal of the entrepreneurial logic is to theorize about

Table 4.5. *Entrepreneurial Logics and Guiding Principles Observed Within Corporate Venture Projects. Based on three core elements of a business logics as derived from Thornton (2004) and Dalpiaz et al. (2016)*

Element	Entrepreneurial logic	Derived Guiding Principles for Ventures
Mission	Theorize about new opportunities that create value (Felin & Zenger, 2009)	• Visionary mindset • Out of the box thinking, counterfactual thinking
Basis of legitimacy	Scientific founder method (Camuffo et al., 2020; Grimes, 2018); lean startup (Ries, 2011, 2017); and accelerator mentoring (Cohen et al., 2019a)	• Test out quickly hypotheses about market acceptance (100+ interviews with customers) • Avoid processes and rules of the corporate (rule bending) • Be agile in fine-tuning the product towards perceived emerging or changing needs • Get external mentor feedback (and investors) • Get things done instead of focus on professionalization (MVP focus) • Set milestones based upon learning (non-financial KPIs – scientific founder method)
Sources of legitimation	Symbolic actions such as conveying founder team experience (Zott & Huy, 2007) and material actions such as developing partners (e.g., Santos & Eisenhardt, 2009) or creating an MVP (e.g., Camuffo et al., 2020)	• Involve stakeholder and showcase partners to back up the success story • Recruit experienced venture leaders from the entrepreneurial scene • Show working prototype/MVP and present testimonials from customers

new opportunities and prove that there is value in a certain business, not necessarily backed up by profit. The focal corporate logic on the contrary—and with it most organizational logics—focus on long-term survival and sustainable profits.

Similar observations can be made regarding the basis of legitimacy. Many corporate incubation programs (typically succeeding phases of acceleration) allow their ventures to recruit people easier, follow fewer or less strict rules than the corporation (Weiblen & Chesbrough, 2015) and provide the ventures with significant budgets without them having to justify the expenses in the same way as corporate projects have to do. In the case of our company incubator, an advisory board monitored the proceeds and the strategic progress, very much like a board of directors is the mechanism through which venture capitalists control their investments (Garg & Furr, 2017). The ventures investigated closely interacted with the external entrepreneurial community and often hired external specialists to gain specific capabilities or market knowledge, and strengthen the team's entrepreneurial mindset:

> *When we founded, we started with three employees. The rest we hired externally [. . .] no corporate guys, but people coming from the media industry, startup experts from Berlin.* (Business developer, internal corporate venture)

Others relied on consulting through external mentors that complement the advisory boards of ventures located at the incubation platform, much like in common accelerators and incubation programs. The dominant method of work follows the scientific founder method, which implies being agile in development and flexible in changes based on customer testing, much along the lines of the lean startup method (cf. Camuffo et al., 2020):

> *It was our external mentor who told us to increasingly focus on the customers and their needs.* (CEO, internal corporate venture)

> *Processes need to be adapted to fit the particular market you are operating in, and the customers you are working for.* (Head of Product Development, internal corporate venture)

> *For us, the big driver was to get the thing out there, see how people use it, and then make little changes here and there to see what customers really want.* (AI expert, internal venture)

> *During the initial phases, it is about trial and error, learning what is accepted in the market. We needed to quickly react to this feedback and offer new solutions.* (Head of Product Management, Venture B)

Whereas for entrepreneurs, the basis of legitimation lies in testing hypotheses about market acceptance quickly, and in being agile in fine-tuning the product towards emerging or changing needs with the help of stakeholders such as reputed VCs and or mentors, for managers, the basis of such legitimation is much more related to their capacity to adhere to corporate rules.

Finally, while entrepreneurs gain legitimacy through symbolic actions such as having sold their previous ventures successfully or through having 'cashed' in through an IPO (Zott & Huy, 2007), corporate managers gain legitimacy by developing projects within the corporate logic, i.e. delivering on revenues and profit within the business units of the organization. With regards to material actions, our analysis shows that entrepreneurs consider positive customer feedback as well as interest expressed by potential partners as an important source of legitimation:

> *You need to find sponsors and stakeholders who support your topic. This is how you create legitimacy.* (CEO, internal corporate venture)

> *Customers response was pretty good with 10,000 downloads and 2000 active users. There were also revenues generated.* (CEO, Venture F)

> *When we pitch, we do not present any corporate slides. We try to stand out from the crowd. We often introduce our product by presenting a particular use case and the related customer. We would bring a picture of one of our customers for example.* (CTO, Venture C)

The contrast between both logics is evident. Corporate entrepreneurs who focus very much on legitimizing their projects within the entrepreneurial logic will face challenges on key KPIs along the focal corporate logic. A particular conundrum is the typical lag of revenue in entrepreneurial ventures (commonly substituted by proxies of the value generation potential). In the absence of being able to adhere to and deliver on key corporate logics, corporate entrepreneurs will need to engage in additional actions to help creating legitimacy for their projects. In the following section, we develop our model of organizational acculturation—a process that allows corporate entrepreneurs to substitute the lack of financial results with non-financial metrics covering key items of the dominant corporate logic, and thus increase the chances for their corporate venture project of being financed and/or integrated into a business unit.

4.6 Organizational Acculturation as an Integration Mechanism for Corporate Venture Projects

Whereas in the initial phases all of our ventures used entrepreneurial elements prominently to move forward, only those ventures successfully integrated into an existing business unit in which the project team understood the need to adopt material and cultural practices of the corporate logic while, at the same time, seeking shelter in the structures set up by the corporate to foster an entrepreneurial logic. We call this process *organizational acculturation.* In this, we observed three important mechanisms that were used to facilitate successful integration: acquisition of the corporate logic, anchoring into the corporate logic, and accruing to the corporate logic. Below, we explain each of these mechanisms and how they interact for a successful integration of corporate venture projects.

4.6.1 Acquisition of the Focal Corporate Logic

Arguably, understanding the focal corporate logic and what is considered important or not in the respective corporation is difficult. When contrasting projects that successfully integrated with those that were discontinued, we found that the acquisition of a deep understanding of the focal corporate logic represents an important prerequisite for internal corporate ventures. Acquiring the mainly tacit knowledge is not straightforward for leaders of ventures that are sheltered from the corporate in accelerators and incubators, often located in entrepreneurially rich ecosystems far away from the headquarters. These structures often encourage to recruit externally, sometimes even leading to projects being headed by serial entrepreneurs, hired specifically for the job, with very little corporate embeddedness or understanding. For example, Venture E, which ultimately failed despite substantial market interest, was located in the Silicon Valley accelerator of the company, staffed in key positions with company-external executives that brought clear challenges as team members reflected:

> *The first things they did was hiring a robotics engineer and a CEO who was external to the company. He had a bunch of prior startup experience and business experience that the team knew was needed. So, they hired him pretty early. People were aware that they technically worked for [the company], but they weren't really familiar with much of it.*

> *I would say that pretty much everyone was unaware of [the focal company's] values and goals.*

Despite spending much time promoting the idea internally and meeting important stakeholders, the externally hired CEO of Venture E mainly relied on his experience as an entrepreneur to make decisions and ignored the non-negotiable importance of adhering to internal planning cycles. The head of the corporate incubation platform explained:

> *With [Venture E] we missed the annual budget application. You know, we came too late. And it was critical because the team was growing, there was demand for funding. And since we missed the window to get a decision for alignment with the target organization, they just turned it off and we ran out of money.*

Similarly, Venture F had little understanding of the corporate logic. The team itself was highly motivated but came with limited knowledge due to their young age and resulting short tenure in the parent organization. A member of its steering board explained:

> *I think the topic per se was interesting. Maybe it was related to the average age of the team. The depth was missing.*

The other ventures, which often had much less promise (e.g., Venture D), acquired knowledge of the corporate logic early on, through different ways. One way, used by Ventures B and C, is to have a dedicated "corporate crocodile" in the leadership of the venture, a process, which we call innate knowledge:

> *It was helpful that [development manager] who came from the corporate research department, had close connections to the management board, and knew how such business decisions are usually taken, what kind of planning and templates are needed.* (Team member, Venture B)

> *You need a general overview within the corporation. I worked for several units, including production, quality assurance, purchasing, and I cooperated with marketing. These are the areas where you need to know to have a good overview and to know where to gain speed or where to omit things.* (CEO, Venture C)

Sometimes, it is not possible to have such a person in the leadership team of the venture and we noticed that in those cases mentors were used to bring in that kind of knowledge. Venture A for example received substantial support by a group of corporate mentors while Venture D even involved the corporate community in order to have access to a wide range of competencies:

> *I see myself responsible for the venture, representing the venture and protecting it. The people we brought in would perish within the corporation. They don't know the game, they don't know how politics works and they don't have the network. They don't have any corporate experience. I can slowly introduce them, and lead them. We create a greater understanding, that's our job. We make sure that [the venture] gets a funding, that [the venture] is well represented, that the topic is explained, that the corporate requests do not directly go to the venture.* (Business developer, Venture A)

> *People are aware of the project and sometimes colleagues will ask me "How is the project doing?", and "What is the best way to assist you if you have any issues?* (CEO, Venture D)

4.6.2 Anchoring the Venture into the Corporate Logic

The importance of the corporate logic becomes more salient when the ventures mature. Several ventures recognized the need to increasingly use symbols and material practices adopted from the corporate logic, to build their legitimacy within the company. When using symbolic narratives, the venture team frames its activities in a way that it fits the corporate logic using the guiding principles that can be derived from corporate logics. Venture A and B, for instance, claimed to be able to deliver 100 million revenue in line with the unwritten but widespread belief that a new business is only successful when it makes 100 million in revenue. Whether the teams actually achieve this goal is less important, the mere claim provides sufficient legitimacy as often, the intention counts more than the actual achievement.

Sometimes, however, symbolic adjustment is not enough and – although it might not be in the economic interest of the project, it still gets materially adjusted to the corporate logic. Knowing that the company wants to 'de-risk' by partnering with customers, Venture A, for example, relied on its customer to take responsibility to cover liabilities and order supply parts. For an entrepreneur this would be a no go since it implies a decrease in value through future revenue sharing with the customer, but our informant explained:

> *There were many things that we didn't know how to do. It was even worse when we started the pilot. We ordered products from Brazil to Kenia.But, point number one: How can we register such products in the system? Point number two: who is responsible if anything goes wrong with the products? We were confronted with numerous processes that were not well adapted for projects like this. We had to create our own processes to be able to sell our units during the pilot phase. We asked our customer to take that responsibility as a partner.* (CEO, Venture D)

Likewise, the managers in Ventures B and C made sure to respect and actively integrate corporate logics in the rules and practices applied to their ventures and notably demonstrate how they leverage internal competencies within the confines of the focal corporate logic:

> *A big market for ceramic parts is the American gun industry. But this does not fit "invented for life." We have some customers that we declined and said sorry we are not able to support you because what you are doing is not in line with "invented for life." So, these are some basic rules which we set up as a company.* (CEO, Venture C).

> *The [focal company's] CEO himself is an enthusiastic cyclist. He was convinced, as the corporation already had important competences in battery technology, electronics, motors and sensors. We could even make displays. Actually, we could rely on many in-house capabilities.* (Product manager, Venture B)

By contrast, the CEO of Venture E did not pay much attention to important guiding principles derived from the corporate logic. The team developed a Minimum

Viable Product, which was sold directly to end users:

> *We wanted to be able to get units out there just to see how people would actually end up using them. Until people actually get them into their home and play with them, you do not really know. Maybe people will use them for something completely different that you did not think of, and then we could start tuning it for that. [...] It's just difficult to say what the end goal actually is going to be.* (Team member, Venture E)

This is not how de-risking is usually done in the company. De-risking in the mother organization implies that there is a partner who is willing to co-invest in the product or act as a lead user and the product is clearly positioned in a B2B model. This "partnering with a customer" guideline is derived from the automotive supplier logic, in which the company's customers know exactly what end users want, so there is no need to test it out on the market. In the entrepreneurial ecosystem, however, radically new products (like in the case of Venture E) are tested directly with end users and optimized through multiple iterations of concepts, prototypes, and MVPs.

Likewise Venture F, focusing on a platform solution, was not guided by the focal corporate logic when setting up the new business. Instead of presenting a technologically unique selling point, which would be appreciated as a core representation of the engineering logic, the team relied largely on emotionally charged messages (marketing-focus) to reach their customers:

> *It was certainly no technological challenge. [...] The simpler and the more unprofessional it seems, the more efficient the message is. You need very simple messages. The app - focusing on emotions. [...] The slogan – very simple. With two words only. "Your app for everything," or "car sharing and more." Very simple messages that you can place on a picture.* (CEO, Venture F)

This is a very entrepreneurial approach but does not necessarily form a source of legitimacy in a corporate setting. Although appealing to the market, inside the company, the venture was considered unprofessional as explained by a member of the steering board:

> *This customer centricity, to me it seemed like "Jugend forscht" [a German contest for adolescent scientists, note by authors]. I did not perceive it as profound and detailed enough. Some of their statements were too vague, not precise enough.*

The young team identified very much with the outside entrepreneurial community. To keep up with the major competitors, a high amount of initial investment was needed. However, contrary to corporate standards, the venture seemed to rely little on detailed planning. Instead, the two founders spent much time managing their stakeholders. This might sound promising from a traditional 'product championing' point of view (Burgelman, 1983), yet by failing to adopt significant material practices and showing willingness to operate along the professional standards of the parent organization these activities fell short:

> *We pointed out the numbers invested by our competitors to our board, to give them a sense of what is common in the industry. But we did not make a detailed calculation showing that we need 300 million euros or something.* (Co-founder, Venture E).

> *They were represented at every event because it was a cool topic. They promoted the product. But it didn't help the project any further. They didn't make any progress.* (Member of the incubation platform)

4.6.3 Accretion to the Corporate Logic

Finally, a pure anchoring of the projects in the corporate logic is not sufficient to complete the process of successful integration or otherwise continued scale of such a venture. Since none of these projects really meets the minimum financial KPIs as stipulated by common corporate practices, a successful integration process also requires the venture managers to show what they can bring to the corporation in terms of renewal and enrichment of the existing corporate logic. In analogy to prior research on organizational agency in the evolution of logics (Dalpiaz et al., 2016), we find that venture leaders can show such accretion through emphasizing additive effects on three main levels: guiding principles (Table 4.6), how the organization searches for opportunities (Table 4.7), and corporate practices (Table 4.8).

