Agility Transformation Excellence:
Guiding Organizations Towards Corporate Agility

DISSERTATION
of the University of St.Gallen,
School of Management,
Economics, Law, Social Sciences,
International Affairs and Computer Science,
to obtain the title of
Doctor of Philosophy in Management

submitted by

Roman Klimenko

from

Russia

Approved on the application of

Prof. Dr. Robert Winter

and

Prof. Dr. Peter Rohner

Dissertation no. 5182

D-Druck Spescha, St. Gallen 2022

The University of St.Gallen, School of Management, Economics, Law, Social Sciences, International Affairs and Computer Science, hereby consents to the printing of the present dissertation, without hereby expressing any opinion on the view herein expressed.

St. Gallen, October 29, 2021

The President:

Prof. Dr. Bernhard Ehrenzeller

Acknowledgements

In 2018 one of the most acknowledged business theorists Prof. Dr. Robert Winter, and the real-life example of a successful academic and business professional Prof. Dr. Peter Rohner accepted me as their PhD student. The dissertation project at hand was written under the supervision of these exceptional professionals, to which, in no particular order, I am truly thankful.

Prof. Dr. Robert Winter is an exemplary role model for a decisive leader, an unquestionable expert in his field, and a highly talented person. Healthy pragmatism combined with structural design thinking are some of the distinguishing traits that he nurtures in every student graduating from his chair. I am fascinated by his dedication to his students and employees, and I am personally thankful for the investments that he made in my educational and personal growth.

Working side by side with Prof. Dr. Peter Rohner was a unique opportunity for me to transfer the scientific knowledge into the multi-faceted world of practice, turning the results of my academic study into sharp management instruments. His unique combination of business savvy and academic acumen are the exemplary traits I would want to develop in my career.

The person I approached every time the storm began, Prof. Dr. Stephan Aier, has helped me throughout my PhD journey not only by continuously challenging my methodology, but also by supporting me with his optimistic and humorous attitude. My dearest team of PhD comrades also deserves special attention. Our continuous insightful exchange, unconditional mutual support with tons of entertaining moments left me awesome memories for a long time to remember. I am very grateful to Dr. Raphael Schilling, Carolina Kiselev, Marcel Cahenzli, Jan-Philipp Schiele, Nicola Staub and Marius Schmid for making this PhD journey so remarkable. A special message of gratitude I am expressing to Prof. Dr. Janis Beese and Prof. Dr. Kazem Haki for their personal help and support in my PhD endeavor.

St. Gallen, October 2021 Roman Klimenko

Summary of Contents

1 Introduction 1
2 Conceptual Foundations 8
3 Research Methodology 27
4 Designing a Capability Maturity Model for Corporate Agility 48
5 Discussion 154
6 Conclusion 163
Bibliography 169
Appendix A 189
Appendix B 197
Curriculum Vitae 199

Table of Contents

1 Introduction 1

1.1 Motivation and Problem Description 2

1.2 Research Objectives 3

1.3 Structure of the Dissertation 6

2 Conceptual Foundations 8

2.1 Corporate Agility as an Organizational Phenomenon 8

2.1.1 "Being Agile" Versus "Doing Agile" 8

2.1.2 Defining Enterprise-wide Corporate Agility 10

2.1.3 Responsiveness as an Outcome of Corporate Agility 13

2.2 Developing and Measuring Organizational Maturity 15

2.2.1 Maturity Conceptualization 15

2.2.2 Organizational Learning and Capabilities 17

2.2.3 Capability Maturity Models 21

3 Research Methodology 27

3.1 Design Science Research Process 27

3.1.1 Problem identification and motivation 27

3.1.2 Defining the objectives for a solution 28

3.1.3 Design and development 29

3.1.4 Demonstration 29

3.1.5 Evaluation 29

3.1.6 Communication 30

3.2 Maturity Model Design 31

3.2.1 Corporate Agility Maturity Concept 31

3.2.2 Maturity Levels Definition 34

3.2.3 Maturity Measurement 40

3.2.4 Maturity Model Adaptation 42

3.3 Validation and Evaluation 44

4 Designing a Capability Maturity Model for Corporate Agility 48
4.1 Problem Analysis and Requirements Definition 48
4.1.1 Formulating the Guiding Objectives 48
4.1.2 Analysis of the Existing Maturity Models 49
4.2 Maturity Model Design 55
4.2.1 Corporate Agility Maturity Concept 55
4.2.2 Identifying Effective Organizational Learning Journeys 82
4.2.3 Corporate Agility Maturity Measurement Model 88
4.2.4 Towards Configuration Mechanism for Corporate Agility Maturity Model 95
4.3 Evaluation of the Maturity Models 145
5 Discussion 154
5.1 Results Achieved 154
5.2 Application of the Corporate Agility Maturity Model in Practice 157
5.2.1 Financial industry 158
5.2.2 Healthcare industry 159
5.2.3 Pharmaceutical industry 160
5.2.4 Manufacturing industry 161
6 Conclusion 163
6.1 Critical Reflection and Limitations 163
6.2 Implications for Research 165
6.3 Future Research Suggestions 167
Bibliography 169
Appendix A 189
Appendix B 197
Curriculum Vitae 199

List of Abbreviations

CA	Corporate Agility
MM	Maturity model
CMM	Capability Maturity model
MI	Measurement Instrument
DSR	Design Science Research
RA	Rasch algorithm
BE	Business Engineering
e.g.	exempli gratia, for example
et al.	et alii, and others
etc.	et cetera, and similar other things
i.e.	id est, in other words
IS	Information Systems
IT	Information Technology
KPI	Key Performance Indicator
Ph.D.	Doctor of Philosophy
PLS	Partial Least Squares
SEM	Structural Equation Modelling

List of Figures

Figure 1: Design artifacts to be developed in the scope of the dissertation project.....6

Figure 2: DSRM Process Model (Peffers et al., 2007). 27

Figure 3: Schematic principle of the Rasch algorithm (Lahrmann, Marx, Mettler, Winter, & Wortmann, 2011). 35

Figure 4: Corporate Agility Maturity Model (General) 86

Figure 5: Actual (as-is) maturity state of the organizations. 94

Figure 6: Desired (to-be) maturity state of the organizations. 94

Figure 7: Number of representatives from different industries. 104

Figure 8: Personal experience with Agile transformation (in years). 105

Figure 9: Number of organizations grouped according to their size (measured in number of employees). 105

Figure 10: Number of respondents per organizational level 106

Figure 11: Corporate Agility KPIs (averaged values) represented by different organizational levels: Managing Directors and Project Leaders. 106

Figure 12: Comparison of the actual (AS-IS) and the desired (TO-BE) states of the capabilities. 107

Figure 13: Corporate Agility Maturity Model customized for Financial industry (i.e. Banks and Insurers).....126

Figure 14: Graphical representation of the differences between CA Maturity Model for Financial industry and the General CA MM. 130

Figure 15: Regression analysis between CA maturity as independent variable and Corporate Agility performance indicators (KPIs) as dependent ones, general model with 114 responses. 147

Figure 16: Regression analysis between CA maturity level of financial organizations as independent variable and Corporate Agility performance indicators (KPIs) as dependent variables, Financial model with 50 responses. 147

Figure 17: Company A Corporate Agility maturity evaluation. 150

Figure 18: Company B Corporate Agility maturity evaluation. 151

Figure 19: Company C Corporate Agility maturity evaluation. 152

List of Tables

Table 1: Sample Size and Item Calibration Stability (Linacre, 1994). 37

Table 2: Coding of Actual and Desired Values. 38

Table 3: Extent to which the existing Agility Maturity Models meet the requirements (R1-R4) 51

Table 4: Existing design solutions to be reused/adopted for the CA MM..... 54

Table 5: Literature review of the Corporate Agility capability candidates. .. 59

Table 6: Search criteria to collect candidates for Corporate Agility performance indicators 61

Table 7: Candidates for CA-related KPIs and performance indicators. 63

Table 8: Workshop-contributed capabilities and measurement items..... 68

Table 9: Candidates for CA capabilities and measurement items 72

Table 10: Candidates for CA performance indicators (KPIs). 73

Table 11: Analyzing the Effect of Corporate Agility Capabilities on Corporate Agility Performance indicators 79

Table 12: Corporate Agility capabilities catalogue 81

Table 13: Corporate Agility performance indicators (KPIs) catalogue..... 82

Table 14: Results of Rasch algorithm..... 84

Table 15: Corporate Agility maturity measurement instrument 93

Table 16: Statistically significant differences of CA capabilities between financial and non-financial organizations. 108

Table 17: Statistically significant differences of CA capabilities between managing directors and project leaders..... 110

Table 18: Statistically significant differences of CA capabilities between respondents having ‘run-the-business’ and ‘change-the-business’ perspectives 113

Table 19: Statistically significant differences of CA capabilities between respondents working in 'large' and 'small' organizations..... 115

Table 20: Statistically significant differences of CA capabilities between respondents with ‘Enterprise-wide’ and ‘Cross-X’ scope of job responsibility 116

Table 21: Statistically significant differences of CA capabilities between organizations with 'Emergent' and 'Step-wise' transformation archetypes.. 117

Table 22: Statistically significant differences of CA capabilities between respondents with ‘expert’-level and ‘moderate’ experience of Agile transformation..... 119

Table 23: Statistically significant differences of CA capabilities between organizations that underwent minor and revolutionary organizational changes. 121

Table 24: Infit and Outfit statistics, Rasch analysis of CA capabilities for Financial industry..... 125

Table 25: Comparing the results between General and Financial CA Maturity Models..... 128

Table 26: Perceptual differences between Managing Directors and Project Leaders towards CA capabilities and their effects on CA performance..... 136

Table 27: Perceptual differences between employees responsible for Changing-the-business and Running-the-business towards CA capabilities and their effects on CA performance. 139

Table 28: Perceptual differences between employees with Enterprise-wide and Cross-X scope of responsibilities towards CA capabilities and their effects on CA performance..... 143

Table 29: Measurement instrument for the Corporate Agility performance 146

Table 30: Overview of the companies 149

Table 31: CA maturity assessment for company A 150

Table 32: CA maturity assessment for company B 151

Table 33: CA maturity assessment for company C 152

Abstract

As organizations are challenged with volatility, uncertainty, complexity and ambiguity (VUCA), developing agile capabilities becomes the first priority for most organizations to innovate and respond rapidly to external changes (Klimenko, Winter, & Rohner, 2019). However, a shift in management toward greater agility at the enterprise level poses major challenges for organizations trying to transform their slow-moving, top-down bureaucratic practices (Leybourn, 2019). In this dissertation project the author designed a Corporate Agility Maturity Model to support organizations in their transformational programs by providing guidance on systematically developing Corporate Agility capabilities in a certain sequence that follows the organizational learning journey. The author captured the Corporate Agility as an organizational phenomenon and, therefore, focused on Agility not on the team level or individual level, but at the highest organizational level, where enterprise-wide decisions are made for the entirety of the organization. Although maturity models are an established instrument to devise development paths, currently available maturity models often focus on the control of certain capabilities (doing things right) (Winter & Aier, 2020). The proposed Corporate Agility Maturity Model identifies the organizational Corporate Agility maturity level and derives a roadmap for developing the Corporate Agility capabilities in a sequence appropriate for a given type of organization (doing the right things).

Keywords: Corporate Agility, Capability Maturity Model, Agile Transformation, Organizational learning.

Kurzfassung

Da Organisationen mit Volatilität, Ungewissheit, Komplexität und Mehrdeutigkeit (VUCA) konfrontiert sind, wird die Entwicklung agiler Fähigkeiten für die meisten Organisationen zur ersten Priorität, um innovativ zu sein und schnell auf externe Veränderungen zu reagieren (Klimenko et al., 2019). Dennoch ist die Entwicklung der Agilität auf Unternehmensebene für Organisationen, die versuchen ihre langsamen und bürokratischen Top-down-Praktiken zu transformieren, mit grossen Herausforderungen verbunden (Leybourn, 2019). In diesem Dissertationsprojekt hat der Autor ein Reifegradmodell für Corporate Agility entwickelt, um Organisationen bei ihren Transformationsprogrammen zu unterstützen, indem er eine Anleitung für die systematische Entwicklung von Corporate Agility-Fähigkeiten in einer bestimmten Reihenfolge gibt, die dem organisatorischen Lernweg folgt. Der Autor erfasste die Corporate Agility als ein organisatorisches Phänomen und konzentrierte sich daher auf die Agilität nicht auf der Team- oder Individualebene, sondern auf der höchsten Organisationsebene, wo unternehmensweite Entscheidungen für die Gesamtheit der Organisation getroffen werden. Obwohl Reifegradmodelle (MMs) ein etabliertes Instrument sind, um Entwicklungspfade zu entwerfen, konzentrieren sich derzeit verfügbare Reifegradmodelle oft auf die Beherrschung bestimmter Fähigkeiten (Dinge richtig tun) (Winter & Aier, 2020). Das vorgeschlagene Corporate Agility Reifegradmodell identifiziert den organisatorischen Corporate Agility Reifegrad und leitet eine Roadmap für die Entwicklung der Corporate Agility Fähigkeiten in einer für einen bestimmten Organisationstyp geeigneten Reihenfolge ab (Die richtigen Dinge tun).

Schlüsselwörter: Corporate Agility, Capability Maturity Model, Agile Transformation, Organizational learning.

1 Introduction

Considering the VUCA (volatility, uncertainty, complexity and ambiguity) environment that companies are facing nowadays, developing Agile capabilities becomes the first priority for most organizations (Klimenko et al., 2019). Companies must continually update existing technology and launch innovative products to keep up with the most disruptive competitors. Klimenko et al. (2019) referenced Lehn (2018) in their work to emphasize that Corporate Agility is regarded as a 'survival' organizational capability to adapt to rapid changes in the business environment. Therefore, as the pressure mounts to find innovative ways to remain competitive in such rapidly changing environments, Agility is no longer just desirable but is becoming essential (Aghina, Handscomb, Ludolph, Rona, & West, 2020).

The development of Agility at the *enterprise-wide level* demonstrates a significant boost in multiple organizational outcomes (Aghina et al., 2020). Focusing on an enterprise-wide level requires senior management to recognize, measure and reward decisions that consider the organization's overall interests (DeLoach, 2004). Therefore, the tools and measures used by the transformation leaders should reflect the enterprise-wide view and be consistent with the strategic goals, business objectives, policies, organizational capabilities and processes of the entire organization (DeLoach, 2004).

The research by Aghina et al. (2020) demonstrates that while most organizations still work at team-level Agility, only a few organizations have completed the full transformation across all dimensions of the operating model at the *enterprise level*. According to Leybourn (2019), the main challenges for particularly larger organizations willing to enhance Agility at the enterprise level include risk-averse cultures, organizational silos, bureaucratic layers, workforce passivity, traditional mindsets and, above all, lack of strongly supportive leadership at the top. Considering the growing desire to develop Agility not only as a pilot project at the team level, but to achieve an enterprise-wide implementation of Agility across the whole organization (Aghina et al., 2020), the author focuses on developing a Corporate Agility Maturity Model

to address the challenge of organizational transformation with the aim to enhance Corporate Agility on a corporate level. Development of Corporate Agility at the *enterprise-wide level* represents a highly complex, yet less researched topic for practitioners and academia, since the main focus is not on the team or individual level, but on the entirety of the organization, where decisions are made for the whole organization (van Manen & van Vliet, 2014).

1.1 Motivation and Problem Description

The further development of Corporate Agility on an enterprise-wide level represents a highly complex and relevant topic for companies, mainly due to the integrative character of the enterprise-wide aspects that cover a wide set of functionalities and provide many different services for a diverse and heterogeneous set of stakeholders (Winter & Aier, 2020). Gandomani, Zulzalil, and Nafchi (2015) define the Agility transformation as the process of transforming the whole organization into being Agile. Winter and Aier (2020) argued that for the organization to enhance the enterprise-wide IS, the organization should follow an organizational learning process to develop the domain-specific capabilities. Such an organizational learning requires knowing both the interdependent capabilities, and the recipe, which is the order of implementation (Eisenhardt & Martin, 2000). The extent of the realized organizational capabilities in a certain domain would then represent the *maturity* (Winter & Aier, 2020).

One of the ways to measure the maturity state and to further enhance it in a certain domain is to develop a *maturity model*, which serves as the scale for the appraisal of the position on the evolution path (Becker, Knackstedt, & Pöppelbuß, 2009). Maturity models are described as effective instruments to derive and prioritize improvement measures and subsequently control the progress of their implementation (Becker et al., 2009; de Bruin, Rosemann, Freeze, & Kulkarni, 2005). A maturity model provides criteria and characteristics that need to be fulfilled to reach a particular maturity level (Becker et al., 2009). In their paper Winter and Aier (2020) argue that maturity models are widely applied in academia and science as a guiding tool to

navigate organizations through the evolution of their IS. Being applied as an organizational tool, the maturity models should cover a large and diverse set of capabilities as well as a potentially long evolution path. However, Winter and Aier (2020) further argue that a widely adopted and well-known exemplar of maturity models, namely the Capability Maturity Model Integration (CMMI), impose a governance perspective on a set of core capabilities within a certain domain and, therefore, focus on systematically improving control of all capabilities that are regarded to be essential ('doing things right'). Instead, the desired maturity model is capable of identifying which capabilities should be developed in which sequence ('doing the right things'), providing a meaningful sequence of heterogeneous capabilities for the systematic maturity development (Winter & Aier, 2020).

Taking into consideration such requirements, the author conducted a thorough analysis of the existing maturity models designed in a Corporate Agility domain (see Chapter 4.1.2) and confirmed that the existing artifacts required in a field of Corporate Agility are not available or are suboptimal. Considering that the development of respective capabilities leads to increased performance in the transformational processes, the working hypothesis is formulated in the following way: *Corporate Agility can only be successfully enhanced by organizational learning that develops enterprise level capabilities in an appropriate sequence.*

1.2 Research Objectives

Considering that Agile forms of organizational design and Agile practices are mostly widespread at start-ups or "born digital" companies like Amazon, Facebook, or Google (Tumbas, Berente, & vom Brocke, 2017), the development of the Corporate Agility in the dissertation project mainly targets large and mature service enterprises. Aghina et al. (2020) emphasize that only a few of such organizations have completed a full transformation across all dimensions of the operating model at the *enterprise level*. Considering the growing desire to develop Agility not only as a pilot project at the team level, but to achieve an enterprise-wide implementation of Agility across the whole

organization (Aghina et al., 2020), the author focuses on developing a Corporate Agility Maturity Model to address the challenge of organizational transformation in order to enhance Corporate Agility on a corporate level.

With the aim to develop the Corporate Agility Maturity Model, the author intends to support organizations in their transformational programs by providing guidance on systematically developing Corporate Agility capabilities on the enterprise level in a certain sequence that follows the organizational learning journey. The author proposes the following set of artifacts to be developed in the scope of this dissertation project in order to enhance Corporate Agility and to navigate through the organizational transformation:

1. *Corporate Agility Effect Model.* The main purpose of developing the Corporate Agility effect model is to inform (or to prescribe) the design process of the core artifact – the Corporate Agility Maturity Model. The development of such effect knowledge will help to achieve reasonably well justified empirical explanatory knowledge about the effect of Corporate Agility (enterprise level capabilities) on Corporate Agility performance.
2. *Corporate Agility Maturity Assessment Model.* The primary objective in developing such a measurement tool is to identify an easier and more transparent way to measure organization's Corporate Agility maturity with reasonably good precision. The author, therefore, intends to develop a fully validated and evaluated light-weight model for assessing the maturity of Corporate Agility. In addition, the design purpose of such a tool is to calibrate the Corporate Agility Maturity Model for organizational learning.
3. *Corporate Agility Maturity Model for organizational learning*. The proposed maturity model will be the core element of the organizational learning tool to identify the empirically validated learning journeys for organizations to enhance Agility on the enterprise-wide level. It aims at enhancing Corporate Agility through identifying and developing *enterprise level capabilities* in a sequence

that correspond to organizational learning, rather than 'top-down' control levels. Such a maturity model (MM) will help organizations to avoid most of the obstacles and overcome potential problems during the organizational transformation.

4. *Configuration Mechanism for Situated Corporate Agility Maturity Models*. To adapt the learning journey of Corporate Agility maturity development for specific groups of stakeholders, the author proposes the configuration mechanism, which supports the design process of developing situational maturity models based on certain context factors.

Following the Gregor and Hevner (2013) classification, the author offers the extension of known design knowledge previously applied to the field of business intelligence and corporate performance management (Lahrmann et al., 2011; Raber, Wortmann, & Winter, 2013b; Winter & Aier, 2020) and refines such design knowledge in order to overcome the challenges specific to Agile transformation on the enterprise-wide level.

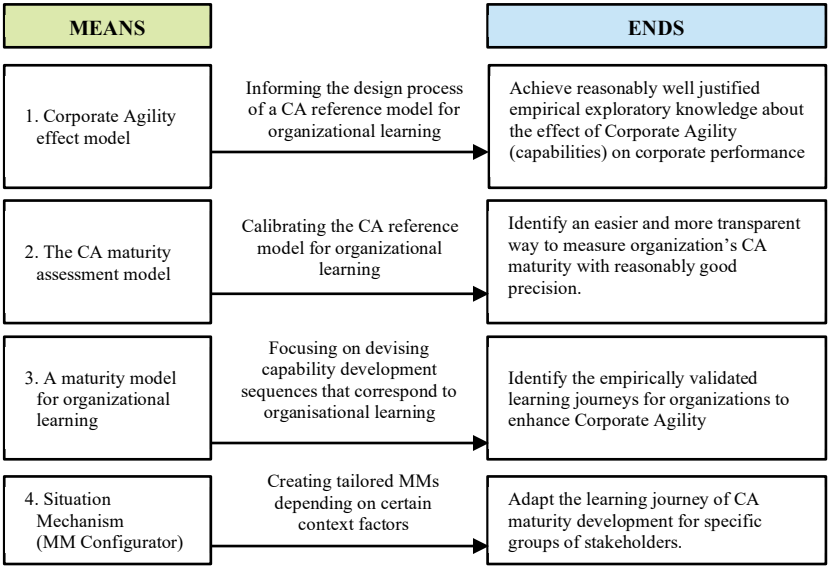


Figure 1: Design artifacts to be developed in the scope of the dissertation project

These deliverables are considered innovative in the way that they create a well justified design and empirical explanatory knowledge, outlining the model that explains the effect of Agility on the corporate level.

1.3 Structure of the Dissertation

The structure of this dissertation follows the DSR process model of Peffers, Tuunanen, Rothenberger, and Chatterjee (2007) with the main DSR aspects structured consequentially.

Chapter 1 outlines the motivation to comprehensively study the phenomenon, outlining the current problems as an introduction to the dissertation work. The research objectives, the key artifacts to be developed, and the structure of the work are listed accordingly. In Chapter 2 the author summarizes the conceptual foundations focusing on the Corporate Agility and conceptualizing the Agility maturity of the organization on the enterprise-wide level. The notion of Organizational Learning and development of the Corporate Agility capabilities through maturity models are discussed in details. Chapter 3 discusses the

methodology, where the author reports the main design decisions of the artifacts' construction and evaluation. Chapter 4 presents the process of artifacts' development and the results of the evaluation. It starts with the formulation of the guiding set of objectives in order to systematically assess the existing solutions. Based on the design requirements, the author presents the development and the evaluation process of the artifacts thereafter. In Chapter 5 the author aggregates and consolidates the case-specific insights into a holistic description of the contribution, including the results achieved and the application to the practice. In Chapter 6 the author presents the conclusion focusing on the boundary conditions, the implications for research, and suggestions for future research.

2 Conceptual Foundations

2.1 Corporate Agility as an Organizational Phenomenon

2.1.1 "Being Agile" Versus "Doing Agile"

Agility was initially introduced by the Iacocca Institute of Lehigh University as *'the capacity to prosper in an unpredictable and changing environment'*, which is a key element of market competition that allows a firm to operate in a fragmented market (Abdelilah, El Korchi, & Balambo, 2018). In the work related to Agile organizations, Ravichandran (2018) refers to the empirical studies of Ferrier (2001), which demonstrated that firms capable of responding quickly and with innovative actions to changes in their business environments have been able to improve their performance.

While change becomes one of the main drivers of Agility (Abdelilah et al., 2018), organizations worldwide are adopting Agile software development methods to challenge their traditional plan-driven way of producing software (Salo & Abrahamsson, 2008). Such Agile methods were originally developed as a rebellion against traditional software development methods - broadly referred to as "waterfall" methods - which were linear and siloed (Sommer, 2019). The problems with waterfall methods arise largely from their overemphasis on documentation, strict discipline around prescribed processes and tools, and general lack of space for experimentation and collaboration (Sommer, 2019). The Agile Manifesto was created by a group of leading experts in software development, who originally came together to create a common methodology for software development. The outcome of that gathering was a common set of values and principles for "being Agile" (Sommer, 2019). Dikert, Paasivaara, and Lassenius (2016) define Agile software development as a set of iterative and incremental software engineering methods that are advocated based on an "Agile philosophy" captured in the Agile Manifesto (Fowler & Highsmith, 2001).

While Agile techniques vary in practices and emphasis, they share common characteristics, including iterative development and a focus on interaction,

communication, and the reduction of resource-intensive intermediate artifacts (Cohen, Lindvall, & Costa, 2004). Such Agile techniques suggest the teams to develop their products and services in iterations, which allows to adapt quickly to changing requirements. Working in close location and focusing on communication means teams can make decisions and act on them immediately, rather than wait on correspondence. Cohen et al. (2004) further argue that reducing intermediate artifacts that do not add value to the final deliverable means more resources can be devoted to the development of the product itself and it can be completed sooner. Sommer (2019) refers to the work of Alqudah and Razali (2016) and states that some scaled Agile approaches, such as SAFE, NEXUS, and LeSS, explain how Agile methods, mainly Scrum, can be synchronized across teams, while maintaining the focus of shared delivery in one product group or across one portfolio. Common to these methods is the focus on single teams or groups of teams in the context of either one product (software or physical) or one project or project portfolio.

Following a set of Agile techniques and adopting an Agile methodology, or simply *'doing Agile'*, is intentionally distinguished from the *'being Agile'* approach, where the teams consider the specific way of working (methodology, process, techniques, tools) or any form of adherence of less importance, and instead embrace Agile principles and values in an Agile mindset to focus on delivering customer value while learning continuously (Horlach & Drechsler, 2020). According to van Manen and van Vliet (2014), *'being Agile'* is a mindset based on trust, collaboration and continuous improvement. The impact of Agile on the whole organization, therefore, goes much further than just the development teams that follow Agile methods, and being a truly Agile organization requires more than the implementation of an Agile method such as Scrum (van Manen & van Vliet, 2014). The authors further argue that if an organization wants to become completely Agile and achieve all the potential benefits of an Agile way of working, this also requires a certain mindset of people throughout the organization.

When large organizations try to adopt Agile methods, they face a lot of issues that are different compared to individual teams adopting Agile, which is due

to the fact that Agile methods in general focus more on the *team level* and less on the *enterprise level* (van Manen & van Vliet, 2014). Such a focus on 'being Agile' not only on the team level, but also throughout the organization makes the enterprise-wide adoption of Agility a complex and hard journey. van Manen and van Vliet (2014) refer to the previous works of Dingsøyr and Moe (2013); Senapathi and Srinivasan (2012), which observed numerous issues and challenges associated with the implementation and adoption of Agile at the organizational level. As it was earlier outlined in the Chapter 1.1 'Motivation and Problem description', the author intends to capture Agility specifically as an organizational phenomenon and to focus on the development of Corporate Agility on an enterprise-wide level. Therefore, Agile principles, methods, roles, processes and tools such as SCRUM, SAFe, and NEXUS are not covered explicitly in the dissertation at hand. Relevant activities on the team or individual level are only analyzed with regards to their impact on the corporate level. In the next subsection the author discusses the Corporate Agility as an organizational phenomenon in more detail.

2.1.2 Defining Enterprise-wide Corporate Agility

The strategy, management, and IS literature has adopted a consistent view of Agility as reflecting a symbiosis of *sensing* and *responding* capabilities (Tallon, Queiroz, Coltman, & Sharma, 2019). To further elaborate on the *responding* aspect, Teece, Peteraf, and Leih (2016) analyzed Agility through the lens of dynamic capabilities, proposing a framework with three primary clusters: *sensing*, *seizing*, and *transforming*. The first aspect 'sensing' is characterized by the identification of opportunities, threats, and sensing of unknown futures. The authors emphasize that in environments characterized by deep uncertainty, companies must sense and/or generate options for growth before the market logics of those options become apparent to all (Teece et al., 2016). The second aspect is 'seizing', which is defined as the mobilization of an organization's resources to capture the value from addressing the needs and opportunities. In addition, seizing is about implementation and getting things done through flexible sourcing arrangements, building "slack" into the organization itself, reengineering rule-bound hierarchies, and adopting open

innovation processes. The third aspect is continued 'transforming' or 'renewal', comprising of breaking conventional modes of thinking. Teece et al. (2016) explicitly emphasize the difficulty of transformation for large established organizations, which often takes a crisis to effectuate significant change. Teece et al. (2016) provide an argument in favor of Agility saying that "business firms should doggedly seek to become Agile no matter the cost, keeping options open all the time, maintaining redundancy at all times, and staying in a constant state of radical transformation".

While researchers may agree that Agility is about sensing and responding, there is some variation in the level at which Agility is considered (corporate, business unit, process or work group) and the composition of the construct (Tallon et al., 2019). According to DeLoach (2004), an enterprise-wide view of an organization is a high-level standpoint, from which managers consider the best interests of the organization as a whole, and not just any particular business unit. In their systematic literature review Dikert et al. (2016) analyzed the challenges associated with developing Agility throughout the organization. Such a large-scale Agile transformation involves additional concerns in interfacing with other organizational units, such as human resources, marketing and sales, and product management (Dikert et al., 2016). Various terms are used interchangeably to refer to Agility at the enterprise level: enterprise Agility (Yang & Liu, 2012), organizational Agility (Nejatian, Zarei, Nejati, & Zanjirchi, 2018), and Corporate Agility (Ganguly, Nilchiani, & Farr, 2009). Tallon et al. (2019) conducted an analysis of the publications on organizational Agility to offer a confined conceptualization. In particular, Tallon et al. (2019) referred to the definition of Sambamurthy, Bharadwaj, and Grover (2003), where an organizational Agility is defined as the ability to detect and seize market opportunities with speed and surprise. In addition, Hovorka and Larsen (2006) define enterprise Agility as the ability to detect opportunities for innovation and seize opportunities by assembling requisite assets, knowledge, and relationships. Similarly, Holmqvist and Pessi (2006) describe organizational Agility as an organization's ability to sense and respond rapidly to unpredictable events in order to satisfy changing customer demands.

According to Santos Bernardes and Hanna (2009), the term organizational agility is often used interchangeably with the term *responsiveness*. Such an inconsistency and ambiguity regarding the use of the agility construct does not bring clarity whether agility and responsiveness are synonyms or distinct concepts. In their work Santos Bernardes and Hanna (2009) analyzed the most common associations of the term organizational agility in literature to study the often overlapping use of the related terms and to clarify differences between them. In general, the literature typically characterizes agility as a manufacturing paradigm, which focuses on the ability to change the configuration of a system (Gunasekaran, 1999; Zhang & Sharifi, 2000) and involves structural and infrastructural elements. Storey, Emberson, and Reade (2005) define agility as a set of interlinked changes in marketing, production, design and organization. Narasimhan, Swink, and Kim (2006) define agility as the ability to efficiently change operating states. Santos Bernardes and Hanna (2009) emphasize that these definitions somewhat explicitly contain the notion of reconfiguration, which allows to readily and fundamentally establish a new parameter set by adjusting the infrastructure and transformation process.

In consistence with the definition of agility as an organization's ability to rapidly reconfigure, Van Oosterhout, Waarts, and van Hillegersberg (2006) describe organizational agility as an ability to swiftly change businesses and business processes beyond the normal level of flexibility to effectively manage unpredictable external and internal changes. Santos Bernardes and Hanna (2009) state that the definition of agility has the notion of fundamental organizational change and unpredictability, where agility is described as organization's ability to fundamentally reconfigure available options in order to accommodate unforeseen environmental circumstances. Walter (2021) refers to the work of Lee, Sambamurthy, Lim, and Wei (2015) that conceptualized enterprise-wide (corporate) Agility as a higher-order dynamic capability to configure and reconfigure organizational resources in response to the environment or emerging competitive realities.

Santos Bernardes and Hanna (2009) concluded that agility is the ready ability to fundamentally change states in a timely manner. It is a property that allows

the system to change its fundamental configuration vis-a`-vis unanticipated issues. It implies uncertainty about the future state (configuration) of the system: upon materialization of a situation, the system changes states such that the new architecture can address the situation. It is not the ability to absorb change within pre-established parameters, but the ability to reorganize rapidly and smoothly, whereby the end state or situation needing change are not established a priori. It is not bound by pre-defined possibilities, as it implies the fundamental change in the arrangement itself. Agility, therefore, enables a competitive strategy by having the organization consistently ready for reconfiguration (Santos Bernardes & Hanna, 2009).

After analyzing the publications and the relevant compilation of definitions, the author chooses sufficiently representative definition of the enterprise-wide Corporate Agility construct from the work of Lee et al. (2015), which was later referenced in the research of Walter (2021). It is emphasized that *organizations demonstrating a mature level of Agility on an enterprise-wide (corporate) level are able to detect opportunities and threats, judge the benefits and risks of initiating an action, and execute actions through building, integration, and reconfiguration of internal and external resources with competitive speed and success.* Such a consolidated definition of the enterprise-wide Corporate Agility will be used as an exhaustive and comprehensive basis for this dissertation, where the ability for reconfiguration leads to a higher level of responsiveness.

2.1.3 Responsiveness as an Outcome of Corporate Agility

Similar to arguments in the IT business value literature that IT can create primary (first order) and secondary (second order) impacts and that these impacts materialize at the process and firm-levels, respectively, the Agility literature suggests that Agility can be an end in itself (a first order impact at the process-level) and a means to an end (a second order impact in the form of higher firm performance at the firm-level) (Tallon et al., 2019). This sub-chapter further clarifies the conceptualization of Corporate Agility

performance as an outcome following the research results of Santos Bernardes and Hanna (2009).

Zhang and Sharifi (2000) argue that a firm's current level of Agility can be assessed through general factors such as how responsive the company is to changes in its business environment and how effective the company is in proactively capturing the market needs. Bessant, Kaplinsky, and Lamming (2003) assert that competitive success is strongly linked to the ability of a firm to respond quickly and flexibly to its environment and meet the emerging challenges with innovative responses; they call such abilities *responsiveness*. Daugherty and Pittman (1995) emphasize that corporate responsiveness is a performance-oriented concept originated in the interaction with markets. Findings from the literature review conducted by Santos Bernardes and Hanna (2009) indicate that in most definitions the term responsiveness is characterized by an action or reaction on the fact of modulating stimuli. For example, Zaheer and Zaheer (1997) describe responsiveness as the rapidity with which firms respond to environmental signals and suggest that responsiveness is a critical capability in fast-paced environments. Similarly, Das (1995) define responsiveness as the nimbleness and swiftness of an organization to explore external opportunities, while reducing the impact of threats. Meehan and Dawson (2002) concluded from fieldwork that managers regard responsiveness as the ability to concomitantly meet customer needs and be rapid and proactive.