Enrichment and exemplification of new guiding principles. First, our investigations have shown that corporate venturing influences how the new internal venture helps instill desired long-established guiding principles about how to do business (refer to Table 4.6). For example, the originally very technically and capability-driven corporation increasingly added customer development approaches to its product development processes. Traditionally, the organization's central model of new product development was based on the core principle that the business customer delivers a full specification to which our case company then brought its technical problem-solving skills, or as one of our venture managers summarized, "there was always the attitude we have such great technology, the customer will appreciate it, they will need what we can do." Increasingly, however, a new approach began to

Table 4.6. Main Accretion Mechanism: Enrichment and Exemplification of New Guiding Principles.

Exemplary Accretion to the Corporate Logic	Examples from Our Data Analysis
Developing customers: Technical development is newly complemented with proactive customer-development approaches as opposed to receiving pre-specified problems	"The need for sales expertise and the way how to address new customers is something we have been doing a lot and found that the expertise we have within [the company] is not very suitable for what we actually need. This has led to a re-thinking both at the start-up platform as well as on top management level [...]. We are active in markets that we know very well for decades already, but if we want to enter new markets, we need sales expertise from outside." (CEO, Venture C)
Learning from failure: Mistakes that have always had to be avoided are increasingly accepted as an opportunity to learn and grow.	It was winter time and it was freezing cold. Our bicycles were not designed for such weather and they broke down. This of course led to the fact that we had to stop the project. But we said please give us two days, we can do it. We have worked around the clock, through the night and that has welded the team together. You need to do those resets where you say we're going to show that we've got what it takes. And we did it. That was simply a team effort. It is still in people's heads today. These are situations that create a sense of we. That's what it needs. (Former CEO, Venture B)
Challenging the engineering function as sole source for innovation: New ideas can not only be developed in the central R&D department; everyone can shape the transformation, not just engineers.	"They were all totally shocked that now people from the production plant are coming out with a new idea. They thought they'd gone completely crazy, because a finishing plant only does what the central office orders and never does anything else. [...] They had to check with the management to see if people from the manufacturing plants were allowed to use the innovation platform." (CEO, Venture C)

manifest that solutions were not just valuable because of technological superiority and customer problems do not appear magically but can be investigated proactively. Looking at business problems through a customer value lens rather than technical prowess was a very much desired shift in a key principle of the corporation and the more successful project leaders made sure to emphasize how their project exemplified such new principle:

> *The search for the right customer segment is one of the lessons learned of [Venture D]. There are many slides on the topic, [the founder] regularly presents them, and they are used as example in the Accelerator Program. In any case, the project is a prime example of how important it is to find the right customer group and to be flexible with it.* (Internal Consultant on Venture D)

Another increasingly desired quality to secure the continued ability of the organization to innovate was the introduction of a culture where failure is accepted and is even seen as opportunity to learn and grow. In 2019, after several years of internal open debate of the conflict between a failure culture and the striving for excellence in the company's traditional logic, the top management published in the internal corporate blog a new leadership principle "We learn from our mistakes, and see them as part of our innovation culture!" Our analysis shows that some of our venture managers made sure that their project teams embodied this newly emerging principle or otherwise demonstrated how their project enables the organization to gradually transition from its very risk-averse to a more failure-friendly culture:

> *Sometimes, the process of testing something—like a new business model—means that you are going to encounter failure. But that failure mostly is carrying a lesson of what you could have done better. Or what you should do better next. So, I think of course, it is a balance because there are also very high expectations. And sometimes, part of it is also trying to communicate very realistically about the challenges and also the wins.* (Project coordinator, Venture D)

Finally, along with the need to innovate at higher rates, the primacy of the engineering logic in which engineers are regarded as the only legitimate source of innovation has been challenged over the past few years. Venture C, for example, was able to show that not only engineers from the corporate R&D department can have ideas that lead to substantial innovations, but also employees from other areas such as a production site can successfully contribute to the company's innovative capability. While maybe trivial for an outsider, this caused a significant shock in the company and lead to a structure which encouraged employees from everywhere in the company to submit their own ideas and drive them forward through the corporate innovation initiatives. The profound impact on the organization is illustrated by the high-reaching visibility and use of Venture C to exemplify this emerging new principle:

> *[The CEO] has already presented us as example to demonstrate that the company is able to create innovations within production sites. [Manager] said, look what we can do with the ceramics business [...] and even [the CTO recognized that there are different approaches to innovation.* (CEO, Venture C)

Broadening the opportunity scope. Closely related to enriching key guiding principles are contributions to how the organization searches for opportunities, an important instantiation of an organizational logic (cf. Dalpiaz et al., 2016). We find that showcasing how a project helps the organization along redefines its traditional opportunity scope serves as an important element of accretion (refer to Table 4.7). We observed two very different ways in which ventures can make a contribution in that domain. First, along with the pressure to experiment with new business models that deviate from the company's traditional business model, ventures that were able to emphasize how their business helps expand the traditional economic logic found often welcoming attention. Venture A, for example, represents an attempt to build up a platform business—an entirely new approach for the company that previously focused on product-centric businesses and had hence reached a certain celebrity status within the organization. Another example for such effect is Venture D, which managed to garner significant organizational attention by emphasizing how their approach reaches far into the organization to enable creative thinking about new ways of doing business:

> *Our project is totally shifting things and giving a new business model that is really different, that is forcing [the company] to rethink its business processes. So far everything is really set-up for B2B. And now for the first time, we are even selling to B2C end users.* (Project coordinator, Venture D)

Table 4.7. Main Accretion Mechanism: Broadening the Opportunity Scope.

Exemplary Accretion to the Corporate Logic	Examples from Our Data Analysis
Innovating the business model: Increasing emergence of new business model elements and experimenting with new economic logics.	"And at some point, we decided that we wanted to make ceramics bigger at [the company] and be active in several markets, with several customers. To do this, we need a different business model. That doesn't work from the classic automotive plant. This is not a classic product innovation, but rather a business model innovation." (CEO, Venture C)
	"I supported the project because I believe that we need new Business Models in Africa to be really successful in the long term. (Business developer African Market on Venture D)
Image enhancement & brand renewal communication: The company offers increasingly attractive products for young, outward-thinking people and is consolidating its reputation as an innovative employer.	"The company—and this is also driven by [the CEO]—wants to transform itself. Digitization, connectivity, 3s (software, sensor, services). That's the future. And they are always desperately looking for examples illustrating those changes. Frankly speaking, so far, the company has few examples. I can say this because we are always approached when there is any public communication needed." (Consultant, Venture A)
	"So, I think the main thing that (Venture D) contributes to the value of [the company] would be social responsibility and inclusion." (Project Assistant and Analyst on Venture D)

On the other hand, new opportunities are equally built by enhancing the company's image as an innovative employer, thus attracting new talent, a rather important concern for the incumbent organization. Highly successful venture teams often succeeded in focusing attention to their contribution to enhancing the image of the entire organization. For example, both venture A and B, actively promoted the use of the "brand" as a young, entrepreneurial brand as opposed to a legacy brand based on engineering quality with a bit foregone glory:

> *We had enthusiastic customers. After the fair, there was great enthusiasm for the bicycle market. The Board of Management saw the chance that the corporate brand name was not somewhere under the hood but publicly hyped by the bicycle industry.* (Head of development drive unit, Venture B).

> *[Venture A] had an impact on the brand. Young, dynamic, innovative. [...]. I think a lot of money went into marketing, but at the end of the day, as they managed to establish a direct customer relationship via the platform, it was definitely beneficial for the brand.* (Internal Consultant on Venture A)

Likewise, the continued support of Venture D was to large extent contingent on its success to tap into the image enhancement effects and the resulting favorable attention that generated:

> *I would say that 75% of the people that know about the project like it a lot. And they are proud of being with (the company) because there are projects like this one.* (CEO, Venture D)

> *[. . .] I think it was a bit of luck. The communication team got to know the project and they got interested. And they were the ones asking me to present. And the more I presented the more attention I got and the more commitment from management.* (CEO, Venture D)

Change in organizational practices. A third important form of accretion comes from demonstrating the effectiveness of installing new or modifying existing business practices and generally showing how a project helps creating and disseminating desirable new capabilities within the organization (refer to Table 4.8). For example, at the Executive Forum 2017, an internal conference for employees, the CEO had called for continued cultural change and announced that the way of working should become more diverse, creative, and results-focused, and importantly less hierarchical. This required an increasing cooperation between departments and the

Table 4.8. Main Accretion Mechanism: Change in Organizational Practices.

Exemplary Accretion to the Corporate Logic	Examples from Our Data Analysis
Cross-unit collaboration & increase in functional flexibility: adoption of a holistic view on corporate product portfolio and collaboration across silos incl. more flexible approaches to organizing.	"We have looked at the company's portfolio to see how we can make use of it: What motors we have internally, what batteries we have, what voltage range is suitable. We found most of the needed elements provided by diverse internal units." (Former CEO, Venture B)
Contribution to corporate knowledge stock: Ventures are seen as opportunity to learn and acquire new capabilities across different units.	"Internal communication is highly important. You have no idea how often you are asked within the company can't you come over here with [the venture] and explain this and that, and give a lecture here and so on. That's what I do too. We could otherwise employ someone at [the venture] [...] It is a very concrete responsibility that we have." (Consultant, Venture A)

adoption of a holistic view on the corporate product portfolio. Venture D, for example, emphasized a silo-rejection attitude (e.g., Ries, 2017) and showed how the organization can successfully seize opportunities across units:

> *Of course, we had to learn the corporate pricing model. We needed that knowledge because if you go to the field and somebody wants a product, even if they ask about an industrial boiler, you need the specific knowledge. If they ask us about a power tool, about a washing machine or a dish washer, it is the same company. So instead of focusing on ourselves, we were forced to increasingly integrated with other business entities. And have very good knowledge of the whole range of products.* (CEO, Venture D)

Finally, in order to secure continued attention and support, the more successful corporate ventures can equally demonstrate how they accrue to the corporate knowledge stocks and capabilities that embody the corporate logic. Both venture A and C attached great importance to sharing specific capabilities internally and supporting established business:

> *[The corporation] heavily invests in [the venture] and there must also be things that [the venture] gives back. That could be competence exchanges for example. We did workshops with colleagues from business units where we did a complete onboarding for 2 days. A deep dive for their solution so they could benefit from our experience.* (CEO, Venture A)

> *The second point is that we can learn so much about this for other business areas as well. This has not only something to do with [the business unit], but also with [other business units] because this understanding of bottom of the pyramid customers is not really anchored in our company and this is one way to get it. Then, of course, one benefit is a cooperation with [partners]. [...] they are premium partners that are very interesting, not only for [the business unit], but for [the company] in general.* (Business developer African market on Venture D)

In conclusion, the examples show how venture managers at least show partial agency in trying demonstrate and communicate how their ventures help creating desired change in the corporate logics. Not all projects exhibited accretion on all levels, but in all of the successful projects, the managers made sure to identify and proactively communicate positive effects along several of the outlined elements. This is particularly prevalent in both ventures C and D, which by all financial standards in the corporation fell substantially short and would never have received so much support without a proactive strategy of showing how they not only understand and follow the traditional corporate logic but also help the corporate logic to accrue additional elements. By contrast, Ventures E and F, which were eventually stopped, showed little interest for offering new opportunities to the corporation. Venture E, for example, made sure to continuously separate from the corporation. For example, in a newspaper article appearing right after an important trade show where the product was presented for the first time and attracted an enormous amount of attention, the corporate name was only mentioned once in a side comment:

> *We tried to be as autonomous as possible. We really wanted to be able to make all decisions on our own, as much as we could.* (Team member, Venture E)

> *Most of us—despite the chief level people in the company—were never really in contact with people from [the corporation]. For most of us it felt like a subsidiary of [the corporation]. They would basically check us every year but [the venture's CEO] was the only interaction with them.* (Team member, Venture E)

4.6.4 Concluding Framework of Organizational Acculturation

For a project to be different enough and have potential for strategic renewal, it has to adopt elements from the professional community of entrepreneurs and their professional logics. Whereas at first these elements were introduced bottom up, later on our case company decided to formalize the entrepreneurial forms and practices that endorse such a logic. However, the drawback is that the emphasized symbolic and material practices such as agile prototyping, end user feedback, experimentation, or customer testimonials, which offer legitimation within the entrepreneurial logic, are not at all sources of legitimacy within the received logic of the focal corporation. Hence, emerging corporate ventures need to implement symbolically (such as in the use of exhibited heuristics) and materially (developing prototypes that objectively pass the corporate quality standards) those logics into their operating reference system.

Since the corporate logic is the result of an organization's historical development and embedded in its character, it is neither that visible nor easy to comprehend. In our particular case, for example it comprises the tacit understanding of the symbolic versus material importance of certain proclaimed or tacit guidelines. For example, the possibility to realize 100 million Euro of annual revenue after only a few years needs to be emphasized in prospective communication by each project team, even if largely symbolically. Materially crucial on the other hand is the use of a legitimate partner to co-realize and de-risk the project, which has higher value than making sales in earlier phases of the project. In generalizing, this means that that the 'entrepreneurially inclined technologist' (Burgelman, 1983) either needs innate knowledge, which allows him or her to understand the corporate logic, or needs to have access to corporate experts that provide access and foster adoption of important organizational logics.

The organization might manufacture such access through the appointment of middle managers that are supposed to bring such "cultural capital" to the ventures in their advisory boards. However, quite counter-intuitively, those that are most interested to have such a function might also identify increasingly with the outside entrepreneurial community and hence dis-identify with the corporation. This process might lead to a rejection of corporate elements. To build legitimacy within the company, internal corporate ventures need to anchor practices and values adopted from the corporate logic into their new business. Finally, to guarantee strategic renewal, which is the main goal of the entrepreneurial initiatives, the internal ventures cannot limit themselves to a sole adaptation, but rather need to help "upgrade" or enrich the dominant logic by carefully inducing specific elements of the entrepreneurial logic—as expression of the potential for renewal. Table 4.9 summarizes key levers in the process of organizational acculturation.

4.7 Discussion and Contribution

Only recently, the literature on institutional logics has started to take a more agentic view on how logics can be used in organizations to create new opportunities (Dalpiaz et al., 2016) and how institutional entrepreneurs combine different logics to build new organizational forms (Tracey et al., 2011). However, institutional entrepreneurs start from a greenfield and can theorize how to combine elements of different logics to their advantage. By contrast, in existing organizations there is a dominant logic in place, which poses very different managerial and entrepreneurial challenges when bringing in a new professional logic, especially when done so through local elements such as new projects that purposefully contrast with the dominant corporate logic. Building on Dalpiaz et al. (2016), we zoom into the micro-level mechanisms and show how individuals who work on projects that fit within such a new central professional logic needs to legitimate these projects toward proponents of another logic—in our case a historically grown dominant corporate logic. Our research emphasizes three important mechanisms of acculturation as a more bottom-up recombinant strategy—as opposed to a strategic recombinant strategy (Dalpiaz et al., 2016)—to get legitimacy and hence secure sustained funding for projects that are born in a logic that is distinct from the corporation.

Quite counter-intuitively, we show that it is exactly the anchoring into the old, dominant logic that makes the introduction of a new logic successful. This implies

Table 4.9. *Acculturation Mechanisms to Socialize Corporate Venture Projects Into the Focal Organization.*

Main Mechanism	Detail Mechanisms	Exemplary Quotes
Acquisition: Gaining a deep understanding of the corporate logic	Innate knowledge	"The venture leader was a perfect fit. He was assistant to [Member of the Board of Management] for a very long time and knows the whole organization. He was able to lead revue meetings very well." (Development manager drive unit, Venture B)
	Mentors offering access to cultural capital	"I see myself responsible for the venture. Representing the venture and protecting it. The people we brought in would perish within the corporation. They don't know the game, they don't know how politics works and they don't have the network. They don't have any corporate experience. I can slowly introduce them, and lead them. We create a greater understanding, that's our job. We make sure that [the venture] gets a funding, that [the venture] is well represented, that the topic is explained, that the corporate requests do not bother the venture." (Consultant, Venture A)
Anchoring: Using corporate elements to position the new business into the corporate logic and create legitimacy	Symbolic narratives	"But now we also want to sell the systems to schools. Thus, we can call it a B2B business that can be scaled." (Venture leader, Venture D)
	Material forms	"Initially, freedom was extremely high. It was needed to get here. Today we consciously have to introduce processes. That's what we need to lower the risk and reduce our costs. It wasn't our focus in the beginning when we only had 200 scooters. Little details didn't matter. Now we have 3.500 scooters and details play a huge role. We need processes and process-loyalty." (CEO, Venture A).
Accretion: Gradually growing together and showing how the business pays back to the organization	Enrichment and exemplification of new guiding principles	[...] we also have the confidence to try things and fail because I mean, you find it in the business environment, failure and trying is usually not very highly rewarded. (Project coordinator, Venture D)
	Broadening the opportunity scope	"Another benefit of course is the cooperation with MKopa or MPesa. If you are interested in the Startup Scene in Africa, you will quickly come across MKopa and MPesa because they are very successful in mobile money. They are leaders all over Africa. They are premium partners who are highly interesting, not only for TT but also for the company as a whole. It increases the brand awareness and facilitates collaborations with these partners." (Business Developer for African region, Venture D)
	Change in organizational practices	"We are currently working on a payment solution that gets implemented by the end of the year. [The company] is getting more and more involved. We are in close exchange with established units so the company benefits from our experience." (Head of PR and Communications, Venture A)

that organizations need to be very careful in selecting individuals who have to endorse a new logic. When these individuals do not acquire the necessary understanding for the focal corporate logic, they will not be able to succeed. This theorizing finds its roots in old institutional work of DiMaggio (1982), who launched a theory of cultural entrepreneurship by describing how Higginson, being a member of the Brahmin Bostonian elite, could only start an attempt to establish a new Orchestra and Museum in the late 19th Century in Boston because he was young and thus of marginal importance to the Brahmin elite. At the same time, he also could only succeed because he was so central to that elite (DiMaggio, 1982, p. 46). In other words, it was both his peripheral position and his exposure to other norms and cultures that allowed him to succeed. We add to this perspective three micro-level mechanisms of how such process of acculturation can be managed successfully. By analogy, our findings might be insightful for theory formation in adjacent research fields. For example, when onboarding new employees (Bauer & Erdogan, 2011), especially those with desired skillsets and competencies that are novel within the established frame of an organization, proactive practices of acculturation might play out in important ways.

Our research also helps shed further empirical light on the theoretic puzzle of how organizations deal with multiple field level logics that are introduced into these organizations through their founders or constituents (Besharov & Smith, 2014). While most research has taken a contingency perspective to show how organizations comply to conflicting logics through hybrid identities (Battilana & Dorado, 2010) or selective coupling (Pache & Santos, 2013), we empirically illustrate that organizational constituents make sense, interpret and give meaning to field level logics that are carried into the organization (Binder, 2007) and translate them in guiding principles or 'best practices' in the organization and guiding principles for the way in which they think their projects should ideally be moved forward (McPherson & Sauder, 2013). Over time, the guidelines that are derived from these logics seem to complement each other and characterize what old institutional theorists such as Selznick would have called the 'organizational character' of the corporation (cf. King, 2015). We show that agentic work on new, contrasting, logics along a process of acculturation can facilitate the organizational character to morph into a slightly adjusted one. The acculturation process implies that most of the old logics that formed the basis of the character remain respected (through a process of anchoring) but new elements are added (through a process of accruing), which ultimately enables the organization to move toward an improved fit with its changing environment. In this respect, processes of organizational acculturation of new logics illustrate a potential pathway for organizational adaptation processes in which choice coexists with external constraints (Hrebiniak & Joyce, 1985).

Finally, we also contribute to the literature on corporate venturing, which often suffers from theoretical limitations in providing insights into the question why so many corporate venturing initiatives fail (Hill & Birkinshaw, 2014). The literature has had difficulties to extend the descriptive level and prior theoretical accounts as in Raisch and Tushman (2016). We deep-dive into this conundrum through the lens of institutional logics, which allows us to explain theoretically why many of the more recently started initiatives by corporation that adopt central professional practices from the entrepreneurship community remain lackluster and often disappoint in their actual contribution (CBInsights, 2019; Heinemann, 2015).We offer new theory why even projects with strong market attraction and with well networked members may ultimately fail if the key venture leaders fail to acquire the necessary "organizational cultural capital" to enable agentic use of focal corporate logics. By building on sociological concepts, for example cultural adaptation processes as originally studied in the context of refugees that need to balance two cultures (Rudmin, 2003), we offer new perspectives and thus new avenues for further research to the domain of corporate venturing, notably on how to lead a corporate venture at different stages of its life cycle. Furthermore, we emphasize that successful venture teams with strategic renewal aspiration should not limit themselves to assimilation. Rather, they should be encouraged to integrate by bringing in elements from the entrepreneurial culture to enrich the dominant corporate logic. Such successful acculturation might lead to gradual changes in the dominant logic over time, an interesting research area to understand organizational evolution.

4.8 Conclusion

Inserting an entrepreneurial logic into the corporate logic has become essential for large companies to create new market opportunities and foster strategic renewal. By virtue of unique data access, we showed that venture teams that skillfully orchestrate an organizational acculturation process around their projects will find it much easier to become successfully integrated into a business unit, even in case of not meeting key financial performance indicators. Ventures that have been socialized in the outside entrepreneurial community without incorporating and subsequently adding to the dominant corporate logic are prone to failure. Likewise, ventures that limit themselves to pure assimilation do not succeed either as they fail to contribute to the overarching goal of strategic renewal. The following quote from one of the corporate business model consultants we interviewed in poignantly summarizes our insights:

> *If you want to generate impact you have to know the culture [. . .] It is the same principle with people—they must first feel understood before they let themselves be talked to and change.*

5 | Entrepreneurial Experimentation in Corporate Ventures: Fitting Experimental Strategies to Levels of Business Theorizing

5.1 Abstract

While experimentation in entrepreneurial ventures has become a broadly accepted means to validate ideas and optimize business models, recent work has engaged in a critical debate about the potential limitations of scientific entrepreneurship and lean startup experiments. Our research looks at the practice of entrepreneurial experimentation in the context of a large engineering company that has built diverse innovation initiatives around scientific entrepreneurship methods. We find that venture projects come with different levels of business theorizing and linked levels of uncertainty, which makes it important for entrepreneurs to select and execute experimental strategies appropriate for the respective business goals. In particular,

they will need to strategically make use of the commitment-generating function of experiments. We emphasize the importance of the experimentation capability of entrepreneurs that allows them to run optimization and exploration experiments efficiently, and effectively incorporate experiments as commitment function. Moreover, we also identify the experimentation capability of organizations as important field of research that will need further investigation. Our findings contribute to the emerging interest in entrepreneurial experimentation as well as corporate entrepreneurship.

"To invent you have to experiment, and if you know in advance that it's going to work, it's not an experiment. Most large organizations embrace the idea of invention, but are not willing to suffer the string of failed experiments necessary to get there."

Jeff Bezos, 2015 Letter to Shareholders[3]

5.2 Introduction

Scientific entrepreneurship methods, popularized as lean startup in the practitioner community (Blank, 2013; Ries, 2011), have become widely diffused in accelerator programs around the globe (Cohen et al., 2019a; Felin et al., 2019), in university education, and more recently in corporate accelerators (Hampel et al., 2020). Inspired by Silicon Valley's startup ecosystem successes, a growing number of incumbents have begun to introduce the methods and tools of scientific entrepreneurship to foster entrepreneurial spirit within the corporation (Kanbach & Stubner, 2016), and thus add to corporate renewal (Shankar & Shepherd, 2019).

Amidst its wide popularity, a lively debate has emerged in the scientific community about the benefits and limitations of lean startup and scientific entrepreneurship methods (e.g., Bocken & Snihur, 2019; Camuffo et al., 2020; Contigiani & Levinthal, 2019; Felin et al., 2019; Leatherbee & Katila, 2019). More critical views highlight potential shortcomings of an over-reliance on lean startup and its toolkits. A lot of the current debate rests largely on theoretical arguments (e.g., Bocken & Snihur, 2019; Contigiani & Levinthal, 2019; Felin et al., 2019; Hampel et al., 2020), while

[3]Available from https://ir.aboutamazon.com/annual-reports

only first empirical evidence for the utility of a strict scientific approach has been brought forward (Camuffo et al., 2020). Further empirical exploration of the practice of business experimentation and the scientific method is scant.

Our study addresses those gaps by providing in-depth exploratory evidence to substantiate the current debate on the boundary conditions of experimentation. We compare 14 projects within a single company that differ in their level of business theorizing to shed light on the different functions of experimentation and their conditions of applicability. In particular, we emphasize the importance of the commitment-generating function of experimentation. Furthermore, our insights add to a burgeoning conversation about experimental capability (Shelef et al., 2020).

5.3 Literature Backdrop

Inspired by the success of numerous startups from Silicon Valley, scientific entrepreneurship methods known as Lean Startup in the practitioner community (Blank, 2013; Ries, 2011) have received increasing attention over the past decade. Key elements of this method are structured market-engagement and a dedication to data-driven decision-making: by collecting primary evidence about customer preferences, typically through business experiments with rigorous hypothesis testing through prototypes and early product versions, the development of entrepreneurial business cases has shown to be faster and higher performing compared to more intuitive approaches (Camuffo et al., 2020). Consequently, experimentation as a key element of the scientific method has developed into a vital approach for many innovative industries where outcomes are difficult to predict (Chavda, 2019). Through formulation of hypotheses about the underlying business model and by testing the assumptions before committing relevant resources, entrepreneurs can gather relevant knowledge about the business environment and thus are said to be able to take better-informed decisions as uncertainties are reduced when developing new business models (Andries, Debackere, & Van Looy, 2013; Leatherbee & Katila, 2019; McDonald & Eisenhardt, 2020; McGrath, 2010). Recently, a lively debate has emerged in the scholarly community about the benefits and limitations of the scientific method and in particular the practice of business experimentation, (e.g., Bocken & Snihur, 2019; Camuffo et al., 2020; Contigiani & Levinthal, 2019; Felin et al., 2019; Leatherbee & Katila, 2019). Critical views have been voiced, highlighting potential shortcomings of an over-focus on lean startup and its toolkits. Felin and colleagues (2019), for example, compellingly outline the perspective that a key task of the entrepreneur would be the development of valuable and unique economic theories (in line with a theory-based view of the firm as developed in Felin & Zenger 2009; 2017), for which lean startup methods provide little guidance. The critique maintains that the predominant focus on customer feedback may favor incremental innovation rather than high novelty.

Amidst this debate, we equally observe that lean startup and its scientific underpinnings enjoy increasing attraction also in corporate contexts. Strongly inspired by the startup ecosystem in the Silicon Valley that spawned numerous well-known companies, a growing number of incumbents have begun to introduce programs and innovation units designed to encourage business experimentation (Buvat, Gilchriest, Turkington, KVJ, & Ghosh, 2017; Hampel et al., 2020; Ries, 2017). Well-structured programs in form of corporate accelerators have been introduced to effectively develop the search process (Kohler, 2017), typically with expectations of fostering entrepreneurial spirit within the corporation (Kanbach & Stubner, 2016) but often also with the ambitious goal of adding to corporate renewal (Shankar & Shepherd, 2019). Recent empirical research has indeed shown that the active engagement of employees in business model experiments can enable strategic renewal in incumbents during times of industry transformation (Bojovic, Sabatier, & Coblence, 2019; Cozzolino, Verona, & Rothaermel, 2018). On the other hand, lean startup practices have also been suggested to "help organizations tackle grand challenges" (Bocken & Snihur, 2019, p. 2).

Typical methods and tools applied include structured customer development processes (Blank, 2013), variants of the value proposition and business model canvas (Osterwalder & Pigneur, 2010), as well as experimental iterations on minimum viable products and business model conceptions (Ries, 2011, 2017). While a number of elements are not new and relate to previously studied practices and processes (for a comprehensive discussion refer to Contigiani and Levinthal (2019)), the combination of methods and the explicit borrowing from the entrepreneurial profession, i.e. of practices adapted to entrepreneurial environments more than corporate structures, raises new questions. Generally, we know rather little about challenges and limitations of lean startup experimentation in corporate contexts (Camuffo et al., 2020; Hampel et al., 2020) and how they reconcile project-level flexibility of lean startup with firm-level innovation portfolio considerations (Contigiani & Levinthal, 2019). Moreover, a lot of the current debate in the literature rests largely on theoretical arguments (e.g., Bocken & Snihur, 2019; Contigiani & Levinthal, 2019; Felin et al., 2019; Hampel et al., 2020). While first empirical evidence for the utility of a strict scientific approach has been brought forward (Camuffo et al., 2020), further empirically driven exploration of the practice of experimentation and the scientific method is scant.

We argue that in particular a more in-depth study of the different functions of experimentation and their applicability in dependence on different venture types will substantiate the current discussion about boundary conditions of scientific entrepreneurship and lean startup inspired experimentation within incumbent firms.

5.4 Method

As prior literature on the effects and uses of experimentation in corporate venture projects is limited, specifically in its empirical approach, we opted for a qualitative research design (Eisenhardt, 1989). We structured our exploratory quest around three steps, starting with a first wave of open exploratory interviews within a single company, then selecting specific cases of internal corporate ventures for their potential to develop towards comparative insights, and finally, as our insights begun to converge, completing our data collection through interviews with independent experts.