Grounded on the literature review and study of formal definitions available and typically encountered, Santos Bernardes and Hanna (2009) propose that responsiveness is neither being prepared for a pre-established range of actions nor being able to change the means to achieve (reconfiguration), *but a propensity for purposeful and timely behavior change in the presence of modulating stimuli.* In order for an entity to be denoted responsive, it has to anticipate or address stimuli with timely and commensurate changes. It was then concluded that *Agility* allows an organization to exploit uncertainty by facilitating timely competitive actions through fundamental reconfiguration,

while *responsiveness* indicates how well the system behaves vis-`a-vis market change (Santos Bernardes & Hanna, 2009).

To illustrate the conceptualization of responsiveness, Santos Bernardes and Hanna (2009) proposed the case of company XYZ, which is a contract electronics maker that designs, builds and ships complete packaged products. The electronic industry is considered a fast-paced environment, and the company XYZ needs to be able to conveniently accommodate changes to respond to uncertainty. Assuming a hypothetical scenario, a new invention is introduced to the market by a competitor, which leads to a sudden loss of business making the current product line of XYZ completely obsolete. XYZ company identifies an attractive new opportunity in a different product line, but this cannot be tapped with the current transformation process and infrastructure. The opportunity could well involve a new and unrelated market, not foreseen by XYZ. In this situation, Corporate Agility would be demonstrated only if the company was able to readily and fundamentally reconfigure the transformation process and infrastructure to tap the new opportunity, while responsiveness would further require the company to rapidly do so in the presence of such a modulating stimulus (Santos Bernardes & Hanna, 2009).

2.2 Developing and Measuring Organizational Maturity

2.2.1 Maturity Conceptualization

Kimberly (1980) and Quinn and Cameron (1983) are referenced to be the ones who actively promoted the discussions about the creation and growth of organizations (Kazanjian & Drazin, 1989). In particular, Kazanjian and Drazin (1989) in their work highlighted the stages of growth in the organization life cycle as a controversial concept. The authors stated that a number of multi-stage models have been proposed, which assume that predictable patterns exist in the growth of organizations and that these patterns unfold as discrete time periods best thought of as stages (Kazanjian & Drazin, 1989).

Either implicitly or explicitly, the stages of growth models share a common underlying logic (Kazanjian & Drazin, 1989). Organizations undergo transformations in their design characteristics which enable them to face the new tasks or problems that growth elicits. Kazanjian and Drazin (1989) further argued that the problems, tasks or environments may differ from model to model, but almost all suggest that stages emerge in a well-defined sequence such that the solution of one set of problems or tasks leads to a new set of problems or tasks emerging which the organization must address.

Rosemann and De Bruin (2005) refer to the work of Maull, Tranfield, and Maull (2003), which encountered problems while trying to define maturity of Business Process Management (BPM) programs using objective measures. This approach appeared to be too complex to apply and, instead, a phenomenological approach was chosen to assess the organization's perception of their maturity using objective measures as a guideline (Rosemann & De Bruin, 2005).

Fraser, Moultrie, and Gregory (2002) define maturity as 'ripeness', conveying the notion of development from an initial state to some a more advanced state. According to Becker et al. (2009), continual improvement requires the company's positioning with regard to its *capabilities* and the quality of its goods and services. As a rule, this positioning involves a comparison with the company's goals, external requirements (e. g. customer demands, laws or guidelines), or benchmarks. The authors raised a question of what needs to be measured and how, and what to compare it with, in order to assess the as-is situation of a company and to assign it a specific quality or degree of maturity (Becker et al., 2009).

According to Becker et al. (2009), a company has a low maturity if it has little capabilities in the domain under consideration. The highest development stage is then represented by a conception of total maturity. Winter and Aier (2020) argued that *the organizational maturity is represented by the extent of the realized organizational capabilities in a certain domain.* However, rather than assessing the organizational maturity by the 'bureaucratic' levels of capability sophistication, *maturity should be measured by the difficulty of developed*

organizational capabilities. Thus, a company is considered having the highest level of maturity if it has achieved the most difficult capabilities. Respectively, a company has a low maturity if it only achieved those capabilities that other companies have achieved, too (Winter & Aier, 2020). The design of the Corporate Agility Maturity Model presented in this dissertation project is based on the aforementioned conceptualization of organizational maturity and its relation to the difficulty of relevant capabilities. Such a maturity conceptualization also fits the notion of the organization's learning process, which the organization should follow to develop the domain-specific capabilities (Winter & Aier, 2020). The following sub-chapter further elaborates on the organizational learning process.

2.2.2 Organizational Learning and Capabilities

The theory of organization has long been dominated by a paradigm, which suggests that the solution to making decisions in an uncertain environment lies in the 'input-process-output' sequence of hierarchical information processing (Nonaka, 1994). Another difficulty emphasized by Argyris and Schön (1978) relates to the concepts of "double-loop learning", which arises from a strong orientation toward organization development (Nonaka, 1994). Since the first integrated theory of organizational learning presented by Argyris and Schön (1978), it has been widely assumed, implicitly or explicitly, that double-loop learning, i.e., the questioning and reconstruction of existing perspectives, interpretation frameworks, or decision premises, can be very difficult for organizations to implement by themselves (Nonaka, 1994). In order to overcome this difficulty, Argyris and Schön (1978) argue that some kind of artificial intervention such as the use of organizational development programs is required (Nonaka, 1994). Organizations continuously create new knowledge by reconstructing existing perspectives, frameworks, or premises on a day-to-day basis.

Nonaka (1994) in his work argued that the dynamic theory of organizational knowledge creation explains how knowledge held by individuals, organizations, and societies can be simultaneously enlarged and enriched

through the spiral, interactive amplification of tacit and explicit knowledge held by individuals, organizations, and societies. Taken by itself, learning has rather limited, static connotations whereas organizational knowledge creation is a more wide-ranging and dynamic concept (Nonaka, 1994). As knowledge emerges as an ever more important feature of advanced industrial development, it is necessary to pay increased attention to the processes by which it is created and the assessment of its quality and value both to the organization and society (Nonaka, 1994).

The concept of 'knowledge conversion' raises two important considerations, that of the knowledge system to which it contributes, and that of social justification (Nonaka, Von Krogh, & Voelpel, 2006). First, the knowledge system captures the organization's global learning and creates organizational knowledge, which is then re-categorized and re-contextualized in the enterprise-wide layer of the organization (Nonaka et al., 2006). The knowledge layer does not solely exist in the 'material and physical space', but is embedded in the corporate vision, outlining the fields of development for the organization, and the organizational culture that orients individuals' choices, mindsets and actions (Nonaka et al., 2006).

In organizations, many vital processes of innovation, change and renewal can be analyzed through the knowledge conversion lens (Nonaka et al., 2006). The definition of knowledge and the concept of knowledge conversion prompted academic works on organization-enabling conditions and the context for knowledge creation. Since organizational knowledge creation is a process, coordination can also be anticipatory; knowledge activists communicate future prospects and so provide an overall direction for the knowledge creation occurring in the different teams throughout the organization (Nonaka et al., 2006). By communicating future prospects in respect of knowledge creation, the theory of organizational knowledge creation emphasizes the development of 'knowledge visions' in organizations. Such knowledge vision specifies a 'potentiality for being': *the current and future organizational state, and the broad contours of knowledge that the organization should seek and create in*

order to move from the current to the future state (Nonaka & Toyama, 2005; Nonaka et al., 2006).

The firm becomes a 'manufacturer' and 'steward' of such knowledge assets (Nonaka et al., 2006). Some of these assets it may choose to keep for current or future business and projects, some it may sell, license or give away, and some it may choose to discard. In the environment with changing market conditions and rapid technological change, the firm should develop and accumulate knowledge assets of a higher order: knowledge to create knowledge, or *organizational capability to innovate and self-renew* (Nonaka et al., 2006). The authors further argued that the firms have *'creative routines'* that call upon and inspire people and teams to revisit existing patterns of work and invent new ones. Without these higher-order knowledge assets, the firm has a reduced capacity to adapt to the environment (Nonaka et al., 2006). If a firm cannot build knowledge assets that can be utilized in its business system layer and project system layer, it can neither fulfil its raison d'être, generate profit, nor survive changing market conditions and intensifying competition (Nonaka et al., 2006).

Nonaka et al. (2006) outlined the distinct knowledge strategies in their work that are embedded in the organizational knowledge creation theory. First, firms allocate resources to leverage their knowledge assets, making them available to organizational units and projects. Second, based on existing expertise, they expand their existing knowledge assets further. Third, firms build knowledge assets internally by appropriating information and knowledge from markets, strategic partners, customers, suppliers or other external constituents. And, finally, firms explore and develop completely new knowledge assets by probing new technologies or markets (Nonaka et al., 2006). Knowledge assets represent an organization's past, knowledge creation the present, and knowledge visions the future. The theory can explain how the accumulated product of past efforts can give rise to present activities, *guided by and extended towards an ideal future* (Nonaka et al., 2006).

According to Teece, Pisano, and Shuen (1997), winners in the global marketplace have been firms that can demonstrate timely responsiveness and

rapid and flexible product innovation, coupled with the management capability to effectively coordinate and redeploy internal and external competences. Teece et al. (1997) refer to this ability to achieve new forms of competitive advantage as *dynamic capabilities.* For the organizations to have the competitive advantage in situations of rapid and unpredictable change, organizational learning is actively supported through development of dynamic capabilities (Eisenhardt & Martin, 2000), by which firm managers 'integrate, build, and reconfigure internal and external competencies to address rapidly changing environments' (Teece et al., 1997). Eisenhardt and Martin (2000) analyzed dynamic capabilities through the resource-based view, in which dynamic capabilities were described as heterogeneously distributed resources across the organization, thus reflecting an organization's ability to achieve new and innovative forms of competitive advantage given *path dependencies* and market positions (Teece et al., 1997).

Dynamic capabilities are often characterized as unique and idiosyncratic processes that emerge from path-dependent histories of individual firms (Eisenhardt & Martin, 2000). The notion of *path dependencies* is crucial in organizational learning, as the learning direction is the function of its current position and the paths ahead (Teece et al., 1997). Considering that the firm's previous investments and its repertoire of routines constrain its future behavior, opportunities for learning will be 'close in' to previous activities. Dynamic capabilities are, therefore, the antecedent organizational and strategic routines by which managers alter their resource base - acquire and shed resources, integrate them together, and recombine them - to generate new value-creating strategies (Eisenhardt & Martin, 2000). The authors stated that specific dynamic capabilities exhibit common features that are associated with effective processes across firms. In other words, there are more and less effective ways to execute particular dynamic capabilities (Eisenhardt & Martin, 2000). Such 'effectiveness' of dealing with the specific organizational, interpersonal, and technical challenges, demonstrated by reaching a required threshold level of activity performance, indicates whether the organization possesses such capability or not. Eisenhardt and Martin (2000) provided an example of an '*effective product development'* process as an important

dynamic capability, which is essential for superior products. In this case, the effectiveness, or the minimal required threshold of performance for a capability to be present, is assured by the organization's ability to bring cross-functional teams with diversified expertise together in a timely manner.

According to Eisenhardt and Martin (2000), the managers of firms that develop effective dynamic capabilities very probably begin the development of that capability from different starting points, and take unique paths or '*learning journeys*'. Since they end up with capabilities that are similar in terms of key attributes, there are multiple paths (equifinality) to the same dynamic capabilities (Eisenhardt & Martin, 2000). The authors referenced the previous literature (Teece et al., 1997) and emphasized that dynamic capabilities are characterized as complicated routines that emerge from path-dependent processes, which are more accurately described in terms of learning mechanisms (Eisenhardt & Martin, 2000). Such learning mechanisms guide the evolution of dynamic capabilities, which implies that the order of implementation of dynamic capabilities is *consequential* (Eisenhardt & Martin, 2000). The authors further report that dynamic capabilities are often combinations of simpler capabilities and related routines, some of which may be foundational to others and so must be learned first. In their study Eisenhardt and Martin (2000) provided the evidence where managers built effective dynamic capabilities by following these 'sequence steps', which were executed in an appropriate sequencing of the learning of capabilities from the simpler and more predictable capabilities to the more sophisticated ones. Thus, the effective organizational learning requires knowing both the ingredients, which are the *interdependent capabilities*, and the *recipe*, which is the order of implementation.

2.2.3 Capability Maturity Models

2.2.3.1 Fundamental Concepts

Maturity models are described as effective instruments to assess the as-is situation of a company, derive and prioritize improvement measures and subsequently control the progress of their implementation (Becker et al., 2009;

de Bruin et al., 2005). Since the Software Engineering Institute has launched the Capability Maturity Model almost twenty years ago, hundreds of maturity models have been proposed by researchers and practitioners across multiple application domains (Pöppelbuß & Röglinger, 2011). Based on the assumption of predictable patterns of evolution and change, Pöppelbuß and Röglinger (2011) referenced the earlier works of Becker et al. (2009) and Kazanjian and Drazin (1989) to describe maturity models that represent an anticipated, desired, or typical evolution path of these objects from an initial state to maturity shaped as discrete stages.

Pöppelbuß and Röglinger (2011) researched the concept of maturity models and developed a framework of general design principles for maturity models. While researching the existing literature, Pöppelbuß and Röglinger (2011) discovered maturity models (or 'stages-of-growth' models) focusing on manifold classes of entities, such as people, processes, or other objects from a specific application domain. The authors further highlighted the maturity models referring to the resource-based view of the firm where resources are classified into assets (i.e., process in- and outputs) and capabilities (i.e., repeatable patterns of action in the use of assets).

On a coarse level, a maturity model consists of a sequence of maturity levels for a class of objects (Becker et al., 2009). At the heart of maturity models are capabilities related to objects such as technologies/systems, processes, people/workforce, and management abilities such as project or knowledge management (Winter & Aier, 2020). Pöppelbuß and Röglinger (2011) addressed to the work of Fraser et al. (2002) that identified the following components of a maturity model: levels, descriptors, descriptions for each level, dimensions, process areas, activities for each process area, and a description of each activity as performed at a certain maturity level. Maturity models are further divided into *domain reference models* (i.e., the domain or scope that is assessed) and *assessment models* (i.e., how maturity levels are assigned to particular elements of the domain reference model) (Pöppelbuß & Röglinger, 2011).

Advancing on the evolution path between the two extremes involves a continuous progression regarding the organization's capabilities or process performance (Becker et al., 2009). A maturity model, therefore, serves as the scale for the appraisal of the position on the evolution path and provides criteria and characteristics that need to be fulfilled to reach a particular maturity level (Becker et al., 2009). According to Winter and Aier (2020), research and practice have developed a multitude of Maturity Models (MMs) focusing on different concerns to guide organizations through the evolution of their IS and related processes. Winter and Aier (2020) further argue that since capabilities are a maturity model's common de-nominator for all relevant problem dimensions and issues, a maturity model is well capable to outline anticipated, typical, and/or logical evolution paths from an initial to a desired target stage even for complex, multi-faceted problems in a coherent way.

The definition of a maturity model by Paulk, Curtis, Chrissis, and Weber (1993), which describe it as *an accepted instrument for systematically documenting and guiding the development and transformation of organizations on the basis of best or common practices*, fits the purpose of the dissertation at hand and justifies the development of the Corporate Agility Maturity Model as an organizational learning tool to identify the empirically validated learning journeys for organizations to enhance Agility on the enterprise-wide level. According to Winter and Aier (2020), maturity models need to cover a large and diverse set of capabilities as well as a potentially long and expensive evolution path, and 'doing the right things' is much more important than achieving a desired level of control. Since the Corporate Agility Maturity Model proposed in the dissertation at hand aims at enhancing Corporate Agility capabilities in a sequence that correspond to organizational learning, the choice of the maturity model development approach, *top-down* or *bottom-up*, is not irrelevant. The differences between top-down and bottom-up design approaches are outlined in the following sub-chapter.

2.2.3.2 Top-down Versus Bottom-up Design Approaches

Becker et al. (2009) presented a procedure model for developing maturity models in their work, which encompass certain underlying construction principles. A comprehensive comparison is, therefore, requisite for a reasoned determination of the design strategy (Becker et al., 2009). Lahrmann and Marx (2010) stated that such design phase addresses the requirements-based design and outlines the principle concept of maturity, the structure of levels, dimensions, and sub-dimensions (the meta-model). The stages should also be named with short labels that give a clear indication of the intent of the stage (de Bruin et al., 2005). When defining maturity stages either a *top-down* or *bottom-up* approach can be used. With a top-down approach, definitions are written first and then measures are developed to fit the definitions. With a bottom-up approach the requirements and measures are determined first and then definitions are written to reflect these (de Bruin et al., 2005). The maturity model presented by Becker et al. (2009) represents a *top-down* approach, which includes clearly outlined degrees of maturity: 0 – Non-existent, 1 – Initial, 2 – Repeatable, 3 – Defined, 4 – Managed, 5 – Optimized. The respective capabilities are then formulated accordingly in order to fit into each of the maturity stage. Winter and Aier (2020) consider Capability Maturity Model Integration (CMMI) as a widely adopted and well-known exemplar of ´top-down´ maturity models. However, such maturity models impose a governance perspective on a set of core capabilities within a certain domain and, therefore, focus on systematically improving control of all capabilities that are regarded to be essential (‘doing things right’) (Winter & Aier, 2020). Instead, the desired maturity model is capable of identifying which capabilities should be developed in which sequence (‘doing the right things’), providing a meaningful sequence of heterogeneous capabilities for the systematic maturity development.

Winter and Aier (2020) proposed an empirically grounded design method for maturity models in their work, which devises capability development sequences rather than control levels. The design method offers a *bottom-up* approach of developing maturity models that help to identify which

capabilities should be developed in which sequence (‘doing the right things’), instead of focusing on systematically improving control of all capabilities that are regarded to be essential (‘doing things right’) (Winter & Aier, 2020). The authors further emphasize that for maturity models focusing on the enterprise-wide level it is crucial to cover a large and diverse set of capabilities that meet the expectations of large and potentially heterogeneous groups of stakeholders. (Winter & Aier, 2020). To understand the development paths and potential path-dependencies, the authors emphasize the importance of developing a meaningful sequence of (different) capabilities, which correspond much better to the systematic maturity development and the concept of organizational learning, than a certain level of heterogeneous capabilities that only share the same level of control maturity (Winter & Aier, 2020).

2.2.3.3 Contextualization and Adaptation of the Maturity Model

Mettler and Rohner (2009) collected some criticism addressed to the traditional CMMI-like maturity models in their research. Mettler and Rohner (2009) provided an example of Pfeffer and Sutton (1999), which argued that although the purpose of maturity models is to identify a gap between the actual and the intended organizational design which then can be closed by succeeding development activities, lots of existing models do not describe how to effectively perform these actions. This ‘knowing-doing gap’ can be very difficult to close, even when the decision makers know what to do. In addition, Mettler and Rohner (2009) argued that the developed models often only represent a static view of an organization, leaving behind situativity in organizational design.

Mettler and Rohner (2009) stated that by following this inherent notion to see organizations in a continual state of tension or struggle with their environments, maturity models can be useful instruments for balancing internal needs (e.g. claims of work force, management, shareholder) as well as to adapt to environment circumstances (e.g. market conditions) by enhancing the quality of choice. Maturity models, therefore, can help organizations to become more flexible and Agile by determining how business activities can

better be aligned with technology and the capabilities of the work force (Mettler & Rohner, 2009). The authors further argued that situativity should be taken into consideration during the maturity model construction process, given that it is an important influencing factor of maturity. Contextual factors like organization size (e.g. large procurement departments versus 'lone warrior' in charge of procurement) and coordination form (e.g. autonomous sourcing versus sourcing within organized networks) play a major role in order to develop effective design propositions (Mettler & Rohner, 2009). As a result, having filled the basic maturity model design with adequate assessment items and defined the stages of maturity, Mettler and Rohner (2009) integrated situativity considerations into the design of their situational maturity model on the basis of the configurational scenarios.

Winter and Aier (2020) extended the maturity model designed method by components for identifying situations and for configuring maturity models to a specific situation. To better fit the specific situation of a given organization, the maturity model is further configured depending on the context factors. It is, therefore, important to understand the structural differences among various situations and their consequences for situating the maturity model. On a meta level Winter and Aier (2020) suggest to identify and operationalize contingencies of maturity models as a foundation of a situational maturity model. At the next step, the statistical analysis of an empirically collected data set will then help to derive those contingencies that significantly moderate the definition of maturity levels. After identifying and operationalizing the contingencies of a maturity model, Winter and Aier (2020) suggest to build (1) contingency-dependent data sub sets, (2) re-populate situated Corporate Agility Maturity Models from these subsets, and (3) re-evaluate the situational Corporate Agility Maturity Model.

3 Research Methodology

3.1 Design Science Research Process

As the author intends to propose a set of reliable artifacts for guiding organizations along an Agile transformation journey by measuring and developing Corporate Agility maturity of organizations, the dissertation project mainly follows the process model of Peffers et al. (2007) for design science research (Figure 2).

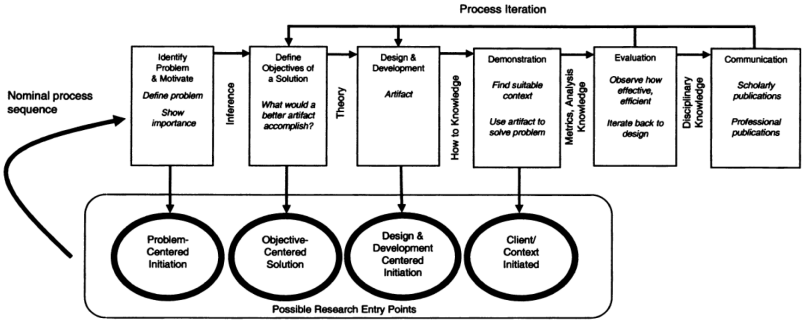


Figure 2: DSRM Process Model (Peffers et al., 2007).

3.1.1 Problem identification and motivation

In the first phase Peffers et al. (2007) suggest to define the specific research problem and justify the value of a solution. Because the problem definition is used to develop an artifact that can effectively provide a solution, it may be useful to atomize the problem conceptually so that the solution can capture its complexity (Peffers et al., 2007). Problems do not necessarily translate directly into objectives for the artifact because the process of design is necessarily one of partial and incremental solutions. Consequently, after the problem is identified, there remains the step of determining the performance objectives for a solution (Peffers et al., 2007). Following the methodology, the author highlights the fact that organizations are struggling to successfully deliver major transformation projects to keep up with the most disruptive competitors (Leybourn, 2019). In an attempt to adapt to rapid changes and the VUCA

environment, only a very limited number of companies sufficiently enhanced Corporate Agility as a 'survival' organizational capability. Development of the Corporate Agility on an enterprise-wide level represents a highly complex, yet less researched topic for practitioners and academia, since the main focus is not on the team or individual level, but on the entirety of the organization, where decisions are made for the whole organization. The Corporate Agility is important for the overall success and can only be successfully enhanced by organizational learning that develops Corporate Agility capabilities in an appropriate sequence.

3.1.2 Defining the objectives for a solution

In the second phase of the DSR process, Peffers et al. (2007) recommend to infer the objectives of a solution from the problem definition and knowledge of what is possible and feasible. The objectives can be quantitative, such as terms in which a desirable solution is better than current ones, or qualitative, such as a description of how a new artifact is expected to support solutions to problems not addressed. The objectives should be inferred rationally from the problem specification. Resources required for this include the knowledge of the state of problems, current solutions, and their efficacy (Peffers et al., 2007). Following the DSR process, the author states his objectives to support organizations in their transformational programs by providing guidance on systematically developing Corporate Agility capabilities in a certain sequence that follows the organizational learning journey. With the aim to enhance Corporate Agility and to navigate through organizational transformation, the author proposes developing Corporate Agility Maturity Model that helps organizations (1) to assess the current maturity of their Corporate Agility capabilities, (2) to create a basis for defining their target state, (3) to enable fact-based communication with a large group of stakeholders concerning organization's Agility transformation, and (4) to derive concrete measures (roadmap) for directed improvement of the capabilities.

3.1.3 Design and development

Peffers et al. (2007) define the next step as creating the artifact(s), which potentially could be constructs, models, methods, or instantiations. Conceptually, a design research artifact can be any designed object in which a research contribution is embedded in the design. This activity includes determining the artifact's desired functionality and its architecture and then creating the actual artifact (Peffers et al., 2007). In this phase of the DSR process the author leverages the existing state of the art and the empirical data collected through the workshops, individual interviews and online questionnaires in order to iteratively design and develop the artifacts. The author focuses on the main aspects of the proposed solution, including the Corporate Agility Effect Model, the Corporate Agility Maturity Model, and their validation and evaluation.

3.1.4 Demonstration

After the design and development phase the author follows Peffers et al. (2007) to demonstrate the utility of the developed artifact. This phase aims to demonstrate the use of the artifact to solve one or more instances of the problem (Peffers et al., 2007), which could involve its use in experimentation, simulation, case study, proof, or other appropriate activity. Resources required for the demonstration include effective knowledge of how to use the artifact to solve the problem (Peffers et al., 2007). The author then proves the utility of the developed artifacts by applying the resulting solution to the large service organizations, where the transformation professionals could directly apply it in their organizations and give detailed feedback of their experience during the individual interviews.

3.1.5 Evaluation

At the following step Peffers et al. (2007) suggest to observe and measure how well the artifact supports a solution to the problem. This activity involves comparing the objectives of a solution to actual observed results from the use of the artifact in the demonstration. It requires knowledge of relevant metrics

and analysis techniques. Depending on the nature of the problem venue and the artifact, evaluation could take many forms. It could include items such as a comparison of the artifact's functionality with the solution objectives from activity 2, objective quantitative performance measures such as budgets or items produced, the results of satisfaction surveys, client feedback, or simulations. It could include quantifiable measures of system performance, such as response time or availability. Conceptually, such an evaluation could include any appropriate empirical evidence or logical proof. The nature of the research venue may dictate whether such an iteration is feasible or not (Peffers et al., 2007).

The author iteratively validates and evaluates the proposed artifacts after each round of development following the established methodology. Multiple evaluation criteria and their statistical significance are tested with the help of various statistical tools. However, it is important to note that there are significant limitations to perform a longitudinal study in order to evaluate whether the organizations have actually followed the prescriptive knowledge that was generated by the proposed artifacts. In particular, the Corporate Agility Maturity Model and the respective measurement instrument support organizations with developing Agile capabilities in an effective way. The evaluation of whether the organizations have actually followed the learning journeys in the prescribed way or not would have required significant resources and is, therefore, excluded from the dissertation at hand. Although the utility of the designed artifact is not investigated, the author of this dissertation, instead, conducts a calibration of the Corporate Agility measurement tool, which reflects the utility of the Corporate Agility Maturity Model. The objective is, therefore, to make sure that the Corporate Agility maturity measurement instrument's assessment is linked to the actual Corporate Agility performance.

3.1.6 Communication

At the final step of the DSR process, Peffers et al. (2007) communicate the problem and its importance, the artifact, its utility and novelty, the rigor of its

design, and its effectiveness to researchers and other relevant audiences such as practicing professionals, when appropriate. To complete the final step of the DSR process and to provide practitioners with the results of this dissertation project, a dedicated web-site is designed and established for the organizations in Healthcare, Finance, Retail, Manufacturing and Public Administration sectors. An online version of the Corporate Agility Maturity Model and its measurement instrument offers the organizations support with undergoing the Agile transformation. Apart from the dissemination of the results to practice partners, the development procedure and the design knowledge contribution are documented in depth and published in appropriate scientific outlets.

3.2 Maturity Model Design

The chapters of this dissertation project mainly reflect a design method for maturity models proposed by Winter and Aier (2020). The proposed Corporate Agility Maturity Model is constructed in three key steps: (1) definition and refinement of maturity dimensions, (2) questionnaire development and corresponding data collection, and (3) determination of maturity levels and their corresponding Corporate Agility capabilities. For the maturity model dimensions, the identified capabilities together with the effect model form the basis to identify measurement items. The process is conducted together with practitioner focus groups and informed by existing maturity models. The capabilities are assumed to be progressively more difficult to acquire indicators of maturity.

3.2.1 Corporate Agility Maturity Concept

Following Winter and Aier (2020), on the meta level the design process starts with developing a metamodel covering all relevant perspectives for a given domain. Often this development can be based on a respective theory (e.g. Effect Model), on practices and capabilities that can be observed in practice, and/or can be condensed from empirical research in the respective domain. The DSR knowledge is commonly separated into two types: descriptive knowledge (Ω), which is about natural phenomena and the regularities among them; and

prescriptive knowledge (Λ), which is the "how" knowledge of artifacts (Winter & Aier, 2020). To balance these contributions, the author in this dissertation first contributes to the descriptive knowledge (Ω) by developing and validating the Corporate Agility Effect Model. By validating the means-end relationships between key Corporate Agility capabilities and Corporate Agility performance, the author follows Winter and Aier (2020) to create an appropriate foundation for rigorously designing and contributing to prescriptive knowledge (Λ), namely, the Corporate Agility Maturity Model. In other words, the Corporate Agility Effect Model provides evidence that a certain set of Corporate Agility-related capabilities indeed have an impact on Corporate Agility performance. Ultimately, the Corporate Agility Effect Model acts as a theoretical justification for the Corporate Agility Maturity Model and is then transformed into a set of prescriptive statements captured by the Corporate Agility Maturity Model (Winter & Aier, 2020).

The process of developing the Effect Model includes collecting the Corporate Agility capabilities and performance indicators (KPIs) from the literature review and series of workshops and interviews conducted with the practice partners. The empirically collected data is then statistically analyzed to understand which Corporate Agility capability has which effect on the respective Corporate Agility performance indicators (KPIs). In the process of developing the Corporate Agility Effect Model, the author follows Winter and Aier (2020) to apply the linear regression model as an important and useful tool to study the relationship among variables. In their work Eck (2018) follows the definition of Weisberg (2005) stating that regression analysis is primarily used for predicting values of the response variable at interesting values of the predictor variables, discovering the predictors that are associated with the response variable, and estimating how changes in the predictor variables affect the response variable. To study the relationship between Corporate Agility capabilities and performance indicators, the author chooses the multivariate linear regression as a technique that helps to interpret possible linear relationships between certain input and output variables (Izenman, 2008).

Before exploring the effect of Corporate Agility capabilities on performance indicators, the author has to perform the statistical analysis of the missing data. Indeed, researchers are frequently faced with the problem of incomplete data sets, particularly when there is information about a large number of characteristics for each individual in a study (Sinharay, Stern, & Russell, 2001). Sometimes missing values occur because some individuals are unable to respond one or more times during the study or drop out of the study prematurely. The objective is to find the required estimates of the effects of the predictor on the outcome so that the uncertainty due to the missing values is taken into account (Sinharay et al., 2001). If all the respondents with missing values are eliminated from the study, meaning that only complete cases are analyzed, the researcher then ignores information present in those incomplete observations risking to end up with incorrect results. Sinharay et al. (2001) further argues that in a multivariate study with a large number of variables, ignoring incomplete observations may result in very few observations being used in the analysis. In his work Lin (2010) refers to the multiple imputation procedure by Rubin (1987) as a popular method for missing data. The author, therefore, follows the multiple imputation procedure, which replaces each missing value with a set of plausible values that represent the uncertainty about the values to be imputed (Lin, 2010).

Multiple imputation inference involves three distinct phases. First, the missing data are filled in m times to generate m complete data sets. Second, the m complete data sets are analyzed by using standard procedures. Finally, the results from the m complete data sets are combined for the inference (Lin, 2010). To estimate the parameters in the model, the Expectation Maximization two-step iterative approach is applied, which finds maximum likelihood estimates by repeating Expectation (E-step) and Maximization (M-step) steps in parametric models for incomplete data. An E-step finds the distribution for the missing data based on the known values for the observed data and the current estimates of the parameters; and an M-step substitutes the missing data with the expected values (Lin, 2010).

3.2.2 Maturity Levels Definition

Following Winter and Aier (2020), the author applies a maturity model population technique to cluster capabilities and assigns these clusters of capabilities to certain maturity levels. To populate the Corporate Agility Maturity Model a questionnaire-based survey is designed, in which the respondents are asked to provide two different estimations of the organizational capabilities, namely, the actual (as-is) and desired (to-be) capability states on a seven-point Likert scale. The respondents are expected to be knowledgeable in the transformation journey that their organization is undertaking, answering the questions from the enterprise-wide perspective. The data is collected on paper as well as through an online questionnaire distributed among industry experts, transformation managers, and executives at practitioner events and workshops.

Initially, it is assumed that the as-is and to-be levels are not necessarily the same, and the difference between them demonstrates a certain ambition level of a company. One should not confuse the desired maturity (to-be level) of capability with what the company thinks the enterprise-wide Agility actually requires. Instead, the to-be value should reflect the desired level that the company would like to achieve. As such, a large gap between the actual and desired capability states, therefore, indicates the high level of the company's desire to achieve such capability.

Such a gap could potentially demonstrate the level of challenge for a particular company associated with achieving this capability. However, the gap alone does not allow us to make conclusions regarding the capability's difficulty, as the perception of difficulty varies for different companies. In order to correctly assess the level of difficulty associated with achieving a certain capability, an additional parameter, the company's performance (Agile KPIs), is included in the questionnaire. As a result, both the Agility performance and the gap between the actual and desired capability states are asked in the questionnaire when collecting the empirical data. However, there is no such objective to theorize the relationship between capability and performance. The perception of difficulty varies among the companies, and, therefore, the author leverages

the information about company's performance as a proxy to understand how difficult it is for the companies to achieve a certain capability.

One of the main deliverables that the maturity model provides is the learning journey, which informs the organization on the sequence of capabilities that should be developed to gradually increase the maturity of Corporate Agility. Based on the working assumption of this dissertation project, a company is considered having the highest level of maturity if it has achieved the most difficult capabilities. Respectively, a company has a low maturity if it only achieved those capabilities that other companies have achieved, too. The key objective here is to understand what capabilities, in fact, are considered difficult.

In order to adequately capture the organizational learning processes (and the relative difficulties of its stages) in the context of Corporate Agility, Winter and Aier (2020) recommend the empirically grounded, quantitative approach proposed by Lahrmann et al. (2011), in which the Rasch algorithm is used as an Item Response Theory (IRT)-based approach in combination with cluster analysis. IRT in general and its Rasch operationalization in particular measure the difficulty of items and the respective capability of organizations on the same scale based on quantitative, e.g. questionnaire data. Thus, the Rasch algorithm provides an empirically grounded list of capabilities ordered by their perceived difficulty. The capabilities on this list can then be clustered and assigned to maturity levels based on their position on the list (Winter & Aier, 2020).

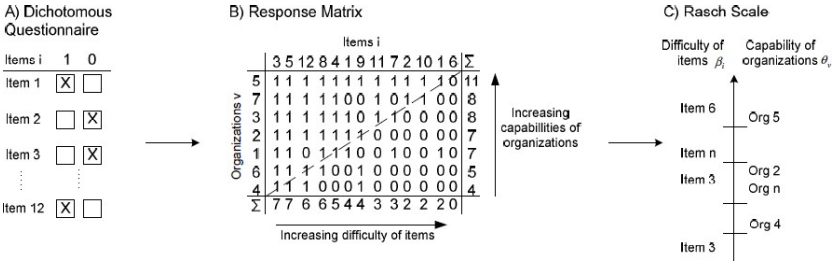


Figure 3: Schematic principle of the Rasch algorithm (Lahrmann, Marx, Mettler, Winter, & Wortmann, 2011).