5.4.1 Research Setting

We use the context of a large German engineering and electronics company, mainly active in the automotive industry, to study different types of entrepreneurial projects and their particular approaches to business experimentation. Due to significant technological and societal changes in its major industry, the corporation felt pressure toward strategic renewal over the past decade. The company aimed in particular at building new business opportunities that would extend its existing competences around the Internet of Things—a sector with many players associated with the entrepreneurship community, such as Google and Apple vying for platform leadership in different IoT application domains. In order to achieve its ambitious goal of becoming an IoT platform leader and to ensure a viable future, the company has begun to invest significantly in internal corporate venturing. Employees are encouraged to hand in own ideas and develop them along a specifically designed innovation framework, comprising corporate acceleration and incubation initiatives. It has enrolled in particular consultants from Haas Business School and the Strategyzer Group[4] to get direct access to the state-of-the-art methods and tools such as the lean customer development process (Blank & Dorf, 2012), agile development (Ries, 2011), and business model and value proposition canvas (Osterwalder & Pigneur, 2010).

One of the company's most prestigious innovation initiatives is the corporate accelerator program. As the introduction of new technology or service offerings in unknown markets is risky and many ideas fail, the company decided to create a two-phase program around scientific methods of hypothesis formulation and testing to evaluate new opportunities. This way, the company hopes to weed out potential false positives early before high investments are made. Teams that run through the first phase of the program try to systematically validate initial hypotheses and to find product market fit. In the second phase, they create a MVP that is tested with

[4] Founded by Alexander Osterwalder, the creator of the globally recognized business-modeling framework (the business model canvas) with adjacent management tools to help corporations and start-ups to build and innovate on business models.

first target customers. During the program, a resource constraint environment is simulated. The teams are asked to talk to potential customers, then experiment and learn about the new market. By 2019, after five cohorts run on its global sites, the company has investigated around 169 ideas of which 50 projects were selected to continue with phase two. In the second phase, 14 projects managed to validate their business model and find first customers. The accelerator program helped the company to save an estimated low triple-digit million figure in opportunity costs due to early termination of projects. The program has subsequently become a central mechanism for how the company uses experimentation to reduce risk in early development phases. Further elements of business coaching around the business model canvas, lean innovation, and experimentation have been introduced at different levels (central and business unit level).

The described setting is particularly well suited for our research. First, by closely collaborating with leaders of the scientific founder method and following structures and practices originally designed for the Silicon Valley startup scene, the company has introduced experimentation as major approach to product develop in a highly professional way. This allows us to conclude that the commitment to this type of process has been sincere and its implementation follows professional standards with relying on strong expertise. Given recent research on the effectiveness of teaching scientific methods alongside the more traditional lean startup tools (Camuffo et al., 2020), we believe the company has focused successfully on not only adopting respective tools and practices but also emphasizing the scientific entrepreneurship character of the process. Second, the high technology giant offers a large variety of products and services in different industries. This gives us the opportunity to investigate a diverse set of internal corporate ventures with different innovation types to draw our conclusions.

5.4.2 Sampling & Data Collection

In a first step, we conducted interviews with all venture teams that we identified within the company in early 2018. This allowed us to explore general patterns and challenges these ventures faced during their development process and helped us to select the ventures that were further considered in our research process. In line with our interest to investigate the requirements for experimentation in dependence on different levels of business theorizing, we sampled 14 ventures based on our major selection criteria: We aimed at variety of project types, following literature that has emphasized different types of innovations (Schumpeter, 1934; Westgren & Wuebker, 2019). Thereby, data limitations with regards to access to primary and secondary data within the confidentiality restrictions set by the corporate context influenced our selection.

All selected ventures operated in an environment characterized by high insecurity and were supported by at least one of the company's entrepreneurship initiatives. We studied the ventures over a period of two and a half years between January 2018 and June 2020. At the end of the research period, six of the internal ventures were still ongoing, whereas eight ventures were stopped.

As summarized in Table 5.1, we used several data sources: (1) semi-structured interviews with executives, venture leaders and corporate innovation experts; (2)

archival materials such as internal documents and presentations, internet sources and press releases; and (3) own observations. Our primary data source consists of semi-structured interviews (Gioia et al., 2013) that we conducted in three rounds. First, we conducted 53 exploratory interviews to familiarize ourselves with the research context and investigate how internal corporate ventures build their business case. We mainly asked open-ended questions to get to know the projects and their general approach to experimentation. The initial empirical insights helped us to obtain a general understanding of the different project types and to subsequently select the ventures to be further considered in our study. In the second step, we conducted 33 deep dive interviews with the shortlisted ventures. The deep dive interviews of our second wave of data collection had four sections. First, we asked about the informant's background and the underlying idea of the venture. Then we focused on the procedural aspects of the venture's build-up phase. In particular, we asked for key activities in the initial phases and tools that guided through the process, as well as key philosophies to mobilize resources. In the third part, we investigated the entrepreneurial strategy including aspects such as the importance of specific technical solutions for the product, the specific approach to business model design, and the relationship to customers and other stakeholders. Finally, we ended the interview by asking about the interviewee's personal view on uncertainty in the entrepreneurial process. After analyzing our data that mainly considered our selected ventures, we conducted a final round of interviews with domain experts to include an additional perspective on experimentation within the company. In this third round of investigation, we conducted six additional interviews that helped to produce a more complete, accurate picture on the ventures, approaches to experimentation, and challenges encountered, and to ensure data validity (Kumar et al., 1993).

Table 5.1. *Overview Data Sources.*

Data source	Type of Data	Use of Data
Interviews	**Exploratory interviews (53)** with innovation experts, team members, project leaders, and internal consultants to investigate significant challenges in projects that went through new innovation programs	Familiarize with the organization, select the sample, and get a first idea on key process drivers of corporate entrepreneurship projects.
	Focused project interviews (33) with venture leaders, team members, and decision takers on the corporate logic	Investigate the mechanisms used by venture leaders to develop the business cases of their projects and mobilize internal resources
	Outside view interviews (6) with internal experts on the company experimental process	Confirm key challenges and learning on experimental capacity of the organization
	Informal conversations: Informal talks with employees	Clarify uncertainties and open questions, track the development of individual projects, collect further opinions and domain-general insights
Archival data (internal)	**Project related documents:** internal presentations of the project, client's presentation, correspondence with project team, process flow chart, budget application documents, sales plans	Familiarize with the project, Triangulate data received from interviews and observations.
	Internal news articles used to raise awareness about the product	Familiarize with the project and triangulate data
	Secondary interview data	Familiarize with the project, Triangulate data received from interviews and observations.
Archival data (external)	**Journal articles** from local, national, and international journals and newspapers	Familiarize with the project, Investigate external presentation
	Project websites used for communicating product and establishing sales channel.	Analyze customer interactions and external positioning
	Video clips containing product presentations and interviews.	Understand presentation and communication to internal and external constituents
Observations	**Field notes (592 pages):** record of internal conversations, meetings, social interactions over a period of two years	Collect further project insights, triangulate data

All interviews were recorded and transcribed, resulting in 1082 pages of interview data. We complemented our primary data with archival material and own observations. As one author spent three years within the company, we had full access to internal documents, and other internal means of communication. This distinguished access to data helped us to deeply understand our research context, select suitable cases for our analysis, and come up with detailed insights on the individual ventures and their particular approach chosen to generate new products or services. Our secondary data included documents such as seed project applications and sales plans, project presentations used for internal and external stakeholders, meeting notes, intranet postings, and press releases.

5.4.3 Data Analysis

Motivated by Felin and colleagues' (2019) claiming that the lean startup method may in particular meet its limitations when it comes to more novel business theory development, a key concern in our research was to identify heterogeneity in entrepreneurial theorizing. We thus started our data analysis by creating a comprehensive case description for each of the 14 ventures and classifying them according to their level of business theorizing.

Prior research offers a number of different approaches on how to classify types of entrepreneurial ideas and sources of innovation, which can help operationalize levels of business theorizing more concretely. One renowned example is Schumpeter (1934) who depicted five different ways of combining productive factors: the production of new goods or higher-value goods, the adoption of new production methods for existing goods, the entry into new markets with new or existing products, the exploration of new sources of supply, and finally the development of new organizational or market structures. Based on Schumpeter's classification, Westgren & Wuebker (2019) identified different forms of entrepreneurial value creation theorizing, notably the shift in production technology, causing a price-change, business model innovations leading to higher competitiveness, as well as the recombination of productive resources creating an entirely new strategic attribute.

Similar to Westgren & Wuebker, we adopt Schumpeter's taxonomy and adjust it to come up with different categories to which we can map our ventures. We identified heterogeneity in our cases in combinations of (1) technologically driven efficiency improvements, which is consistent with Schumpeter's fourth type of innovation; (2) the degree of novelty in user functions, ranging from either completely novel functions to improving upon known user functions, or targeting explicit unmet needs, which is a combination out of Schumpeter's first and third conception of innovation; (3) business organization-driven efficiency improvements, reflecting Schumpeter's second type of innovation; (4) and finally the vision of new socio-technical models of economic exchange and behaviors, that can be associated with Schumpeter's fifth type of innovation.

Note that entrepreneurial ideas can be driven by combinations of theories. In particular, the visionary theorizing is typically combined with forms of novel customer functions, or technological breakthroughs. The author with the deepest insights into the individual venture projects made a first classification of the individual cases. To validate this classification, a second author independently grouped the ventures into the four categories. In case there was disagreement on the allocation, an independent opinion was obtained in addition.

Across our cases we identified three technological driven ventures, four cases that offered novelties in user functions, three cases that fell into the category of business model innovations, as well as four cases that fit into the category of vision driven ventures Table 5.2.

Table 5.2. *Level of Business Theorizing.*

Nr.	Short Description	Start	Original Level of Business Theorizing	
			Description	Category
A	Water heating system for developing regions	2017	Novel business model based on micro payments	Business model driven
B	Automated parking solution	2013	Vision-driven based on novel personal mobility scenario	Visionary
C	Key sensor component for unarmed aerial vehicles	2015	Vision-driven based on future mobility concepts	Visionary
D	Drive system for electronic bike (pedelec)	2016	Technological component used to service emerging user function	Tech-driven
E	Home robot for entertainment & security	2014	Novel user function for home scenario	Functionality driven
F	Logistics optimization solution (SW & HW)	2014	New technical functions to serve unmet needs	Functionality driven
G	Mobility platform (aggregator)	2015	New business model based on platform business	Business model driven
H	Wireless localization and secure key management for vehicles	2015	New user functions targeting explicit unmet customer needs	Functionality driven
I	Interactive fitness bike	2016	Novel user functions	Functionality driven
J	Healthcare instrument for home use	2016	Improved user function through improved technical solution	Tech-driven
K	Last mile mobility Solution	2016	Vision-driven based on new mobility option	Visionary
L	Platform for smart agriculture	2018	New business model based on platform business	Business model driven
M	Energy solution for caravans	2018	Technologically driven innovation used for new market	Tech-driven
N	Smart city concept	2016	Vision-driven based on smart city concept	Visionary

The awareness that there are different levels of business theorizing and correspondingly diverging forms of uncertainty subsequently helped to better understand the necessity for different experimentation styles. Thus in a second step we coded for the ventures' particular approach towards experimentation.

After the within-case analysis, we then turned to cross-case analysis which led us to our theoretical insights that we compared with prior research (Eisenhardt & Graebner, 2007; Eisenhardt, Graebner, & Sonnenshein, 2016). In particular, the exchange between our case insights and the many conceptual or even normative prescriptions in prior literature helped us shaping our understanding of the use, applicability, and some preliminary boundary conditions of scientific entrepreneurship practices in large corporate contexts.

5.5 Findings

5.5.1 Experimental Functions

Our exploration shows that experiments can serve different functions. The various ways in which our venture teams used experiments ultimately also influenced the outcome variables of the ventures. Depending on the type of project, our data reveals three major functions of experimenting: exploration of elements of customer value and the business model, optimization to refine the solution, and commitment generating, meaning a shaping or scoping approach that rests on collective action and the generation of social proof points (cf. Felin & Zenger, 2009). Here, experimentation elicits commitments under uncertainty and enrolls key stakeholders for the purpose of joint investments into an economic and technical vision. Across our cases we identify ventures that use several experimental strategies within the same project. We explore the different foci of experimentation, as well as their fit to the nature of entrepreneurial project.

Scientific Experimentation: Exploration and Optimization

In line with the understanding of scientific entrepreneurship, experiments served to either explore customer reactions and preferences or optimize specific elements of the business model (i.e. value proposition, revenue model, channels, etc.).

Exploration experiments are principally used for generating data points for both problems and solution perceptions. Our data shows that most ventures – except for venture D, venture J, and venture M - initially involved in exploration experiments to scout problem domains for viable, i.e. interesting, and big enough problems and thus narrow the scope of research. The ventures that did not make use of the exploration function were highly technically driven and already started with a clear product conception. Exploration experiments pertain to actions taken around the observations and critical examination of customer problems, aka customer discovery. Thereby the approach of scientific exploration significantly differs from traditional market research, since the ventures focus on the critical examination of customer problems instead of directly focusing on a concrete solution in a predefined market.

> *We went to customers without a solution, without knowing how the product could look like. The MVP was not yet ready. We wanted to understand the problem. Our first interview partner was a parking garage provider and he said my problem is the HMI interface of my billing system.* (Business model expert, Venture B)

> *We had different market segments that we wanted to investigate and explore. We observed the professional fitness market and found out relatively quickly that both what the users want and what the users of this equipment want are going in a completely different direction than we originally thought (...) And so we pivoted and we said okay it's not about making cycling realistic, we actually have to offer a value proposition that satisfies both the owners and the users.* (Venture leader, Venture I)

> *And a first, concrete product idea was this scooter which was the result of a longer process, where we were open for solutions and searched a lot in the market for problems that actually exist and tried to understand the customer segments: Who are the potential customers, what problems do they have?* (Venture leader, Venture K)

> *The most important thing was to be out on the streets to acquire knowledge. Knowledge about the pain points. How do people move around? What do they experience? What are the sticking points? And where can we reach the people? Who can be reached where? We have conducted different experiments. (...) For example, we organized an event where people were asked to indicate on a huge map where they came from and how they got here. That was our goal. Building knowledge. Building understanding.* (Venture leader, Venture K)

If done well, exploration holds the potential to direct the attention of the entrepreneur towards important problem spaces and helps identifying counter-intuitive or unexpected aspects. Applying a scientific discovery mind-set will stimulate entrepreneurial creativity to imagine interesting novel economic theories as the team in our case Venture C did rather successfully. The team engaged in substantial exploration and gathered qualitative insight, which ultimately led to discarding of several potential problem-solution spaces:

> *Through customer surveys and various conversations, we figured out that there are numerous topics related to the aircraft. We tried to find a product that we could serve with our core competence. One that is so general that it can be used for as many aircrafts as possible. And that's how we ended up with the Sensor Box.* (Technical developer, Venture C)

It requires emphasis that, strictly speaking, these are not all experiments that would pass critical review of professional experimental designers. However, it would clearly fall into a canon of scientific methods—also scientists (at least social scientists) often engage in a deep purposeful immersion into their empirical contexts in order to unearth interesting research questions, before designing hypotheses, collecting data and running regression models or other forms of analyses. To stay consistent with the practitioner notion of experimentation and its widespread distribution also in the emergent body of research (Chavda, 2019; Contigiani, 2019; Shelef et al., 2020), we use the term experimentation here loosely and call these exploration or discovery experiments. These types of experiments are most often used and typically help validate problem theories or unspecified problem-solution-theories. Although exploration experiments might lack "investigative rigor" in an experimental sense, they might still be conducted with a scientific mindset of critical analysis. Applying science to such exploration requires a good understanding of the biases that observers might introduce.

We found that there is a risk to focus solely on quantitative evidence, at the expense of an integrated and paced strategy that also leverages qualitative evidence. The more confident a corporate entrepreneur is about an idea and about data points to be generated, the easier qualitative exploration is overlooked. Presumption about customer demands might be more pronounced in corporate contexts that have established customers groups, which might backfire when moving into new markets as one of the company's UX expert highlights:

> *Very often it's about numbers. And there is not so much value given to the qualitative part, but that's very crucial because we spent so much time and so much effort in quantitative studies without doing qualitative part before. [...] So I would not underestimate the value of qualitative activity [...] for example, another project with [...] that was in Africa. Basically we don't sell a lot, it could be better. However, there it's all about how big and loud it is. You know? But at [company] we want products to be light and small! But for that market, we just go for the biggest one. [...] this project was the only one we did in such a way—going there.*

An interesting complication may come when exploration experiments are substantially used also in solution validation. This happens more often than one might think, simply because of the aforementioned complexity of developing effective criteria (measurable variables), and more importantly developing thresholds before running tests:

> *The trickiest part is to understand how much value we can extract. You can still experiment. The big question is how to figure out the willingness to pay and the costs that we have. (...) How much would it cost you to make that? The willingness to pay, you can try it out. But the biggest thing that I see is understanding how much would it cost. You ask internally, you try to assume it. It's always very difficult, especially if it is a complex thing.* (UX expert)

A typical exploration experiment around a product solution would be an MVP that is put out to the same customer in consecutive, iterative steps, and gets modified to respond to the feedback of this one particular customer. Venture I for example used a multi-step approach to refine their MVP over time and collect relevant customer insights:

> *We testing in several stages. First of all, we stood in front of the gym with a hard copy of the bike. Simple power point slides where our product idea was explained. That was our prototype number one. We collected some ideas and developed a 3D app in the next step. (...) To explain to our potential customers what a motion platform is. How should it look like? How does it move? And in step three, we had a bike. And we developed this prototype further. [...] With this prototype we wanted to test the customer interaction and the value proposition, not the technical feasibility.* (Venture leader, Venture I)

In this case, a local optimum (Benner & Tushman, 2003) can be achieved, yet at the risk of optimizing this product for a potentially very small group of customers. Such learning process is more a singular trial-end-error process than a classic experiment. Exploration experiments at solution levels run the risk to refine a product within their own reference scheme. It allows creating an internally consistent product for a particular test user but may lose what scientists call external validity, i.e. not necessarily makes much sense against outside evaluation criteria such as aspiration levels of the parent organization (March, 1991), a partner or the entrepreneur. Exploration experiments are highly susceptible to potential satisficing behavior (Cyert & March, 1963) and local optima. This is supported by the fact that the measure design for exploration experiments often emerges "inductively" upon examining the "field evidence":

> *Very often, we do experiments without having metrics before. And then you just take what it counts and say yeah, this is what we wanted.* (UX expert)

Once the customer problems and preferences have been identified, our data shows that exploration experiments are often followed by optimization experiments.

Optimization experiments allow the optimization of a particular product feature or business model against a clear alternative hypothesis and ex-ante defined threshold criteria. This contains tests to modify the MVP in various dimensions; A/B testing of website design, price sensitivity tests, etc. would be a classic example of such optimization experiment. In our cases, we identified a whole range of projects that used optimization experiments, in particular functionality-driven ventures such as venture E, venture H and venture I, that optimize specific product features through such experimentation, and business-driven experiments, such as venture A and venture L, optimizing specific elements of the business model such as willingness to pay:

> *We assembled a demonstrator in three weeks and went back to the customer to iterate our product. During those conversations with the customer we received further feedback on how the product should be designed. For example one person said "Oh now I understand what you want to provide. I would like to have a button that I can press to get the temperatures of the previous day at 6 pm." [. . .] This is how we proceeded, step by step. We also went to market with a limited series first, just to learn from the market and get feedback to fix the bugs, improve the product and then scale it up.* (Venture leader, Venture L)

> *After proving last year that we have customers that are willing to pay for the product and that are actually making the payments, the next phase of testing on which we focused this year was scalability and profitability.* (Project coordinator, Venture A)

> *We did so much user testing to try to get as much feedback as possible and keep the design iterations going as tightly as we could* (AI Research Scientist, Venture E)

Typically, these types of experiments require a sufficient number of data points to create reliable results (Davenport, 2009). Experiment size can be of particular challenge for corporates that play in the B2B domain where there are large but few potential customers, or in other domains where the access to the number of potential data points is restricted. The venture leader of venture C for example explained how difficult it was do follow the requirements of the corporate accelerator program and find sufficient interview partners in a B2B domain to conduct one hundred interviews within eight weeks.

Perfected in online environments (Kohavi & Thomke, 2017) that typically allow such forms of experimentation in swift and resource-efficient manners, optimization experiments are often more difficult or at least resource-intensive to run in complex hardware products and setting with small-sized customer groups. It might hence not be surprising, that in practice, we observe very few occasions where true optimization experiments take place in a rigorous scientific manner:

> *The lean startup model if you read the book, is very focused on software, right? So, I would say most of Silicon Valley tries to follow a similar model to that. But the thing is that it starts to break down once you deal with hardware, right. Because hardware takes a while to make, and then to test and everything. With software, you can implement a bunch of different things at the same time, put all these things into service at the same time and feel like half these things do not work, let us get rid of them. Hardware, you cannot really do that. [...] Our hardware team had to go about doing things a little differently than the software team. But I would say we probably stuck to something that was in the same ballpark as the lean startup model. [...] We kind of adapted it to our needs.* (AI Research Scientist, Venture E)

Often, the reason for it is that the stage of the venture and the market engagement options available simply do not allow such strict scientific testing. Even if possible, employing rigorous experimental standards is not an intuitive capability. The lean startup toolset as such has no built-in automatism to force a strict scientific approach, as the research by Camuffo and colleagues (2020) clearly highlights. Both of their experiment groups were subjected to lean startup training, yet the treatment group received specific training and mentoring in applying rigorous scientific thinking and experimental capabilities.

Important for these types of experiments are ex-ante defined, falsifiable hypotheses that offer reliable measures of what needs to be tested (i.e. action rather than intention), along with threshold criteria. As any trained empirical scientist knows, the respective design of indicators has high impact on the validity of the measurements—i.e. can we measure what we set out to measure? This means, these types of experiments are rather difficult to run in nascent markets, when we have little understanding of what a suitable behavioral variable could be that would approximate potential value, as the following quote from one of our business model experts highlights:

> *[...] With those new businesses, we often don't know yet what drives this business model. We have to find that out. And that depends on the project. There are famous examples like Facebook, where it's eyes on the screen. And that's the only metric they need. Sure, they have other ones, but if you ask, well, what's the most important one, what's the one metric that matters more than any? That's what we're looking for by the end of our accelerator. What is that metric?* (Business model expert)

We observed in our cases that especially technical-driven ventures sometimes seem to struggle with optimization experiments, as prototypes need to be in a very advanced state to provide accurate information about the problem-solution fit. Concerning venture J that had to be stopped after three years, as the product could not solve the customer problem, one of the co-founders stated:

> *It simply turned out that although the product really did fit relatively well, the approach we took did not solve the actual problem [. . .]. That was a major learning. At the beginning of the project, it was not yet clear. But that's the case with many things. The customer doesn't know, we don't know. We didn't know each other, we didn't know the limits of the technology. We always go to the limits of what is technically feasible, and thereby enter uncharted territory.* (Co-founder, Venture J)

Most of our ventures employed scientific exploration and optimization with quite high proficiency levels (certainly owing to respective coaching). Whereas all our ventures used scientific experimentation, only some ventures used a third function of entrepreneurial experimentation, what we call commitment experiments.

Commitment Experiments: Strategic pre-commitments and external stakeholder mobilization

This category of experiments uses a notion of the entire project being an experiment. The reference points for experimental outcomes are not alternative configurations of the value proposition or business model elements but rather alternative sets of economic theories about the future (cf. Felin & Zenger, 2009, 2017). The purpose of such experimentation is to learn about the innate quality of the "mobilizing" effect of the entrepreneurial theory and the capability of the entrepreneur to activate other players to buy into this vision of an alternative economic future.

Venture B serves as example. Situated in the contemporary trend of autonomous navigation for cars (here a parking solution), the entrepreneurial idea rests on a grand theory that combines beliefs about the emergence of a specific customer preference in the envisioned future, about a particular technological design and corresponding value network configurations of value capture. The "truth" of Venture B's commercial theory can on the one hand be revealed through specific exploration and optimization experiments. However, given the speculative nature of both perceived customer preferences and technical solutions, a prime experimental requirement in the first step will be to understand into which direction preferences and solutions of value chain partners will move and to prepare the market for a novelty. This function of experimentation is in particular needed for highly visionary projects such as venture B, venture C, and venture K that are characterized by high uncertainty. The successful ability of Venture B to build a proof of concept together with an important market player and to garner a lot of public attention and global interest in this particular solution not only begins to validate the potential "truth" of the underlying commercial theory but elevates the value of the entire economic theory underlying this venture. By biasing the potential actions of other market players—an important feature of strategy (cf. Van den Steen, 2017)—towards the specific problem-solution vision underlying Venture B's case, the innate value generation ability of this entire problem-solution space has now changed. Commitment experiments are those that can shift the value magnitude of an idea.

> *When you look at very, very early prototypes, there was this kind of wild looking - I don't know - looks like a robot from a sci-fi video game. Right. The more we were talking to people, and the more thought was put into it, the more that we realized, in order for people to accept this thing into their home and into their intimate like personal space, it had to be something that also had an emotional appeal to it. It is much easier for someone to welcome this thing in, if they thought it was cute and endearing and it kind of warmed them up inside a little bit in comparison to this cold, animatronic just calculating thing. So, I would say over time that is something that had changed. [...] everyone kind of realized, wow, this cute thing is cool. It is easier to get excited about this than this thing that kind of looks like an appliance.* (AI Research Scientist, Venture E)

> *If the parking garage operator says hey, I have a problem with the HMI interface. People can't pay properly. They always type something wrong and get annoyed. And we tell them you don't need a paying machine. You don't need the interface. In the future, the car will pay. But you have to make people believe that it works first. (...) This [product] is something completely different, another world. And it's not enough to make promises. They want to see it. You need to influence the market.* (Business Model Expert, Venture B)

The fact that the entire entrepreneurial venture can be regarded as an experiment for the organization runs very much analogous to the argumentation by Kerr, Nanda and Rhodes-Kropf (2014) who described entrepreneurship in general as an experiment that allows from a societal point of view to figure out competitively the value of novel ideas.

> *If someone has a vision, there is also kind of a cluster of ideas and nice to haves. You cannot solves this within a year and you need someone who really wants this, and 2-3 years earlier you needed to decide where do you want to place the [technical solution] and it was decided [...] and then we followed strictly this view. Because the customers don't care; they just want to have it done [...] at [company] we always try to find a solution in 2-3 different ways. And the best solution is taken up at the end.* (Project leader, Venture B)

Another important function of commitment experiments is the creation of internal commitment to ensure continuous funding. In some cases, it is not enough to pitch an idea, but the decision takers have to be convinced by experiencing the product, at least in the form of an MVP:

> *In the beginning everyone thought it would not work but this perception changed over time. For example, I organized a test driving in the factory and at the beginning everybody laughed. The big and extremely powerful car and next to it this bicycle. But I told them to drive and they liked it. Convincing! Press work! I let [member of the board of directors] and [CEO of the company] drive and showed a picture of it in the [internal newspaper]. There is an article about it. And everyone wondered what they were doing. [Member of the board of directors] rode the bike and smiled. They were role models. I think that was extremely important.* (Former CEO, Venture D)

Venture I demonstrates what happens if the internal commitment function cannot be activated as planned. Due to unfavorable circumstances, the team did not have the chance to present its MVP to the decision committee that decided on the further funding of the project. As a result, the committee was unable to fully understand the product and the final decision was negatively affected.

> *An essential reason from my point of view is the fact that we could not demonstrate the product, we could not show it and [the decision committee] could not try it out and experience it. [...] I mean, in case you are a gym goer and you sit on the bike every day and you are bored, then you can imagine that [our product] is cool. But if you don't go to the gym and you don't ride a bike then you probably don't have much imagination.* (Founder, Venture I)

5.5.2 Leveraging Experimental Functions in Corporate Ventures

Our data confirms the importance of experimentation for the successful development of new ventures. At the same time, it reveals the difficulties of leveraging experimental functions and avoiding execution failure. Several major challenges have repeatedly emerged in our data.

First, we identify the challenge of fitting experimental functions to the level of business theorizing. In general, both optimization and exploration experiments are appropriate options when they reveal "knowable" information about the potential value of a commercial (business model) theory of the entrepreneur. Running optimization and exploration experiments efficiently and effectively creates trust into the project and delivers the required data-driven insights to either abandon or continue the project. However, fitting the scientific experimentation approach to the project type and related level of uncertainty is extremely important.

Ventures aiming to introduce new product functions, or developing new business models should usually start with exploration experiments and move on to optimization experiments as soon as the customer needs have become more concrete (e.g., Venture A, Venture F, Venture L). Directly going out with a rather well developed product (solution) theory and engaging in optimization experiments would steer the venture's development in a predetermined direction and limit the scope for unfolding its potential. Many lean startup processes do immediately begin with a specific thesis, in which the solution, not necessarily the problem, gets validated.