The author needs to take the following assumptions and modifications to the basic model of the Rasch algorithm into consideration. First of all, it is necessary to check the Rasch statistical validity criteria in order to define the minimum required number of responses to achieve statistically valid results. For that, the author focuses on Rasch algorithm requirements and assumptions outlined in Linacre (1994). This helps to understand how many responses are necessary to obtain usefully stable item calibrations of the Rasch algorithm and the resulted maturity model. The work of Linacre (1994) also gives an understanding of how long a questionnaire should be to obtain usefully stable organizations' measure estimates. According to Linacre (1994), no item has a difficulty stable to within .01 or even .1 logits. In fact, stability to within ±.3 logits is the best that can be expected for most variables. For groups of items, Wright and Douglas (1975) report that, when calibrations deviate in a random way from their optimal values, "as test length increases above 30 items, virtually no reasonable testing situation risks a measurement bias [for the examinees] large enough to notice." For even shorter tests, measures based on item calibration with random deviations up to 0.5 logits are "for all practical purposes free from bias."

Theoretically, the stability of an item calibration is its modelled standard error. For a sample of N examinees, that is reasonably targeted at the items and that responds to the test as intended, the average item p-values are in the range 0.5 to 0.87, so that modelled item standard errors are in the range $2/\sqrt{N} < SE < 3/\sqrt{N}$, i.e, $4/SE2 < N < 9/SE2$ (Wright & Stone, 1979). To calculate the sample size needed to have 99% confidence that no item calibration is more than 1 logit away from its stable value, Wright and Stone (1979) offer the following calculation. A two-tailed 99% confidence interval is ±2.6 S.E. wide. For a ±1 logit interval, this S.E. is ±1/2.6 logits. This gives a minimum sample in the range $4*(2.6)2 < N < 9*(2.6)2$, i.e, $27 < N < 61$, depending on targeting. Thus, a sample of 50 well-targeted examinees is conservative for obtaining useful, stable estimates.

Following Linacre (1994), the requirements are symmetric for the Rasch model: one would be required to have as many items (for a stable person

measure) as persons (for a stable item measure). Consequently, 30 items administered to 30 persons (with reasonable targeting and fit) should produce statistically stable measures (Linacre, 1994).

Item Calibrations stable within	Confidence	Minimum sample size range (best to poor targeting)	Size for most purposes
± 1 logit	95%	16 - 36	30
± 1 logit	99%	27 - 61	50
± ½ logit	95%	64 - 144	100
± ½ logit	99%	108 - 243	150
Definitive or High Stakes	99%+	250 – 20*test length	250
Adverse Circumstances	Robust	450 upwards	500

Table 1: Sample Size and Item Calibration Stability (Linacre, 1994).

Second, in the context of complex socio technical systems Lahrmann et al. (2011) suggest to use the expressive power of rating scales, e.g. a Likert scale from one to seven, since it is superior to dichotomous scales. A Likert scale clearly recognizes that the questions are requiring merely expressed opinions than just simple right or wrong answers (Lahrmann et al., 2011).

Third, in order to develop maturity models in the context of IS, researchers should not only ask for the actual situation of an item i at organization v A_{vi}, but also for the desired situation of item i at organization v D_{vi} (Lahrmann et al., 2011). The overall utility function of an item i at organization v is not necessary monotonically increasing, but could be limited by D_{vi} providing an upper bound for the item. The potential and desired improvement is then provided by the delta value between the desired and actual values $X_{vi} = D_{vi} - A_{vi}$. A negative delta expresses overcompliance or undesired developments. The delta value X_{vi} can serve as the input variable for the Rasch algorithm. Considering that maturity models should provide not only an individual as-is assessment, but a common and consistent development perspective, Lahrmann et al. (2011) proposed the usage of a modified delta between the individual

actual values A_{vi} (organization specific) and common desired values $D_{i\ median}$ (median across all organizations) $X_{vi} = D_{i\ median} - A_{vi}$. The median $D_{i\ median}$ is able to express the importance of one item for all organizations. Lahrmann et al. (2011) argued that comparing to the arithmetic mean, the median is much more stable for extreme values. Thus, the median is preferred over the mean. The difficulty of an item per organization is then given by the delta value: A high positive gap expresses a difficult and desired item. Negative gaps and also values on the threshold itself express easy items. All negative gaps are suggested to be collapsed into one category, as they all express overcompliance. Also, very large gaps are collapsed into one category as there is hardly any distinction between "very, very" difficult items and "very, very, very" difficult items (Lahrmann et al., 2011). Therefore, a re-coding of data is applied resulting in seven values. The result is presented in Table 2. Following the Rasch model application for Likert scales, more easy items are expressed with a higher value.

Delta Δ	<0	0	1	2	3	4	>4
X_{vi}	7	6	5	4	3	2	1
Interpretation	Easy items						Difficult items

Table 2: Coding of Actual and Desired Values.

The Rasch algorithm only yields a single ordinal scale that represents the logit measure of each item and organization (Lahrmann et al., 2011). The algorithm tries to predict these two variables at the same time: (1) item difficulty and (2) respondent's capability. The logits are interval level units of measurements corresponding to total scores that have undergone an exponential transformation (Rasch, 1960). They are defined mathematically as the natural log of an odd-ratio. For respondents, this odd-ratio (based on their score and the total score possible) translates into an *odds-of-success* estimate on any task. Conversely for a task, the odds-ratio (based on the task's score and the total score possible) translates into an *odds-of-failure* estimate for any respondent (Ludlow, Haley, & Gans, 1992).

A positive logit for a company means that for the majority of capabilities the company reached the desired level of capability development, and, therefore, this company is quite advanced capability-wise (Ludlow & Haley, 1995). Negative logit for a company demonstrates that the company achieved less than half of the capabilities. A positive logit for a capability means that this capability is a rather challenging one, implying that the majority of respondents could not reach the desired level of this capability. Negative logit for capability demonstrates that the capability is achieved by more than half of the companies, thus demonstrating that this capability is less challenging to achieve (Ludlow & Haley, 1995).

The Rasch Algorithm assumes that highly capable organizations have a high probability of having successfully implemented difficult items (i.e. rarely achieved capabilities), while immature organizations only have implemented basic items (i.e. always achieved capabilities) (Winter & Aier, 2020). Therefore, the algorithm calculates a score for the difficulty of items and the capability of organizations. Both scores are measured on the same scale. More specifically, on the basis of the actual and desired values, the Rasch Algorithm yields a single ordinal scale that represents the logit measure of each item and organization, but no distinct maturity levels (Winter & Aier, 2020). In order to overcome subjectivity in defining maturity levels, Winter and Aier (2020) suggest employing hierarchical clustering (squared Euclidean distance, Ward's cluster method) to assign items to maturity levels. The capabilities are then clustered into sets of similar difficulty. The optimal number of sets could be determined quantitatively. Considering that the prominence of the various CMM-based maturity models use five maturity levels, Winter and Aier (2020) recommend adopting five maturity levels as a working hypothesis. These five clusters of capabilities represent the organizational learning stages of Corporate Agility, starting from an initial stage of "low hanging fruits" all the way to the final stage comprising the most difficult capabilities (Winter & Aier, 2020).

3.2.3 Maturity Measurement

In order to serve as a practical guidance for organizations, the Corporate Agility Maturity Model should be provided together with a Corporate Agility maturity assessment instrument. Winter and Aier (2020) follow the work of Raber et al. (2013b) to derive a pragmatic (short and simple) questionnaire. Such a measurement instrument derived from the Corporate Agility Maturity Model allows to calculate the Corporate Agility maturity level for a given organization.

To develop the survey tool, the author follows Raber et al. (2013b) and considers the level an organization has reached in the Corporate Agility Maturity Model as the most straightforward candidate for measuring the organization's Corporate Agility maturity. The challenge is, therefore, to derive a single value of maturity from the set of progressively more difficult capabilities of Corporate Agility maturity. The designated survey instrument reflects the relevant and statistically validated capabilities that are derived from the Corporate Agility Maturity Model. The list of measurement items associated with a certain Corporate Agility capability constitutes the questionnaire using a seven-point Likert scale.

To determine the quality of the measurement instrument, the survey responses are measured against the maturity levels of the Corporate Agility Maturity Model. Therefore, ideal maturity profiles, i.e. characteristic values, are defined for each maturity level (Raber et al., 2013b). In particular, Raber et al. (2013b) suggest to follow a theoretical approach of Joachim, Beimborn, and Weitzel (2011), in which these characteristic values are based on the assumption that Corporate Agility maturity increases in a linear manner in equidistant steps and on the fact that items are measured using a Likert scale. The author defines characteristic values v_{li} for each item *i* and all levels *l* according to the number of maturity levels in the designated Corporate Agility Maturity Model. Considering a five-levels maturity model and a seven-point Likert scale measurement, the ideal maturity profile for level five, for example, is represented by all items having a rating of seven.

At the next phase, Raber et al. (2013b) suggest to utilize a twofold application of the Euclidean metric, which yields the Corporate Agility maturity level of an organization as a result. To measure Corporate Agility maturity, the author follows Raber et al. (2013b) and computes the Euclidean distance for the specific Corporate Agility maturity dimension *d* of an organization *o* between the answers x_{oi} given to the specific items *i* belonging to the set of items of this dimension I_d, and their defined characteristic values for the specific maturity level v_{li}. This results in a total of five distance values $DistD_{od}$ for each organization *o* per maturity level:

$$DistD_{od}(l) = \sqrt{\sum_{i \in I_d} (x_{oi} - v_{li})^2} \; for \; 1 \le d \le n_d \; and \; 1 \le l \le n_l$$

Having the total number of dimensions n_d and the total number of levels n_l, each maturity dimension of an organization is then classified into one of the five maturity levels by using these distance values (Raber et al., 2013b). Simply the level with the least distance is attributed to every maturity dimension yielding five integer values for each organization, which characterize the organization's maturity (Raber et al., 2013b).

$$LevelD_{od} = m, \text{such that } DistD_{od}(m) = \min_{1 \le l \le n_l} (DistD_{od}(l)) \text{ for } 1 \le m \le n_l$$

To compute the overall maturity level $LevelO_o$ for an organization *o*, Raber et al. (2013b) once again applied the Euclidean distance to calculate the distance between the five maturity values $LevelD_{od}$ of each dimension, and the characteristic value of the specific maturity dimension *d* for each level *l*, u_{ld}, which is simply *l*. Again, the least distance of the five resulting distance values $DistO_o$ per organization determines the organization's respective Corporate Agility maturity level (Raber et al., 2013b).

$$\text{Let } DistO_o(l) = \sqrt{\sum_{d=1}^{n_d} (LevelD_{od} - u_{ld})^2} \text{ for } 1 \le l \le n_l, \text{ then}$$

$$LevelO_o = m, \text{such that } DistO_o(m) = \min_{1 \le l \le n_l} (DistO_o(l)) \text{ for } 1 \le m \le n_l$$

3.2.4 Maturity Model Adaptation

In this research step the author follows Winter and Aier (2020) to understand the structural differences among various situations and their consequences for situating the Corporate Agility Maturity Model. To better fit the specific situation of a given organization, the maturity model is further configured depending on the initial data set (Winter & Aier, 2020). The goal is to provide a somewhat generic maturity model and not to end up with an infinite set of individual maturity models. The objective, therefore, is to analyze the empirical data collected at the first step and to understand, whether we would achieve different clusters of capabilities, assigned differently to maturity levels, if we ran the Rasch algorithm with certain subsets of cases (Winter & Aier, 2020). To achieve this goal, the authors suggest to identify situations and configure results (MMs) to a specific situation.

On a meta level Winter and Aier (2020) suggest to identify and operationalize contingencies of maturity models as a foundation of a situational maturity model. The contingency factors are collected through (1) reviewing the existing literature and (2) by conducting the qualitative empirical research, during which the author discusses the candidates for the contingency factors with the practice partners and the transformation leaders through workshops and semi-structured individual interviews. The latter approach helps to better understand the insights from the practice world and to explore different stakeholders' perspectives.

At the next step, the statistical analysis of an empirically collected data set helps to derive those contingencies that significantly moderate the definition of maturity levels (Winter & Aier, 2020). To define the response variance between different context-related data sets, the author follows the work of Kim (2015), in which a t test is described as a type of statistical test that is used to compare the means of two groups. There are two types of statistical inference: parametric and nonparametric methods. Parametric methods refer to a statistical technique in which one defines the probability distribution of probability variables and makes inferences about the parameters of the distribution. T tests are a type of parametric method; they can be used when

the samples satisfy the conditions of normality, equal variance, and independence (Kim, 2015).

T tests can be divided into two types: the *independent* t test, which can be used when the two groups under comparison are independent of each other, and the *paired* t test, which can be used when the two groups under comparison are dependent on each other. An independent-group t test can be carried out for a comparison of means between two independent groups (Kim, 2015). The author, therefore, applies the independent t test to explore the presence of the effect of contingency factor on the organizational learning journey.

The collected answers are divided into two independent sub-sets based on their association to the context factor. In case the context factor has a nature of an ordinal scale, the groups are divided into lower and higher values of the respective context scale. For example, in case of the contextual question '*How long is your personal experience with Agile transformation?'*, those respondents, who identified themselves as having less than a year, 1-2 years, and 3-5 years of experience, belong to group 1 representing the employees with moderate experience of Agile transformation, while the experts with 6-10 years and 10+ years of experience belong to group 2. In case of a categorical nature of the context factor, the groups are formed according to the respective categories. For example, in case of the contextual question '*How much time do you personally spend on running-the-business versus changing-the-business?'*, respondents who identified themselves as *running the business* are allocated to group 1, while those responsible for *changing the business* belong to group 2.

The unpaired t test is going to demonstrate whether there are significant differences in how the groups of respondents rated the Corporate Agility capabilities. According to McLeod (2019), however, presenting the statistical significance is not sufficient to describe the statistical results. In addition to the observations about the statistical differences between two groups of responses, the magnitude of such difference should also be presented (McLeod, 2019). The larger the effect size, the stronger the relationship between two variables. The author, therefore, supports the results with the effect size in order to

measure the sizes of differences between group means. Following McLeod (2019), Cohen's d is used as an appropriate effect size for the comparison between two means to accompany the reporting of t-test results.

Cohen suggested that d = 0.2 is considered a 'small' effect size, 0.5 represents a 'medium' effect size, and 0.8 is a 'large' effect size (McLeod, 2019). This means that if the difference between two groups' means is less than 0.2 standard deviations, the difference is negligible, even if it is statistically significant (McLeod, 2019).

After identifying and operationalizing the contingencies of maturity model, Winter and Aier (2020) suggest to build (1) contingency-dependent data sub sets, (2) re-populate situated Corporate Agility Maturity Models from these subsets, and (3) re-evaluate the situational Corporate Agility Maturity Model. The authors argue that the correlations of the maturity level and success will be further improved (Raber, Wortmann, & Winter, 2013a). As a result, the author contributes to an option to 'customize' learning paths for specific types of organizations in order to reflect specific challenges and opportunities (Winter & Aier, 2020).

3.3 Validation and Evaluation

Maturity model as a designed artifact requires a utility evaluation (Winter & Aier, 2020). A maturity model is useful if it allows to measure an organization's maturity in a specific field correctly (necessary condition) and more precisely, more comprehensively, or more efficiently (sufficient conditions) than existing artifacts (Winter & Aier, 2020). As a result, the proposed Corporate Agility maturity measurement instrument provides a basis for validation of Corporate Agility Maturity Model, because it "applies" the maturity model to organizations to calculate their as-is position with respect to the maturity model (Raber et al., 2013b). The objective is, therefore, to make sure that the Corporate Agility maturity measurement instrument's assessment is linked to the actual Corporate Agility performance.

Following Raber et al. (2013b), the assumption is that the organizations at a high level of Corporate Agility maturity are able to generate greater business benefits than organizations at a lower level of Corporate Agility maturity. To investigate the relationship, Raber et al. (2013b) construct a structural equation model. The model relates the output of the maturity instrument, i.e. the maturity level, as an independent variable and the performance indicators as dependent variables (Raber et al., 2013b). In order to validate the model, Raber et al. (2013b) suggest to employ Partial Least Square (PLS) analysis as a regression-based technique that allows for estimating and testing relationships between constructs (Chin, 1998).

Following Raber et al. (2013b), it is necessary to make sure that the reliability and validity criteria have been met by applying Cronbach's α test. Winter and Aier (2020) referenced the work of Nunnally and Bernstein (1994) to state that Cronbach's Alpha coefficient exceeding 0.7 provides the evidence of a strong support for internal consistency and reliability of the model.

After establishing validity and reliability, Raber et al. (2013b) suggest to test the model for the hypothesized paths. According to Raber et al. (2013b), the primary evaluation criteria for testing the structural model for the hypothesized paths are the R^2 measures as well as level and significance of the path coefficients (Hair Jr, Ringle, & Sarstedt, 2011). Raber et al. (2013b) use R^2 values to indicate the amount of variance of a dependent variable explained by the model.

At the next stage Raber, Epple, Rothenberger, and Winter (2016) suggest to evaluate the validity and to calibrate the proposed Corporate Agility maturity measurement instrument. The 'traditional' qualitative maturity assessment method would have been used in case the proposed Corporate Agility Maturity Model is not available to define whether the company belongs to the top achievers, or whether the performance of the company is mediocre. Raber et al. (2016) describe the process of evaluating the validity of a maturity measurement instrument by comparing the maturity model-based maturity assessment of a set of organizations with the maturity levels derived from qualitative analyses in these organizations. This provides the evidence that the

proposed Corporate Agility Maturity Model correctly assesses Corporate Agility maturity.

In order to evaluate the model, Raber et al. (2016) propose to evaluate the companies, which exhibit certain maturity levels rather than random sampling. The authors suggest to select various companies according to the key contingencies to ensure that different organization types are covered (Raber et al., 2016). Such purposeful sampling is not only the prevailing selection approach in qualitative research (Miles, Huberman, & Saldana, 2013), but it is necessary to evaluate whether the maturity model correctly assesses organizations with different characteristics and maturity levels (Raber et al., 2016).

Raber et al. (2016) follow the multi-methods approach of Podsakoff, MacKenzie, Lee, and Podsakoff (2003) to alleviate any possible incorrect responses that may be attributable to the desire to answer what is socially desirable, or a prevailing (false) sense of maturity level. Raber et al. (2016) further state that ensuring anonymity and confidentiality to the participants reduces the impact of such response bias in quantitative data collection. Moreover, the use of qualitative methods, such as in-depth case investigations, do not rely on the participant's answer to a question about the maturity (Raber et al., 2016), but seeks to obtain explanations of the underlying mechanisms and reasons for the presence of such issue (Yin, 2009). Raber et al. (2016) state that the qualitative maturity evaluation is not exclusively based on the participants' responses to what the maturity levels are, but it is based on the background information that participants provide about the organization and on how they relate such company specifics to the different maturity dimensions. Raber et al. (2016) argue that such explanation building, together with basing the results on consistent responses of several participants in each company, ensures the internal validity of the information obtained (Yin, 2009). The investigation of the underlying facts relating to the different maturity levels obtained from consistent responses of multiple participants in each organization makes the case investigation the more objective method for assessing maturity (Raber et al., 2016).

To qualitatively assess the maturity in the organizations, Raber et al. (2016) propose to conduct semi-structured interviews with several interviewees in each organization. As Raber et al. (2016) state in their work, the in-depth interviews are a suitable means for this purpose, since this method of qualitative data collection does not rely on subjective statements of the participants, but on the underlying mechanisms and causes (Yin, 2009). Since semi-structured interviews shall be informed by prior theory (Eisenhardt, 1989), Raber et al. (2016) structure the interview outline based on the maturity dimensions incorporated into the maturity model. The use of open-ended questions and the option to add or refine questions in semi-structured interviews enables to confirm existing dimensions and to probe for additional maturity dimensions (Raber et al., 2016). Following Raber et al. (2016), the author then transcribes and codes the interviews and develops detailed interview write-ups that focus on explaining why each organization may be on specific Corporate Agility maturity levels with regards to the different maturity dimensions.

Raber et al. (2016) argue that it is, however, substantially more laborious to obtain maturity assessments using in-depth case analyses, than to use the maturity model assessment questionnaire. Thus, demonstrating that the easily obtainable maturity model assessments are comparable to the assessments resulting from labor-intensive case investigations provides evidence for the utility of the proposed maturity model artifact suite (Raber et al., 2016). The results of the qualitative assessments of the Corporate Agility maturity are then compared to the maturity model-based Corporate Agility maturity measurement values. The comparison of both maturity ratings is then visualized through a Radar chart diagram to illustrate the extent to which underlying maturity patterns are equal (Raber et al., 2016).

4 Designing a Capability Maturity Model for Corporate Agility

4.1 Problem Analysis and Requirements Definition

4.1.1 Formulating the Guiding Objectives

Considering the growing desire to develop Agility not only as a pilot project at the team level, but to achieve an enterprise-wide implementation of Agility across the whole organization (Aghina et al., 2020), the author focuses on developing a Corporate Agility Maturity Model to address the challenge of organizational transformation with the aim to enhance Corporate Agility on a corporate level. The development of Corporate Agility at the *enterprise-wide level* represents a highly complex objective, since the main focus is not on the team or individual level, but on the entirety of the organization, where decisions are made for the whole organization. The author, therefore, sets the requirement for the Corporate Agility Maturity Model to cover the integrative character of the enterprise-wide aspects *(R1)*, including diverse corporate functionalities and heterogeneous set of stakeholders.

Following the research of Winter and Aier (2020), the Corporate Agility Maturity Model proposed in this dissertation should be applied as an organizational tool, which covers a large and diverse set of capabilities as well as a potentially long evolution path. This leads to the set of requirements, which assure the organizational learning notion of the proposed maturity model. Therefore, the maturity model should be based on empirically tested Corporate Agility capabilities *(R2)*.

To guide the organizations along the learning journey, such capabilities should be ordered according to their difficultness referring to how easy or difficult it is to achieve them *(R3)*. The guiding approach leads the organizations along the sequence of progressively more difficult capabilities from less challenging towards more complex ones.

Eventually, to adapt the learning journey of the Corporate Agility maturity development for the specific groups of stakeholders, the maturity model should consist of the configuration mechanism (R4), which supports the design process of developing situational maturity models based on certain context factors, such as industry or the size of a specific company.

4.1.2 Analysis of the Existing Maturity Models

Having outlined the main objectives for the proposed artifacts, the author turns his focus on the existing state of the art to find eligible examples of maturity models that offer organizational learning guidance on the enterprise-wide level. The analysis of such models allows to identify the gaps that need to be closed by the design outlined in the dissertation at hand.

Numerous maturity models have been proposed in the 'Agility' domain. Nurdiani, Börstler, Fricker, Petersen, and Chatzipetrou (2019) conducted a systematic literature review focusing on 'Agility', 'capability' and 'maturity', resulting in a list of Agile maturity models such as Sidky, Arthur, and Bohner (2007), Turetken, Stojanov, and Trienekens (2017), Yin, Figueiredo, and da Silva (2011) and Packlick (2007). Such maturity models were developed in the software engineering field focusing on scaling Agility methods throughout the organization or rolling out agile workgroup/team practices using scaled agile methods. The author researches the existing literature in an attempt to find the recently developed Agility maturity models that consider 'Agility' as an organizational phenomenon aiming to enhance Corporate Agility capabilities on the enterprise-wide level. The notable examples that are the closest to the outlined criteria are *Development of the Organizational Agility Maturity Model* (Wendler, 2014), *Applying an organizational Agility maturity model* (Gunsberg et al., 2018), and *Agility Capability Maturity Framework* (Stachowiak & Oleśków-Szłapka, 2018).

Wendler (2014) positions the Organizational Agility Maturity Model for (1) assessing the current level of organizational Agility, (2) identifying potential areas for improvement, and (3) planning, executing, and monitoring appropriate improvement actions. The author also reflects on the necessity to

follow the path to an Agile organization through the development process affecting all parts of an organization from workforce to organizational structures, processes, technologies used and the overall organizational culture. The proposed maturity model was positioned as a useful and practical assessment tool that is able to actually reflect existent patterns of organizational Agility in the software and IT service industry (Wendler, 2014). This model was later applied by Gunsberg et al. (2018) in a non-commercial domain, specifically in the IS division of the higher education industry. The Agility Capability Maturity Framework presented by Stachowiak and Oleśków-Szłapka (2018) is based on the idea that Agility is the capability that should be developed and strengthened. The authors offer five maturity stages to which such a capability can be developed, with limited clarification on how exactly the Agility features should be enhanced.

The existing maturity models in the Agility domain, which the author derives from the literature review, outline unrealistic scenarios that do not support the organizational learning notion. Being designed in a *top-down* pattern of bureaucratic intensity (see Chapter 2.2.3.2), such CMMI models are visualized as a grid that is filled with capabilities; however, the capabilities were not empirically tested, and their relevance to Corporate Agility is questionable. Such models do not consider empirical datasets and ignore the sequences of capability development. Instead of progressing from less challenging capabilities towards more complex ones, the existing models follow an oversimplistic approach and ignore the relevant idea about the amount of challenge required to achieve a certain capability. These maturity models promote a formalized bureaucratic development imposed to all the capabilities at a certain maturity level at the same time, which denotes more of a controlled, and less of a learning process. Considering that the Agility transformation journey is, first of all, an organizational learning process, it is important to assure that the guiding tool is able to adapt the learning journey to the particular industry or a specific company's size. The perception of the learning journeys varies significantly between the stakeholders, which have different scopes of responsibilities or work at different organizational levels. Since it would have been naive to ignore such differences in the context environment, it is expected

that such differences are reflected in the capabilities that populate the maturity model. However, the currently available maturity models in the Corporate Agility domain do not consider configurating the learning journeys to specific contextual environments, and, therefore, do not match to the maturity development stages of various organizations.

As a result, such an analysis of the presented maturity models allows to make the conclusion that the existing solutions are sub-optimal and rather insufficient to fulfil the requirements outlined in Chapter 4.1.1. The methodology of the presented models does not take into consideration the notion of having various learning journeys designed in a way that would guide organizations along the organizational learning process and provide a clear sequence of capabilities that are ordered according to the difficultness of achieving them. Therefore, the author considers the existing models to be 'unfit' for the main purpose of this dissertation project. The table below presents the extent to which the existing Agility Maturity Models meet the requirements (R1-R4).

Source	**R1** *Enterprise-wide Agility*	**R2** *Empirically tested capabilities*	**R3** *Notion of capability difficultness*	**R4** *Configuration mechanism (situativity)*
Wendler (2014)	+	-	-	-
Gunsberg et al. (2018)	+	-	-	-
Stachowiak and Oleśków-Szłapka (2018)	+	-	-	-
Sidky et al. (2007)	+	-	-	-
Turetken et al. (2017)	-	-	-	-
Yin et al. (2011)	-	-	-	-
Packlick (2007)	-	-	-	-

Table 3: Extent to which the existing Agility Maturity Models meet the requirements (R1-R4)

There are, however, eligible candidates for maturity models outside of the Corporate Agility domain, whose methodology offers the necessary systematic guidance on the enterprise-wide level. Such models have been previously applied to the fields of business intelligence and corporate performance

management (Lahrmann et al., 2011; Raber, Winter, & Wortmann, 2012; Raber et al., 2013b; Winter & Aier, 2020). These maturity models are designed in a bottom-up fashion, which offer an organizational learning path by incorporating the empirical assessment over which capability is more challenging/less challenging to achieve. A notable example of such a maturity model was presented by Mettler (2011), which prescribes the maturity journey to develop the 'right' capability at the 'right' time. The model guides the organization by identifying the current position in the 'journey', and prescribes the path of progressively ordered capabilities, whose systematic development leads to a higher maturity level. The distinguishing characteristic of such a design approach is that the resulting learning journeys could be customized to a specific industry or a particular domain, offering the individual learning paths for each of the contextual environment. The table below outlines the *existing design solutions that are reused/adopted for the Corporate Agility Maturity Model development.*

Design tasks	**Initial source / Design approach applied**	**Design approach reused / adopted to the dissertation project**
1. Research method selection	**(Lahrmann et al., 2011; Raber et al., 2012; Raber et al., 2013a, 2013b; Winter & Aier, 2020).** Developing artefacts following Design Science Research approach.	Following the process model of (Peffers et al., 2007) (design science research) to develop the Corporate Agility Maturity Model.
2. Design method for maturity model development	**Winter and Aier (2020).** Proposed an empirically grounded design method for maturity models, which devises capability development sequences rather than control levels.	The Corporate Agility Maturity Model is constructed in three key steps: (1) definition and refinement of maturity dimensions, (2) questionnaire development and corresponding data collection, and (3) determination of maturity levels and their corresponding Corporate Agility capabilities.

Design tasks	Initial source / Design approach applied	Design approach reused / adopted to the dissertation project
3. Identifying the relevant capabilities	**Winter and Aier (2020).** Conducted a comprehensive literature search to systematically collect a number of capability candidates.	Systematically collect Agility-related capabilities that measure the extent to which the organization has adopted Agile principles, and, therefore, cover different aspects and different stages of Corporate Agility.
4. Defining the Performance Indicators (KPIs)	**Raber et al. (2013b).** Three different business benefits of Business Intelligence were derived from literature.	Systematically collect candidates for Corporate Agility performance indicators (KPIs) that demonstrate the effect of being Agile across the organization.
5. Data collection	**Raber et al. (2012).** Empirical data about Business Intelligence capabilities collected using a paper and online version of the questionnaire.	Collect the empirical data that describe which realization stages of Corporate Agility capabilities correspond to which realized Corporate Agility performance.
6. Developing the Effect Model	**Raber et al. (2012).** IS success models and their underlying theoretical foundations were utilized in order to explain which variables or capabilities affect (better: cause) IS success.	Identify significant linkages between capabilities and performance indicators, assuming that with the enhancement of Corporate Agility capabilities the Corporate Agility performance indicators should also demonstrate the improvement.
7. Identifying Effective Organizational Learning Journeys	**Lahrmann et al. (2011)** Run the collected empirical Business Intelligence (BI) maturity data through the Rasch algorithm. The result is an array of relevant capabilities, which are then clustered into sets of similar difficulty.	The gap between the actual (as-is) and desired (to-be) level of Corporate Agility capability development is used as input data to the Rasch algorithm in order to derive the learning journeys. Such learning journeys are represented by the capabilities that are

Design tasks	Initial source / Design approach applied	Design approach reused / adopted to the dissertation project
		ordered based on the challenge associated with achieving them.
8. Developing Assessment instrument	**Raber et al. (2013b)** BI maturity is calculated on the basis of 25 items (questionnaire). The maturity level having the smallest Euclidean distance represents the overall BI maturity level of the organization.	Deriving a single value of Corporate Agility maturity level from the set of progressively more difficult Corporate Agility capabilities through a pragmatic (short and simple) questionnaire/assessment tool.
9. Evaluation of the artefact	**Raber et al. (2016).** Testing whether an empirically assessed BI maturity level of a set of organizations is statistically significantly correlated to the achieved business benefits of BI.	Conducting a calibration of the Corporate Agility measurement tool, which reflects the utility of the Corporate Agility Maturity Model. The objective is to make sure that the Corporate Agility maturity measurement instrument's assessment is linked to the actual Corporate Agility performance.
10. Developing configuration mechanism	**Raber et al. (2013a)** Customizing the learning paths for specific types of organizations/industries by developing a situational maturity model.	Identifying structural differences among various situations to configure Corporate Agility Maturity Model to a specific situation.

Table 4: Existing design solutions to be reused/adopted for the CA MM

Following the DSR communication schema offered by Gregor and Hevner (2013), the dissertation at hand provides knowledge contribution through extending known solutions to new problems ('*exaptation'*). In particular, the author offers an extension to the design knowledge proposed in the fields of business intelligence and corporate performance management (Lahrmann et al., 2011; Raber et al., 2012; Raber et al., 2013b; Winter & Aier, 2020) by

further refining it in order to overcome the challenges specific for Corporate Agility.

4.2 Maturity Model Design

4.2.1 Corporate Agility Maturity Concept

Assuming that the Corporate Agility capabilities determine the Agile performance of the organization on the enterprise-wide level, achieving certain capabilities becomes the primary objective for those willing to achieve a certain level of Agile performance. The maturity model design process, therefore, starts with identifying the relevant capabilities, whose sequential development increases the Corporate Agility maturity level. The resulting Corporate Agility Effect Model should offer reasonably well justified empirical explanatory knowledge about the effect of Corporate Agility (capabilities) on Corporate Agility performance.

4.2.1.1 Corporate Agility Capability Candidates: State of the Art

Following the design method of Winter and Aier (2020), in the first step the author conducts a comprehensive literature search to systematically collect a number of Corporate Agility capability candidates. These Agility-related capabilities are supposed to measure the extent to which the organization has adopted Agile principles, and, therefore, cover different aspects and different stages of Corporate Agility. In the further research steps these capabilities serve as independent variables in the Corporate Agility effect model.

The author follows the recommendations of Webster and Watson (2002), which seek to encourage more conceptual structuring in literature reviews. The author identifies the following full-text databases to be targeted: Business Source Ultimate (EBSCO), ABI/INFORM Collection (ProQuest), Association for Information Systems (AIS) eLibrary, and IEEE Xplore. These databases offer a comprehensive set of business-oriented articles, which define Organizational Agility as a business concept in addition to the well-recognized notion of an iterative and incremental software engineering. The author

thoroughly investigates articles published in the English language that satisfy the following search criteria:

(Corporate Agility OR Organizational Agility OR Organisational Agility OR Agile Organization OR Corporate Agility OR Enterprise Agility OR Business Agility OR Strategic Agility AND Capabilit)*

In search of additional conceptual set of capabilities, the author expands the search and includes online search engine "Google Scholar" to compile a sufficiently large pool of capability candidates. To satisfy the author's objective of collecting relevant Corporate Agility capability candidates, certain inclusion and exclusion criteria are formulated in regards to the application scope. As such, the author intends to capture Corporate Agility as an organizational phenomenon. Individual activities may be relevant, but only with regards to the impact on the corporate level. The author, therefore, excludes capabilities relevant to Agility as an iterative approach to software development: Agile principles, methods, roles, processes and tools (SCRUM, SAFe, NEXUS, etc). This condition is determined based on the assumption that having local Agility alone does not necessarily mean a high maturity on the enterprise-wide level. Therefore, the author's intention is to analyze the overarching organizational level, rather than the individual teams following an Agile approach.

Having said that, the activities happening at the individual or project level may be analyzed, but only with regards to the impact on the corporate level. As such, the author does pay attention to the coordination in projects and the way these projects are conducted, since the project management activities, as well as the team members' roles and responsibilities, to a certain extent constitute a governance approach that potentially may create tensions and negative consequences to the rest of the company.

The author prioritizes the outlets with the higher VHB-JOURQUAL 3 ranking ('A+' and 'A'), collecting the capability candidates primarily from such outlets as *Information Systems Research, Management Information Systems Quarterly, The Journal of Strategic Information Systems,* and *Journal of the*

Association for Information Systems (JAIS). The pool of capability candidates is filled by the findings collected between June 2019 and October 2020. The analytical software application Atlas.ti 8 is applied to do the coding and to aggregate the findings into an initial list of Corporate Agility capability candidates. Considering that the current list will be further enriched with the capability candidates collected from the practice partners, the author does not further consolidate or group the capabilities in this phase.