Our data shows that in many cases it is not the venture but the organization itself that prevents projects from fully exploring the market through systematic experimentation before committing to a specific solution. Venture K for example was highly limited in finding problem-solution fit as the final product was already set by the company:

> *It was difficult to get support from the organization for our market-oriented approach and be allowed to reject the scooter if we find a different solution for the problems we have identified.* (Venture leader, Venture K)

Venture J suffered from the company's fear to present first ideas to the customers that are not yet fully developed and do not meet the regular quality standards that the company aims to provide:

> *I said that we have to approach the customer first before we can start to develop the product. But then the [company] said no we can't just go to the customer, we first have to see whether it works. That means we have developed a prototype for half a year which shows that we can read something with the sensor technology. Then we spent half a year discussing internally how the business model could look like and what prices we could ask.* (Former venture leader, Venture J)

Highly visionary projects should usually spend even more time exploring the market. However, at some point also projects with a high level of business theorizing need to focus and move from exploration to optimization in order to not dissipate its energies.

Before we actually developed a product we had to be clear whether this business is coming or whether this business can come. There are some barriers to every new market, be it acceptance by the population or the creation of some kind of infrastructure. Of course, we examined all of this and, validated it for our start-up, for our team, made it marketable, and presented a ramp-up scenario. [...] So the whole thing ran in advance. That was part of our application for the pitch night. Of course, it [the product] was iteratively improved again and again, renewed again and again, extended. (Venture leader, Venture C)

What we did was based on the motto of maximum complexity with maximum simultaneity. We looked at all segments. We were located as a mixed team within the city administration. In this respect, the approach is perhaps a bit more complex than what you would normally do. We also didn't have a focus on a particular street or building where we said, "That's where we're developing innovation now." For us, the lab was the whole city. On the one hand, that was, of course, very extraordinary, innovative. We were in the focus of other cities or ministries and were the flagship project for digitization in Baden-Württemberg. But at the same time, of course, it also has the difficulty of getting bogged down. (Business lead, Venture N)

Technical driven ventures often opt for directly validating specific data points by means of optimization experiments (e.g., Venture D, Venture J, Venture M). Spending too much time on further exploring the business environment would shift the focus away from the actual idea and delay concrete findings. We conclude that there is an important aspect of fitting experimental functions to the nature of the business, its theorizing levels, and the resulting uncertainty levels.

Second, we demonstrate that a focus on the scientific method, i.e. on the traditional understanding of entrepreneurial experimentation as learning and optimization tool is often not enough especially for highly visionary products. While it may successfully lead to identify presumable customer preferences and optimize product design, the attention and resources spent may not be adequate for the requirements of the project. In cases of projects in which the entrepreneurial idea rests on an economic theory of a certain magnitude that surpasses a single innovation within an existing business model, or an innovation in product features imagined to meet latent customer demand, the entrepreneurs can rely less on optimization experiments and will need to engage more proactively in commitment-generating experimentation, promoting their project more as an experimental unit as such to the management and the external environment than focusing too much on optimizing.

Interestingly, only one venture (Venture B) of the four respective candidate teams that could be regarded venture-level experiments (Kerr et al., 2014), focused predominantly on the commitment-generating function of experiments and thus created internal as well as external commitment. Venture B, in particular, excelled at focusing its experimental approach on commitment generation based on the co-investment into a highly visible physical proof of concept.

> *Market influencing means you place a product somewhere and you invest in it so people find it cool. No matter what it is, B2C or B2B. That means you put up a demo parking garage and show it to people. And then they come.* (Business model exert, Venture B)

The venture not only helped to present the product to potential customers, but also served as show case to attract investors to finance product implementation. Venture C on the contrary ended up focusing more on optimizing the particular design of its sensor box while neglecting the importance of commitment experimentation.

> *So we took a three step approach. First, there was no prototype. We did different renderings to show how we wanted the product to look. When we went to a trade show in Munich we already had a mockup with us. Basically a screen where data was visualized. The output was an artificial horizon, some sensor data. There was a 3D printed airplane model, which the potential customer could move to see how the output changes on the screen. And then, the next step was to implement our vision. We've created a sensor box lately. It helps to get a feeling for the dimensions, the weight and the form factors of the product. This mockup even has brand labels, to create a clear product character. Now the customer can see that the product is actually smaller than it was before.* (Development engineer, Venture C)

While this project has been successful for a while in its business unit, it ultimately failed to garner top-level support, even more so as the company is reviewing and tightening its budget.

Our third case, Venture K, failed entirely to engage in commitment-generating experimentation. While generally set out to explore new solutions for last-mile mobility, the team got stuck in customer exploration and early solution validation experiments. Instead, it would have been more appropriate to develop a comprehensive economic theory, test whether it could create a coherent vision about the future needs of urban mobility, and anchor the actions of other market participants on its vision (cf. Van den Steen, 2017). Failing to understand the contingency of the scope of entrepreneurial theory development on specific emphasis in experimental strategy can lead to a rather ineffective business development process.

Venture N engaged in external commitment-generating experimentation, however, the venture did make little use of their prototypes to equally generate internal commitment and ensure project continuation.

> *We tried to involve the press on early on. We actively involved the [local newspaper] by saying: "The robot, it needs a name, could you do a competition for the readers. The citizens can baptize our robot." There was an action where readers could suggest names, and there was a jury. Afterwards the robot was officially baptized. We organized events and brought together the press and the citizens.* (Business Model Expert, Venture N)

> *I don't think we had a clear definition of what we actually wanted to reach with this Lab. For me it was always the urban showcase for all the Smart City solutions the company has. To give an example: If we had a customer to whom we wanted to show what the company had to offer in the field of Smart Cities, we would have to take them on a little trip around the world. [. . .] We could take him to Monaco and say: "Look, we have a smart city platform there." Or to San Francisco. But that's very expensive. Otherwise I show him PowerPoint slides, but that's very unsatisfying. Or I can just take him to my urban lab in Ludwigsburg. Now Ludwigsburg may not be as sexy as New York, Paris, Milan, but it's right next door. [...] In this respect it would have been perfect. But we would have had to push or communicate the topic differently.* (Business Model Expert, Venture N)

The engagement in internal commitment-generating experimentation is equally important for ventures focusing on business model innovations, as they need to create internal legitimacy for a new way of creating, delivering, and capturing value within the organization. The founder of Venture A, for example, recognized the importance and devised a sophisticated strategy and even brought major decision takers at place to convince them about the water heating system based on micro payments:

> *I did a stakeholder map plan. I wrote down all stakeholders for my project. I defined what will be important for them and I defined what I need from them. And I defined a strategy of communication with what should be the format, the frequency. This was important.* (Founder, Venture A)

> *My technique is to use lots of videos. It helps to make it more tangible. Top management will never go to a customer house. But actually this is not 100% correct. [Manager for thermal technology] and [General Manager in Kenia] went to Kenia to see with their own eyes what we are doing on the field.* (Founder, Venture A)

Despite the importance of the commitment function, we have found proof that it is essential to avoid imbalance between scientific experimentation and commitment creation. Notably projects that focus on new functions, business models, or technical improvements also need to make sure to demonstrate substantial progress over time. This was a major problem of Venture G, which mainly concentrated on the involvement of relevant interest groups without ensuring that the project would be taken forward in terms of content.

> *The atmosphere in the team was no longer good. [The founders] were at different events all the time, but they didn't care about the team anymore. And because of this focus on stakeholder management we didn't make much progress in the project.* (Team member, Venture G)

We linked the leveraging of experimental functions to the outcome of the projects at the end of our research period (refer to Table 5.3) and find that in case the venture teams do not succeed in leveraging the experimental functions, it can easily result in discontinuation of the project. Venture B, Venture C, Venture E, Venture G, Venture I, Venture J revealed different execution failures and where stopped during the period of our data collection.

Other ventures successfully applied experimentation in dependence on their respective level of business theorizing and made use of the commitment function to ensure continuous support. As a result, Venture D, Venture F, Venture H, Venture L, and Venture M were still ongoing at the end of our data collection or even reached

Table 5.3. *Experiment Functions.*

	Short Description	Scientific Experimentation *(adaptive entrepreneurial search)*		Commitment Experimentation *(shaping & scoping pursuit)*		Outcome (at the end of data collection)
		Exploration/ Discovery function	*Optimization function*	*Internal pre-commitment function*	*External mobilization function*	
A	Water heating system for developing regions	Market	Business model	High	Low	Successfully discontinued in 2019
B	Automated parking solution	Ecosystem, Technical feasibility	Business model	High	High	Ongoing
C	Key sensor component for unarmed aerial vehicles	Customer need	Technical	Medium	Low	Discontinued in 2019
D	Drive system for electronic bike (pedelec)	-	Technical	High	Low	Successful business
E	Home robot for entertainment & security	Customer Value	Value proposition	Medium	Medium	Discontinued in 2018
F	Software & Hardware for logistics optimization	Customer need	Technical	Medium	Low	Ongoing
G	Mobility platform (aggregator)	Customer value, ecosystem	Business model	High	High	Discontinuation in 2018
H	Wireless localization and secure key management for vehicles	Value proposition	Technical	Medium	Medium	Ongoing
I	Interactive fitness bike	Value Proposition	Business Model, Technical	Medium	Low	Discontinued in 2019
J	Healthcare instrument for home use	Technical feasibility	Technical	Low	Low	Discontinued in 2019
K	Last mile mobility Solution	Ecosystem, Customer need	-	Low	Medium	Successfully discontinued in 2018 (sold)
L	Platform for smart agriculture	Customer need	Business model	High	Medium	Ongoing
M	Energy solution for caravans	Value proposition	Technical	Medium	Low	Ongoing
N	Smart city	Ecosystem	Value proposition	Low	Medium	Discontinued in 2019

the status of a fully-grown up business. It must be added that the success or failure of the ventures is certainly not exclusively determined by the effective use of the experimental process, since the outcome is usually influenced by further variables. However, our exploratory study suggests a significant relation between the right use of experimental functions and the outcome of a venture.

Moreover, our data equally highlights that success does not always imply the continuation of a venture project. We equally observed desired failure as another contingent outcome of the scientific method. In those cases (Venture A, Venture K), abandoning a project was still considered a success as certain thresholds could not be met and there was likely sufficient data to make that decision with confidence. In those cases, the ventures were able to develop very satisfying business proposals but failed to garner ultimate support, as their revenue potential did not meet the magnitude requirements of the focal firm. Aspiration levels of our case company in terms of expected bottom-line contribution are clearly defined: a new project must be able to generate at least EUR 100 million annual revenues within a 3-year period. The successful scientific method projects rather often ran into issues of not being able to provide sufficient evidence for business models that were able to guarantee such aspiration level and subsequently struggle to get internal traction.

With respect to the experimentation strategy, this is interesting for two reasons: First, we note that the same rigor of KPI threshold was not be applied for very visionary projects, i.e. projects feeding from unique, possibly even contrarian beliefs (Felin & Zenger, 2017). In those cases, the experiments run by the respective entrepreneurs focused more on external resource mobilization and reduction of action alternatives (Van den Steen, 2017) and the generation of social proof points (e.g., Felin et al., 2019), which together appeared to bestow confidence in the ultimate bottom-line contribution of the resulting business opportunity:

> *We had KPIs for our use cases. What is the reaction from the airports? How can we scale? What does Vienna say, what does Moscow say, what does Paris say? You have to go there and talk to them. So the standard KPIs were very poorly represented, very few in the sense of classic project management.* (Business model expert, Venture B)

Our data even reveals that forcing highly visionary ventures to strictly follow the KPI threshold can be counterproductive as it might limit the ventures to unfold their full potential. Notably Venture C struggled from the rigid requirements when participating in the company's Accelerator Program. Conducting 100 interviews with regard to one specific problem was not what the company needed in the initial phases of its development, where the project only started with exploration.

Second, amongst those projects with, let's call it more "modest commercial theories," that focused predominantly on exploration and optimization experiments, we see entrepreneurs who were particularly skilled in leveraging a more commitment-focused view, which allowed these projects, at least for a while, to continue despite clearly not meeting target business KPIs. Project A is an excellent example, as one of our respondents relayed:

> *It was accepted by the corporation that the team was delayed because it was a completely new project team setting up a new business model. And it was in Africa. So it's expected that things, you know, would probably take much longer than expected. For us this is importantly a project that allows us to learn about how we can operate in this region. And if things do not run as smoothly, it has little impact on our core business. (Member of steering committee, Venture A)*

The project leader at Venture A successfully framed her activities in the understanding that the entire project as such would be an experiment, which successfully activated corporate support despite the fairly obvious developments of the business model experimentation side showing that this particular business would not meet the strict threshold criteria of the company.

Business experimentation experts have criticized using such rather loose connotations of experiments as creating "illusion of evidence" and "lack of investigative rigor" (e.g., Davenport, 2009) but we believe this is exactly the requirement and applicable use of commitment experimentation. Following from the above, we find that the more successful corporate entrepreneurs understand and use the commitment-generating function of experiments purposefully, particularly for internal stakeholder mobilization:

> *The best way was through a prototype, simply by creating the experience. Last Thursday, our CEO gave a very personal speech on the subject. He said that for him, the old people issue was not at all exciting until the time he drove our prototype. Since then, he had a completely different conviction. Suddenly that was something completely new. Some things are very difficult to communicate via transparencies or via presentation, but it is important to simply experience it. So it was good to build this prototype. It did not look like a target product but it drove very well and then simply convinced by driving.* (Development manager Drive Unit, Venture D)

In summary, we find that apart from operational skill of running experimentation in the scientific spirit, developing also strategic experimentation capability and understanding different functions of experiment, notably their commitment-generating capacity helps corporate entrepreneurs to develop ventures within a corporate setting. The more successful corporate entrepreneurs are well able to employ the right mix of strategies at the right time and incorporate a purposeful use of experiments as commitment function in addition and beyond business model validation and optimization.

5.6 Discussion and Implications

Our paper offers new insights and opens additional lines of inquiry for the emerging literature in entrepreneurial experimentation, as well as for corporate entrepreneurship literature and related constructs like experimental capabilities at the individual level as well as at the firm level.

The corporate context with its wide variety in projects enabled us to observe heterogeneity in experimentation practices and thus helped establish potential linkages between project types and experimental strategies, which adds important nuance to the existing literature on experimentation in entrepreneurship and its use particularly in the corporate context. Importantly, extending current research on the beneficial performance of the scientific method for entrepreneurs (Camuffo et al., 2020), our qualitative insights show that performance might be of more relative character, at least in the corporate entrepreneurship context.

At conceptual level, our findings show that it will be important to engage in definitional and conceptual clarity. While there is a lot of overlap in material practice and in spirit, there are also important distinctions between the "scientific method" to entrepreneurship and "business experimentation." While experimentation is an integral part of lean startup, not all lean startup approaches relate necessarily to scientific experimentation. In fact, a lot of the data generation of "scientific entrepreneurs" is centered more around structured and critical feedback loops than experimentation with control groups and cut-off points, etc. On the other hand, even if we employ a more relaxed definition of the nature of experiments, we find important and previously underappreciated functional elements of experiments linked to commitment generation, in which the experimental validation focuses on the commitment-generating capability of the venture team for its vision, compared to the evidence-based validation of a commercialization strategy. This allows us to qualify the term experimentation, which creates interesting contingencies regarding appropriate entrepreneurial strategies in different contexts.

5.6.1 Emerging Literature on Scientific Entrepreneurship & Experimentation

Gans et al. (2019) make a conceptually clear and compelling distinction of the entrepreneurial idea from its commercialization strategy. Our data shows that in practice, this distinction is not always as straightforward as depicted. While in many technology-driven start-ups (often technology spin-offs) this might be the natural starting point due to the given inherent leveraging capacity of the technological resource (Gruber, MacMillan, & Thompson, 2008; Shane, 2000), a significant number of entrepreneurial ideas are built around a particular "rent-generating" theory (Westgren & Wuebker, 2019) with strong attachment to particular customer needs and business model elements. This moves theorizing about value creation, the cornerstone of the theory-based view of the firm (Felin & Zenger, 2009, 2017), to the foreground as the defining element for the experimental strategy of the venture. Further research is warranted to disentangle these effects and examine for what theory levels strategies like a "test two, chose one" (Gans et al., 2019) are indeed most successful, and under what conditions of theorizing a commitment and tactical optimization might be a more fruitful approach.

To this end, our research adds to an emergent contingency-notion of entrepreneurial practices and strategies (e.g., Westgren & Wuebker, 2019). In our case, we see that the scope of theorizing and linked levels of uncertainty (Felin & Zenger, 2009, 2017) determine to what extent the scientific method can generate desired outcomes. That means, finding appropriate experimental strategies requires a keen assessment of the underlying nature of the economic theorizing of the entrepreneur (Felin & Zenger, 2009). In many cases, experimental approaches validate more the environmental conditions and to what extent the entrepreneur is correct with is rent-yielding theory. In that case, discovery and optimization experiments support the adaptive capacity of entrepreneurial search. However, for different types of ideas, for example ideas that are highly novel, possibly catering to imagined need spaces rather than immediate customer problems (Von Hippel & von Krogh, 2016), or ideas that require change in multiple production factors and product features at the same time (cf. Westgren & Wuebker, 2019), the commitment function of experimentation with its directive capacity of economic action takes center stage. Further research on the distinction between different experimental strategies and their agentic use by entrepreneurs and firms will help improve our understanding of the outcomes of entrepreneurial processes.

The notion that different types of entrepreneurial ventures might require different approaches to experimental strategy is easily overlooked in the contemporary design of acceleration programs but should be considered in understanding performance implications of the scientific method. While first studies have emerged that provide evidence for positive performance implications of the scientific method (Camuffo et al., 2020), further research is warranted on the extent to which a strictly scientific experimental approach to entrepreneurship is feasible for other types of entrepreneurial projects, and under what conditions. Notably complex and novelty generating entrepreneurial theories might need other types of processes, or other forms of experimental strategies to advance.

A second important discussion will need to evolve around the extent to which experimental approaches in form of "scientific entrepreneurship" are geared to effectively reduce uncertainty, a dominant claim in the discussion of lean startup (Bocken & Snihur, 2019; Contigiani & Levinthal, 2019). Entrepreneurship scholars and practitioners alike have placed uncertainty as a prominent operating condition for entrepreneurs and in particular lean startup proponents claim their method to be an important mechanism to counter such uncertainty. Designed as a learning instrument, however, scientific experimentation appears predominantly as an adequate tool to reduce local ignorance of the entrepreneur, which has also been shown in research on the impact of accelerators (Cohen et al., 2019b). Our cases corroborate that business experimentation might be an adequate tool to mitigate "local" knowledge gaps while being possibly less useful in environments of high Knightian uncertainty. In that case, the contingency of the appropriate business development method is the "knowability" and the appropriate understanding of the entrepreneur or entrepreneurial venture of the knowledge context (cf. Agarwal, Moeen, & Shah, 2017) they are located in. Reducing Knightean uncertainty (Knight, 1921) appears a difficult challenge for exploration and optimization experiments. In that realm, commitment-generating experiments with their action control ability, or the testing of that ability (Van den Steen, 2017, 2018) might be a potentially more appropriate strategy, albeit not trivial with respect to the demands on the capabilities of the entrepreneur. It appears that commitment (Ghemawat & Del Sol, 1998) and related experimental capabilities are important elements coinciding with true uncertainty, rather than scientific business experimentation. While our case evidence points to potential performance implications of the ability to clearly distinguish between knowledge regimes (risk versus uncertainty levels) and fitting these with the appropriate experimentation strategy, further quantitative evidence is needed.

Finally, several contemporary studies and essays have touched upon the capacity of the scientific method, and notably lean startup to reduce type II (false negatives) errors (e.g., Camuffo et al., 2020; Contigiani & Levinthal, 2019). Our research shows that such effect would depend on additional factors; it does not appear to be an inherent quality of experimentation. The primary effect of the scientific experimentation in entrepreneurship is not an absolute reduction of error but to create a local optimum fitted to criteria set by the entrepreneur. The main effect is to help the entrepreneur weed out type I errors, i.e. to persist too long with ineffective business ideas that do not meet desired return thresholds. In fact, albeit lack of quantitative evidence, our cases point to the risk that a rigorous application of scientific experimentation might lead to an increase of type II errors—to the extent of which type II errors are a material problem of entrepreneurship. Entrepreneurial aspiration levels, paired with resourcing options, and time constraints might actually lead to sorting out entrepreneurial ideas that other entrepreneurs in other contexts can develop successfully—and the scientific method can potentially lead to sorting those out more swiftly. That can be regarded both as beneficial but could also be an inherent bias in the method. For individual entrepreneurs, the benefits may outweigh the downsides of a missed opportunity, yet at corporate levels that same effect may not be desirable. For example, at individual levels, we may not find that most aspiring entrepreneurs better discard "Elon Musk-type" ideas, yet corporates with a desire for strategic innovation will be more concerned about applying practices that generate more decisions that discard entrepreneurial ideas. A more in-depth inquiry into type II errors in entrepreneurship and appropriate means to avoid undesired type II error should unearth further boundary conditions of the scientific method.

5.6.2 Strategic Innovation, Corporate Entrepreneurship and Experimentation Capacity

Our findings highlight that experimental capacity might be an important corporate capability, in particular, with the increasing interest in "bottom-up innovation," i.e. corporate employees getting enabled through their corporations to take action and engage in innovative projects at non-strategic functions, is a newer phenomenon about which we know little (Hampel et al., 2020). The overall pressure across multiple industries to renew faster than in the past and subsequent attempts to use internal programs for employee mobilization and retention has spawned significant growth in corporate acceleration programs. Through these accelerators, firms have more systematically begun to build their ability to run multiple experiments in parallel. Our findings inform this literature by providing empirical evidence of the boundary conditions of scientific entrepreneurship and lean startup inspired experimentation, a key design feature of many of such accelerators. The experimental capacity of the firm may benefit tremendously from its ability to design those programs and processes around different experimental strategies and enabling alignment between strategy and nature of the entrepreneurial idea, especially against such ambitious hopes of corporate renewal.

Generally, if we believe that the experimental capacity at firm level might be an interesting strategy-relevant construct, future research should endeavor to show its competitive impact as well as produce deeper insights on organizational and resourcing processes that build this capacity.

We find a similar construct on the individual level in form of the experimentation capacity of entrepreneurs that enables them to run optimization and exploration experiments efficiently and understand the commitment-generating capacity of experiments. The more successful corporate entrepreneurs were well able to employ a mix of strategies at the right time and incorporate a purposeful use of experiments as commitment function in addition and beyond business model validation and optimization. This function appears most important, however, for more visionary business theories, and for globally novel customer functions. Similar to the experimental capacity at firm level we recommend further research to better understand the emergence of the experimental capacity, its nature and its influence on the success of venture projects.

5.7 Implications for Practice

Our findings clearly indicate that applying the scientific method in corporate entrepreneurship can indeed help develop insights into new business ideas in efficient ways. However, it is not given that the exclusive application of the scientific method will lead to business cases with strategic impact, i.e. open completely new business fields, new applications domains, and nascent markets, in which the firm might want to position itself as an important player. The method's focus on providing customer evidence for utility and willingness to pay with ensuring optimization of business model elements will more likely out-select such ideas from the process, if the respective corporate entrepreneur follows the method strictly and does not understand how to engage in commitment-generating experimentation, using that function purposefully to compensate for lack of or difficulty to meet traditional KPIs. Our findings corroborate prior theoretical warnings (cf. Felin & Zenger, 2009, 2017): the exclusive use of scientific method in corporate entrepreneurship will likely lead to type II errors (false negatives), in particularly for projects of highly novel economic theories.

Not all types of experiments are equally suited to generate interpretable market feedback necessary to make relevant and correct decisions about continuing versus terminating the project, or into which direction to continue. Identifying strategic playgrounds and understanding how to design experiments that focus less on quantitative support of a customer theory but more on staged resource commitments and bounded actions of co-creation partners will be necessary to allow more strategic projects to emerge from the innovation process. The respective prototyping approach is less iterative to validated singular product features than iterative to generate "buzz" and continued agreement of the value partners to create the new "social reality."

It appears as if it will be important for the corporation and its innovation programs—and by extension also for non-corporate innovation and entrepreneurship programs like accelerators and incubator platforms—to develop the capacity to identify the right experiment-business type-fit. Different types of projects carry different goals in their respective experimental strategy: exploratory learning, theory validation, or commitment creation. The ability of the corporation to adapt flexibly to the nature of the experiments run and the respective corporate process requirements into these goals is important for the survival of projects. Corporate innovation programs should be aware and designed around not only to mitigate organization design challenges but also enable experimental strategy fit. Furthermore, the insights that there might also be individual-level experimental abilities point to the potential necessity to select individuals that engage in the entrepreneurial process more purposefully, an intriguing practical question into the further “professionalization” of the entrepreneurial function.

5.8 Conclusion

Scientific entrepreneurship methods have been increasingly popularized and are equally adopted by a growing number of incumbent firms with the goal of adding to corporate renewal. Drawing on 14 corporate ventures within a large engineering and electronic firms, we provide empirical evidence on the boundary conditions of scientific entrepreneurship and lean startup inspired experimentation, a key design feature of many accelerators.

We find several interesting dynamics at play: First, while of course different experimental strategies serve different learning goals, it appears that the level of business theorizing determines which experimental strategy (or combination thereof) is of primary importance for venture projects. Second, we find important and previously underappreciated functional elements of experiments linked to commitment generation that may lead to success of more visionary business theories, and for globally novel customer functions even if performance metrics of the underlying commercial theory may not satisfy the corporate context. Third, we introduce the notion of experimentation capability of entrepreneurs, meaning their ability to employ a mix of strategies at the right time and incorporate a purposeful use of experiments as commitment function in addition and beyond business model validation and optimization, to avoid type I and type II errors. Further in-depth studies are needed to enrich our findings and to advance the controversial debate on the boundary conditions of scientific experimentation.

6 | Contributions and Further Research

The four papers presented in this dissertation provide insights into the contemporary challenges of established companies when transforming their core business in response to a changing environment. A particular focus lies on internal corporate venturing, allowing firms to develop additional competencies and diversify into new fields. My findings connect literature on internal corporate venturing with relevant theory to explain how incumbent firms adopt entrepreneurial practices and point out why this is such a difficult task. Such approach is of primary relevance since literature on internal venturing has not yet been sufficiently theoretically examined (Narayanan et al., 2009). This last chapter of the thesis summarizes the theoretical contribution of the individual papers, delineates the managerial implications resulting from this research, and finally concludes by presenting opportunities for further research.

6.1 Scientific Contribution

The first case study explores the topic of organizational transformation that represents a major interest in the field of corporate entrepreneurship. We investigated how a firm changes its organizational form from being a “manufacturing, product centric firm” to being an “IoT company”. This is of considerable interest since the current debate on the emergence of IoT in an industrial context mainly centers on technical developments, as well as on newly arising opportunities, without deeply analyzing the impact on the specific configuration of organizational elements. The paper stresses three dimensions that are of particular importance for a company that wants to transform its organizational form. First, it is crucial to understand the strategic effects of the transformation, comprising ecosystem building as well as the management of relevant partners. We explained the stimulation and exploitation of network effects and pointed out the importance of controlling user access as well as data streams. Second, building on extant research on business model innovation, we claimed that the change of organizational forms equally comprises a fundamental alteration in the way the organization creates, delivers, and captures value. Eventually, we asserted that the transformation towards a company offering IoT solutions requires a significant restructuring on the organizational level.

Our research contributes new knowledge to research on the organizational transformation of incumbent firms by pointing out the complex implications that can be expected when a company changes components of its organizational form to accommodate a new technology paradigm.

The second paper sheds light on the topic of corporate entrepreneurship in a highly dynamic business environment. We described typical decisions and dilemmas faced by large companies when trying to generate and introduce new business ideas that do not fit into the core business and could potentially disrupt current activities. We especially focused on the high-tech industry, that - despite revealing great potential for the creation of fundamentally new products and the entering of new markets through entrepreneurial approaches - requires extremely high standards and perfection, which is in contrast to the experimental nature of entrepreneurship. Based on empirical data, the study contributes to a better understanding of corporate entrepreneurship by highlighting the importance of entrepreneurial elements for the strategy of organizations (Narayanan et al., 2009), and by capturing the effects of corporate entrepreneurship beyond the financial aspects (Zahra, 1991). We provided a comprehensive overview of various forms and tools used to stimulate innovation within established organizations and discussed the interplay of different innovation programs. Our findings are derived both from literature and our own field research.

In the third paper, we set out to explore the challenges when bringing a new professional logic into a dominant corporate logic to create new opportunities. The paper contributes to literature in two major fields.

First, we extended our understanding of institutional logics theory. We zoomed into the micro-level mechanisms of how individuals working on projects that fit within a new central professional logic need to legitimate these projects to proponents of another logic to secure sustained funding for the projects and contribute to strategic renewal. We built on institutional work of DiMaggio (1982) and added three micro-level mechanisms to describe how the process of organizational acculturation can be managed successfully. Our study provides empirical evidence that the anchoring into the old, dominant logic renders the introduction of a new logic successful. At the same time, we equally emphasized that anchoring in a known logic still requires to introduce elements of the new logic to contribute to strategic renewal.