N	Capability	Source
1	Ability to co-opt customers in (1) exploration and exploitation of innovation opportunities, (2) as sources of innovation ideas (3) as cocreators of innovation (4) as users in testing ideas or helping other users learn about the idea.	(Sambamurthy et al., 2003)
2	Ability to leverage relationships with outsourcing partners and competencies of suppliers, distributors, contract manufacturers and logistics providers in the exploration and exploitation of innovation opportunities.	(Felipe, Roldan, & Leal-Rodriguez, 2017; Sambamurthy et al., 2003)
3	Ability to effectively respond to customers' special requests (e.g., personalized products and services) whenever such demands arise.	(Cepeda & Arias-Perez, 2019; Felipe et al., 2017; Liu & Yang, 2020)
4	Ability to effectively respond to competitors' actions and implement appropriate decisions in the face of market/customer changes.	(Felipe et al., 2017; Liu & Yang, 2020)
5	Ability to constantly look for ways to innovate by promoting creative ideas and behaviors (e.g., continuous improvement).	(Cai, Liu, Huang, & Liang, 2019; Cegarra-Navarro & Martelo-Landroguez, 2020; Charbonnier-Voirin, 2011; Felipe et al., 2017; Harsch & Festing, 2020; Panda & Rath, 2018a; Qosasi, Permana, Muftiadi, Purnomo, & Maulina, 2019)
6	Ability to proactively collect information about the customers' needs and competitors' major concerns to remain vigilant.	(Liu & Yang, 2020; Tallon et al., 2019; Teece et al., 2016)

N	Capability	Source
7	Ability to quickly adopt new technologies and restructure the IT operations in a timely manner.	(Panda & Rath, 2018a; Park, El Sawy, & Fiss, 2017)
8	The ability to spontaneously reconfigure resources to build new operational capabilities to address urgent, unpredictable, and novel environmental situations.	(Cunha, Gomes, Mellahi, Miner, & Rego, 2020; Park et al., 2017; Pavlou & El Sawy, 2010)
9	Ability to modify/restructure processes and enhance business process flexibility in a timely manner.	(Park et al., 2017; Qosasi et al., 2019; Ravichandran, 2018)
10	Ability to increase the speed of product development to introduce new products in a timely manner.	(Park et al., 2017; Ravichandran, 2018)
11	Ability to identify and enter the new markets.	(Ravichandran, 2018)
12	Ability to re-define the scope of the business or implement new business models.	(Lee et al., 2015; Ravichandran, 2018)
13	Skills development and knowledge sharing	(Charbonnier-Voirin, 2011)
14	Communication of the strategic vision	(Charbonnier-Voirin, 2011)
15	Performance evaluation and recognition	(Charbonnier-Voirin, 2011)
16	Delegation of responsibilities	(Charbonnier-Voirin, 2011)
17	The ability to initiate radical strategic movements	(Lee et al., 2015)
18	Running established and new disruptive business models in parallel.	(Tallon et al., 2019)
19	Leveraging Agile methods	(Harsch & Festing, 2020)
20	Utilizing Disruptive technologies (artificial intelligence, analytics, and IoT platforms) to make sense of big data.	(Warner & Wager, 2019)
21	The ability to use existing and experimenting with new IT resources and practices (IT ambidexterity).	(Tallon et al., 2019)
22	Adopting self-service business intelligence	(Tallon et al., 2019)
23	Leveraging open innovation	(Teece et al., 2016)
24	Ability to develop the products iteratively and incrementally.	(Teece et al., 2016)
25	Effective entrepreneurial management	(Teece et al., 2016)
26	Maintaining excess resources and capacity	(Teece et al., 2016)

N	Capability	Source
27	Establishing flexible organizational structures with flat hierarchies and self-organized teams.	(Harsch & Festing, 2020; Teece et al., 2016)
28	Business-IT alignment	(Cunha et al., 2020)
29	Networked / virtual collaborative ways	(Tallon et al., 2019)
30	Employee empowerment by encouraging the positive failure and self-confidence mindset.	(Cunha et al., 2020; Harsch & Festing, 2020; Tallon et al., 2019)
31	Skill-based pay	(Harsch & Festing, 2020)
32	Using a Digital Innovation Lab	(Warner & Wager, 2019)
33	Calculated risk-taking	(Tallon et al., 2019)
34	Developed Agile employer brand	(Harsch & Festing, 2020)

Table 5: Literature review of the Corporate Agility capability candidates.

4.2.1.2 Corporate Agility Performance Indicators: State of the Art

In the next step the author aims to define the Corporate Agility (Key) Performance Indicators (KPIs). The earlier collected Corporate Agility capabilities define what activities the company is actually doing, while the Corporate Agility performance indicators outlined in this chapter demonstrate the effect of being Agile in the organization. The author has earlier conceptualized Corporate Agility maturity based on the term 'responsiveness' (see Chapter 2.1.3), which is used to define the outcome of Corporate Agility in the organization. In the following, such conceptualization serves as a foundation for defining Corporate Agility performance indicators (KPIs).

The applicability of the resulting maturity model strongly depends on the choice of the Corporate Agility performance indicators. In particular, the investigation of the relationship between Corporate Agility capabilities and Corporate Agility performance determines the Corporate Agility capabilities that demonstrate a statistically significant impact on the Corporate Agility performance indicators. Such effect knowledge informs the design process of the core artifact – the Corporate Agility Maturity Model. It is, therefore, utterly important to assure that the performance indicators, used as dependent variables in the Corporate Agility Effect Model, indeed represent the effect of being Agile on the corporate level in the organization. Respecting such

consideration protects the author from drifting the focus towards the undesired area of the overall organizational performance. For example, including financial indicators such as 'Revenue' or 'IRR' would reflect organization's financial or business performance instead of the performance of being Agile on the enterprise-wide level. Taking the working assumption that the Agile organizations could potentially demonstrate poor financial performance into consideration, the author aims to decouple Corporate Agility performance indicators from the KPIs that reflect the overall business performance. Such a consideration guarantees that an organization that is not Agile yet profitable and financially sound is categorized by the Corporate Agility maturity measurement instrument as an organization with low maturity of Corporate Agility.

To measure the realization of Corporate Agility, the author systematically collects candidates for Corporate Agility performance indicators (KPIs) from the existing literature. To quantify the success of being Agile on the enterprise-level, the organization's objective to increase responsiveness has to be made measurable. To satisfy the author's objective of collecting relevant Corporate Agility performance indicators candidates, certain inclusion and exclusion criteria are formulated in regards to the application scope. The author relies on published studies on the performance impact of Corporate Agility, where the construct Corporate Agility is analyzed in research models as an independent or dependent variable. In particular, the author focuses on the articles where Structural Equation Model (SEM), regression and other statistical approaches are utilized to investigate significant components of the Corporate Agility construct. Similar to the search of the capability candidates, the author targets the following full-text databases: Business Source Ultimate (EBSCO), ABI/INFORM Collection (ProQuest), Association for Information Systems (AIS) eLibrary, and IEEE Xplore. The author thoroughly investigates articles published in the English language that satisfy the following search criteria:

Measurement	**AND**	Corporate Agility *OR* Organizational Agility *OR* Organisational Agility *OR* Agile Organization *OR* Corporate Agility *OR* Enterprise Agility *OR* Business Agility *OR* Strategic Agility
Regression		
Structural Equation Modelling		
Performance		
Responsiveness		
Metrics		

Table 6: Search criteria to collect candidates for Corporate Agility performance indicators

The author prioritizes the outlets with the higher VHB-JOURQUAL 3 ranking ('A+' and 'A'), collecting the candidates for Corporate Agility performance indicators primarily from such outlets as *Information Systems Research, Management Information Systems Quarterly,* and *The Journal of Strategic Information Systems.* A set of highly relevant articles is found in the journals ranked 'B' and 'C', such as *California Management Review* and *Management Decision.* The findings from these and other outlets ranked below 'B' are also included in the preliminary list of Corporate Agility performance indicators, since the author is encouraged to collect a large number of candidates. The candidates for Corporate Agility performance indicators are then filtered at the empirical validation phase, in which only the statistically significant indicators that can explain the concept of Corporate Agility are accepted to the Corporate Agility Effect Model.

The pool of the candidates for Corporate Agility performance indicators is filled by the findings collected between June 2019 and October 2020. The analytical software application Atlas.ti 8 is applied to do the coding and to aggregate the findings into the preliminary list of candidates for Corporate Agility-related performance indicators.

Dimension (Agility KPI)	Measurement Indicators	Source
Strategic Sensing / Prediction	Accuracy of predicting significant disturbances in the external environment (market fluctuation, disruptive competitor, supplier failure, etc.).	(Lee et al., 2015; Liang, Wang, Xue, & Ge, 2017; Lu & Ramamurthy, 2011; Panda & Rath, 2018b; Park et al., 2017; Ravichandran, 2018; Tallon & Pinsonneault, 2011)
	Accuracy of predicting significant internal organizational disturbances (internal environment).	
Customer-centricity	Customers' perceptions of the firm's offerings (Degree to which organization's offerings can solve customers' problems).	(Aburub, 2015; Park et al., 2017; Ravichandran, 2018; Tallon & Pinsonneault, 2011; Yang & Liu, 2012)
	Degree to which the organization IT infrastructure allows to offer personalized products and services.	
Partnership and supplier network	Degree to which the organization can leverage assets, knowledge, and competencies of various suppliers and distributors.	(Felipe et al., 2017; Yang & Liu, 2012)
	Switching cost of service providers and other suppliers.	
Organizational Flexibility	Extent to which the organization can cope with external changes in the environment without fundamental change in the existing organizational configuration.	(Aburub, 2015; Lu & Ramamurthy, 2011; Park et al., 2017)
	Extent to which the organization can cope with internal organizational disturbances (internal environment) without fundamental change in the existing organizational configuration.	
Business reconfiguration (fundamental change in the existing organizational configuration)	The ease with which organization can reconfigure its resources to introduce new products/services.	(Liang et al., 2017; Lu & Ramamurthy, 2011; Park et al., 2017; Teece et al., 2016)
	The ease with which organization can reconfigure its organizational capabilities.	
	The ease with which organization can change its business model.	
	The ease with which organization can change its business strategy.	
	The ease with which organization can change business processes.	

Dimension (Agility KPI)	Measurement Indicators	Source
	The ease with which organization can adopt new (IT) technology.	

Table 7: Candidates for CA-related KPIs and performance indicators.

4.2.1.3 Discussing Corporate Agility with Transformation Leaders

In addition to the Corporate Agility capabilities and KPIs collected from the existing literature, the author aims to collect additional capability candidates and performance indicators by conducting workshops and interviews with industry leaders and practice partners. The author's objective is to consolidate different views and approaches of measuring Agility.

The organized workshops and individual interviews with transformation leaders not only help to evaluate the existing candidates for Corporate Agility capabilities and performance indicators, but also contribute items that are considered important among representatives from the practice world. Such a combination of the academic and practice world assured the utility and usability of the designed artifacts. Different practice partners demonstrate different perceptions, and each of them find their own measurement items to be significant for Corporate Agility. Discussions with practice partners are also a good opportunity to conduct the sorting exercises in order to derive a well-defined measurement scale for Agility.

Before raising the questions, the author makes sure that all the participants have a consistent understanding of the term 'performance', since for the practice partners this word is usually associated with the overall organization's performance or financial ratios. Therefore, it is specifically outlined that the dependent variable of our model is the *effect of being Agile across the organization*. Afterwards, the author raises the questions of what it means for the organizations to be Agile on a corporate level, and how the organizations enhance the Corporate Agility capabilities on the enterprise-wide level. The following notable answer is provided by one of the transformation leaders:

> *"I still do not know how to measure productivity out of Agile. You can work as Agile as you want and as flexible as you want, but if*

> *you still spend the same number of man-days, you probably spend the same amount of money. Measuring the direct influence of Agility is a big challenge".*

When talking about the overall speed that Agile might bring, some Agile transformation leaders express their challenge to crystallize the measurement indicator that would definitely assess the Agility performance on the enterprise-wide level:

> *"If this year's results are the same as the last one's, is it because we didn't contribute anything from being Agile, or would the organization have been a lot slower if we hadn't initiated certain changes?"*

The very existence of relevant Agility KPIs, therefore, becomes one of the capabilities the organizations should enhance in order to track the progress of Agile transformation initiatives. In particular, it is not only important for the organizations to have the Agile transformation KPIs properly formulated and defined, but it also matters whether the organizations assess and routinely measures the Agile transformation KPIs on a corporate level.

A transformation leader from a large financial organization shared their opinion regarding the SAFe framework as a necessary pre-requisite to become more Agile on a corporate level:

> *"I would not consider the implementation of frameworks like SAFe as the ultimate solution on the way to Agile transformation excellence. Such a framework is not bad, it is sophisticated, but the employees do not develop the necessary mindset when following them. A company may re-group or re-name certain functions, but simply following the rules will soon bring the organization back into chaos".*

To investigate whether *scaling lean and Agile practices* leads to an increase of Corporate Agility performance, the author includes the Corporate Agility capability candidate, which is measured as the degree to which an organization has integrated lean and Agile practices (e.g., SAFe, LeSS, DAD, Nexus, etc.).

To further understand the aspect of having lean and Agile practices integrated, the following measurement items are proposed: (1) Degree to which executive management has necessary competences in Agility/Scrum/Lean, (2) Extent to which visionary roles are sufficiently represented in the organization, and (3) Extent to which the role of Agile transformation architect/coach/catalyst is sufficiently represented in the organization.

Special focus of discussion is directed towards delegating responsibilities and developing self-organized teams. On this topic, the following comment was made:

> *"Discussions and reflections with the teams are important to understand what the teams can do for the maturity. Senior managers know exactly what the project teams have to do, yet the higher management rarely discuss what they are responsible for. In fact, we should not tell them as our teams are self-organized, and they know what to do. Therefore, when problems occur, we should understand what our contribution from the management side could be to fix the issue and make the team perform".*

Feedback like the afore mentioned allows to extend the current list of capabilities with the aspects of forming and shaping self-organized teams aiming to restrict the line management from hindering the operation activity. Such autonomy can potentially be measured by the degree to which the team members can choose and distribute roles and responsibilities within the team. To cover the responsibilities of senior managers, the ability to strive for continuous improvement is proposed as a candidate to measure the extent to which top management is committed to organizational change. To make sure that such initiatives are stated at the enterprise-wide level, the measurement item can be formulated as the extent to which change initiatives are reflected in the corporate strategy of the organization.

The participants agree that the transformational leadership requires (1) creating purpose and (2) demonstrating servant leadership as an enabler to develop the organization beyond managing. To include the aspect of the purpose-driven

leadership, the author formulates an additional capability candidate to measure the degree to which a leader represents a role model for employees.

Apart from the leadership aspect, the overall agreement is that accelerating the development of products and services is key for maintaining the competitive advantage in the market. The practice leaders, however, emphasize issues related to getting the earlier feedback during the production process:

> *"The current problem is that the development of new products takes too much time. This happens due to the long cycle of information and other organizational influences. The main objective is, therefore, to fasten the process of product development and shorten the time to get the first feedback after the product delivery".*

This feedback is in accordance with the state of the art, in which the ability to introduce new products in a timely manner (Park et al., 2017) and the ability to increase the speed of product development (Ravichandran, 2018) are considered important to improve Agility on an enterprise-wide level. In addition to such measurement indicators, the additional capabilities are formulated to assure a rapid product and service development cycle. In particular, the degree to which the software development process is iterative, the speed of developing a Minimum Viable Product (MVP), and the speed of moving from the prototype to market launch are added to the list of the Corporate Agility candidates as a result of discussions.

Another important aspect is raised in regards to managing the project/product portfolio:

> *"How do you steer your portfolio? It used to be 'project portfolio', now we call it 'product portfolio', but we still have a top-down process (Product Portfolio prioritization). How do I strategically steer my workforce to deliver the right products, to invest into the things that we want to grow, and decrease investing into the things that we would want to go away from?"*

To address this aspect, the following measurement items are proposed: (1) Extent to which the product owner is responsible for ROI, (2) Clarity on ROI

targets, strategic objectives and roadmaps, and (3) Degree to which the value of the innovation project portfolio is optimized.

Considering the increasing importance of establishing a customer-oriented perspective, the practice partners suggest adding customer-centric capabilities to develop the customer orientation of the employees and the anchoring of customer orientation in the company's corporate strategy. The following measurement items are proposed to assess the extent to which the company focuses on its customers: (1) Degree to which employees interact with customers directly (even in "back office" functions), (2) Extent to which the organization shares its customer experience with all employees, and (3) Extent to which the customer-centricity mindset is checked at the stage of job interviews.

Lastly, the transformation leaders agree that there should be a methodology in place to attract start-ups and other disruptive companies. The capability *'Attracting innovative ideas through start-up ecosystem'* is, therefore, proposed along with the following measurement items: (1) Level of support provided to start-ups, (2) Intensity of testing new ideas, approaches and technologies with promising start-ups, and (3) Intensity of organizing start-up communities and events. The capabilities collected during the workshop with the practice partners are summarized in the table below:

Capabilities	**Measurement items**
Managing Organizational change	Degree to which KPIs and OKRs (Objectives and Key Results) for Agile transformation defined on a corporate level
	Extent to which the organization assesses Agile transformation KPIs
Scaling lean and agile practices	Degree to which organization has integrated lean and agile practices (e.g., SAFe, LeSS, DAD, Nexus, etc.).
Delegation of competences & responsibilities	Maturity of delegation practices aimed to develop self-organized teams
	Willingness of key decision makers to transfer essential competencies and responsibilities
	Degree of collaboration between project teams

Capabilities	Measurement items
Self-organized teams	Degree to which the team is involved in the recruitment process
	Degree to which team members can choose and distribute roles and responsibilities within the team
	Degree of decentralization in decision-making
	Diversity of functionalities represented in the team
	Extent to which employees are willing to share knowledge and coach each other
Striving for continuous improvement	Extent to which change initiatives are promoted by top management.
Purpose-driven leadership	Degree to which a leader represents a role model for employees
	Degree to which employees are motivated by their leaders
Iterative product development	Incremental development and early and continuous value delivery
Rapid prototyping	Developing an MVP over a short period of time to let potential users interact with it and provide feedback
Frictionless software development	Degree to which software development lifecycle is automated
Product portfolio management	Extent to which Product owner is responsible for ROI
	Clarity on ROI targets, strategic objectives and roadmaps
	Degree to which the value of the innovation project portfolio is optimized
Customer-orientated employees	Degree to which employees interact with customers directly (even in “back office” functions)
	Extent to which the organization shares its customer experience with all employees
	Extent to which the customer-centricity mindset is checked at the stage of job interviews
Attracting innovative ideas through start-up ecosystem	Level of support provided to start-ups
	Intensity of testing new ideas, approaches, and technologies with promising start-ups
	Intensity of organizing start-up communities and events

Table 8: Workshop-contributed capabilities and measurement items.

4.2.1.4 Aggregation and Consolidation of Corporate Agility Capabilities and Performance Indicators (KPIs)

After collecting the candidates for Corporate Agility capabilities and performance indicators, the author's objective is to aggregate and consolidate them. This step is necessary to arrive at a consistent list of capabilities, performance indicators and their measurement items, which can later be used as a foundation for the questionnaire. During the consolidation procedure the author should take into consideration the resulting number of capabilities. The author should avoid oversimplifying the measurement model with having too few capabilities, and, on the other hand, the number of capabilities should not be too high to avoid model being too complex. Based on the discussions with the practice partners, the author derive the guiding principles that the capabilities, their measurement items and the performance indicators should comply with.

First of all, a capability should be formulated as an ability to achieve a certain purpose with a certain performance level (i.e. reaching a certain threshold of performance) (see Chapter 2.2.2). On the contrary to the way the capability is formulated in CMMI models (see Chapter 2.2.3), the capability in the proposed Corporate Agility Maturity Model is going to be assigned to a certain maturity level, which means that the organization achieving such a capability can perform an activity at a certain minimum performance threshold. The objective is, therefore, to formulate capabilities in a compelling way so that the respondents can differentiate capabilities from an activity, performance indicator, or a process.

Secondly, a clear differentiation between the capability and the measurement items is made. To formulate the capabilities and the measurement items differently, the author follows the principle that the capability cannot be directly and clearly measured, while the measurement item is formulated in a measurable and quantifiable way. A measurement item, however, should not demonstrate a degree of realization such as 'high' or 'low'. The author, therefore, conducts several rounds of discussions with practice partners to

revise the measurement items and to remove those of them that demonstrate the level of realization.

It is also important to assure that all of the collected capabilities share a similar level of granularity. The initial list of capability candidates combined ones that are too abstract and ones that are 'fine-grained'. To harmonize the description of the capabilities and to make their formulation more homogeneous and consistent, the author conducts a series of exercises with practice partners to move towards a comparable level of granularity. To reach that goal, participants are asked whether they understood the statement behind the measurement item in a similar way. If this is the case, the item is then qualified as a measurement item, otherwise it is adjusted and reformulated to reach a common understanding. The discussions with the practice partners also assure that the resulting capabilities are mutually exclusive and collectively exhaustive.

Below is the aggregated list of candidates for Corporate Agility capabilities and measurement items collected from a systematic literature review and interviews with the practice partners. Having achieved a more comprehensive understanding of Corporate Agility capabilities, the current list is used as a foundation for development of the questionnaire.

Dimension	Capabilities	Measurement items
1. INNOVATION-DRIVEN CORPORATE STRATEGY	1.1. Continuous revising of Corporate Strategy	Frequency of strategic plan re-development and re-evaluation.
	1.2. Predicting far-future changes	Intensity of discussions about possible far-future challenges
	1.3. Testing new business ideas/models	Degree of collaboration with innovative start-ups.
	1.4. Integrating new business ideas/models into organization	Extent to which old and new business models can co-exist
	1.5. Striving for continuous improvement	Extent to which change initiatives are promoted by top management.
	1.6. Prioritizing innovation portfolio	Degree to which the value of the innovation project portfolio is optimized.

Dimension	Capabilities	Measurement items
	1.7. Promoting enterprise-wide digitalization	Extent to which digital initiatives are prioritized in Corporate strategy
	1.8. Integrating into business Ecosystem	Degree of integration with other partners in business ecosystem
2. INFORMATION TECHNOLOGY	2.1. Flexible IT architecture	Extent to which IT infrastructure can be modified (modularity).
	2.2. Keeping IT infrastructure up-to-date	The degree to which current IT infrastructure is modernized and up-to-date.
	2.3. Dynamic scalability enhancement	Extent to which all data and applications are hosted in the cloud.
	2.4. Building customer-experience APIs at scale	Prevalence of services provided through customer-facing APIs.
	2.5. Integrating Big Data analytics with BI systems	Degree of integration between BI tools and Big Data Analytics.
3. HUMAN RESOURCES AND ORGANIZATIONAL STRUCTURE	3.1. Fostering future-driven skills and competences	Degree to which personnel's skills and competences are developed based on far-future requirements.
	3.2. Failure-tolerant mindset	Tolerance for failure
	3.3. Knowledge sharing	Degree of knowledge transparency within the organization
	3.4. Virtual collaboration	Extent to which employees are using virtual collaborative ways of working
	3.5. Constantly evolving organizational structure	Flexibility of organizational structure and governance
4. LEADERSHIP / TOP MANAGEMENT	4.1. Purpose-driven leadership	Degree to which employees are motivated by the purpose.
	4.2. Experienced leadership of Agile transformation	Extent to which experienced Agile transformation specialists are sufficiently represented in the organization.
	4.3. Defining relevant performance indicators (KPIs) for Corporate Agility	Extent to which Agile transformation KPIs are explicitly defined
	4.4. Measuring Corporate Agility performance (KPIs)	Frequency of measuring Corporate Agility through KPIs
	4.5. Delegating tasks to self-organized teams	Maturity of delegation practices aimed to develop self-organized teams.
	4.6. Scaling lean and Agile practices	Degree to which organization has integrated lean and Agile practices (e.g., SAFe, LeSS, DAD, Nexus, etc.).

Dimension	Capabilities	Measurement items
5. CUSTOMER-CENTERED PRODUCT DEVELOPMENT	5.1. Consolidating customer data	Degree to which the customer data is consolidated.
	5.2. Utilizing customer data	Degree of data-driven personalization
	5.3. Customer engagement	Intensity of collaboration between customers (B2C or B2B) and product development team.
	5.4. Iterative software development	Degree to which software development process is iterative.
	5.5. Continuous software deployment	Degree to which software deployment is automated.
	5.6. Rapid scaling from prototype to product launch	Speed of moving from the prototype to market launch.

Table 9: Candidates for CA capabilities and measurement items

According to Bergkvist and Rossiter (2007), practitioners prefer to apply single-item measures to minimize respondent refusal and cost. Considering that neither multiple-item, nor single-item measures demonstrate better empirical results (Gardner, Cummings, Dunham, & Pierce, 1998), the author groups the capabilities in such a way that each of the capability is described by one measurement item to assure that the defined measurement item consistently provides a way to measure a certain capability.

To measure the realization of Corporate Agility, the author systematically collects the candidates for Corporate Agility performance indicators (KPIs) from the existing literature and by conducting workshops and interviews with the practice partners. The following step for the author is to aggregate and filter out different Agility conceptualizations by following the guiding principles. First of all, the author checks whether the performance indicators are indeed formulated as 'performance measures' and demonstrate the degree of success. It is also important to make sure that the performance indicators reflect the outcome of having certain capabilities. In other words, for every Corporate Agility capability there is a respective Corporate Agility performance indicator that reflects the potential outcome effect that the achievement of the capability causes. Such a consistency check assures that the performance indicators, being the dependent variables of the Effect Model, are measuring the effect of

the capabilities that act as independent variables. The table below illustrates the results of the aggregation and filtering the performance indicators.

Aspect	Code	Measurement Indicators	Source
Strategic Prediction	SP	Accuracy of predicting significant disturbances in the external environment (market fluctuation, disruptive competitor, new technology, etc).	(Lee et al., 2015; Liang et al., 2017; Lu & Ramamurthy, 2011; Panda & Rath, 2018b; Park et al., 2017; Ravichandran, 2018; Tallon & Pinsonneault, 2011)
Customer Centricity	CS	Degree to which customers' changing needs are satisfied by organization's products and services	(Aburub, 2015; Park et al., 2017; Ravichandran, 2018; Tallon & Pinsonneault, 2011; Yang & Liu, 2012)
Independence from Suppliers	IS	Switching cost of service providers and other suppliers	(Felipe et al., 2017; Yang & Liu, 2012)
Business Model Reconfiguration	BMR	The ease with which organization can change its business model	(Aburub, 2015; Ravichandran, 2018)
Business Strategy Reconfiguration	BSR	The ease with which organization can change its business strategy	(Liang et al., 2017)
Organizational Capabilities Reconfiguration	OCR	The ease with which organization can reconfigure its organizational capabilities.	(Ravichandran, 2018; Teece et al., 2016)
Business Processes Reconfiguration	BPR	The ease with which organization can change business processes	(Park et al., 2017; Ravichandran, 2018)
Organizational Structure Reconfiguration	OSR	The ease with which organization can change organizational structure	(Park et al., 2017)
Information Technology Reconfiguration	IT	The ease with which organization can adopt new (IT) technology	(Liang et al., 2017; Lu & Ramamurthy, 2011; Panda & Rath, 2018a)

Table 10: Candidates for CA performance indicators (KPIs).

4.2.1.5 Data Collection: Exploring the Corporate Agility in Organizations

At this stage the author defines the candidates for Corporate Agility capabilities and performance indicators (KPIs). After that, the central step of developing the maturity model is collecting the empirical data that describe which realization stages of Corporate Agility capabilities correspond to which realized Corporate Agility performance. This correlation identifies the level of challenge (i.e. difficultness) associated with achieving a certain capability, as well as the capabilities that are candidates for aggregation. The data collected then inform the Effect Model to define the irrelevant capabilities, which are not correlated to the success of Corporate Agility.

When targeting the participants of the survey, the author's objective is to assure that the companies are sufficiently diversified in terms of Corporate Agility performance. Therefore, the potential respondents should represent organizations that demonstrate both 'poor' and 'advanced' performance. Such a heterogenous portfolio of respondents provides insights on the learning journeys, with the help of which the author can understand what exactly made the company a 'low performer' and, respectively, what initiatives led the successful company to become so advanced in developing the Corporate Agility maturity.

To collect the empirical data about Corporate Agility in different organizations, the author develops and distributes a questionnaire-based survey. The author also collects contextual data, which is later analyzed in more detail (see Chapter 4.2.4) to investigate the configurability and situativity aspect. The following set of guiding principles is taken into consideration when developing the survey instrument to assure the successful execution of the data collection phase.

The practice partners have earlier emphasized that the questionnaire should not consume too much of respondent's time to fill out. To meet this requirement, the author's objective is to derive a questionnaire that requires not more than 30 minutes to answer all of the questions.

To provide the opportunity for participants to opt out of answering certain questions, all of the questions are marked as 'not mandatory', which allows the participants to leave some questions without an answer and proceed to the next question. Despite missing empirical data, this initiative prevents the respondents from quitting the questionnaire, in case the obligatory question has no relevance to the respondent, and allows the participants to answer more questions that they are familiar with.

The author applies the Likert scale with answers ranging from 1 to 7. The author proposes to make slight changes to the methodology of developing the questionnaire by Lahrmann et al. (2011) and to increase the number of responses from 5 to 7. A higher number of response options allows for a more diversified range of answers and helps to avoid the risk of having low statistical variance in the answers.

A major challenge in developing the questionnaire is to assure that the respondents with different backgrounds have a similar understanding of the measurement scale. Considering that all of the participants have different perceptions towards the measurement items, the answers ranging between 'strongly disagree' and 'strongly agree' would not have provided the necessary consistency. To make sure that the measurement scale is understood in a similar way, yet not to convey overprecision, the author formulates an individual scale for each of the measurement items, where the extreme values of 1 and 7 are described in detail.

This questionnaire is focusing on the organizational transformation with the aim to enhance Corporate Agility. The respondent is expected to be knowledgeable in the transformation journey that their organization is undertaking, answering the questions from the enterprise-wide perspective. It is, therefore, desirable that the respondents have a sufficiently broad understanding and sufficiently deep insight into the organization.

The online questionnaire tool LimeSurvey is used to design the survey instrument. The respondents are provided with German and English versions of the questionnaire to allow for a wider audience to take part in the survey.

Before distributing the questionnaire, the author conducts a pre-test with three evaluation partners representing the financial industry. Such an iteration round helps to validate the questions and assures that the description of the measurement scale is formulated clearly and coherently. The link to the questionnaire web-site was distributed to 541 participants between October 2020 and December 2020. There are in total 125 unique responses, accounting to a 23% response rate. The original questionnaire is presented in Appendix A.

4.2.1.6 Developing the Effect Model

In analyzing the relationship between Corporate Agility capabilities and Corporate Agility performance indicators (KPIs), the first ones serve as independent variables, while the latter ones as dependent variables. The working assumption of the Effect Model is that with the enhancement of Corporate Agility capabilities the Corporate Agility performance indicators should also demonstrate the improvement.

The author aims to measure the different aspects of Corporate Agility to make sure that the resulting Corporate Agility Maturity Model only consists of the capabilities that have an impact on Corporate Agility performance to avoid the maturity model being parsimonious. The author is more interested in identifying significant linkages (on a local level) between capabilities and performance indicators, and less interested in finding an overall quantitative relation between them. Therefore, the objective is to get a detailed account on which capabilities have which effects on which performance indicator.

Following Rubin (1987), multiple imputation (Expectation Maximization method) is used for handling missing data. The multivariate linear regression is then applied to investigate the significance of the relationship following the methodology (see Chapter 3.2.1). Below are the results of the regression analysis that is the foundation of the development of the Corporate Agility Effect Model.

	Strategic Prediction	Customer Satisfaction	Independence from Suppliers	Business Model Reconfiguration	Business Strategy reconfiguration	Organizational Capabilities reconfiguration	Business Process reconfiguration	Organizational Structure reconfiguration	IT Infrastructure reconfiguration
	SP	**CS**	**IS**	**BMR**	**BSR**	**OCR**	**BPR**	**OSR**	**IT**
1.1. Continuous revising of Corporate Strategy	0.248	0.309	n/a	n/a	0.234	0.21	n/a	0.303	n/a
1.2. Predicting far-future changes	0.231	0.29	n/a	n/a	0.269	0.285	0.23	0.292	0.199
1.3. Testing new business ideas/models	0.239	n/a	n/a	n/a	0.204	0.253	n/a	n/a	n/a
1.4. Integrating new business ideas/models into organization	0.355	0.198	0.33	0.462	0.455	0.464	0.386	0.417	0.224
1.5. Striving for continuous improvement	0.221	0.265	n/a	0.316	0.323	0.353	0.286	0.448	n/a
1.6. Prioritizing innovation portfolio	0.378	0.251	0.256	0.416	0.428	0.627	0.46	0.465	n/a
1.7. Promoting enterprise-wide digitalization	0.278	0.224	n/a	0.224	n/a	0.318	n/a	n/a	n/a
1.8. Integrating into business Ecosystem	0.397	0.247	n/a	0.538	0.497	0.617	0.318	0.482	0.245
2.1. Flexible IT architecture	n/a	n/a	0.377	0.482	0.424	0.423	0.468	0.373	0.392
2.2. Keeping IT infrastructure up-to-date	0.272	0.178	0.352	0.265	0.398	0.395	0.349	0.317	0.506
2.3. Dynamic scalability enhancement	0.183	0.153	0.552	0.303	0.362	0.408	0.268	0.4	0.256
2.4. Building customer-experience APIs at scale	0.233	n/a	0.46	0.5	0.349	0.387	0.353	0.358	n/a

	Strategic Prediction	Customer Satisfaction	Independence from Suppliers	Business Model Reconfiguration	Business Strategy reconfiguration	Organizational Capabilities reconfiguration	Business Process reconfiguration	Organizational Structure reconfiguration	IT Infrastructure reconfiguration
2.5. Integrating Big Data analytics with BI systems	0.396	n/a	n/a	0.242	n/a	0.306	n/a	n/a	0.217
3.1. Fostering future-driven skills and competences	0.344	0.219	n/a	0.396	0.455	0.536	0.48	0.391	0.325
3.2. Failure-tolerant mindset	0.34	0.221	0.313	0.324	0.377	0.526	0.451	0.361	0.25
3.3. Knowledge sharing	0.212	0.151	0.241	0.347	0.368	0.485	0.44	0.328	0.238
3.4. Virtual collaboration	n/a	n/a	0.347	0.239	0.424	0.356	n/a	0.34	0.229
3.5. Constantly evolving organizational structure	0.271	0.25	0.32	0.469	0.488	0.544	0.471	0.566	0.318
4.1. Purpose-driven leadership	0.471	0.341	0.306	0.321	0.409	0.451	0.417	0.367	0.356
4.2. Experienced leadership of Agile transformation	0.271	0.144	n/a	0.267	0.257	0.423	0.36	0.339	0.218
4.3. Defining relevant KPIs for Corporate Agility	0.292	n/a	n/a	0.274	n/a	0.339	0.35	n/a	n/a
4.4. Defining and measuring Corporate Agility performance (KPIs)	0.262	n/a	n/a	0.312	0.273	0.439	0.341	0.373	n/a
4.5. Delegating tasks to self-organized teams	0.317	0.239	0.424	0.423	0.38	0.375	0.421	0.358	0.282

	Strategic Prediction	Customer Satisfaction	Independence from Suppliers	Business Model Reconfiguration	Business Strategy reconfiguration	Organizational Capabilities reconfiguration	Business Process reconfiguration	Organizational Structure reconfiguration	IT Infrastructure reconfiguration
4.6. Scaling lean and Agile practices	0.233	n/a	0.24	n/a	n/a	0.38	0.259	0.233	0.275
5.1. Consolidating customer data	n/a	0.251	n/a	n/a	n/a	n/a	0.238	n/a	0.268
5.2. Utilizing customer data	n/a	n/a	n/a	0.278	n/a	0.277	n/a	n/a	0.25
5.3. Customer engagement	0.254	0.18	0.228	0.323	0.316	0.3	0.354	0.342	0.226
5.4. Iterative software development	0.222	n/a	n/a	n/a	0.3	0.293	0.303	n/a	0.285
5.5. Continuous software deployment	0.247	0.234	0.442	0.26	0.343	0.425	0.361	n/a	0.423
5.6. Rapid scaling from prototype to product launch	0.278	0.289	0.29	0.332	0.305	0.352	0.36	n/a	n/a

Table 11: Analyzing the Effect of Corporate Agility Capabilities on Corporate Agility Performance indicators

All *β slopes* are significant at $p < 0.05$. For certain positions marked as '*n/a*' it was not possible to derive the value due to the lack of empirical data or statistical insignificance.

The result of the presented investigation provides a deeper understanding of the relations and allows for further filtering the significant Corporate Agility capabilities and performance indicators. After analyzing the regression model, three capabilities and two performance indicators are treated as redundant and, therefore, excluded from the final list of Corporate Agility capabilities and Corporate Agility performance indicators. As such, the capabilities '*1.7. Promoting enterprise-wide digitalization', '4.3. Defining relevant KPIs for Corporate Agility,'* and *'5.2. Utilizing customer data'* are aggregated with the

similar ones since they did not sufficiently explain the Corporate Agility performance. The multivariate regression also confirms that performance indicators such as '*Customer satisfaction'* and '*Independence from suppliers*' do not qualify to sufficiently measure the effect of Corporate Agility. The certain cases, in which the Corporate Agility capabilities demonstrate a degree of correlation with the performance indicators, are not supported by the state of the art and the empirical knowledge collected during the rounds of workshops and interviews with the practice partners. On this ground, the above-mentioned Corporate Agility KPIs are excluded from the final list of Corporate Agility performance indicators. Below are the finalized Corporate Agility capabilities and Corporate Agility performance indicators presented in the form of catalogues. Both capabilities and performance indicators proved to be statistically significant and, therefore, constitute the core of the Corporate Agility Effect Model. The capabilities are grouped in the respective dimensions, which later inform the design of the Corporate Agility Maturity Model.

1. Innovation-Driven Corporate Strategy	2. Information Technology	3. Human Resources and Organizational Structure	4. Leadership / Top Management	5. Customer-Centered Product Development
1.1. Continuous revising of Corporate Strategy	2.1. Flexible IT architecture	3.1. Fostering future-driven skills and competences	4.1. Purpose-driven leadership	5.1. Consolidating customer data
1.2. Predicting far-future changes	2.2. Keeping IT infrastructure up-to-date	3.2. Failure-tolerant mindset	4.2. Experienced leadership of Agile transformation	5.2. Customer engagement
1.3. Testing new business ideas/models	2.3. Dynamic scalability enhancement	3.3. Knowledge sharing	4.3. Defining and measuring Corporate Agility performance (KPIs)	5.3. Iterative software development
1.4. Integrating new business ideas/models into organization	2.4. Building customer-experience APIs at scale	3.4. Virtual collaboration	4.4. Delegating tasks to self-organized teams	5.4. Continuous software deployment
1.5. Striving for continuous improvement	2.5. Integrating Big Data analytics with BI systems	3.5. Constantly evolving organizational structure	4.5. Scaling lean and Agile practices	5.5. Rapid scaling from prototype to product launch
1.6. Prioritizing innovation portfolio				
1.7. Integrating into business Ecosystem				

Table 12: Corporate Agility capabilities catalogue

Aspect	Code	Measurement Indicators
Strategic Prediction	SP	Accuracy of predicting significant disturbances in the external environment (market fluctuation, disruptive competitor, new technology, etc).
Business Model Reconfiguration	BMR	The ease with which organization can change its business model
Business Strategy Reconfiguration	BSR	The ease with which organization can change its business strategy
Organizational Capabilities Reconfiguration	OCR	The ease with which organization can reconfigure its organizational capabilities.
Business Processes Reconfiguration	BPR	The ease with which organization can change business processes
Organizational Structure Reconfiguration	OSR	The ease with which organization can change organizational structure
Information Technology	IT	The ease with which organization can adopt new (IT) technology

Table 13: Corporate Agility performance indicators (KPIs) catalogue

4.2.2 Identifying Effective Organizational Learning Journeys

Once performance-relevant capabilities are identified, the author applies a maturity model population technique to cluster capabilities and to assign these clusters of capabilities to certain maturity levels following the methodology outlined in Chapter 3.2.2.

The gap between the actual (as-is) and desired (to-be) level of maturity derived after the empirical data collection, in combination with the organization's performance, is then used as input data to the Rasch algorithm in order to derive the learning journeys. Based on the design hypothesis, the respective Corporate Agility learning journeys represent a sequence of capabilities, whose purposeful achievement leads to an increased Corporate Agility performance. Such learning journeys are represented by the capabilities that are ordered based on the challenge associated with achieving them.

Raber et al. (2012) followed Linacre and Wright (1998) in their work and applied the BIGSTEPS software version 2.82 in order to obtain the Rasch item calibration for the maturity model. Important output statistics are the measure of difficulty and a set of standardized fit statistics (infit and outfit) for each

item (Raber et al., 2012). Infit is more sensitive to unexpected behavior affecting responses to items near the organization's capability level, whereas outfit is more sensitive to unexpected behavior of organizations on items far from the organization's capability level (Raber et al., 2012). Values of both fit statistics are expected to be close to one, and the data is considered productive for measurement when infit and outfit are between 0.5 and 1.5. A minimum of 90% of infit and outfit values are considered productive for measurement. Raber et al. (2012) further stated that if the data set meets the quality criterion described in Dekleva and Drehmer (1997), then the data conforms to the model. The output of Rasch algorithm is demonstrated below, where the capabilities are arranged into maturity clusters that are derived by the cluster analysis.

Logit	Error	Infit	Outfit	Maturity Level	Capability
0.58	0.09	0.97	0.98	5	2.5. Integrating Big Data analytics with BI systems
0.48	0.08	1.3	1.25	5	2.3. Dynamic scalability enhancement
0.46	0.08	1.12	1.15	5	4.5. Scaling lean and Agile practices
0.4	0.08	0.93	0.92	5	3.1. Fostering future-driven skills and competences
0.39	0.08	0.94	0.91	5	3.5. Constantly evolving organizational structure
0.38	0.08	1.12	1.09	5	4.3. Defining and measuring Corporate Agility performance (KPIs)
0.38	0.08	0.97	0.98	5	4.4. Delegating tasks to self-organized teams
0.32	0.08	1	0.98	5	2.1. Flexible IT architecture
0.28	0.08	0.89	0.92	5	5.5. Rapid scaling from prototype to product launch
0.17	0.08	1.15	1.14	4	5.2. Customer engagement
0.17	0.08	1.09	1.06	4	4.2. Experienced leadership of Agile transformation
0.13	0.08	0.73	0.76	4	1.6. Prioritizing innovation portfolio
0.02	0.08	0.66	0.76	3	1.7. Integrating into business Ecosystem
-0.01	0.08	1.02	1.02	3	1.4. Integrating new business ideas/models into organization

Logit	Error	Infit	Outfit	Maturity Level	Capability
-0.01	0.08	0.88	0.87	3	3.3. Knowledge sharing
-0.04	0.09	1.22	1.23	3	5.4. Continuous software deployment
-0.05	0.08	0.91	1	3	2.4. Building customer-experience APIs at scale
-0.11	0.08	0.9	0.93	3	5.1. Consolidating customer data
-0.21	0.08	1.05	1.02	2	1.5. Striving for continuous improvement
-0.26	0.08	0.97	0.97	2	5.3. Iterative software development
-0.28	0.08	0.82	0.85	2	4.1. Purpose-driven leadership
-0.28	0.08	0.88	0.9	2	2.2. Keeping IT infrastructure up-to-date
-0.45	0.08	1.35	1.36	1	1.1. Continuous revising of Corporate Strategy
-0.48	0.08	0.93	0.93	1	3.2. Failure-tolerant mindset
-0.53	0.08	0.89	0.85	1	1.2. Predicting far-future changes
-0.63	0.08	1.39	1.43	1	1.3. Testing new business ideas/models
-0.8	0.08	1.13	1.11	1	3.4. Virtual collaboration

Table 14: Results of Rasch algorithm

The capabilities that most organizations have achieved are considered to be the less challenging ones, and the capabilities that only few best-performing organizations have achieved are considered to be more challenging ones. The author, however, would like to be cautious with simply labeling the challenge associated with achieving these capabilities as “difficulty”, as such a term would significantly oversimplify a much more elaborate logic behind it. One could say that these capabilities are ordered according to their difficultness referring to how easy or difficult it is to achieve them. However, it is more of an ordering according to the respective learning process. The logic behind this learning idea originated from the educational theory, which says that, if the organizations or people want to develop certain capabilities, it is not irrelevant in which order they build up these capabilities (Winter & Aier, 2020). The idea of sequential development of capabilities is in the core of the PISA assessment instrument (Programme for International Student Assessment), in which 15-

year-old school pupils' scholastic performance is measured in the areas of mathematics, science, and reading (OECD, 2012). The pupil is expected to develop the "addition and subtraction" capability first, before learning how to perform "logarithmic differentiation". The organization's learning process, therefore, follows a certain order starting from more foundational capabilities and moving towards more advanced or 'most difficult' ones. The positioning of the capabilities within the maturity levels is not directly related to the easiness to realize them anymore, but instead it illustrates the learning journey, indicating which capabilities the company should develop first, and which ones the company can only develop once the capabilities on the left side of the maturity model are fully achieved.

After ordering the capabilities according to the level of difficultness and clustering them into the respective levels of maturity, the author designs the initial Corporate Agility Maturity Model in its classical visualization (Figure 4).

	Level 1	Level 2	Level 3	Level 4	Level 5
1. INNOVATION-DRIVEN CORPORATE STRATEGY	1.1. Continuous revising of Corporate Strategy 1.2. Predicting far-future changes 1.3. Testing new business ideas/models	1.5. Striving for continuous improvement	1.4. Integrating new business ideas/models into organization 1.7. Integrating into business Ecosystem	1.6. Prioritizing innovation portfolio	
2. INFORMATION TECHNOLOGY		2.2. Keeping IT infrastructure up-to-date	2.4. Building customer-experience APIs at scale		2.1. Flexible IT architecture 2.3. Dynamic scalability enhancement 2.5. Integrating Big Data analytics with BI systems
3. HUMAN RESOURCES AND ORGANIZATIONAL STRUCTURE	3.2. Failure-tolerant mindset 3.4. Virtual collaboration		3.3. Knowledge sharing		3.1. Fostering future-driven skills and competences 3.5. Constantly evolving organizational structure
4. LEADERSHIP / TOP MANAGEMENT		4.1. Purpose-driven leadership		4.2. Experienced leadership of Agile Transformation	4.3. Defining and measuring Corporate Agility performance (KPIs) 4.4. Delegating tasks to self-organized teams 4.5. Scaling lean and agile practices
5. CUSTOMER-CENTERED PRODUCT DEVELOPMENT		5.3. Iterative software development	5.1. Consolidating customer data 5.4. Continuous software deployment	5.2. Customer engagement	5.5. Rapid scaling from prototype to product launch

Figure 4: Corporate Agility Maturity Model (General)

Having analyzed the capabilities that belong to the same maturity level, the following description of each of the maturity levels can be devised. As such, at the *maturity level 1* the companies start their journey formulating the Corporate Strategy on a more frequent basis to make sure that the foreseen changes in the market are taken into consideration when formulating the strategy. Such a focus on the sensing aspect activates the search for a potentially innovative business model that will then be implemented throughout the organization or introduced as a spin-off. Being at the beginning of the transformation journey, the companies are actively integrating the failure-tolerant mindset and adopting virtual forms of collaboration as the crucial capabilities for a fast-paced environment.

The organizations approaching the *maturity level 2* are becoming increasingly concerned about their IT infrastructure and want to make sure that it is up-to-date and demonstrates a high degree of modularity. It is the point where a purpose-driven leadership should be established to adapt the notion of continuous organizational improvement, including customer-centered product development aspects such as iterative software development.

After reaching the *maturity level 3*, the organizations are expected to actively develop almost all dimensions of Corporate Agility. This is the phase where the previously tested (maturity level 1) innovative ideas and business models have matured enough to be considered as a candidate for integrating into the organization, considering the developed ties with the external partners in the surrounding business ecosystem. The IT development is now catching its momentum to develop and introduce customer-experience APIs across all the products and services. It is also expected that the organization excelled at consolidating customer data, and is now utilizing it to develop personalized products and services through the continuous software deployment.

Having matured into *level 4,* the organization developed the capability of prioritizing its innovation portfolio, which is demonstrated by strategically important projects being executed, and by having team resources and investments optimally balanced based on the level of risk, reward, and the newness of the product / technology that the teams are developing. It is

important at this stage to make sure that the organization has a sufficient amount of Agile transformation professionals with a rich experience of organizational change, which can power the Agility transformation further and assure the highest level of customer-centricity. At this level the organization has matured its capability of collaboration with customers (B2C or B2B) and delivers innovative products that are co-developed with their customers.

At the highest *level 5* of the Corporate Agility Maturity Model, the organization is facing the most challenging capabilities that are related to IT, HR, organizational structure, leadership / top management, and customer-centered product development. Assuring the flexibility of IT infrastructure, integrating Big Data analytics with BI systems, and enhancing the dynamic scalability are the IT-related capabilities that only a minority of organizations can achieve nowadays. It is equally challenging to transform the hierarchical organizational structure into a more organic one, and to assure that personnel's skills and competences are developed based on far-future requirements. Only a minority of the organizations are able to correctly formulate the relevant Corporate Agility KPIs and to assess the Agility performance on a regular basis. At the maturity level 5 the organizations demonstrate a progressive delegation process to assure gradual and intentional development of the self-organized teams. Such a maturity of delegation practices allows the organization to have fully-adopted enterprise-wide lean and Agile practices (e.g., SAFe, LeSS, DAD, Nexus, etc.), which is evidenced by an organization being able to scale from the prototype to market launch early enough to catch the market window before the competitors.

4.2.3 Corporate Agility Maturity Measurement Model

The author follows the methodology of Raber et al. (2013b) to design the assessment instrument and to determine its quality by assessing the reliability on the basis of Cronbach's alpha. The Cronbach alpha coefficient computed for the Corporate Agility measurement instrument is 0.937. With support of the research practice (Kline, 1999), the author makes a conclusion that such a

Cronbach's Alpha coefficient can be considered as 'excellent'. The final version of the assessment instrument is demonstrated below.

Dim		Measurement items	AS-IS	TO-BE	Measurement scale (from 1 to 7).
1. INNOVATION-DRIVEN CORPORATE STRATEGY	1.1.	Frequency of strategic plan re-development and re-evaluation.			1 - not on a regular basis (e.g., once in 10 years) 7 - very often (e.g., annually)
	1.2.	Intensity of discussions about possible far-future challenges			1 - Far-future scenarios are rarely discussed on a corporate level. 7 - Constantly trying to define far-future changes in the environment (incl. analyzing assumptions, prerequisites and dependencies).
	1.3.	Degree of collaboration with innovative start-ups.			1 - No attempts to test new technology/business models. 7 - Extensive collaboration with start-ups, incl. testing new disruptive ideas, launching hackathons, etc.
	1.4.	Extent to which old and new business models can co-exist			1 - There is no mechanism of integrating a new business model into the system without disrupting the business. 7 - Management team is capable of orchestrating various business models (allowing new business model to run in parallel with existing business model).
	1.5.	Extent to which change initiatives are promoted by top management.			1 - Top management is hesitant to implement any changes. 7 - Top management calls for absolute commitment for change initiatives and highly prioritizes these initiatives in the Corporate Strategy.
	1.6.	Degree to which the value of the innovation project portfolio is optimized.			1 - Portfolio is poorly optimized resulting in strategically important innovation projects being suppressed. 7 - Investments are optimally balanced with risk, rewards (e.g., EBIT), 'newness' of product/technology.

Dim		Measurement items	AS-IS	TO-BE	Measurement scale (from 1 to 7).
	1.7.	Degree of integration with other partners in business ecosystem			1 - No integration on a process or technical level between the organization and other partners in business ecosystem. 7 - Full integration with partners in business ecosystem, the cooperation framework is clearly defined and regulated.
2. INFORMATION TECHNOLOGY	2.1.	Extent to which IT infrastructure can be modified (modularity).			1 - IT System components are tightly coupled; modifications are painful or not possible. 7 - Highly modular IT system that allows to effortlessly add, modify, and remove any components.
	2.2.	The degree to which current IT infrastructure is modernized and up-to-date.			1 - Existing legacy systems that can't be updated. The hardware or operating systems regularly fail. 7 - Current IT infrastructure is modernized and fully up-to-date.
	2.3.	Extent to which all data and applications are hosted in the cloud.			1 - No cloud solutions are available. 7 - Cloud-based data and applications hosting for all workloads. Immediate access to IT infrastructure from public/private cloud services (e.g. XaaS).
	2.4.	Prevalence of services provided through customer-facing APIs.			1 - There are no services available for external consumption through Public APIs. 7 - All customer journeys are covered with customer-facing APIs.
	2.5.	Degree of integration between BI tools and Big Data Analytics.			1 - BI tools and Big Data Analytics are not integrated. 7 - Real-time Big Data is fully integrated with self-Service BI tools.
3. HUMAN RESOURCES	3.1.	Degree to which personnel's skills and competences are developed based on far-future requirements.			1 - On-call approach: personnel's skills are developed based on the current project requirements. 7 - Organization actively improves personnel's capabilities based on future scenarios and predicted demand of certain skills and competences.

Dim		Measurement items	AS-IS	TO-BE	Measurement scale (from 1 to 7).
	3.2.	Tolerance for failure			1 - The organization is not tolerant of early failure, financing is likely to be liquidated prematurely upon initial unsatisfactory progress. 7 - Exceptional tolerance for failure, motivating and nurturing innovation regardless of unsatisfactory progress.
	3.3.	Degree of knowledge transparency within the organization			1 - Employees (incl. Top management) block the knowledge sharing across the teams or expect some favor in return of sharing information. 7 - Top Management rewards and encourages employees who share their knowledge. There is transparent and proactive communication of failed projects and lessons learned.
	3.4.	Extent to which employees are using virtual collaborative ways of working			1 - All meetings are conducted face-to-face on site. No virtual chat rooms are organized. 7 - Networked / virtual collaborative ways of working are widely implemented throughout the organization.
	3.5.	Flexibility of organizational structure and governance			1 - Overall hierarchical organizational structure with isolated departments, steering committees, and project managers. 7 - Traditional hierarchy is replaced with an Agile organizational model that constantly evolves through formation of ‘Squads’, ‘Chapters’, and 'Tribes'.
4. LEADERSHIP / TOP MANAGEMENT	4.1.	Degree to which employees are motivated by the purpose.			1 - There is no united purpose for employees to focus on. 7 - Employees demonstrate their unquenchable desire to win, sharing their determination to achieve goals.
	4.2.	Extent to which experienced Agile transformation specialists are sufficiently represented in			1 - The organization does not have specialists with previous Agile transformation experience. 7 - Organization has sufficient amount of Agile transformation professionals with rich experience of organizational change.

Dim		Measurement items	AS-IS	TO-BE	Measurement scale (from 1 to 7).
		the organization.			
	4.3.	Frequency of measuring Corporate Agility through KPIs			1 - There are no initiatives to measure the effect of being Agile on a corporate level. 7 - Agility performance of the organization is frequently assessed via KPIs and discussed on a corporate level.
	4.4.	Maturity of delegation practices aimed to develop self-organized teams.			1 - Teams have no decision in distributing roles and responsibilities, all tasks are directed and controlled from the top. 7 - A progressive delegation process is in place to assure gradual and intentional development of self-organized teams.
	4.5.	Degree to which organization has integrated lean and Agile practices (e.g., SAFe, LeSS, DAD, Nexus, etc.).			1 - Organization has a highly regimented waterfall environment and is at the very beginning of implementation. 7 - There is a fully-adopted enterprise-wide framework (e.g., SAFe, LeSS, DAD, Nexus, etc.) that connects all layers of organization in Agile manner.
5. CUSTOMER-CENTERED PRODUCT DEVELOPMENT	5.1.	Degree to which the customer data is consolidated.			1 - There is no consolidated customer view, no understanding of what potential customers may really want/need. 7 - Big Data Analytics consolidates detailed customer's data and provides sufficient insight into customers' behavior.
	5.2.	Intensity of collaboration between customers (B2C or B2B) and product development team.			1 - There is limited to no collaboration with customers regarding product development. 7 - Customers are actively engaged in the creation of innovative products
	5.3.	Degree to which software development process is iterative.			1 - Software development follows single step approach (e.g., Waterfall). 7 - Software development follows well-established Agile ceremonies with

Dim		Measurement items	AS-IS	TO-BE	Measurement scale (from 1 to 7).
					vigorously involved product team (incl. Product owner) and potential users.
	5.4.	Degree to which software deployment is automated.			1 - Code changes are reviewed and verified manually, which involves the developing team moving an iteration along a predefined pipeline to the operations team. 7 - Full end to end, automated software deployment through cloud automation. Teams can immediately respond and deploy responses to customer feedback.
	5.5.	Speed of moving from the prototype to market launch.			1 - A product launch is always late, it takes significant time until a final version is introduced to the market. 7 - Product/service is introduced early enough to catch the market window before competitors.

Table 15: Corporate Agility maturity measurement instrument

The author applies the measurement algorithm to the collected empirical data to derive not only the current Corporate Agility maturity values (as-is), but also the desired ones (to-be). The figures below demonstrate an example of applying the Corporate Agility maturity assessment tool to the survey data set.

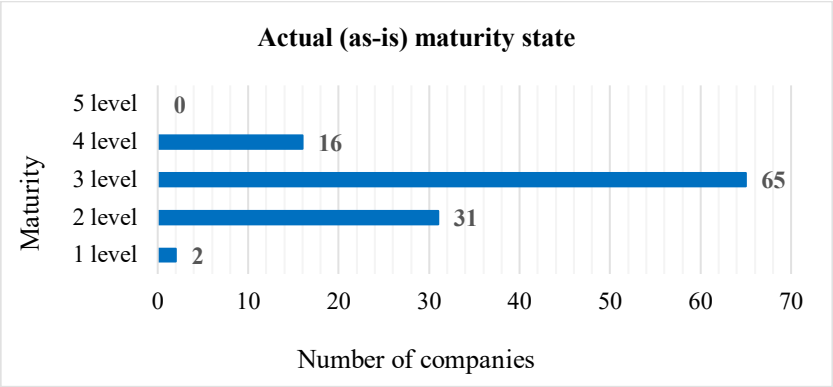


Figure 5: Actual (as-is) maturity state of the organizations.

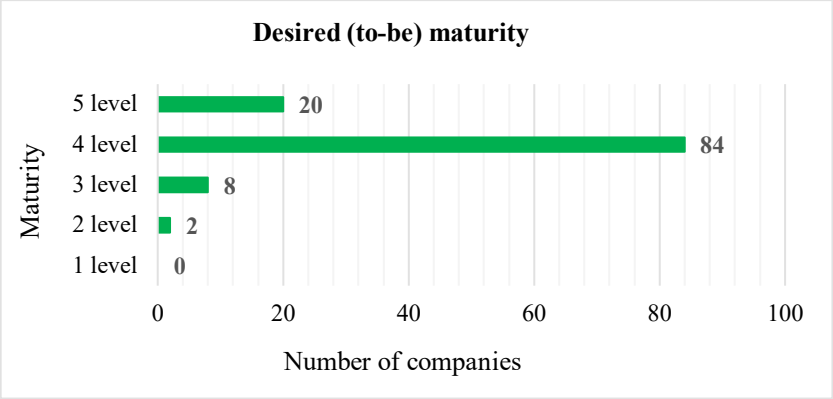


Figure 6: Desired (to-be) maturity state of the organizations.

The working assumption of the dissertation project at hand is that the high level of the organization's Corporate Agility maturity should be reflected by the organization having higher values of Corporate Agility performance indicators (KPIs). The author investigates such a relationship in the evaluation section on this dissertation (see Chapter 4.3).

4.2.4 Towards Configuration Mechanism for Corporate Agility Maturity Model

4.2.4.1 Conceptualizing the Context for Corporate Agility

Large-scale Agile cannot be just taken into use off-the-shelf, but careful customization is needed to make a good fit for the organization and to gain the best benefits (Dikert et al., 2016). Horlach and Drechsler (2020) conducted a large-scale cross-industry and cross-country research program on Agile organizational transformation and have collected extensive data through interviews and focus groups with executives (e.g., CIO or CDO), lower level managers (e.g. program managers, product owners, enterprise architect), and external consultants. In their research the participants had two essential criteria to fulfill: 1) their organization is undergoing a transformation towards organizational Agility, and 2) the participants hold a position with in-depth insights on the overall (Agile) organizational system (Horlach & Drechsler, 2020). The author of the dissertation at hand takes the heterogeneous Agile organizational contexts into consideration, in which Horlach and Drechsler (2020) qualitatively analyzed the various aspects of Organizational Agility.

First of all, the differentiation that Horlach and Drechsler (2020) outlined between employees working on the *executive* level (e.g., CIO or CDO) and those employees occupying *lower management levels* (e.g., such as program managers, product owners, enterprise architects or project leaders) is considered as one of the important context factors to focus on in the current dissertation project. Considering a different scope of the responsibilities for the middle management and executive level, the author decides to analyze the impact that the scope of the responsibilities might have on the maturity development perception.

Secondly, Horlach and Drechsler (2020) named the extent of *employees' experience in Agility* as a potential source for resistance or inertia regarding the changes of the environments and customer needs. They considered a high level of readiness for coping with change as a critical factor for employees' effectiveness. Horlach and Drechsler (2020) further argued that the limited

employees' experience in Agility could potentially indicate the presence of rich experience in traditional project environments, which in turn could imply the employees' preference for stable processes and predefined requirements based on detailed planning (Horlach & Drechsler, 2020). van Manen and van Vliet (2014) earlier stated that often the general resistance employees have towards working Agile is partially based on a lack of an Agile mindset, which in turn is influenced by an extensive experience with non-Agile methods. The *employees' experience in Agile transformation* and *the extent to which the employee is involved in the transformation initiatives* could, therefore, potentially serve as the contingency candidates that may cause the differences in the learning journey that employees with various Agile transformation experience could perceive.

Another important aspect that Horlach and Drechsler (2020) analyzed in their research is the approach in which the transformation towards Agile is executed. Horlach and Drechsler (2020) referenced the works of Dikert et al. (2016) and Paasivaara, Lassenius, Heikkilä, Dikert, and Engblom (2013) to emphasize that when aiming to introduce Agile on a larger scale, organizations tend to choose an approach that lies somewhere between an initial *big bang* top-down transformation towards Agile or an incremental, iterative, and emergent approach where different parts of the organizations can choose whether and how they adopt Agile. In one situation a common way of working across several Agile teams or units may be more effective to successfully transform (parts of) the organization, whereas in another situation self-taught bottom-up experimentation with Agile techniques and tools may be the more effective approach – particularly when considering how to set the stage for *being Agile* in a longer-term and sustained perspective (Horlach & Drechsler, 2020). Horlach and Drechsler (2020) further argued that team autonomy right from the start could lead to the danger of an aimless or quickly stalling transformation process, while a regression to a directive (i.e. non-autonomous) way of working and organizational culture that could potentially constrain the Agile units' autonomy to self-transform in the future (Horlach & Drechsler, 2020). *The degree to which the organization has already progressed through the Agile transformation*, as well as the *Agile transformation archetype* are,

therefore, considered to be the important context candidates that may potentially provide insights on the differences between the approaches for maturity development in the domain of Corporate Agility.

When designing a situational maturity model in the Business Intelligence (BI) domain, Raber et al. (2013a) identified two contextual factors, namely the *company's size* and the *industry*, that have an influence on the evolution of BI maturity on the enterprise-wide level. Considering the similarities of designing a situated maturity model for the enterprise-wide organizational aspect, the author uses the work of Raber et al. (2013a) as a concept model and includes such contingency factors as the potential candidates to be applied in the configuration mechanism.

4.2.4.2 Defining Situational Characteristics for Corporate Agility

To better understand the differences between organizational learning journeys and the tensions within the firm's environment associated with the transformation, the author intends to explore different backgrounds of key stakeholders to understand different perceptions towards enhancing the Corporate Agility. Assuming that people responsible for the change management tasks have different perspectives on transformation comparing to people who are mostly concerned with 'running-the-business' activities, it is necessary to link different learning journeys to various perceptions. Since different groups of stakeholders in the organizations go through different learning journeys in the overall model, conflicts and communication issues are unavoidable when it comes to transformation programs. One should not assume that such different stakeholders working in high-complexity organizations have a common understanding of digital transformation. People with a different scope of responsibilities may have different visions on questions such as which Corporate Agility capability is more important or which capability should be developed first. Understanding the reasons for such tensions could be the first step in helping to avoid potential project failures in the future transformation initiatives. Based on this understanding it is then

possible to develop support for professionals to discuss different perspectives and align them on a shared vision.

The research described in this chapter has an explorative nature, and, as opposed to the confirmative research, the author does not have an explicit hypothesis to confirm. Industry leaders and transformation professionals are interviewed separately and during dedicated workshops in order to define key characteristics that could make an effect on the direction of the organizational learning through Agility transformation. Below are the results of the exploration of various contingency candidates collected through the literature review and interviews with practice partners.

According to Rai (2016), run-the-business (RTB) and change-the-business (CTB) are twin splits of enterprises. Run the business is surviving today and tactical in nature, while Change the business is surviving tomorrow. Rai (2016) called run-the-business and change-the-business a perennial phenomenon across all industrial domains. While enterprises are being reimagined digitally under the influence of great transformational forces of social media, mobility, analytics, cloud and automation, running the business professionals are more tactical in nature focus on running the day to day operations (Rai, 2016). Change the business, on the other hand, is strategic and transformational in nature. Such differences between run-the-business/change-the-business focuses makes it an eligible candidate for a contextual factor. The working assumption is, therefore, that the reflection of Corporate Agility capabilities may be very different in professionals that are mostly involved in change, in contrast to people who are mostly concerned with running the business. The contextual question is formulated as follows:

1. How much time do you personally spend on ‘running-the-business’ versus ‘changing-the-business'?

- ‘Run-the-business’ (0-100%)
- ‘Change-the-business’ (0-100%)

Change poses special challenges at different levels of the organizational hierarchy, as different aspects of the change process may be salient to

employees and may be evaluated quite differently (Jones et al., 2008). To take adequate account of the perceptions and responses to organizational change by members of different groups, Jones et al. (2008) suggest to focus on the way different groups of employees talk about the organizational transformation. Thus, the perception of various stakeholders working on different organizational levels may help to understand their view of enhancing Corporate Agility. In his work Jones et al. (2008) refer to the results of Kanter, Stein, and Jick (1992), who defined the three key groups within organizations during transformation: change strategists at the top of the hierarchy, change managers in middle management (supervisors), and change recipients at lower levels (non-supervisors). Covin and Kilmann (1990) in interviews with external and internal consultants, researchers and managers, found differences across groups of participants in terms of comments about the importance of management support, change preparation, negative leadership actions, employee participation and communication, and understanding of the purpose of the transformation. In addition, Luthans and Sommer (1999) argue that different attitudes between managers and staff arise because managers are more involved in the change process. In an attempt to capture the different perceptions of employees working at different organizational levels towards Corporate Agility and maturity development, the author formulates the following questions as a candidate for a contingency factor:

2. What type of tasks best represent the scope of your responsibilities/position?

- Qualified tasks following instructions (e.g., programmer, accountant, web-designer).
- Independent tasks in a certain functional area, or tasks with limited accountability for other employees (e.g., team leader, project manager or head of department).
- Comprehensive management tasks and decision-making powers (e.g. director, managing director, member of the executive board).

The positioning of the employees throughout organizational levels implies different scopes of job responsibilities. Brosius, Aier, Haki, and Winter (2019) refer to the work of Williams and Karahanna (2013), which conclude the

presence of different perspectives on whether to meet local business needs or organization-wide, global performance goals. According to Currie and Guah (2007), institutional logic has been pertinently used for explaining how intraorganizational processes affect organizational goals, change, and success. It is, therefore, worth investigating the focus of employees' decisions and the broadness of their scope of job responsibilities. To capture such differences in regards to Corporate Agility enhancement, the author formulates the following question after conducting workshops and interviews with the Swiss practice partners:

3. How wide is the scope of your job responsibilities?

- ☐ Focused (e.g., project, function, product, market)
- ☐ Cross-X (e.g., cross-functional, cross-unit, cross-market)
- ☐ Enterprise-wide (cross-enterprise, ecosystem-wide focus)

The book 'The Contingency Theory of Organizations' by Donaldson (2001) presents the study results of Pugh and Hickson (1976), which studied the context of organization and observed a large number of variables including contingency factors. The main finding to emerge from the work is that size (meaning the number of employees) is a contingency of organizational structure. The author aims to include the following question about the number of employees in order to see the difference in Corporate Agility enhancement between SMEs and large organizations:

4. How many people in your organization are directly affected by Agile transformation?

- ☐ >=5000
- ☐ 1000-4999
- ☐ 500-999
- ☐ 100-499
- ☐ 10-99
- ☐ <10

When discussing the transformation archetypes with practice partners, some industry leaders have mentioned the work of Brosseau, Ebrahim, Handscomb, and Thaker (2019), in which three separate Agile transformation archetypes were described, namely 'All-in', 'Step-wise' and 'Emergent'.

All-in entails an organization-wide commitment to go Agile and a series of waves of Agile transformation. According to Brosseau et al. (2019), this transformational archetype shows a clear distinction between the aspire, design, and pilot phase and the scale and improve phase. Many companies will run multiple rounds of pilots and iterate their blueprint several times before fully committing to scaling up across a large part of the organization (Brosseau et al., 2019).

The Step-wise approach is a systematic and more discreet one. An increasing number of organizations gain strong conviction early on and fully commit up front to move the whole organization to an Agile model. Leaders from these organizations define a plan to execute all steps of the transformation approach as quickly as possible. Even in these types of transformation it is rare for the whole organization to transform to an Agile model in a single "big bang"; rather, it is more common for the transformation to proceed through a number of planned waves (Brosseau et al., 2019).