The empirical insights we gathered further help to understand how organizations deal with multiple logics that are introduced into the organization (Besharov & Smith, 2014). Whereas most research considers hybrid identities (Battilana & Dorado, 2010) or selective coupling (Pache & Santos, 2013) when dealing with conflicting logics, we illustrated that new field level logics introduced into an organization translate into guiding principles, and complement the organizational character of the corporation (cf. King, 2015). While most of the old logics that form the basis of the organizational character remain respected, new elements are added that help the organization to morph over time. This is an interesting contribution to understanding organizational evolution.

Second, the paper also contributes to the literature on corporate venturing, which lacks theoretical insights into the question why so many corporate venturing initiatives fail (Hill & Birkinshaw, 2014). Literature often remains on a descriptive level and first theoretical approaches only offer a high-level view (e.g., Raisch & Tushman, 2016). We explored the question why many ventures that have been socialized in the outside entrepreneurial community disappoint in their actual contribution, and offered new theory explaining why venture leaders need arguments and material elements that have legitimacy in the corporate setting in order to be accepted. Likewise, we also argued that ventures aiming on strategic renewal should not limit themselves to assimilation but instead integrate by bringing in elements from the entrepreneurial culture to enrich the dominant one. In this way, we transferred insights from a sociological concept originally studied in the context of refugees (Rudmin, 2003) to the context of internal corporate venturing, and extended the literature by proving that successful integration is not limited to assimilation but can lead to changes in the dominant logic through the insertion of elements of the new logic.

With the fourth paper, we added to an emergent contingency-notion of entrepreneurial practices and strategies (e.g., Agarwal et al., 2017; Westgren & Wuebker, 2019). We pointed out the different functional elements of experiments, notably related to commitment creation, and showed that different types of entrepreneurial ventures require different approaches to experimental strategy. With our empirical insights, we contributed to the discussion on the boundary conditions of scientific entrepreneurship. We discussed the extent to which experimental approaches are suitable for effectively reducing uncertainty, a dominant claim in the discussion of lean startup (Bocken & Snihur, 2019; Contigiani & Levinthal, 2019). Whereas we showed that business experimentation mitigates local knowledge gaps, it appears less useful to reduce Knightean uncertainty (Knight, 1921), especially in the context of complex and novelty generating entrepreneurial theories. We claimed that, instead, commitment (Ghemawat & Del Sol, 1998) and related experimental capabilities are important elements coinciding with true uncertainty. In addition, we provided first evidence that a focus on scientific entrepreneurship helps to avoid persisting too long with ineffective business ideas (type I errors), but at the same time leads to the risk of sorting out entrepreneurial ideas more swiftly (type II errors), thus hindering corporate renewal.

Besides adding to emerging literature on scientific entrepreneurship and experimentation, this fourth paper equally contributes to literature on corporate entrepreneurship, in particular with regards to the burgeoning conversation about experimental capacity (Shelef et al., 2020). The pressure for organizational renewal has led to a substantial increase of corporate innovation initiatives such as accelerator programs, where firms systematically run experiments to evaluate new opportunities. We identified the experimental capacity of a firm as strategy-relevant construct that determines a company's ability to design those programs and ensure alignment between experimental strategy and nature of the venture.

We found a similar construct on the individual level in form of the experimentation capacity of entrepreneurs that enables them to employ the right mix of experimental strategies at the right time and make use of the commitment-generating capacity of experiments.

6.2 Contribution to Practice

Besides significant scientific contributions, the individual papers also offer relevant insights for practice. The first paper sheds light on the emergence of the IoT from a business perspective. Using a real-life example, we demonstrated the implications for companies and highlight important decision points for setting the strategic course of a company. For example, we discussed the different roles that a firm can assume in the ecosystem, and addressed the gradually changing relationships between global players, initiated by an increasingly digitalized business environment. Moreover, we gave unique insights into a digital platform in the field of Smart Agriculture and outlined how the core company effectively uses its strengths to orchestrate the platform. The case study helps managers to identify change needs with regards to a company's strategy, mind-set, and structures that are necessary to successfully manage an organizational transformation.

The second paper contributes to the practice of teaching in the field of entrepreneurship. We provided a detailed description of a corporate entrepreneurship system of a large tech company. Our audience gets familiarized with the innovation culture of an established company and learns about different vehicles and tools that are used to create new business. The case outlines the set-up of a corporate accelerator program and presents a highly structured innovation framework that supports the individual steps of new business creation. In addition to the general description of how incumbent firms approach the topic of innovation, this case helps to understand the cultural differences between established firms and entrepreneurial projects leading to significant challenges in the introduction of such entrepreneurial approaches. Thus, the case prepares students at university-level, as well as managers in executive programs for typical decisions and dilemmas faced when trying to pursue new business ideas and innovative business models in a corporate environment. Finally, the case emphasizes the difficulty of continuous corporate renewal in established industries, thereby highlighting the fact that expectations with regards to the required investment and time horizons should be adjusted respectively.

The case comes with an extensive teaching note including suggested assignments and class discussions, an overview of additional background literature and supporting material, a potential teaching approach, as well as a detailed elaboration of potential answers to the suggested assignments. It can hence effectively be used as basis for teaching in the field of Innovation Management, Corporate Entrepreneurship, Innovation Strategy, and Management of Technology.

The third paper picks up the tensions between the corporate and the entrepreneurial logic already alluded to in the second paper, and offers detailed insights into the question why practices and forms adopted from the entrepreneurial community do not easily result in new business. We deeply immersed into the way norms, values, and working methods evolve over time, thus explaining how the unique character of an organization is formed. We further introduced three mechanisms that individuals should use to legitimate their ventures and successfully integrate into the core company. This brings a new perspective on how to lead a corporate venture at different stages of its life cycle. The findings imply that organizations need to carefully select the corporate entrepreneurs who have to endorse a new logic. Individuals that do not acquire the necessary understanding for the focal corporate logic, will struggle to succeed. Contrary to general expectations, we thus proved that serial entrepreneurs who successfully set up several ventures in an entrepreneurial environment, might not be the right ones to drive innovation projects within an established organization. At the same time, we also emphasized that venture teams with strategic renewal aspiration should nonetheless introduce elements from their entrepreneurial culture to drive the corporate transformation in gradual changes over time. Hereby we offered an intriguing approach for companies to get a better understanding of the process of organizational development and set their expectations correctly.

The fourth paper discusses scientific methods in corporate entrepreneurship as one means to effectively develop insights into new business ideas. We highlighted the different functions of experimentation and created a deeper understanding of the importance of the commitment creation function that focuses on staged resource commitments of relevant stakeholders and compensates for the difficulty to meet traditional KPIs. Moreover, we depicted the downsides of experimentation since not all types of experiments are equally suited to generate interpretable market feedback helping to decide between the continuation and termination of a project. The insights we presented help companies to identify the right experimentation-business type fit for their corporate innovation programs such as accelerators or incubators.

We highlighted the importance of experimental capability at a firm level, meaning the ability of corporations to move away from the one size fits all approach towards experimentation, and instead adapt flexibly to the nature of the experiments and the respective corporate process requirements. We equally introduced the notion of experimentation capability at an individual level, referring to the ability of individuals to employ a mix of experimental strategies at the right time to avoid type I and type II errors. The findings point to the necessity to further professionalize the function of corporate entrepreneurs by purposefully selecting the suitable individuals that engage in venture projects or by providing respective training to increase the experimental abilities of corporate entrepreneurs.

6.3 Outlook on Future Research

This dissertation presents several starting points for further inquiry. First and foremost, it will guide further research that adds theory to the way incumbent firms adopt entrepreneurial practices to drive the organizational transformation.

This dissertation has especially looked at internal corporate venturing, a field that retains substantial room for further exploratory research (Hill & Georgoulas, 2016). Whereas our findings have made interesting theory-driven contributions that shed new light onto the classical problem of why internal ventures often disappoint in their actual outcome, I expect more research that further explores the field using relevant theory. Especially I would like to highlight three prospective research areas around internal corporate venturing, where I do see a significant need for further in-depth research.

First, by identifying mechanisms that lead to the successful integration of internal ventures, we provided empirical insights on how to lead a corporate venture at different stages of its life cycle. Since longitudinal studies on the development of corporate ventures over time are still rare (for an exception see Raisch & Tushman, 2016), I am looking forward to further exploratory research on the management of internal ventures along the life cycle. This is in line with Jansen and colleagues' (2009) call for further research on the development of structural differentiation and integration over time. Given that scaling up internal ventures is a lengthy process and that it takes on average eight years for a venture to become profitable (Biggadike, 1979), an investigation period of several years would be suitable.

Second, I observed that the heterogeneity of internal corporate ventures is little taken into account so far and requires further investigation. Consequently, I expect interesting research with regards to what different types of internal corporate ventures do exist, what approach to innovation those ventures take, and how companies need to react to support different venture types according to their particular needs. Different analytical technics such as qualitative comparative analysis (Ragin, 2009) could help distinguishing different venture types and gaining deeper insights.

Third, in our research, the integration of internal ventures into the core company is presented as major form of growing corporate ventures. Since integration might not be the optimum outcome for all ventures, I expect additional research investigating the remaining forms of acculturation namely segregation, assimilation and marginalization (Berry, 2003; Berry et al., 2006), and their impact on the evolution of organizations. The additional insights will lead to an improved understanding of how organizations can scale up new ventures. Moreover, such research would be also interesting for literature on institutional logics, as it reveals further options on how organizations can deal with multiple logics.

In this dissertation, we equally addressed the topic of "scientific entrepreneurship", referring to the emerging professionalism in the entrepreneurship community (Camuffo et al., 2020; Grimes, 2018; Leatherbee & Katila, 2019). Since the debate on scientific entrepreneurship and its benefits as well as limitations in particular in the corporate context is only just emerging, additional investigations are required to improve our comprehension of how this adoption of methods from the entrepreneurial profession can succeed. Based on the findings of this thesis, I see need for further research when it comes to testing the applicability of a strictly scientific approach to entrepreneurship for various venture types, and analyzing the influence of different experimental strategies on the outcome of the entrepreneurial process.

Moreover, as this research is mainly based on data collected within a German company in the high-tech industry, it would be interesting to extend the investigations by looking at how scientific experimentation is applied across different countries, industries, and company sizes.

Lastly, this dissertation draws attention to the burgeoning conversation about experimental capability (Shelef et al., 2020). Our initial findings might spark further research on the importance of this capability on both, the organizational as well as the individual level. On an organizational level, due to the increasing pressure for corporate renewal and the resulting attempts to use innovation programs to systematically build up the ability to run experiments, further research on the strategy-relevant construct of experimental capability will be needed to demonstrate its competitive impact and to understand the processes that build this capacity.

On an individual level, experimental capacity is augmenting in importance since employees are increasingly encouraged through their corporations to engage in internal innovation projects. Further research on the construct of experimental capability on the individual level will help to better understand the emergence of this capacity and further explore its importance for the success of venture projects.

A | Appendix A

A.1 Figures

Figure A.1. *Platform 12. (Bosch Media Service, 2017)*

Figure A.2. *Grow Startup Platform. (Bosch Media Service, 2018b)*

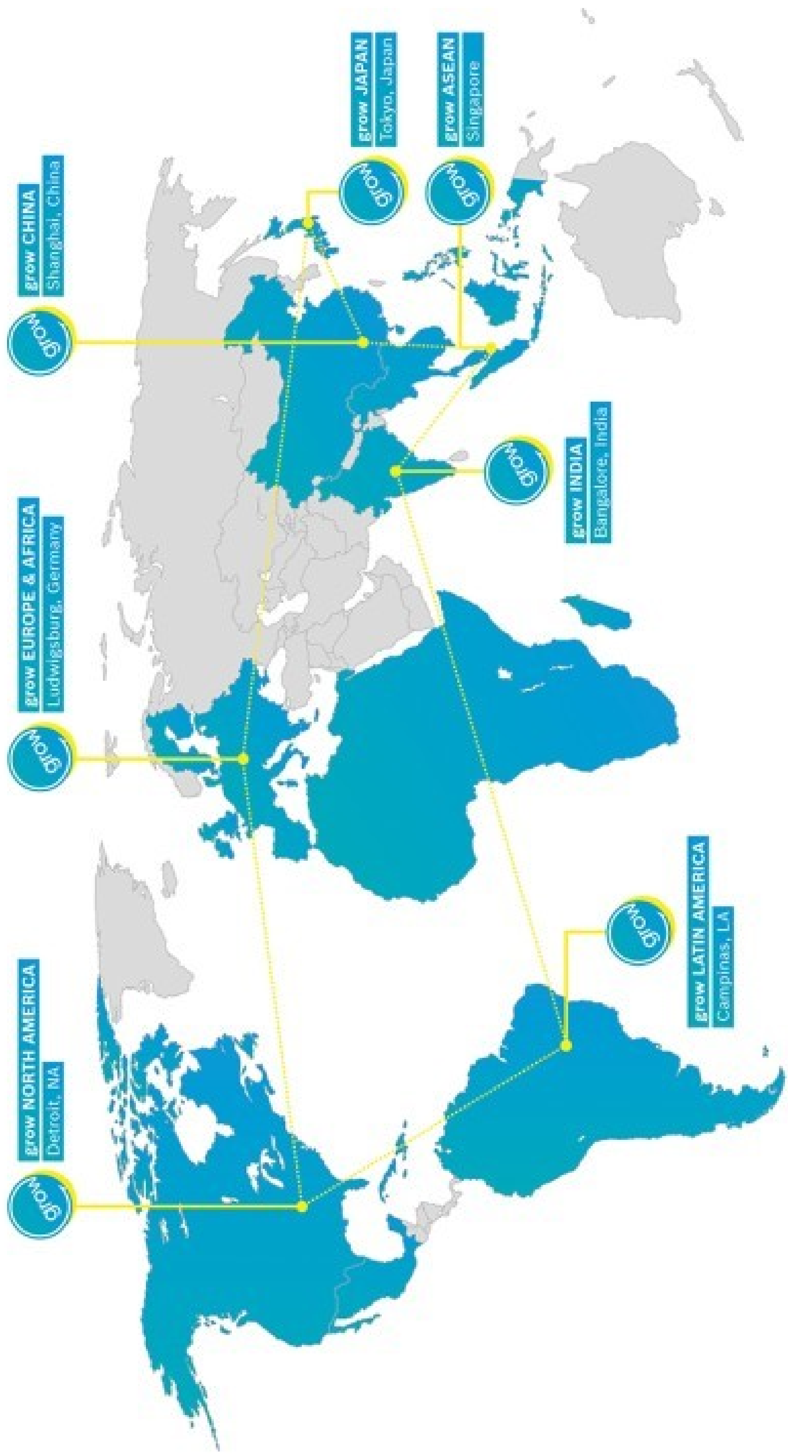

Figure A.3. *Worldwide Alignement of Grow Activities. (Robert Bosch GmbH, 2020b)*

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