Emergent represents essentially a bottom-up approach. Some organizations have chosen to progress their entire Agile transformation through an emergent, bottom-up approach. In this archetype, an aspiration from top leaders sets a clear direction, and significant effort is spent building Agile mind-sets and capabilities among leaders (Brosseau et al., 2019). The author formulates the following question to define the transformation archetype that the organization is undertaking:

5. Which transformation archetype best describes Agile transformation in your organization?

- ☐ Step-wise. Multiple iterations of pilots and blueprint before fully committing to scaling up across a large part of the organization.
- ☐ All – in. Being convinced early on and fully commit up front to move the whole organization to an Agile model.
- ☐ Emergent. Judiciously building Agile capabilities through a bottom-up approach.

Reginaldo and Santos (2020) stated that the stages of the Agile transformation are very dependent on the context of each company. In particular, Reginaldo and Santos (2020) studied the challenges that companies from software and financial industries face while undergoing Agile transformation. The study Reginaldo and Santos (2020) confirmed the high co-occurrence rate of challenges between different *Organization's Business Area* or *Industries*. The study demonstrated that the Agile transformation roadmaps depend heavily on the environment, in which the company operates, and generally need to be adapted to a specific industry (Reginaldo & Santos, 2020). Such challenges are enhanced by actions and influences that take place outside the context of the organization, and the entire communication and relationship network end up generating, or enhancing, the challenges that hinder the adoption of agile practices (Reginaldo & Santos, 2020). The author of this dissertation, therefore, includes the following question about the industry in order to see the difference in Corporate Agility enhancement between organizations operating in various industries:

6. Which industry does the described organization belong to?

- ☐ Financial Services
- ☐ Insurance
- ☐ Information and Communication
- ☐ Public Administration
- ☐ Commerce
- ☐ Health Care
- ☐ Manufacturing
- ☐ Transport and Logistics
- ☐ Utilities
- ☐ Education
- ☐ Other Service

The following candidates for contingency factors are derived during the interviews and discussions with the practice partners. They address the experience of the respondents in Agile transformation, and the extent of change that the organization has achieved or plans to achieve.

7. How long is your personal experience with Agile transformation?

- ☐ 10+ years
- ☐ 6-10 years
- ☐ 3-5 years
- ☐ 1-2 years
- ☐ Less than a year

8. How much change do you think your organization has achieved in the past 5 years?

- ☐ 5 – revolutionary changes
- ☐ 4 – significant changes
- ☐ 3 – various changes across organizations
- ☐ 2 – minor changes
- ☐ 1 – little to no changes

4.2.4.3 Contextual Data Collection

The chapter at hand consists of the survey results, which describe the contextual data of the 125 participants. The figure below depicts the distribution of the participants within various industries. The financial industry, which incorporates banks and insurance companies, appeared to be the most represented industry with 53 unique respondents.

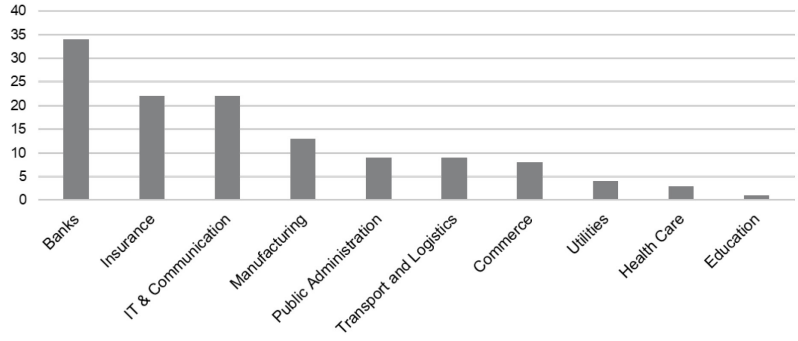


Figure 7: Number of representatives from different industries.

We can also see the extent to which the respondents are experienced in Agile transformation, as illustrated in the figure below. Such experience is cumulative and includes not only the number of years that the respondent worked in the current organization, but also the years of the relevant transformation experience from past career endeavors. Almost 20 respondents are considered experts in Agile transformation, reporting more than 10 years of practical involvement in Agile transformation. The second largest group is represented by more than 30 people and consists of professionals that dedicated between 6 to 10 years to transformation projects. The highest number of responses, namely 53, belongs to specialists with 3 to 5 years of transformation experience. The smallest group in the collected data set of 17 people is represented by employees having between 1 and 2 years of Agile transformation experience.

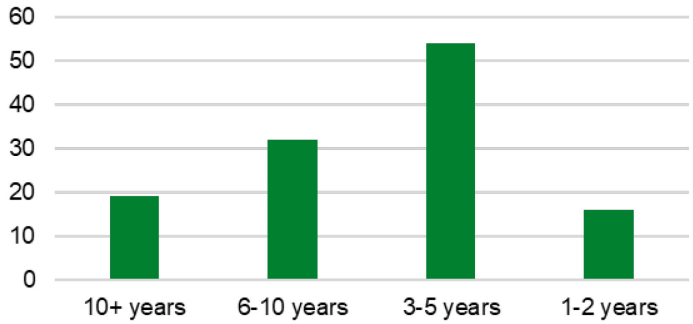


Figure 8: Personal experience with Agile transformation (in years).

As illustrated in the figure below, the data set is almost equally separated between respondents working in organizations with more than 1000 employees or more, named 'large', and those working in smaller organizations with less than 1000 employees, named 'small' for the purpose of further statistical analysis.

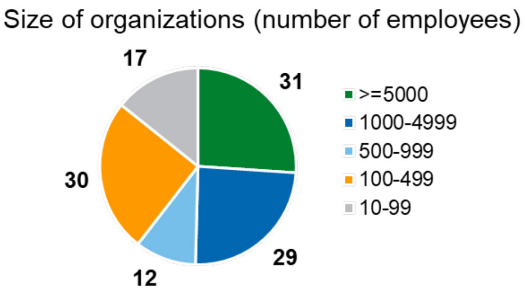


Figure 9: Number of organizations grouped according to their size (measured in number of employees).

The author has also differentiated between respondents representing various organizational levels, namely team members, project leaders (or head of divisions, project managers), and managing directors (or similar positions like C-level employees and members of the executive board committee). As illustrated below, the project managers and managing directors are almost equally represented in the collected data set. Since the group of team members

or ‘specialists’ is significantly underrepresented, the group is excluded from further statistical analysis.

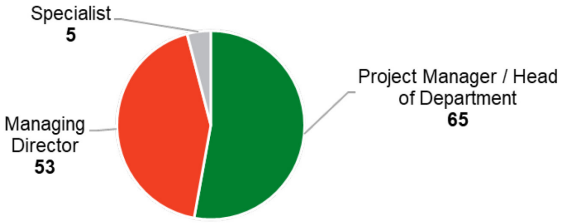


Figure 10: Number of respondents per organizational level

Following the differentiation between the organizational levels, the author compares the averaged values of Corporate Agility KPIs estimated by managing directors and project leaders. It is worth noting that managing directors declare higher values of Corporate Agility performance indicators in comparison to project leaders.

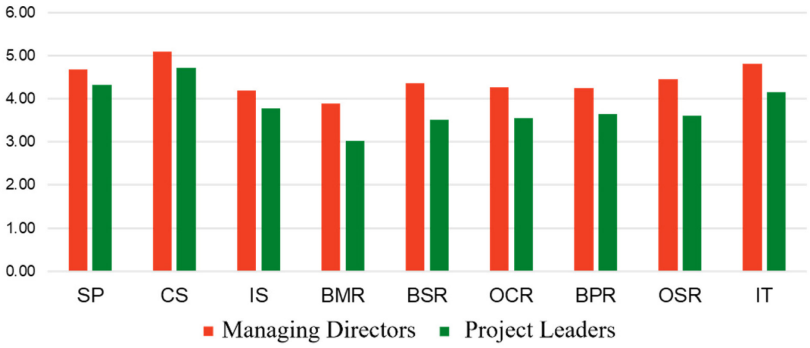


Figure 11: Corporate Agility KPIs (averaged values) represented by different organizational levels: Managing Directors and Project Leaders.

A similar situation can be observed when comparing the estimation of actual and desired states of Corporate Agility capabilities declared by managing directors (marked red) and project leaders (marked green). It is noticeable that for practically all capabilities, with only a few exceptions of capability 4.6 «Scaling lean and Agile practices» and capability 5.2 «Utilizing customer

data», managing directors ranked their current (as-is) levels of capabilities higher comparing to how project leaders viewed the respective capabilities. In addition, managing directors, in general, demonstrated more ambitious desired (to-be) levels of capability development. Such empirical evidence demonstrates different perceptions between project leaders and their managing directors, thus confirming the current state of the literature (Luthans & Sommer, 1999).

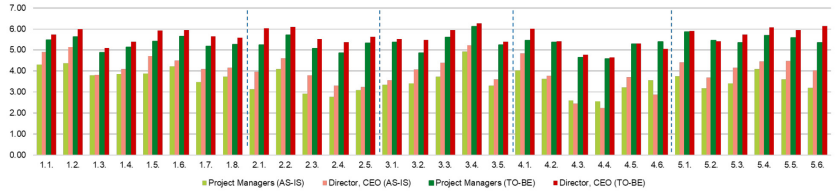


Figure 12: Comparison of the actual (AS-IS) and the desired (TO-BE) states of the capabilities.

4.2.4.4 Testing the Effect of the Contingency Candidates on the Corporate Agility Learning Journeys

The author applies an unpaired t-test statistical analysis to explore the presence of the effect of various contingency factors on the organizational learning journey. The aim of this test is not only to find out whether the effect is observable or not, but also to analyze whether the effect is stronger for certain Corporate Agility capabilities or not.

An independent-samples t test is conducted to compare the answers of respondents working in financial organizations and those working in non-financial organizations. Following McLeod (2019), the author accompanies the reporting of t-test results with the effect size in order to measure the sizes of differences between group means. Cohen suggested that d = 0.2 should be considered a 'small' effect size, 0.5 a 'medium' effect size and 0.8 a 'large' effect size (McLeod, 2019). Below are the tests results in which a statistically significant difference in the answers is recorded.

1) Financial and non-financial companies

Capability	Context group	Mean	SD	t	df	Sig. (2-tailed)	Cohen's d effect size
1.3. Testing new business ideas/models	Financial	5.16	1.621	2.457	117	0.015	0.456
	Non-financial	4.45	1.510				
2.3. Dynamic scalability enhancement	Financial	2.85	1.406	2.602	115	0.010	0.471
	Non-financial	3.62	1.791				
4.1. Purpose-driven leadership	Financial	4.04	1.328	2.053	116	0.042	0.381
	Non-financial	4.56	1.405				

Table 16: Statistically significant differences of CA capabilities between financial and non-financial organizations.

Such results demonstrate that the type of industry does have an effect on the challenge associated with testing new business ideas and models. Specifically, the results suggest that it is less challenging for financial organizations than for non-financial ones to develop extensive collaboration with start-ups to test new disruptive ideas. Non-financial organizations, therefore, demonstrate higher challenges with testing new technology or business models.

The author also observes the differences in evaluating the capability 2.3. 'Dynamic scalability enhancement', which is measured as the extent to which all organization's data and applications are hosted in the cloud. In this case, financial organizations demonstrate higher challenges to establish cloud-based data and applications hosting for all workloads comparing to non-financial organizations. It can also be assumed that non-financial organizations experience less challenges with establishing immediate access to IT infrastructure from public/private cloud services (e.g. XaaS).

The least significant difference between financial and non-financial companies is observed in evaluating the capability 4.1. Purpose-driven leadership, which measures the degree to which employees are motivated by the purpose. With this not a large difference, financial organizations demonstrate more

difficulties with creating a corporate mindset, in which employees demonstrate their unquenchable desire to win, sharing their determination to achieve goals.

Overall, the test results indicate that the differences in the responses between financial and non-financial organizations are positioned between the 'small' and 'medium' effect sizes. The capabilities with a 2-tailed significance lower than 0.05 are excluded from analysis.

2) Managing Directors and Project Leaders

Capability	Context group	Mean	SD	T	df	Sig. (2-tailed)	Cohen's d effect size
1.2. Predicting far-future changes	Managing Directors	5.13	1.456	2.657	113	0.009	0.498
	Project Leaders	4.38	1.560				
1.5. Striving for continuous improvement	Managing Directors	4.72	1.610	2.657	113	0.009	0.521
	Project Leaders	3.89	1.562				
1.6. Prioritizing innovation portfolio	Managing Directors	4.06	1.392	2.158	114	0.033	0.402
	Project Leaders	3.49	1.413				
2.1. Flexible IT architecture	Managing Directors	3.92	1.439	2.872	113	0.005	0.537
	Project Leaders	3.16	1.405				
2.2. Keeping IT infrastructure up-to-date	Managing Directors	4.63	1.284	2.213	113	0.029	0.415
	Project Leaders	4.08	1.383				
2.3. Dynamic scalability enhancement	Managing Directors	3.74	1.788	2.529	110	0.013	0.479
	Project Leaders	2.95	1.502				

Capability	Context group	Mean	SD	T	df	Sig. (2-tailed)	Cohen's d effect size
3.2. Failure-tolerant mindset	Managing Directors	5.00	1.414	2.226	110	0.028	0.422
	Project Leaders	4.41	1.383				
3.3. Knowledge sharing	Managing Directors	4.41	1.458	2.509	111	0.014	0.474
	Project Leaders	3.71	1.497				
4.1. Purpose-driven leadership	Managing Directors	4.82	1.519	3.083	90	0.003	0.6
	Project Leaders	4.03	1.130				
4.5. Scaling lean and Agile practices	Managing Directors	2.91	1.491	-2.208	100	0.030	0.441
	Project Leaders	3.55	1.429				
5.1. Consolidating customer data	Managing Directors	4.43	1.291	2.464	105	0.015	0.478
	Project Leaders	3.79	1.361				
5.2. Customer engagement	Managing Directors	4.12	1.728	2.186	98	0.031	0.443
	Project Leaders	3.41	1.487				
5.4. Continuous software deployment	Managing Directors	4.43	1.642	2.250	86	0.027	0.486
	Project Leaders	3.65	1.598				
5.5. Rapid scaling from prototype to product launch	Managing Directors	4.00	1.447	2.954	96	0.004	0.6
	Project Leaders	3.22	1.160				

Table 17: Statistically significant differences of CA capabilities between managing directors and project leaders.

Comparing the assessment of Corporate Agility capabilities between managing directors and project managers defined significant differences in quite a few capabilities. It is worth paying attention to the capabilities, whose effect size exceeds 0.5 (highlighted green) and which are, therefore, considered to have a 'medium' effect size according to McLeod (2019).

The capability 1.5. 'Striving for continuous improvement' is measured as an extent to which change initiatives are promoted by top management. According to the test results, managing directors expressed less challenges in achieving such capability in comparison to project leaders. In the exemplary organizations that demonstrate a high level of the development of this capability, top management calls for absolute commitment for change initiatives and highly prioritizes these initiatives in the Corporate Strategy. The responses of project leaders can, therefore, be interpreted as if the top management in their organizations is more hesitant to implement organizational changes.

Another significant difference is observable with the capability 2.1. 'Flexible IT architecture', which measures the extent to which IT infrastructure is modular and can be easily modified. In this case project leaders again demonstrate the achievement of this capability to be a higher challenge. The IT system components are tightly coupled, and the modifications tend to be painful or not possible. The perception of managing directors, however, is that the organization's IT system has a higher level of modularity.

The capability 4.1. 'Purpose-driven leadership' is yet another one that has a size effect more than 0.5. The responses of project leaders show that their companies are struggling significantly more with making their employees to have a victory mindset with a strong determination to achieve goals. Managing directors, on the other hand, demonstrate a lower challenge in achieving this goal.

The last capability that demonstrated a medium effect size is capability 5.5. 'Rapid scaling from prototype to product launch', which measures the speed of moving from the prototype to market launch. Managing directors perceive

the achievement of this capability to be less of a struggle in comparison to project leaders. The latter ones express a high level of challenge associated with introducing products/services early enough to catch a market window before competitors, implying that a product launch could be late, and it takes a significant amount of time until a final version is introduced to the market.

3) Run-the-business and change-the-business

Capability	Context group	Mean	SD	t	df	Sig. (2-tailed)	Cohen's d effect size
1.1. Continuous revising of Corporate Strategy	Run business	5.39	1.407	2.287	105	0.024	0.487
	Change business	4.62	1.641				
1.4. Integrating new business ideas/models into organization	Run business	4.84	1.551	2.146	105	0.034	0.457
	Change business	4.08	1.712				
1.6. Prioritizing innovation portfolio	Run business	4.77	1.309	3.370	105	0.001	0.718
	Change business	3.72	1.520				
2.1. Flexible IT architecture	Run business	4.26	1.483	3.668	105	0.000	0.782
	Change business	3.16	1.376				
2.3. Dynamic scalability enhancement	Run business	4.03	1.683	3.382	105	0.001	0.721
	Change business	2.89	1.538				
2.4. Building customer-experience APIs at scale	Run business	3.35	1.561	-2.123	105	0.036	0.452
	Change business	3.99	1.336				

Capability	Context group	Mean	SD	t	df	Sig. (2-tailed)	Cohen's d effect size
3.1. Fostering future-driven skills and competences	Run business	4.29	1.321	2.734	105	0.007	0.583
	Change business	3.47	1.446				
4.4. Delegating tasks to self-organized teams	Run business	4.00	1.693	2.049	105	0.043	0.437
	Change business	3.31	1.534				
4.5. Scaling lean and Agile practices	Run business	4.45	1.434	3.662	105	0.000	0.78
	Change business	3.28	1.519				
5.2. Customer engagement	Run business	4.61	1.283	3.007	73	0.004	0.571
	Change business	3.71	1.692				

Table 18: Statistically significant differences of CA capabilities between respondents having 'run-the-business' and 'change-the-business' perspectives

The scopes of job responsibilities proved to be significant to impact the assessment of Corporate Agility capabilities. Four capabilities demonstrated a size effect with a magnitude close to 'large' (0.8).

The capability 1.6. 'Prioritizing innovation portfolio' is measured as the degree to which the value of the innovation project portfolio is optimized. The results demonstrate a significant difference in two respondents' perspectives, namely 'running-the-business' and 'changing-the-business'. Those with a 'running-the-business' perspective find it less challenging to make the investments optimally balanced with risk, rewards (e.g., EBIT) and 'newness' of products/technologies. Respondents with a 'changing-the-business' perspective, on the other hand, find it more difficult. The organizations struggling to achieve this capability usually describe their portfolio as poorly optimized resulting in strategically important innovation projects being suppressed.

The effect size of the capability 2.1. 'Flexible IT architecture' is very close to 'large', meaning that there is a large difference in how respondents with 'running-the-business' and 'changing-the-business' evaluate this capability. Similar to the previous example, respondents with a 'changing-the-business' perspective perceive the achievement of this capability as a much more challenging task than respondents with a 'running-the-business' perspective.

The capability 2.3. 'Dynamic scalability enhancement' is measured as the extent to which all data and applications are hosted in the cloud. This capability is yet another example of how respondents with a 'running-the-business' perspective find it much easier to host all data and applications for all workload in the cloud, assuring the immediate access to IT infrastructure from public/private cloud services (e.g. XaaS). The same tendency is applicable to the capability 4.5. 'Scaling lean and Agile practices', which is measured as the degree to which an organization has integrated lean and Agile practices (e.g., SAFe, LeSS, DAD, Nexus, etc.). Respondents with a 'change-the-business' perspective find it more challenging to scale a fully-adopted enterprise-wide framework that connects all layers of an organization in an Agile manner.

4) Large and Small organizations

Capability	Context group	Mean	SD	t	df	Sig. (2-tailed)	Cohen's d effect size
1.3. Testing new business ideas/models	Large	5.24	1.405	2.892	112	0.005	0.542
	Small	4.43	1.595				
1.4. Integrating new business ideas/models into organization	Large	4.04	1.662	-2.070	112	0.041	0.388
	Small	4.66	1.542				
2.4. Building customer-experience APIs at scale	Large	4.04	1.398	2.656	112	0.009	0.497
	Small	3.33	1.467				

Capability	Context group	Mean	SD	t	df	Sig. (2-tailed)	Cohen's d effect size
3.1. Fostering future-driven skills and competences	Large	3.51	1.362	-2.981	112	0.004	0.558
	Small	4.28	1.413				
3.5. Constantly evolving organizational structure	Large	3.26	1.482	-4.247	112	0.000	0.795
	Small	4.40	1.387				
4.3. Defining and measuring Corporate Agility performance (KPIs)	Large	3.62	1.467	2.010	112	0.047	0.376
	Small	3.11	1.212				

Table 19: Statistically significant differences of CA capabilities between respondents working in 'large' and 'small' organizations.

The results demonstrate that respondents working in large organizations find it less challenging to achieve the capability 1.3. 'Testing new business ideas/models' comparing to those working in smaller organizations. On the other hand, respondents from large organizations find it more challenging to achieve the capability 3.1. 'Fostering future-driven skills and competences', which is measured as the degree to which personnel's skills and competences are developed based on far-future requirements. The respondents from smaller organizations, therefore, find it easier to actively improve personnel's capabilities based on future scenarios and predicted demand of certain skills and competences. Respondents working in small organizations also find it easier to develop the capability 3.5. 'Constantly evolving organizational structure', assuring the flexibility of the organizational structure and governance.

5) Enterprise-wide and Cross-X scope of job responsibility

Capability	Context group	Mean	SD	t	df	Sig. (2-tailed)	Cohen's d effect size
1.4. Integrating new business ideas/models into organization	Enterprise-wide	4.00	1.717	-2.312	105	0.023	0.449
	Cross-X	4.73	1.538				
1.7. Integrating into business Ecosystem	Enterprise-wide	3.97	1.270	-3.474	105	0.001	0.674
	Cross-X	4.82	1.253				
2.4. Building customer-experience APIs at scale	Enterprise-wide	3.10	1.507	-2.946	105	0.004	0.572
	Cross-X	3.94	1.405				
3.5. Constantly evolving organizational structure	Enterprise-wide	4.48	1.466	3.895	105	0.000	0.756
	Cross-X	3.41	1.368				

Table 20: Statistically significant differences of CA capabilities between respondents with 'Enterprise-wide' and 'Cross-X' scope of job responsibility

The three capabilities listed in the table above demonstrate statistically significant differences in how respondents that have different scopes of job responsibilities evaluate Corporate Agility capabilities. In particular, the respondents with an enterprise-wide scope find it more challenging to achieve the capability 1.7. 'Integrating into business Ecosystem', which is measured as the degree of integration with other partners in the business ecosystem. On the contrary, those having cross-functional, cross-unit or cross-market (Cross-X) perspectives find it less challenging to achieve a full integration with partners in the business ecosystem.

Respondents with an enterprise-wide perspective also demonstrate find achieving the capability 2.4. 'Building customer-experience APIs at scale' more challenging, which is measured as the prevalence of services provided through customer-facing APIs. Respondents with Cross-X perspectives,

therefore, demonstrate less challenge to cover all customer journeys with customer-facing APIs.

On the other hand, the respondents with a Cross-X perspective find it more difficult to develop the capability 3.5. ‘Constantly evolving organizational structure’, thus demonstrating it to be a challenge to replace the traditional hierarchy with an Agile organizational model that constantly evolves through formation of ‘Squads’, ‘Chapters’, and 'Tribes'. For respondents with an enterprise-wide perspective, assuring the flexibility of organizational structure and governance seems to be less challenging.

6) Emergent and Step-wise transformation archetype

Capability	Context group	Mean	SD	t	df	Sig. (2-tailed)	Cohen’s d effect size
3.2. Failure-tolerant mindset	Emergent	4.50	1.420	2.362	96	0.020	0.501
	Step-wise	3.77	1.488				
3.4. Virtual collaboration	Emergent	5.24	1.539	3.556	96	0.001	0.755
	Step-wise	4.06	1.562				
3.5. Constantly evolving organizational structure	Emergent	4.53	1.581	3.684	96	0.000	0.782
	Step-wise	3.39	1.387				
5.4. Continuous software deployment	Emergent	3.53	1.482	-2.137	96	0.035	0.454
	Step-wise	4.27	1.693				

Table 21: Statistically significant differences of CA capabilities between organizations with 'Emergent' and 'Step-wise' transformation archetypes.

Considering the impact that the organization’s transformation archetype may have on the assessment of Corporate Agility capabilities, the author hereby demonstrates some of the examples of statistically significant differences between organizations with ‘emergent’ (*judiciously building Agile capabilities through a bottom-up approach*) and ‘step-wise’ (*multiple iterations of pilots and blueprint before fully committing to scaling up across a large part of the*

organization) transformation archetypes. The capability 3.2. ‘Failure-tolerant mindset’ has a ‘medium’ effect size demonstrating the differences between the responses. In particular, the author observes a higher challenge for organizations with a ‘step-wise’ archetype to establish the necessary tolerance for failure and to nurture innovation regardless of unsatisfactory progress.

In regards to the capability 3.4. ‘Virtual collaboration’, which is measured as the extent to which employees are using virtual collaborative ways of working, the author observes a significantly higher challenge in achieving it for organizations with a ‘step-wise’ transformation archetype with the effect size close to ‘large’. It is, therefore, easier for organizations with an ‘emergent’ transformation archetype to widely implement virtual collaborative ways of working throughout the organization.

The differences between responses reflecting the development of the capability 3.5. ‘Constantly evolving organizational structure’ demonstrate an effect size close to ‘large’. Thus, the organizations with a ‘step-wise’ transformation archetype express significantly more challenges in replacing the traditional hierarchy with an Agile organizational model that constantly evolves through formation of ‘Squads’, ‘Chapters’, and 'Tribes'.

7) Expert-level and moderate experience of Agile transformation

Capability	Context group	Mean	SD	t	df	Sig. (2-tailed)	Cohen's d effect size
1.6. Prioritizing innovation portfolio	Moderate	4.86	1.144	4.354	82	0.000	0.859
	Expert	3.66	1.673				
2.3. Dynamic scalability enhancement	Moderate	3.28	1.516	-2.869	113	0.005	0.54
	Expert	4.14	1.702				
3.2. Failure-tolerant mindset	Moderate	4.69	1.198	4.167	83	0.000	0.821
	Expert	3.50	1.729				

Table 22: Statistically significant differences of CA capabilities between respondents with 'expert'-level and 'moderate' experience of Agile transformation.

After analyzing the responses of people with different Agile transformation experiences, the author observes a series of capabilities that demonstrate 'large' statistical differences between the answers of experts and those with moderate knowledge of Agile transformation. Namely, the capability 1.6. 'Prioritizing innovation portfolio' demonstrates a large effect site of 0.859, indicating the large difference of how the value of the innovation project portfolio is optimized in organizations. The responses of people with an expert level of Agile transformation indicate a significantly higher challenge associated with balancing the investments with risk, rewards (e.g., EBIT) and 'newness' of product/technology, comparing to those having moderate experience with Agile transformation. The latter ones, on the other hand, demonstrate much less challenges in achieving the capability 3.2. 'Failure-tolerant mindset', with a 'large' effect size of 0.821.

In addition, there is a statistically significant difference between the responses regarding the capability 2.3. 'Dynamic scalability enhancement'. Experts in Agile transformation demonstrate less challenge with achieving it, comparing to respondents with moderate experience of Agile transformation.

8) Minor and revolutionary organizational changes

Capability	Context group	Mean	SD	t	df	Sig. (2-tailed)	Cohen's d effect size
1.1. Continuous revising of Corporate Strategy	Minor	4.26	1.592	-2.160	110	0.033	0.408
	Significant	4.90	1.530				
1.2. Predicting far-future changes	Minor	4.22	1.475	-3.333	110	0.001	0.63
	Significant	5.14	1.432				
1.3. Testing new business ideas/models	Minor	4.44	1.538	-2.552	110	0.012	0.483
	Significant	5.19	1.550				
1.5. Striving for continuous improvement	Minor	3.72	1.595	-3.140	110	0.002	0.594
	Significant	4.67	1.605				
1.7. Integrating into business Ecosystem	Minor	3.50	1.225	-3.153	110	0.002	0.596
	Significant	4.24	1.261				
2.2. Keeping IT infrastructure up-to-date	Minor	4.02	1.511	-2.474	100	0.015	0.472
	Significant	4.66	1.178				
2.4. Building customer-experience APIs at scale	Minor	3.89	1.436	2.527	110	0.013	0.478
	Significant	3.24	1.275				
2.5. Integrating Big Data analytics with BI systems	Minor	2.83	1.194	-2.467	110	0.015	0.476
	Significant	3.47	1.489				

Capability	Context group	Mean	SD	t	df	Sig. (2-tailed)	Cohen's d effect size
3.3. Knowledge sharing	Minor	3.69	1.357	-2.368	110	0.020	0.448
	Significant	4.34	1.573				
3.5. Constantly evolving organizational structure	Minor	3.06	1.379	-2.597	110	0.011	0.491
	Significant	3.76	1.479				
4.1. Purpose-driven leadership	Minor	4.09	1.350	-2.030	110	0.045	0.384
	Significant	4.62	1.400				
4.3. Defining and measuring Corporate Agility performance (KPIs)	Minor	4.09	1.154	2.460	110	0.015	0.465
	Significant	3.48	1.442				
4.4. Delegating tasks to self-organized teams	Minor	3.02	1.560	-3.289	110	0.001	0.622
	Significant	3.95	1.432				
4.5. Scaling lean and Agile practices	Minor	2.89	1.223	-3.621	110	0.000	0.685
	Significant	3.86	1.583				
5.3. Iterative software development	Minor	3.70	1.550	-3.318	110	0.001	0.627
	Significant	4.69	1.592				

Table 23: Statistically significant differences of CA capabilities between organizations that underwent minor and revolutionary organizational changes.

The contingency factor analyzed in this chapter reflects the extent of change that the organizations underwent in the last 5 years. Being further ahead in the process in Agile transformation, the organizations with richer experience of

Agile transformation are assumed to have different perspectives on developing the Corporate Agility capabilities. Below are some of the examples of the capabilities, the evaluation of which demonstrate statistically different perspectives between the respondents working in organizations with minor and significant organizational changes.

With the size effect of 0.685, the development of the capability 4.5. 'Scaling lean and Agile practices' is an example of where the respondents with minor organizational change demonstrate higher challenges, comparing to organizations with significant Agile transformation experience. A similar tendency is observable with capabilities 4.4. 'Delegating tasks to self-organized teams' and 5.3. 'Iterative software development', which the respondents from organizations with significant records of organizational changes find easier to develop.

In case of the capabilities 1.2. 'Predicting far-future changes', 1.5. 'Striving for continuous improvement', and 1.7. 'Integrating into business Ecosystem', respondents working in the organizations that already underwent significant changes demonstrate less challenge to develop them.

4.2.4.5 Situated Corporate Agility Maturity Model for Financial Industry

After investigating which context factors have an influence on the learning journey, the author aims to design a situated Corporate Agility Maturity Model. Since there is no sufficient empirical data that can justify the creation of valid situated Corporate Agility Maturity Models for each of the context factors, the author analyzes contingency-related sub-sets of data that are sufficient enough to fully design a situated Corporate Agility Maturity Model. The best candidate for designing a fully validated situated Corporate Agility Maturity Model appeared to be the industry-related context factor. The author, therefore, focuses on developing Corporate Agility Maturity Models for banks and insurance companies (i.e. for the financial industry).

The choice to situate Corporate Agility Maturity Model to a financial industry comes from two key considerations. Raber et al. (2013a) in their work stated

the necessity to further analyze the difference between the situational maturity models configured to different industries. The authors in that work divided the initial empirical data set into ‘service’ and ‘non-service’ companies (Raber et al., 2013a). To further crystallize this industrial distinction and to make an attempt to contribute to the body of knowledge related to situativity, the author, therefore, sets the objective to investigate the difference between ‘financial’ and ‘general’ Corporate Agility Maturity Models. Secondly, the financial sector, which constitutes banks and insurance companies in the current dissertation project, is the most represented context-related data sub-set with 53 unique respondents in total. This number of respondents is considered statistically sufficient to populate the model using the Rasch algorithm and, therefore, fully justifies the development purpose.

The situated Corporate Agility Maturity Model is developed by taking the sub-set of data representing the financial organizations only. Raber et al. (2012) in their work followed Linacre and Wright (1998) and applied the BIGSTEPS software version 2.82 in order to obtain a Rasch item calibration for the maturity model. Important output statistics are the measure of difficulty and a set of standardized fit statistics (infit and outfit) for each item (Raber et al., 2012). Values of both fit statistics are expected to be close to one, and the data is considered productive for measurement when infit and outfit are between 0.5 and 1.5. A minimum of 90% of infit and outfit values are considered productive for measurement. Raber et al. (2012) further stated that if the data set meets the quality criterion described in Dekleva and Drehmer (1997), then the data conforms to the model. The output of the Rasch algorithm is demonstrated below, where the capabilities are arranged into maturity clusters that are derived by the cluster analysis.

Logit	Error	Infit	Outfit	Maturity Level	Capability
0.77	0.14	1.09	1.26	5	2.4. Building customer-experience APIs at scale
0.57	0.13	0.82	0.8	5	4.4. Delegating tasks to self-organized teams
0.48	0.13	0.95	1	5	2.5. Integrating Big Data analytics with BI systems
0.41	0.12	1.16	1.16	5	2.1. Flexible IT architecture
0.38	0.13	1.19	1.22	5	4.3. Defining and measuring Corporate Agility performance (KPIs)
0.25	0.13	1.01	1.01	4	4.5. Scaling lean and Agile practices
0.24	0.12	0.98	0.95	4	3.1. Fostering future-driven skills and competences
0.23	0.13	0.97	0.93	4	5.5. Rapid scaling from prototype to product launch
0.18	0.12	0.87	0.86	4	4.2. Experienced leadership of Agile transformation
0.14	0.12	0.82	0.8	4	3.3. Knowledge sharing
0.09	0.13	1.18	1.2	4	5.2. Customer engagement
0.02	0.12	1.01	1.01	3	2.3. Dynamic scalability enhancement
0.01	0.12	0.63	0.64	3	1.6. Prioritizing innovation portfolio
0.01	0.13	1.11	1.08	3	5.4. Continuous software deployment
-0.03	0.12	0.92	1.08	3	1.7. Integrating into business Ecosystem
-0.12	0.12	1.2	1.16	3	1.5. Striving for continuous improvement
-0.13	0.12	0.74	0.73	3	4.1. Purpose-driven leadership
-0.19	0.12	0.66	0.65	2	5.1. Consolidating customer data
-0.23	0.12	1.11	1.1	2	1.4. Integrating new business ideas/models into organization
-0.24	0.12	0.87	0.84	2	2.2. Keeping IT infrastructure up-to-date
-0.28	0.12	1	1.01	2	3.5. Constantly evolving organizational structure

Logit	Error	Infit	Outfit	Maturity Level	Capability
-0.29	0.12	1.3	1.27	2	1.3. Testing new business ideas/models
-0.3	0.12	1.14	1.14	2	1.1. Continuous revising of Corporate Strategy
-0.4	0.12	1.01	0.98	1	5.3. Iterative software development
-0.4	0.12	0.88	0.89	1	3.2. Failure-tolerant mindset
-0.47	0.12	0.88	0.85	1	1.2. Predicting far-future changes
-0.69	0.12	1.31	1.33	1	3.4. Virtual collaboration

Table 24: Infit and Outfit statistics, Rasch analysis of CA capabilities for Financial industry

After ordering the capabilities according to the level of difficulty and clustering them into the respective levels of maturity, the author designs the situated Corporate Agility Maturity Model customized specifically for the financial industry, including banks and insurers.

	Level 1	Level 2	Level 3	Level 4	Level 5
1. INNOVATION-DRIVEN CORPORATE STRATEGY	1.2. Predicting far-future changes	1.1. Continuous revising of Corporate Strategy 1.3. Testing new business ideas/models 1.4. Integrating new business ideas/models into organization	1.5. Striving for continuous improvement 1.6. Prioritizing innovation portfolio 1.7. Integrating into business Ecosystem		
2. INFORMATION TECHNOLOGY		2.2. Keeping IT infrastructure up-to-date	2.3. Dynamic scalability enhancement		2.1. Flexible IT architecture 2.4. Building customer-experience APIs at scale 2.5. Integrating Big Data analytics with BI systems
3. HUMAN RESOURCES AND ORGANIZATIONAL STRUCTURE	3.2. Failure-tolerant mindset 3.4. Virtual collaboration	3.5. Constantly evolving organizational structure		3.1. Fostering future-driven skills and competences 3.3. Knowledge sharing	
4. LEADERSHIP / TOP MANAGEMENT			4.1. Purpose-driven leadership	4.2. Experienced leadership of Agile Transformation 4.5. Scaling lean and agile practices	4.3. Defining and measuring Corporate Agility performance (KPIs) 4.4. Delegating tasks to self-organized teams
5. CUSTOMER-CENTERED PRODUCT DEVELOPMENT	5.3. Iterative software development	5.1. Consolidating customer data	5.4. Continuous software deployment	5.2. Customer engagement 5.5. Rapid scaling from prototype to product launch	

Figure 13: Corporate Agility Maturity Model customized for Financial industry (i.e. Banks and Insurers)

After validating the financial Corporate Agility Maturity Model, which is situated to the banks and insurers to reflect upon their individual learning journey (see Chapter 4.3), the author aims to analyze the general and situated Corporate Agility Maturity Models in detail. Specifically, the objective is to understand the differences between the allocation of the capabilities throughout the maturity clusters by following Raber et al. (2013a). Below are the results of applying the Rasch algorithm for the general and situated (financial) Corporate Agility Maturity Models ordered by measure (M-f) of financial Corporate Agility Maturity Model. The table also includes the respective maturity level for each item ('L-g' for general and 'L-f' for financial model) derived from the subsequent cluster analysis as well as the maturity concept (dimension) to which the item belongs.

Capability	M-f	M-g	L-f	L-g
2.4. Building customer-experience APIs at scale	0.77	-0.05	3	5
4.4. Delegating tasks to self-organized teams	0.57	0.38	5	5
2.5. Integrating Big Data analytics with BI systems	0.48	0.58	5	5
2.1. Flexible IT architecture	0.41	0.32	5	5
4.3. Defining and measuring Corporate Agility performance (KPIs)	0.38	0.38	5	5
4.5. Scaling lean and Agile practices	0.25	0.46	5	4
3.1. Fostering future-driven skills and competences	0.24	0.4	5	4
5.5. Rapid scaling from prototype to product launch	0.23	0.28	5	4
4.2. Experienced leadership of Agile transformation	0.18	0.17	4	4
3.3. Knowledge sharing	0.14	-0.01	3	4
5.2. Customer engagement	0.09	0.17	4	4
2.3. Dynamic scalability enhancement	0.02	0.48	5	3
1.6. Prioritizing innovation portfolio	0.01	0.13	4	3
5.4. Continuous software deployment	0.01	-0.04	3	3
1.7. Integrating into business Ecosystem	-0.03	0.02	3	3

Capability	M-f	M-g	L-f	L-g
1.5. Striving for continuous improvement	-0.12	-0.21	2	3
4.1. Purpose-driven leadership	-0.13	-0.28	2	3
5.1. Consolidating customer data	-0.19	-0.11	3	2
1.4. Integrating new business ideas/models into organization	-0.23	-0.01	3	2
2.2. Keeping IT infrastructure up-to-date	-0.24	-0.28	2	2
3.5. Constantly evolving organizational structure	-0.28	0.39	5	2
1.3. Testing new business ideas/models	-0.29	-0.63	1	2
1.1. Continuous revising of Corporate Strategy	-0.3	-0.45	1	2
5.3. Iterative software development	-0.4	-0.26	2	1
3.2. Failure-tolerant mindset	-0.4	-0.48	1	1
1.2. Predicting far-future changes	-0.47	-0.53	1	1
3.4. Virtual collaboration	-0.69	-0.8	1	1

Table 25: Comparing the results between General and Financial CA Maturity Models

Certain capabilities are positioned differently within the maturity levels. The example of such a difference between the maturity models is the capability 2.4. *'Building customer-experience APIs at scale'*. For the financial organizations this capability is positioned at the highest maturity cluster 5, which indicates the level of challenge for banks and insurers associated with achieving such capability. For all the companies in general this capability is, however, positioned on the maturity level 3, demonstrating that in general the organizations are closer to their desired level of this capability and, therefore, the capability is considered less challenging to achieve when compared to financial organizations. One of the reasons that could explain the extra challenges for banks and insurers to build customer-experience APIs at scale could be the necessity to manage customers' authorization and consent. As the practice partners noted during the workshops and individual interviews, the growing prevalence of services that are now provided to customers through customer-facing APIs forces the financial organizations to share their customer data with other financial institutions. Such a move will require the banks to

develop secure APIs and receive the authorization and consent from the customers to share their data with third parties. Considering the growing importance of privacy and data security, the banks are, therefore, experiencing extra challenges with scaling customer-experience APIs comparing to other companies in general. According to Chuard (2021), the European Union's Open Banking approach is focused on regulation in the form of PSD2. However, while this dictates that banks must create the APIs to interact with third parties, there is no specific guidance on how to do it. As a result, the EU member states have further to go and Open Banking has run into challenges across EU borders (Chuard, 2021). Another reason for the capability to be among the most challenging ones (level 5) could be the fact that Open Banking allows the customers to connect various banking accounts into an aggregated one through an open banking API. This will inevitably increase the competition among the financial service providers.

The capability 3.5. '*Constantly evolving organizational structure*' is an example of the opposite situation, where the majority of the financial organizations are closer to their desired state than other organizations in general. This can be observed by the positioning of the capability at maturity level 3 in the financial Corporate Agility Maturity Model, and maturity level 5 in the General Corporate Agility Maturity Model. The capability is measured as the extent to which the organization is able to replace the traditional hierarchy with an Agile organizational model. Financial organizations, therefore, are closer to this goal by establishing an Agile working structure through 'squads', 'chapters', 'tribes' and other cross-organizational formations.

To further illustrate the differences between the general and financial maturity models, the author provides a graphical representation in a regular view of the maturity models. This visualization helps to better comprehend the differences in the learning journey that organizations from various industries go through.

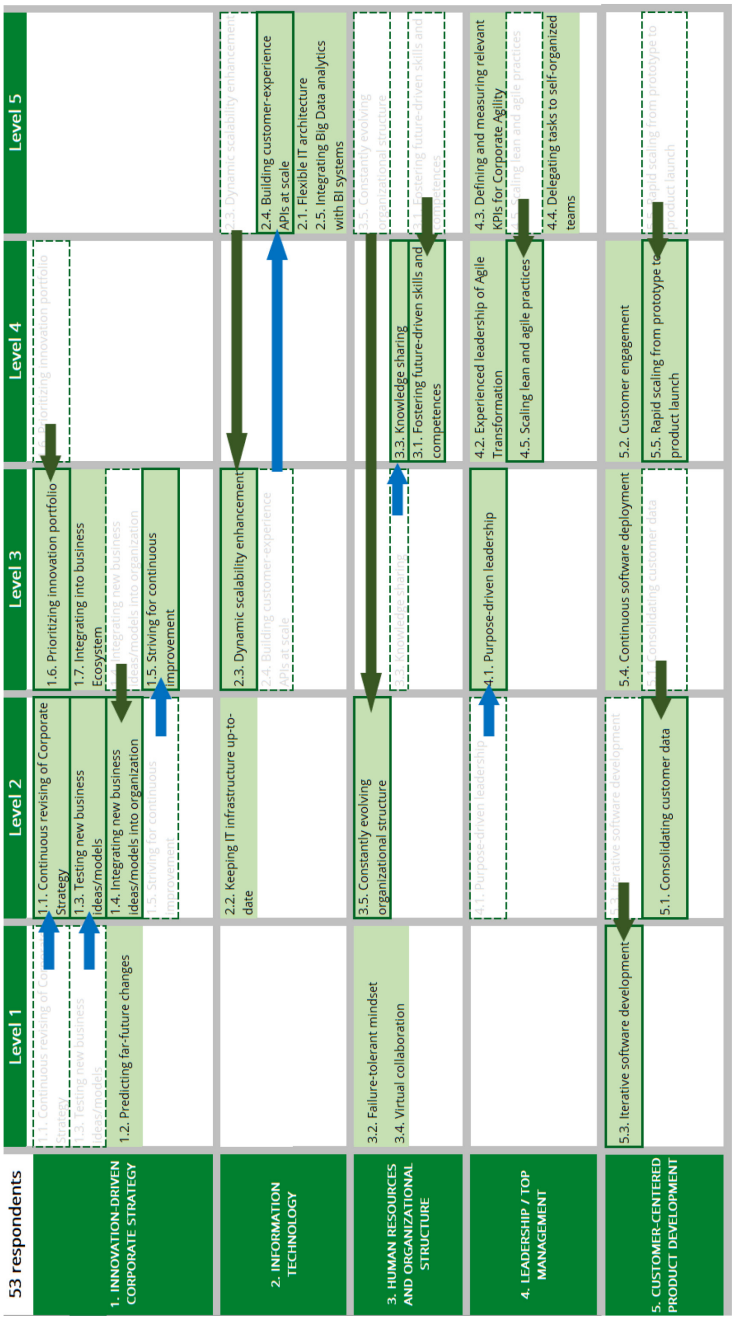


Figure 14: Graphical representation of the differences between CA Maturity Model for Financial industry and the General CA MM.

On *maturity level 1* financial organizations are only concerned with the sensing aspect of the innovation-driven corporate strategy, failure-tolerant mindset, virtual collaboration, and iterative software development. However, it is more challenging for the banks and insurers than for other organizations to re-formulate the corporate strategy on a more frequent basis, which also affects the organizations' capability to seek for a potentially innovative business model that could be implemented throughout the organization or introduced as a spin-off. Such capabilities are positioned on the maturity level 2 of the situated Corporate Agility Maturity Model. On the same *maturity level 2* the financial organizations are also focused on being able to integrate new business ideas into the organization and to consolidate customer data, which is considered more challenging to achieve for non-financial organizations. With a similar focus on IT dimension, both maturity models demonstrate the necessity to be able to modernize their IT infrastructure. The purpose-driven leadership and the continuous organizational improvements seem to cause more challenges for the financial organizations comparing to other companies in different industries. These capabilities are, therefore, positioned on the *maturity level 3* of the situated Corporate Agility Maturity Model. On the level 3 the general and situated maturity models depict the most significant differences. While it is less challenging for the financial organizations to achieve a dynamic scalability enhancement (capability 2.3) and to prioritize innovation portfolios (capability 1.6), non-financial organizations experience less challenge in building the customer-experience APIs at scale (capability 2.4) and to transparently share the knowledge (capability 3.3). At *maturity level 4* neither situated, nor the general Corporate Agility Maturity Model has any IT-related capabilities to develop. Financial organizations, however, demonstrate less challenges in fostering future-driven skills and competences (capability 3.1), scaling lean and Agile practices (capability 4.5) along with rapid scaling from prototype to product launch (capability 5.5). The level of challenge to establish an experienced leadership in Agile transformation is equal for financial and non-financial organizations. At the *maturity level 5* financial organizations are less concerned with the initiatives related to HR & organizational structure (dimension 3), innovation-driven corporate strategy

(dimension 1), and customer-centered product development (dimension 5), while their main focus is concentrated on IT (dimension 2) and leadership & top management (dimension 4). At maturity level 5 the non-financial organizations, on the other hand, are mainly aiming to achieve constantly evolving organizational structure (capability 3.5), fostering future-driven skills and competences (capability 3.1), and rapidly scaling from prototype to product launch (capability 5.5).

4.2.4.6 Exploring the Potential Variances of the learning journeys

After the author explored the presence of the effects of various contingency factors on the organizational learning journeys, it is possible to conclude which context factors do have an effect on Corporate Agility capabilities. To get a more profound understanding on how the focus on the Corporate Agility capabilities shifts throughout the learning process, the author aims to investigate the extent to which the contingency factors, which demonstrate the statistically significant effect on the Corporate Agility capabilities, make an influence on the relationship between the Corporate Agility capabilities and Corporate Agility performance indicators.

It is important to note that the respondents evaluated the Corporate Agility capabilities and performance indicators separately and did not directly report about the relationship between the Corporate Agility capabilities and Corporate Agility performance indicators. The author, therefore, applies the statistical approach to define the moderating interaction effect of various context factors on the relationship between the Corporate Agility capabilities and the Corporate Agility performance indicators. Such an explorative analysis allows to better understand the various stakeholders' perspectives on Corporate Agility capabilities and performance indicators and derive certain hypothesis on the views of various stakeholder groups on Corporate Agility maturity enhancement in general, which impacts the communication and implementation strategy. The investigation of the relationship between the Corporate Agility capabilities and performance indicators can also be considered as the first step to build more trust into the potential situated

maturity models, which can be built considering more empirical data is collected during the future research.

To compare the perceptions of the respondents, the author divides the initial data set into two respective categories. At the next step, the multivariate linear regression is applied individually to each of the data sets as a part of a simple slope analysis. All the *β slopes* derived from the initial data sets are positive, which is in line with the working assumption of the effect model described earlier (see Chapter 4.2.1.6), according to which with the enhancement of Corporate Agility capabilities the Corporate Agility performance indicators should also demonstrate the improvement. Lastly, the difference between the β slopes for each of the capability is calculated to indicate the difference in perceptions of the respective categories. The color-coding is used not only to improve the visual understanding, but also to demonstrate the magnitude of the differences. The values colored dark red indicate the insignificant differences, while the values colored dark green indicate the significant ones. The author discusses the most significant β slope differences (e.g., above the cut-off point 0.3) to offer hypotheses on the underlying reasons to the perceptual differences. For certain positions marked as '*n/a*' it is not possible to derive the difference due to the lack of empirical data and statistical insignificance.

The model includes 27 Corporate Agility capabilities and 7 Corporate Agility performance indicators (KPIs). The initial number of capabilities is reduced from 30 capabilities to 27 as a result of developing the Corporate Agility effect model (see Chapter 4.2.1), in which 3 capabilities proved to be redundant and irrelevant for the development of Corporate Agility. The number of performance indicators is also reduced from 9 to 7 to include only the performance indicators that best represent the construct of Corporate Agility.

1) Managing Directors and Project Leaders Perceptions

The table below illustrates the perceptual differences of employees working at different organizational levels, namely Managing Directors and Project Leaders, towards the Corporate Agility capabilities and their effect on the Corporate Agility performance. The difference is calculated as Project

Leaders' β slope minus Managing Director's β slope. The negative value of the difference, therefore, indicates that the Project Leaders' slope is lower than the Managing Director's slope.

The analysis includes 50 unique responses representing Managing Directors, and 59 unique responses representing Project Leaders.

Number of responses: Managing Directors: **50** Project Leaders: **59** *All β slopes are significant at $p < 0.05$*		Strategic Prediction	Business Model Reconfiguration	Business Strategy reconfiguration	Organizational Capabilities reconfiguration	Business Process reconfiguration	Organizational Structure reconfiguration	IT Infrastructure reconfiguration
		SP	**BMR**	**BSR**	**OCR**	**BPR**	**OSR**	**IT**
1. INNOVATION-DRIVEN CORPORATE STRATEGY	1.1. Continuous revising of Corporate Strategy	0.08	n/a	n/a	n/a	n/a	n/a	n/a
	1.2. Predicting far-future changes	-0.001	n/a	-0.02	-0.012	n/a	n/a	-0.108
	1.3. Testing new business ideas/models	n/a	n/a	-0.01	0.068	n/a	n/a	n/a
	1.4. Integrating new business ideas/models into organization	0.009	0.002	0.05	0.017	-0.027	0.035	n/a
	1.5. Striving for continuous improvement	n/a	n/a	0.021	n/a	n/a	-0.066	n/a
	1.6. Prioritizing innovation portfolio	0.071	n/a	0.245	0.158	0.115	n/a	n/a
	1.7. Integrating into business Ecosystem	0.09	0.08	-0.051	-0.11	n/a	-0.131	n/a
2. INFORMATION TECHNOLOGY	2.1. Flexible IT architecture	n/a	0.322	n/a	0.15	-0.035	n/a	0.094
	2.2. Keeping IT infrastructure up-to-date	n/a	n/a	n/a	0.072	-0.049	n/a	0.106
	2.3. Dynamic scalability enhancement	n/a	-0.013	0.013	0.146	n/a	n/a	n/a
	2.4. Building customer-experience APIs at scale	-0.051	0.034	0.09	0.057	0.057	n/a	n/a
	2.5. Integrating Big Data analytics with BI systems	0.013	n/a	n/a	0.103	n/a	n/a	-0.03

Number of responses: Managing Directors: **50** Project Leaders: **59** *All β slopes are significant at $p < 0.05$*		Strategic Prediction	Business Model Reconfiguration	Business Strategy reconfiguration	Organizational Capabilities reconfiguration	Business Process reconfiguration	Organizational Structure reconfiguration	IT Infrastructure reconfiguration
		SP	**BMR**	**BSR**	**OCR**	**BPR**	**OSR**	**IT**
3.HUMAN RESOURCES AND ORGANIZATIONAL STRUCTURE	3.1. Fostering future-driven skills and competences	0.019	n/a	-0.214	-0.066	-0.087	n/a	-0.09
	3.2. Failure-tolerant mindset	0.037	n/a	-0.046	-0.097	-0.113	-0.052	n/a
	3.3. Knowledge sharing	n/a	n/a	0.09	-0.162	-0.16	n/a	n/a
	3.4. Virtual collaboration	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3.5. Constantly evolving organizational structure	n/a	-0.142	-0.132	0.139	0	-0.058	n/a
4. LEADERSHIP / TOP MANAGEMENT	4.1. Purpose-driven leadership	-0.063	n/a	0.055	n/a	n/a	n/a	0.026
	4.2. Experienced leadership of Agile transformation	0.057	n/a	n/a	0.026	-0.068	n/a	n/a
	4.3. Defining and measuring Corporate Agility performance (KPIs)	n/a	n/a	n/a	-0.052	n/a	n/a	n/a
	4.4. Delegating tasks to self-organized teams	n/a	0.104	0.101	0.179	0.102	0.068	0.104
	4.5. Scaling lean and Agile practices	n/a	n/a	n/a	n/a	n/a	n/a	0.184
5. CUSTOMER-CENTERED PRODUCT DEVELOPMENT	5.1. Consolidating customer data	n/a	n/a	n/a	n/a	n/a	n/a	0.024
	5.2. Customer engagement	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	5.3. Iterative software development	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	5.4. Continuous software deployment	n/a	n/a	n/a	n/a	n/a	n/a	0.049

Number of responses: Managing Directors: **50** Project Leaders: **59** *All β slopes are significant at $p < 0.05$*	Strategic Prediction	Business Model Reconfiguration	Business Strategy reconfiguration	Organizational Capabilities reconfiguration	Business Process reconfiguration	Organizational Structure reconfiguration	IT Infrastructure reconfiguration
	SP	**BMR**	**BSR**	**OCR**	**BPR**	**OSR**	**IT**
5.5. Rapid scaling from prototype to product launch	0.064	n/a	n/a	n/a	0.161	n/a	n/a

Table 26: Perceptual differences between Managing Directors and Project Leaders towards CA capabilities and their effects on CA performance.

The capability 2.1. *Flexible IT architecture* is a good example of where the views of Managing Directors and Project Leaders differ the most. The β slope difference is 0.322, which is the largest difference in this current data set. Such a delta value is positive, which indicates that the Project Leaders' slope is higher than the Managing Director's slope for the capability 2.1. A lower β slope for Managing Directors indicates that the increase of the independent variable (capability 2.1) by 1 level is associated with the less significant increase of the mean of a dependent variable (Corporate Agility performance indicator), comparing to the similar capability enhancement by 1 level for the Project Leaders. In other words, should the two groups of respondents have developed their Corporate Agility capabilities at an equal pace, the Project Leaders would have demonstrated a greater level of organizational responsiveness comparing to the Managing Directors. The results of the t-test analysis described in Chapter 4.2.4.4 demonstrate that Managing Directors rate the capability 2.1. *Flexible IT architecture* at a higher level, while Project Leaders find it significantly more challenging to reach that level of capability development and, therefore, rate this capability at a lower level.

Taking into consideration a greater involvement of Project Leaders in assuring an IT system modularity by adding, modifying, and removing the IT components, the provided t-test results and the β slope difference can potentially indicate that Project Leaders are more realistic in their evaluation

of the current state of the capability 2.1, while Managing Directors, being more involved in the enterprise-wide strategic decisions, underestimate the amount of effort required to achieve the modularity of an IT infrastructure. The author, therefore, hypothesizes that Project Leaders believe that significantly more effort should be invested in developing capability 2.1 before the organization demonstrates a higher level of business model reconfiguration.

Another example of the capability with a lower β slope for Managing Directors is a capability 4.5 *Scaling lean and Agile practices*, which indicates that Project Leaders would have demonstrated a greater level of organizational responsiveness comparing to the Managing Directors, should the two groups of respondents have developed this capability 4.5 at an equal pace. The t-test analysis for this capability demonstrates that Project Leaders rate the capability 4.5. at a higher level, while Managing Directors find it more challenging to reach that level of capability development and, therefore, rate this capability at a lower level. One may argue that Managing Directors are more involved in shaping the enterprise-wide Agile transformation and, therefore, are more realistic in their assessment of the capability 4.5. The author, therefore, offers a potential hypothesis, according to which Managing Directors believe that significantly more effort should be invested in developing capability 4.5 before the organization demonstrates a higher level of responsiveness.

2) Changing-the-business and Running-the-business Perceptions

The table below illustrates the perceptual differences of employees with a *changing-the-business* and a *running-the-business* focus of work. The analysis includes 72 unique responses representing employees with changing-the-business, and 31 unique responses representing employees with running-the-business.

Number of responses: Changing-the-business: **72** Running-the-business: **31** *All β slopes are significant at $p < 0.05$*		Strategic Prediction	Business Model Reconfiguration	Business Strategy reconfiguration	Org. Capabilities reconfiguration	Business Process reconfiguration	Org. Structure reconfiguration	IT Infrastructure reconfiguration
		SP	**BMR**	**BSR**	**OCR**	**BPR**	**OSR**	**IT**
1. INNOVATION-DRIVEN CORPORATE STRATEGY	1.1. Continuous revising of Corporate Strategy	-0.288	-0.205	-0.252	-0.101	-0.089	-0.191	n/a
	1.2. Predicting far-future changes	-0.124	n/a	n/a	n/a	n/a	n/a	n/a
	1.3. Testing new business ideas/models	-0.118	n/a	-0.209	n/a	n/a	n/a	n/a
	1.4. Integrating new business ideas/models into organization	-0.096	-0.274	-0.214	0.011	-0.219	-0.307	n/a
	1.5. Striving for continuous improvement	-0.274	-0.21	-0.159	-0.004	-0.092	-0.096	n/a
	1.6. Prioritizing innovation portfolio	-0.296	-0.284	-0.318	-0.074	-0.018	-0.456	n/a
	1.7. Integrating into business Ecosystem	-0.21	-0.452	-0.485	0.066	-0.299	-0.331	0.042
2. INFORMATION TECHNOLOGY	2.1. Flexible IT architecture	n/a	-0.01	0.033	-0.097	n/a	-0.121	0.205
	2.2. Keeping IT infrastructure up-to-date	-0.078	n/a	n/a	-0.153	n/a	n/a	0.056
	2.3. Dynamic scalability enhancement	n/a	n/a	-0.001	0.047	n/a	n/a	n/a
	2.4. Building customer-experience APIs at scale	-0.187	-0.323	-0.314	-0.089	-0.23	-0.083	n/a
	2.5. Integrating Big Data analytics with BI systems	-0.069	n/a	n/a	-0.033	-0.093	n/a	n/a

Number of responses: Changing-the-business: **72** Running-the-business: **31** *All β slopes are significant at $p < 0.05$*		Strategic Prediction	Business Model Reconfiguration	Business Strategy reconfiguration	Org. Capabilities reconfiguration	Business Process reconfiguration	Org. Structure reconfiguration	IT Infrastructure reconfiguration
		SP	**BMR**	**BSR**	**OCR**	**BPR**	**OSR**	**IT**
3. HUMAN RESOURCES AND ORGANIZATIONAL STRUCTURE	3.1. Fostering future-driven skills and competences	-0.155	-0.202	-0.039	0.102	n/a	-0.068	n/a
	3.2. Failure-tolerant mindset	-0.177	n/a	-0.061	n/a	n/a	n/a	n/a
	3.3. Knowledge sharing	n/a	-0.129	-0.069	0.1	-0.042	-0.2	-0.101
	3.4. Virtual collaboration	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3.5. Constantly evolving organizational structure	n/a	-0.312	-0.152	n/a	-0.216	-0.149	n/a
4. LEADERSHIP / TOP MANAGEMENT	4.1. Purpose-driven leadership	-0.063	-0.227	-0.206	-0.077	-0.173	-0.357	n/a
	4.2. Experienced leadership of Agile transformation	n/a	n/a	n/a	-0.078	-0.177	-0.244	n/a
	4.3. Defining and measuring Corporate Agility performance (KPIs)	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	4.4. Delegating tasks to self-organized teams	0.022	-0.316	-0.238	n/a	-0.243	-0.118	-0.062
	4.5. Scaling lean and Agile practices	n/a	n/a	n/a	-0.096	n/a	n/a	n/a
5. CUSTOMER-CENTERED PRODUCT DEVELOPMENT	5.1. Consolidating customer data	n/a	-0.187	-0.096	n/a	n/a	n/a	n/a
	5.2. Customer engagement	-0.145	-0.412	-0.408	n/a	n/a	-0.164	-0.095
	5.3. Iterative software development	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	5.4. Continuous software deployment	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	5.5. Rapid scaling from prototype to product launch	-0.058	-0.415	-0.551	-0.202	-0.137	n/a	n/a

Table 27: Perceptual differences between employees responsible for Changing-the-business and Running-the-business towards CA capabilities and their effects on CA performance.

The results of the simple slope analysis presented above demonstrate that such capabilities as *1.6. 'Prioritizing innovation portfolio'*, *1.7. 'Integrating into business Ecosystem'*, *5.2. 'Customer engagement'*, and *5.5. 'Rapid scaling from prototype to product launch'* have one of the most significant β slope differences in the current data set (cut-off point 0.4). The delta values (i.e., the difference between the β slopes) for each of these capabilities are negative and calculated as the Changing-the-business' slope minus the Running-the-business' slope. Since the initial β slopes are positive for both data sets, the observed negative sign of the delta values indicates that the Changing-the-business' slopes are lower than the Running-the-business' slopes for the respective capabilities. A lower β slope for the 'changing-the-business' group indicates that the increase of the independent variable (Corporate Agility capability) by 1 level is associated with the less significant increase of the mean of a dependent variable (Corporate Agility performance indicator), comparing to the similar capability enhancement by 1 level for the 'running-the-business' respondents. In other words, should the two groups of respondents have developed their Corporate Agility capabilities at an equal pace, the *running-the-business* employees would have demonstrated a greater level of organizational responsiveness comparing to the *changing-the-business* colleagues.

Considering that such a forecast is extrapolated from the assessment data of the Corporate Agility capabilities and performance indicators, the discrepancy between the expected Corporate Agility maturity levels for the two groups can be rationalized by addressing the perception of each of the groups towards the Corporate Agility maturity and its enhancement. The results of the t-test analysis described in Chapter 4.2.4.4 demonstrate that the respondents with a *running-the-business* perspective, indeed, rate their Corporate Agility capabilities at a higher level, while the respondents with a *changing-the-business* perspective find it significantly more challenging to reach that level of Corporate Agility capability development.

Taking into consideration the t-test results and the β slope differences presented in the table above, the author offers a potential hypothesis that the

running-the-business respondents are generally more optimistic and expect a faster progress towards a higher Corporate Agility maturity level. In particular, the author hypothesizes that the *running-the-business* respondents underestimate the amount of effort required to achieve the Corporate Agility capabilities and claim an unrealistic level of Corporate Agility maturity level, which is overinflated considering the complexity of the Corporate Agility capabilities already achieved by the organization. On the contrary, the *change-the-business* respondents are dealing with the transformation initiatives on a day-to-day basis and, therefore, are more realistic in their evaluation of the current state of the Corporate Agility capabilities and the overall Corporate Agility maturity level. In other words, *changing-the-business* respondents believe that significantly more effort should be invested in developing Corporate Agility capabilities before the organization demonstrates a higher level of responsiveness.

One of the few examples where the delta has a positive sign is related to a capability 2.1. 'Flexible IT architecture' (the difference between β slopes is 0.2). Such a finding demonstrates that the respondents focusing on the *changing-the-business* initiatives believe that an organization will be able to promptly reconfigure its IT infrastructure provided that it establishes a highly modular IT system that allows to effortlessly add, modify, and remove any components. The respondents with a *running-the-business* scope of work demonstrated a 'disagreement' over the value of the capability 2.1, believing that the potential impact from achieving this capability is significantly weaker.

3) Enterprise-wide and Cross-X scope of responsibilities

The table below illustrates the perceptual differences of employees having enterprise-wide and cross-X scopes of responsibilities. The analysis includes 54 unique responses representing employees with an enterprise-wide, and 48 unique responses representing employees with a Cross-X scope of responsibilities. The difference is calculated as the 'enterprise-wide' slope minus the 'cross-X' slope. The negative value of the difference, therefore, indicates that the 'enterprise-wide' slope is lower than the 'cross-X' slope.

Number of responses: Enterprise-wide: **54** Cross-X: **48** *All β slopes are significant at $p < 0.05$*		Strategic Prediction	Business Model Reconfiguration	Business Strategy reconfiguration	Org. Capabilities reconfiguration	Business Process reconfiguration	Org. Structure reconfiguration	IT Infrastructure reconfiguration
		SP	**BMR**	**BSR**	**OCR**	**BPR**	**OSR**	**IT**
1. INNOVATION-DRIVEN CORPORATE STRATEGY	1.1. Continuous revising of Corporate Strategy	0.029	n/a	n/a	n/a	n/a	0.058	n/a
	1.2. Predicting far-future changes	0.014	n/a	n/a	n/a	n/a	n/a	n/a
	1.3. Testing new business ideas/models	-0.013	n/a	n/a	0.106	n/a	n/a	n/a
	1.4. Integrating new business ideas/models into organization	0.18	0.194	0.314	0.058	0.207	0.21	n/a
	1.5. Striving for continuous improvement	-0.086	n/a	0.225	0.241	n/a	0.136	n/a
	1.6. Prioritizing innovation portfolio	0.055	0.297	0.328	0.159	0.348	n/a	n/a
	1.7. Integrating into business Ecosystem	0.128	n/a	n/a	0.199	n/a	n/a	n/a
2. INFORMATION TECHNOLOGY	2.1. Flexible IT architecture	n/a	0.171	0.142	n/a	0.181	n/a	0.044
	2.2. Keeping IT infrastructure up-to-date	n/a	n/a	n/a	n/a	n/a	n/a	0.103
	2.3. Dynamic scalability enhancement	n/a	n/a	0.326	0.24	n/a	n/a	n/a
	2.4. Building customer-experience APIs at scale	0.072	-0.098	-0.014	0.061	0.046	0.012	n/a
	2.5. Integrating Big Data analytics with BI systems	-0.026	n/a	n/a	-0.053	n/a	n/a	n/a
3. HUMAN RESOURCES AND ORGANIZATIONAL STRUCTURE	3.1. Fostering future-driven skills and competences	-0.064	n/a	0.325	0.227	0.177	n/a	n/a
	3.2. Failure-tolerant mindset	-0.016	n/a	0.425	0.204	0.439	n/a	n/a
	3.3. Knowledge sharing	0.073	n/a	0.231	0.276	0.409	n/a	n/a
	3.4. Virtual collaboration	n/a	n/a	0.309	n/a	n/a	n/a	n/a
	3.5. Constantly evolving organizational structure	-0.015	n/a	0.352	0.329	0.29	n/a	n/a

Number of responses: Enterprise-wide: **54** Cross-X: **48** *All β slopes are significant at $p < 0.05$*		Strategic Prediction	Business Model Reconfiguration	Business Strategy reconfiguration	Org. Capabilities reconfiguration	Business Process reconfiguration	Org. Structure reconfiguration	IT Infrastructure reconfiguration
		SP	**BMR**	**BSR**	**OCR**	**BPR**	**OSR**	**IT**
4. LEADERSHIP / TOP MANAGEMENT	4.1. Purpose-driven leadership	0.237	n/a	0.313	0.248	n/a	n/a	n/a
	4.2. Experienced leadership of Agile transformation	n/a	n/a	n/a	0.068	n/a	n/a	n/a
	4.3. Defining and measuring Corporate Agility performance (KPIs)	n/a	n/a	n/a	0.21	n/a	n/a	n/a
	4.4. Delegating tasks to self-organized teams	0.167	0.015	0.07	0.022	0.11	0.111	0.033
	4.5. Scaling lean and Agile practices	n/a	n/a	n/a	-0.055	n/a	n/a	-0.166
5. CUSTOMER-CENTERED PRODUCT DEVELOPMENT	5.1. Consolidating customer data	-0.091	n/a	0.186	n/a	n/a	n/a	0.074
	5.2. Customer engagement	-0.042	n/a	-0.089	-0.013	0.044	0.099	-0.179
	5.3. Iterative software development	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	5.4. Continuous software deployment	n/a	n/a	0.109	-0.006	n/a	n/a	0.136
	5.5. Rapid scaling from prototype to product launch	0.083	0.268	0.106	0.026	0.217	n/a	n/a

Table 28: Perceptual differences between employees with Enterprise-wide and Cross-X scope of responsibilities towards CA capabilities and their effects on CA performance.

The results of the simple slope analysis presented above demonstrate a high number of Corporate Agility capabilities with relatively large β slope differences. In particular, the capability 3.2. *Failure-tolerant mindset* demonstrates one of the highest β slope differences between the perceptions of the respondents with the *enterprise-wide* (cross-enterprise, ecosystem-wide focus) and the *cross-X* (e.g., cross-functional, cross-unit, cross-market) perspectives towards organization's ability to reconfigure its business strategy (β slope difference 0.425) and business processes (β slope difference 0.439). The observed positive sign of the delta values indicates that the slopes for the

respondents with an e*nterprise-wide* scope are higher than for those having a *cross-X* scope. A lower β slopes for *cross-x* respondents indicate that the increase of the independent variable (capability 3.2) by 1 level is associated with the less significant increase of the mean of a dependent variable (Corporate Agility performance indicator), comparing to the similar capability enhancement by 1 level for the e*nterprise-wide* colleagues. In other words, should the two groups of respondents have developed the capability 3.2 at an equal pace, the *enterprise-wide* respondents would have demonstrated a greater level of organizational responsiveness comparing to the *cross-X* respondents, for which the influence of the failure-tolerant culture is much lower on the business strategy (β slope 0.291) and business process (β slope 0.248) reconfiguration.

Another example of the capability with a lower β slope for the *cross-X* respondents is a capability 3.5 *Constantly evolving organizational structure*, which indicates that *enterprise-wide* respondents would have demonstrated a greater level of organizational responsiveness comparing to their *cross-X* colleagues, should the two groups of respondents have developed the capability 3.5 at an equal pace. The t-test analysis for this capability demonstrates that the *enterprise-wide* respondents rate the capability 3.5. at a higher level, while the *cross-X* employees find it more challenging to replace traditional hierarchies with an Agile organizational model and, therefore, rate this capability at a lower level. One may argue that the *cross-X* respondents are more involved in replacing the traditional hierarchies with an Agile organizational model by introducing ‘Squads’, ‘Chapters’, and 'Tribes' on the cross-functional and cross-unit levels and, therefore, are more realistic in their assessment of the capability 3.5. The author, therefore, offers a potential hypothesis, according to which the *enterprise-wide* respondents underestimate the amount of effort required to achieve this capability and claim an unrealistic level of Corporate Agility maturity level, which is overinflated considering the complexity of the Corporate Agility capabilities already achieved by the organization. On the contrary, the *cross-X* respondents are more realistic in their evaluation of the current state of the capability 3.5 and believe that

significantly more effort should be invested in developing this capability before the organization demonstrates a higher level of responsiveness.

4.3 Evaluation of the Maturity Models

In this chapter the author conducts a utility evaluation of the designed artifacts, namely general and situated Corporate Agility Maturity Models as well as the respective maturity measurement instruments. The objective is to make sure that the Corporate Agility maturity measurement instrument's assessment is linked to the actual Corporate Agility performance. Following Raber et al. (2013b), the author assumes that the organizations at a high level of Corporate Agility maturity are able to generate greater business benefits than organizations at a lower level of Corporate Agility maturity. In order to investigate this relationship, the author follows the methodology outlined by Raber et al. (2013b) to test the structural model 'Corporate Agility Maturity - Corporate Agility KPIs' for the hypothesized paths. The model relates the output of the maturity instrument, i.e. the maturity level, as an independent variable and the performance indicators as dependent variables (Raber et al., 2013b). The list of independent and dependent variables is presented in the Table below.

Construct	Label	Indicator
Corporate Agility Maturity	CAM	The maturity level of Corporate Agility, derived from applying the CA measurement instrument
Strategic Prediction	SP	Accuracy of predicting significant disturbances in the external environment (market fluctuation, disruptive competitor, new technology, etc).
Business Model Reconfiguration	BMR	The ease with which organization can change its business model
Business Strategy Reconfiguration	BSR	The ease with which organization can change its business strategy
Organizational Capabilities Reconfiguration	OCR	The ease with which organization can reconfigure its organizational capabilities.

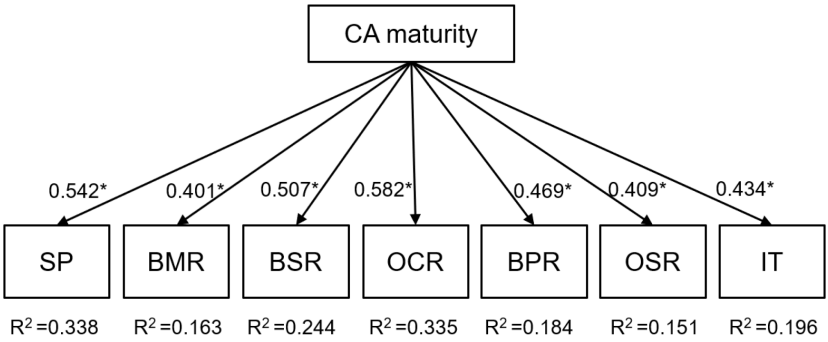
Construct	Label	Indicator
Business Processes Reconfiguration	BPR	The ease with which organization can change business processes
Organizational Structure Reconfiguration	OSR	The ease with which organization can change organizational structure
Information Technology	IT	The ease with which organization can adopt new (IT) technology

Table 29: Measurement instrument for the Corporate Agility performance

To evaluate the general Corporate Agility Maturity Model, the author uses the empirical data collected from practitioners at an earlier stage. 114 unique responses are used to compute the Corporate Agility maturity value of each of the organization.

In order to validate the maturity models, the author conducts an internal consistency (i.e., reliability) test with Cronbach's Alpha using IBM SPSS Statistics 27 software. The results of the test demonstrate that both the validity and reliability criteria are met both for the general and situated maturity models. In particular, the Cronbach's Alpha computed for the general and the situated Corporate Agility measurement instrument is 0.937 and 0.883 accordingly. Winter and Aier (2020) referenced the work of Nunnally and Bernstein (1994) to state that a Cronbach's Alpha coefficient exceeding 0.7 provides evidence of the internal consistency and reliability of the model. With support of the research practice (Kline, 1999), the author makes the conclusion that the Cronbach's Alpha coefficient for the general and the situated maturity models can be considered 'excellent'.

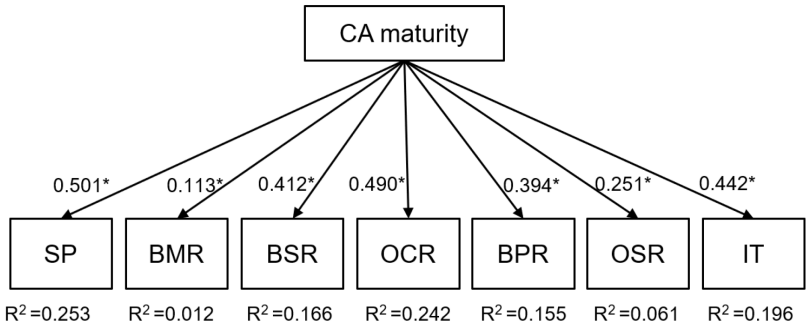
After establishing the validity and reliability, Raber et al. (2013b) suggest to test the model for the hypothesized paths. The figure below illustrates the results of such a regression analysis for the general Corporate Agility Maturity Model.



* Indicates that the path coefficients are significant at $p < 0.001$

Figure 15: Regression analysis between CA maturity as independent variable and Corporate Agility performance indicators (KPIs) as dependent ones, general model with 114 responses.

The next figure depicts the results of the regression analysis for the situated Corporate Agility Maturity Model (Financial industry).



* Indicates that the path coefficients are significant at $p < 0.001$

Figure 16: Regression analysis between CA maturity level of financial organizations as independent variable and Corporate Agility performance indicators (KPIs) as dependent variables, Financial model with 50 responses.

According to Raber et al. (2013b), the primary evaluation criteria for testing the structural model for the hypothesized paths are the R^2 measures as well as the level and significance of the path coefficients (Hair Jr et al., 2011). The

standardized path coefficients indicate the strengths of the relationships between the dependent and independent variables (Raber et al., 2013b).

Raber et al. (2013b) use R^2 values to indicate the amount of variance of a dependent variable explained by the model. The research model explained 33.8% (25.3% for a situated maturity model) of the variance in the dependent variable 'Strategic Prediction', 33.5% (24.2% for a situated maturity model) in 'Organizational Capabilities Reconfiguration', and 24.4% (16.6% for a situated maturity model) in 'Business Strategy Reconfiguration', which are among the highest values representing the influence of the Corporate Agility maturity on the Agility performance indicators. The rest of the indicators are explained as follows: 16.3% (1.2% for a situated maturity model) in 'Business Model Reconfiguration', 18.4% (15.5% for a situated maturity model) in 'Business Process Reconfiguration', 15.1% (6.1% for a situated maturity model) in 'Organizational Structure Reconfiguration', and 19.6% (also 19.6% for a situated maturity model) in 'Information Technology'. The analysis indicates positive and significant relationships between the Corporate Agility maturity construct and all the performance indicators of Corporate Agility for both the general and situated maturity models ($p < 0.001$). It is also confirmed that the proposed general and situated Corporate Agility Maturity Models are valid predictors of the organizational Agility performance on the enterprise-wide level.

In the next stage, the author follows the maturity model evaluation technique of Raber et al. (2016) to evaluate the validity and to calibrate the proposed Corporate Agility maturity measurement instrument. The 'traditional' qualitative maturity assessment method would have been used in case the proposed Corporate Agility Maturity Model would not have been available to define whether the company belongs to the top achievers, or whether the performance of the company is mediocre.

In order to evaluate the model, Raber et al. (2016) propose to evaluate the companies, which exhibit certain maturity levels rather than random sampling. In particular, the authors suggest to select various companies according to the key contingencies to ensure that different organization types are covered. The

author of this dissertation follows the process of selection of the maturity clusters (Raber et al., 2016) and resolves to conduct the evaluation for low, medium, and high Corporate Agility maturity.

#	Industry	Size (people)	Organizational change in the past 5 years	CA maturity level
A	Finance	1000-4999	Minor changes	Low CA maturity
B	IT and Communication	100-499	Various changes across organizations	Medium CA maturity
C	Retail & Commerce	>=5000	Significant changes	High CA maturity

Table 30: Overview of the companies

To qualitatively assess the Corporate Agility maturity in the organizations, the author follows Charbonnier-Voirin (2011) to conduct semi-structured interviews with several interviewees in each organization. The outline of the interview is based on the Corporate Agility Maturity Model dimensions, including a set of open-ended questions (see Appendix B). Following Raber et al. (2016), the author codes the results of the interviews to explain why each of the organizations may be on specific Corporate Agility maturity level with regards to the different maturity dimensions. The results of the qualitative assessments of the Corporate Agility maturity are compared to the maturity model-based Corporate Agility maturity measurement values. The author develops Radar chart diagrams for exemplary cases in order to demonstrate the results of comparing both maturity ratings.

Company A

Dimensions / Assessment type	CA maturity instrument	Qualitative analysis
Innovation-driven corporate strategy	3	2
Information technology	2	2
Human resources and organizational structure	3	2
Leadership / top management	2	1
Customer-centered product development	2	2

Table 31: CA maturity assessment for company A

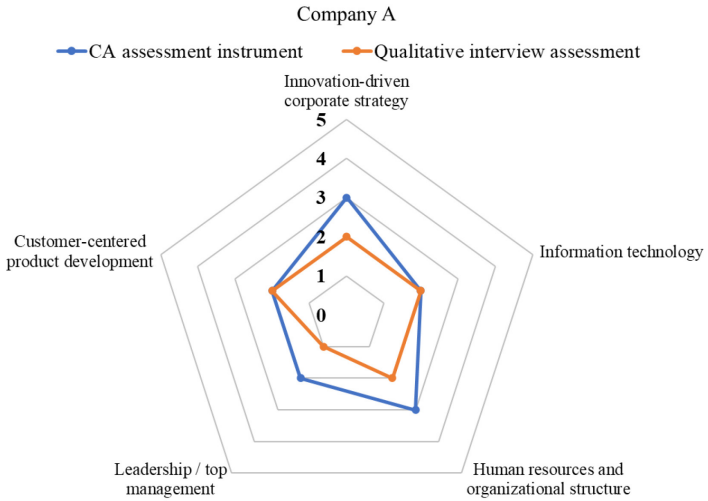


Figure 17: Company A Corporate Agility maturity evaluation.

Company B

Dimensions / Assessment type	CA maturity instrument	Qualitative analysis
Innovation-driven corporate strategy	3	4
Information technology	3	3
Human resources and organizational structure	4	4
Leadership / top management	3	3
Customer-centered product development	4	3

Table 32: CA maturity assessment for company B

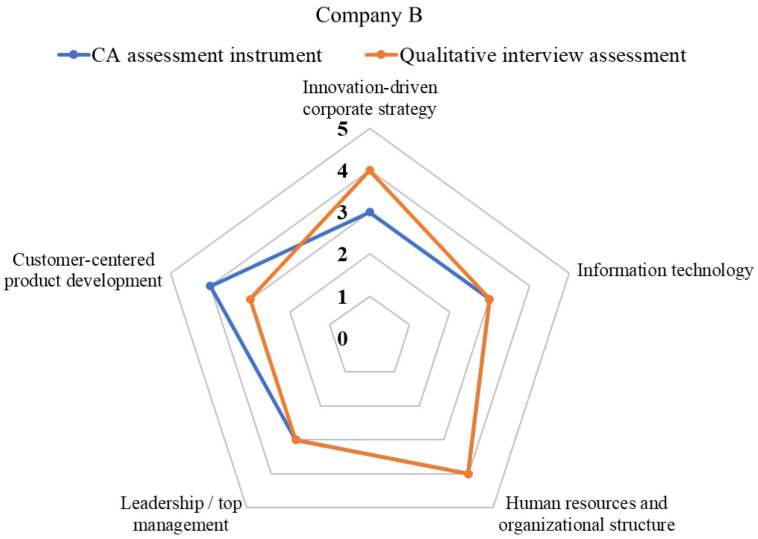


Figure 18: Company B Corporate Agility maturity evaluation.

Company C

Dimensions / Assessment type	CA maturity instrument	Qualitative analysis
Innovation-driven corporate strategy	5	4
Information technology	3	3
Human resources and organizational structure	4	4
Leadership / top management	3	4
Customer-centered product development	4	4

Table 33: CA maturity assessment for company C

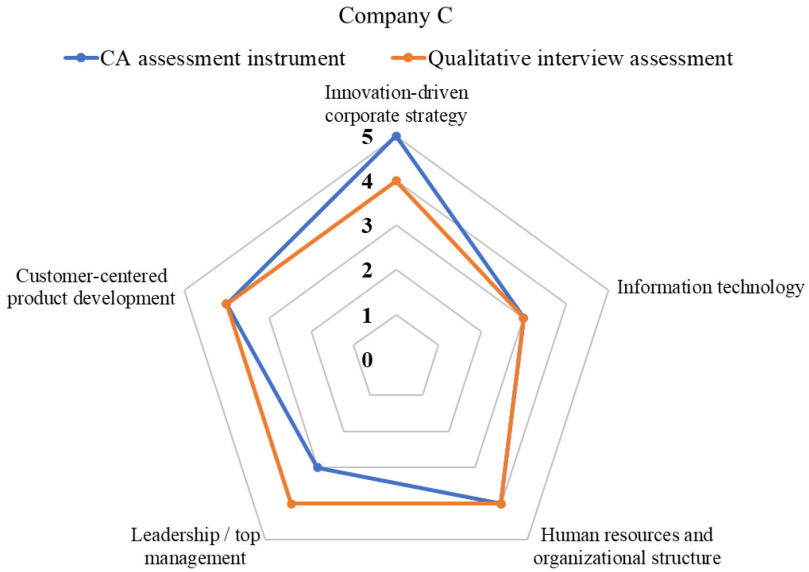


Figure 19: Company C Corporate Agility maturity evaluation.

Raber et al. (2016) stated that if the differences do not cause a change of the maturity cluster and do not account for more than one maturity level, it is considered that the proposed measurement instrument accurately measures the maturity of the organizations. The two measurement approaches demonstrate similar Corporate Agility maturity assessments of the organizations, which confirms that the proposed Corporate Agility maturity assessment model provides reasonable measurements.

5 Discussion

In this chapter the author aims to holistically summarize the overall contribution to integrate the findings and insights from the various stages of the artifacts' development.

5.1 Results Achieved

In the scope of the dissertation project the author developed a set of artifacts aiming to support organizations in their transformational programs. The main objective was to provide guidance on systematically developing Corporate Agility capabilities in a certain sequence that follows the organizational learning journey.

Firstly, the design process started with developing the Corporate Agility Effect Model. The process of developing the effect model included collecting the Corporate Agility capabilities from the literature review and conducting a series of workshops and interviews with practice partners. The author provided a detailed mechanism of aggregating capabilities to assure a consistent level of granularity. In addition to the capabilities, a set of Corporate Agility performance indicators was derived after a comprehensive study of the performance effect. The empirical data was collected from organizations representing various industries in order to analyze the effect of Corporate Agility capabilities on corporate performance. The final list of capabilities and performance indicators was derived to correctly measure the maturity level of Corporate Agility. As a result, the Corporate Agility effect model offers reasonably well justified empirical explanatory knowledge about the effect of Corporate Agility (capabilities) on Corporate Agility performance.

In the next step the author designed and evaluated the Corporate Agility Maturity Model. Various statistical tests were conducted to assure the reliability and validity of the artifact. The proposed maturity model is the core element of the organizational learning tool to identify empirically validated learning journeys for organizations to enhance Corporate Agility. It aims at enhancing Corporate Agility through identifying and developing Corporate

Agility capabilities in a sequence that correspond to organizational learning, rather than 'top-down' control levels. The author also developed a fully validated and evaluated light-weight model for assessing the maturity of Corporate Agility. The designed measurement tool is an easier and more transparent way to measure organization's Corporate Agility maturity with reasonably good precision. The design purpose of such a measurement tool was also to calibrate the Corporate Agility Maturity Model for organizational learning.

To better understand the differences between organizational learning journeys and the tensions within the firm's environment associated with the transformation, the author explored different backgrounds of key stakeholders to understand different perceptions of enhancing Corporate Agility. To support the methodology of developing the situated maturity models described in the work of Winter and Aier (2020), the author contributed by applying the unpaired t test as part of the statistical analysis in order to explore the presence of the effect of various contingency factors on the organizational learning journey. The aim of such a test was not only to find out whether the effect is observable or not, but also to analyze whether such an effect is stronger for certain Corporate Agility capabilities or not using the effect size parameter. In the dissertation project at hand an independent-samples t test was conducted to explore whether there are significant differences in how the groups of respondents rated the Corporate Agility capabilities. The study showed that different groups of stakeholders in the organizations go through different learning journeys. After investigating which of the context factor has an influence on the learning journey, the author elicited the context of the organizations and used the context parameters to customize the generic Corporate Agility Maturity Model to a specific (situated) one a Corporate Agility Maturity Model for the financial industry. The resulting artifact has configuration parameters to derive the maturity development path for a specific industry.

After concluding which of the context factors do have an effect on Corporate Agility capabilities, the author got a more profound understanding on how the

focus on the Corporate Agility capabilities shifts throughout the learning process. As a part of the configurability development, the author further contributed to the design process of the configuration mechanism by incorporating the multivariate linear regression as a part of the simple slope analysis. In particular, the statistical approach was applied to conduct an explorative analysis of various stakeholders' perspectives in order to define the moderating interaction effect of various context factors on the relationship between the Corporate Agility capabilities and the Corporate Agility performance indicators. Such a methodological addition supports in deriving the situated Corporate Agility Maturity Models out of the generic one based on the various stakeholder's views on the Corporate Agility maturity enhancement. As a result, the analysis made it possible to assess the perception of the different stakeholder's groups on Corporate Agility capabilities and KPIs, as well as to analyze their view on the Corporate Agility maturity enhancement, which impacts the communication and implementation strategy. The investigation of the relationship between the Corporate Agility capabilities and KPIs can also be considered as the first step towards building more trust into the potential situated maturity models, which can be built considering more empirical data is collected during future research.

The author designed the following artifacts that are required in the field of Corporate Agility in order to overcome the challenges specific to Agile transformation:

1. Corporate Agility Effect Model.
2. Corporate Agility Maturity Assessment Model.
3. Corporate Agility Maturity Model for organizational learning (General).
4. Situated Corporate Agility Maturity Model for the financial industry
5. Configuration Mechanism for Situated Corporate Agility Maturity Models.

The artifacts designed in the scope of this dissertation project were validated with the aim to enhance Corporate Agility and to navigate the organizational transformation.

5.2 Application of the Corporate Agility Maturity Model in Practice

In the scope of this dissertation project the author developed the Corporate Agility Maturity Model and the maturity assessment instrument, which navigate the Agile transformation leaders along the transformation journey in order to enhance Corporate Agility on an enterprise-wide level. The application of the artifacts in practice offers executive managers support in understanding the current status of Corporate Agility, as well as the most effective way in which the Corporate Agility capabilities should be developed.

As a result of the dissertation project, an organizational learning support tool, designated "Corporate Agility Navigator", was designed to address the challenge of Agility transformation in organizations from various fields. The Corporate Agility Navigator supports managers with:

1. Providing guidance on systematically developing Corporate Agility capabilities in organizations from various fields.
2. Devising Agile capability development sequences that correspond to organizational learning, rather than control levels.
3. A configurational (contextual) mechanism providing individual learning journeys specifically 'tailored' for certain types of organizations.
4. Defining the gap between the desired and the current levels of Agility competences.
5. Identifying the areas requiring improvement in the context of Corporate Agility.

The Corporate Agility maturity level is derived based on the designated assessment instrument, which requires information about the actual and desired states of the Corporate Agility capabilities, as well as the contextual environment. The derived maturity value provides an understanding of where the organization is positioned in terms of Corporate Agility, and what capabilities the organization should develop in order to increase the maturity of their Corporate Agility. After deriving the maturity value, it is then possible

to position the organization among the maturity clusters of the Corporate Agility Maturity Model. On the left side from the designated maturity level one can see the Corporate Agility capabilities that the organization may already consider 'achieved', while the capabilities on the right side of the designated maturity level are the capabilities that the organization still requires to develop in order to further enhance their Corporate Agility.

To be able to apply the Corporate Agility Navigator to a particular industry (i.e. Healthcare, Finance, Manufacturing, Pharma), the Corporate Agility Maturity Model was further configured to reflect specific challenges and opportunities. Such a configuration provides support to organizations with challenges related to transformation journeys. A situated Corporate Agility Maturity Model for the financial industry, including banks and insurers, was developed as an example of the situated maturity model specifically 'tailored' for a certain class of organizations based on pre-defined contingency factors (in our case industry). Below are the examples of how the proposed artifact can further be applied in practice.

5.2.1 Financial industry

In case of a *financial industry*, the proposed Agility Navigator can support banks and insurers (BFSI) to adapt to disruption and change in the market, whether it is caused by shifting regulation, new technology, market volatility or changing customer demands. According to Liermann (2021), the central mission of the banking sector is effective allocation of savings into real investments with positive expected returns. Prior to even that basic goal is the need to attract depositors' savings by providing competitive services and a reputation for competence and honourable behaviour. Attracting deposits is closely tied to customer relationship management. Providing competitive tools and services that assist customers in managing their own financial resources is essential. The same can be said for insurance companies providing support to assist customers in managing their personal and corporate risks across multiple dimensions. Remaining competitive amid rapid technological change requires continuing insight into customers' priorities and preferences. This is further

complicated by intergenerational differences in such preferences. Maintaining an effective customer contact through multiple channels of interaction would be one of the most significant advantages of a financial organization with the high maturity level of Corporate Agility (Liermann, 2021).

Apart from that, the financial services institutions face regulatory changes, cost pressure and new competitors all the time (Jensen, 2021). What is new this time is the acceleration of change driven by opportunities arising from digital technologies in a time of global crisis. Therefore, highly enhanced Corporate Agility capabilities will provide the financial organizations with the key competitive advantages that allow them to succeed in this new environment (Jensen, 2021):

1. *Seamless connectivity:* the banks would be able to offer personalized products and services in real time, orchestrated across channels—from inquiry to application to fulfillment—and enabled in the cloud.
2. *Data-driven intelligence:* In parallel, banks would be able to stream multiple data sources from various systems into a single customer view to allow deep analytics for personalized offers, risk assessment and fraud mitigation.
3. *Operational effectiveness:* the banks would also standardize technology to reduce the total cost of ownership (TCO) and optimize processes by embedding machine learning and other innovative technologies.
4. *Financial insight and risk control:* Lastly, the financial organizations would be able to make faster and better decisions based on real-time data leveraging advanced analytics.

5.2.2 Healthcare industry

In case of such *healthcare organizations* as hospitals, nursing homes, rehabilitation clinics, psychiatry entities, Spitex organizations, and family physicians, the Corporate Agility Navigator can be applied to assess the current degree of Agility and create a roadmap to integrate Agility throughout their enterprise. Shakhour, Obeidat, Jaradat, and Alshurideh (2021) empirically

tested the impact of Corporate Agility practices on achieving organizational excellence in the healthcare sector, and concluded that the enhancement of Corporate Agility in the healthcare organizations is necessary for their survival. Corporate Agility could play an important role in COVID care hospitals to enhance the operations with respect to the facilities and resource requirement for dynamic demand (Suresh, Roobaswathiny, & Lakshmi Priyadarsini, 2021). However, like any other pandemic, COVID-19 will eventually disappear, and survivals will have to adopt agile strategies to address the new challenges caused by the post COVID-19 realities (Shakhour et al., 2021). The adoption of the Corporate Agility in clinical settings is imperative and will allow the healthcare organizations to improve the conventional plan-driven implementation process and, thus, reduce cost, improve patient satisfaction, achieve sustainable healthcare performance outcomes, activate service innovation, and increase the organization propensity to open innovation. Successful healthcare organizations with highly developed Corporate Agility capabilities can reconfigure it is resources and prevent the organizations from missed business opportunities and unexploited resources (Shakhour et al., 2021).

5.2.3 Pharmaceutical industry

Pharmaceutical companies are responsible for manufacturing drugs and distributing them along with other life-saving treatments to provide and sustain healthcare in a community (Moschogianni, 2021). As pharmaceutical companies are operating in a highly competitive environment, it is critical for them to continuously innovate and provide innovative solutions that can help save thousands of lives. The Corporate Agility Navigator offers significant opportunities for pharma companies to boost biopharmaceutical innovation by providing the roadmap for systematical development of Corporate Agility capabilities. According to Moschogianni (2021), pharmaceutical companies are required to enhance their Corporate Agility to match external and internal resources with current needs, which would allow them to reach customers efficiently and effectively through digitizing their supply channels. To adapt to a changing environment, which includes the variation of diseases, types of

patients and variations in healthcare and payer systems (Theodore, Kasali, Balqiah, & Sudhartio, 2021), the pharmaceutical companies should develop the Corporate Agility capabilities to tackle the uncertainty and to promptly respond to the changes in the external environment. For example, rather than pursue a strategy of launching a new formulated drug in the anti-diabetic therapeutic class on its own, a highly responsive pharmaceutical company with matured Corporate Agility capabilities alters its plan by launching a new antiviral drug needed for the COVID-19 pandemic (Theodore et al., 2021).

5.2.4 Manufacturing industry

The *manufacturing sector* is under immense stress to seek new ways of enhancing organizational agility and profits in the drastically changing business environment (Kumar, Singh, & Jain, 2021). According to Kumar et al. (2021), increasing technological innovation and customers' demands stimulate manufacturing companies to acquire the skills and capabilities to delight the customer by proactively sensing and responding to their requirements. The rapid globalization necessitates the need for the manufacturing organizations to develop responsiveness through enhancing the Corporate Agility, which further enables manufacturing firms to deliver value to the customers, to be ready for change, to value human knowledge and skills, and to form virtual partnerships (Dubey & Gunasekaran, 2015). Indeed, enriching the Corporate Agility capabilities allows the manufacturing organizations to quickly respond to customer requirements in the form of innovative features, quickest delivery time and variability of products (Kumar et al., 2021). The Corporate Agility capabilities focus on enhancing the facilities, inventory, transportation, information, sourcing, and pricing aspects, which Galankashi, Helmi, Rahim, and Rafiei (2019) consider as the most important aspects for the manufacturing organizations. According to Kumar et al. (2021), developing Corporate Agility capabilities in the manufacturing organizations allows to reduce the lead time and attain a sustainable competitive advantage by manufacturing quality products efficiently and economically. As a result, every manufacturer pursues the Agile transformation journey to improve the business performance, but the

implementation benefits may vary from firm to firm (Kumar et al., 2021). The Corporate Agility Navigator helps manufacturing companies to enhance their Corporate Agility capabilities and gradually polish their manufacturing facilities to sustain a competitive edge.

An important aspect to clarify refers to the scope of the application of the artifacts. In fact, the application scope depends on the organization's level of analysis where the artifact is going to be applied: business unit, the whole enterprise or a business network. If the goal is to apply the tool to the whole organization, the person responsible for applying the tool shall distribute the designated questionnaire (measurement instrument) throughout the company and collect as many responses as it is feasible to make a statistically valid estimation. A possible example could be a situation in which 95% of the employees report an existence of a certain capability, which can then be considered 'achieved'. Therefore, the achievement of a certain capability on the organizational level will be demonstrated by the aggregated value of the employees' measures.

The organizational learning tool and the maturity assessment instrument together will effectively navigate the Agile transformation leaders along the Agile transformation journey in order to enhance Corporate Agility as an organizational phenomenon. As a result, the dissertation project at hand has successfully elaborated on how the organizational learning tool - capability maturity model - can support the systematic guidance towards Corporate Agility in various context factors.

6 Conclusion

After the artifacts have been designed, it is necessary to provide some reflections on the boundary conditions and potential implications for future research.

6.1 Critical Reflection and Limitations

It is important to note that the author intended to capture Corporate Agility as an organizational phenomenon. Individual activities may be relevant, but only with regards to the impact on the corporate level. The author, therefore, excluded capabilities relevant to Agility as an iterative approach to software development: Agile principles, methods, roles, processes and tools (SCRUM, SAFe, NEXUS, etc).

The learning journey analysis proposed in this dissertation project is based on collected data about the difficulty of Corporate Agility capabilities and their relation to organizational performance. Considering that the difficulty level of capabilities changes over time, certain aspects that are considered difficult today will become less difficult in the future due to the learning tendency. Considering the ephemeral nature of the artifact (Simon, 1969), some elements of the proposed artifacts are going to become redundant in the future. Conversely, the proposed artifacts may be missing some of the elements that are going to be critically important in the observable future. Since the relative difficultness of Corporate Agility capabilities will inevitably change over time, the Corporate Agility Maturity Model should be re-designed and re-calibrated to assure its applicability and actuality. To mitigate the above-mentioned limitation, the author tried to avoid 'perishable' buzz-words and short-term industry trends to make sure that the proposed Corporate Agility model will not get outdated in the nearest future. Such an approach assured a more gradual adjustment of the maturity model and all of the concepts involved.

The Corporate Agility Maturity Model together with the maturity assessment instrument effectively support the transformation leaders to enhance the Corporate Agility on the enterprise-wide level. Having said that, it is important

to note that the artifacts do not guarantee the organizations to reach that goal by simply applying the models. Indeed, the developed artifacts support organizations in their transformational programs by providing guidance on systematically developing Corporate Agility capabilities in a certain sequence that follows the organizational learning journey. However, to advance in this journey, the organization is responsible to allocate sufficient amount of financial and human resources in order to make progress in the capability enhancement. As such, the designated Corporate Agility Maturity Model does not reflect on the overall maturity of Agile transformation and its program's status. Instead, the maturity model provides a 'map', which the organization should follow in a certain sequence in order to enhance the Corporate Agility capabilities. The author believes that the Agile transformation requires not only the correct path to take, but also an appropriate strategy on using and applying such Corporate Agility capabilities. The scope of the current dissertation project, however, only covers the exploration and identification of the relevant Corporate Agility capabilities that are required to enable and facilitate the Agile transformation.

The author would like to highlight the question of the relationship between higher performance of Corporate Agility (or higher maturity of Corporate Agility capabilities) and higher organizational performance. To unambiguously clarify the role of Corporate Agility in the dissertation project at hand, the author reminds that although the working assumption is that enterprise-wide Agility may lead to increased enterprise performance, the purpose of the current dissertation project is not a higher enterprise performance and, therefore, higher organizational performance is not considered as the end-goal of the current project. Although the practice partners involved in the project expressed their desire to see a positive effect on the overall organization becoming more sustainable and profitable, the level of analysis of the current dissertation project is the enterprise-wide Agility level. Therefore, the results of the project will benefit those organizations that are willing to start or have already initiated the Agile transformation program and are in need of guidance along the transformation journey. As a result, the dissertation project at hand is dedicated to provide a means for improving

enterprise-wide Agility only. Despite the possible implication of a higher Corporate Agility on the overall business performance, any dependencies with the overall performance of the organization is left out of the scope.

It is important to note that there are significant limitations to perform a longitudinal study in order to evaluate whether the organizations have actually followed the prescriptive knowledge that was generated by the proposed artifacts. The evaluation of whether the organizations have followed the learning journeys in the prescribed way or not would have required significant resources and is, therefore, excluded from the dissertation at hand. Although the utility of the designed artifact was not investigated, the author of this dissertation, instead, conducted a calibration of the Corporate Agility measurement tool, which reflects the utility of the Corporate Agility Maturity Model.

Last of all, as with every exploratory study, collecting and analyzing additional empirical data from other geographical regions, industries, and different types of organizations may alter the research outcome. The author does not claim that the research results are fully applicable to other situations and, therefore, invites the researchers to connect the findings from the dissertation at hand with their own specific experience.

6.2 Implications for Research

The dissertation project at hand had the particular aim to contribute to the conceptualization of Corporate Agility as an organizational phenomenon. While earlier research activities have extensively investigated the concept of the enterprise-wide Agility, there was a particular research gap on the organizational learning mechanisms to devise Corporate Agility capabilities development sequences. Despite an extensive track record in practice-oriented research on designing maturity models as an established instrument to devise development paths, currently available maturity models often focus on the control of certain capabilities (doing things right), instead of devising capability development sequences that correspond to organizational learning (Winter & Aier, 2020). The development of the Corporate Agility Maturity

Model along with the maturity assessment instrument was an introduction of empirically grounded innovative design methods to the domain of Corporate Agility, where until now the traditional top-down maturity models were triumphing in academia and practice. The author advanced the existing state of the art in Corporate Agility enhancement especially in respect to the organizational learning by leveraging the advanced methodology of designing an organizational learning tool through the Capability Maturity Model (Winter & Aier, 2020). While translating the theoretical concepts of Corporate Agility excellence into actionable guidelines (learning journeys), the author of this dissertation attempts to establish an industry-wide standard for enhancing Agility on the enterprise-wide level to guide organizations through Agile transformation. In doing so, the author contributes to the development of the configurability mechanism that may further customize the resulting Corporate Agility learning journeys to a specific industry or a contextual environment.

6.3 Future Research Suggestions

The author would like to emphasize that certain aspects of the dissertation project are excluded from the scope and, therefore, are subject to future research.

First of all, in the current dissertation project the author defined the context by setting the categories in such a way that the contextual environment is defined unambiguously, such as ‘large organization’ or ‘an expert in Agile transformation’. Such a simplified consideration of the context made it possible to investigate the major differences in the learning journeys between ‘extreme’ positions on the contextual scale, such as ‘large’ – ‘small’ firm, ‘running-the-business’ – ‘changing-the-business’ aspects. However, one may argue that context is multidimensional and fuzzy, and the more realistic situation will be somewhere in the middle between ‘large’ and ‘small’ companies. Therefore, the author highlights the importance of developing a fuzzy context model, which can potentially allow a better understanding of the ‘gray scales’ for configuring applicants. The future research may focus on collecting different use cases from various organizations to understand their context, but not with a 1/0 binary dimension, but rather with fuzzy gray scales.

The author analyzes the most efficient learning journeys towards more Agility on the enterprise level by analyzing the information from the organizations’ past experience. As a result, the proposed Corporate Agility Maturity Model and its measurement instrument help transformation leaders with identifying and developing Corporate Agility capabilities in an effective way (in the appropriate sequence), supporting organizations in their transformation journeys towards higher Agility performance. The proposed Corporate Agility Maturity Model and the respective measurement instrument generate a prescriptive knowledge, which supports organizations with developing Agile capabilities in an effective way. There are, however, significant limitations to evaluate whether the organizations actually followed the learning journeys in the prescribed way or not, since such a longitudinal study would require significant resources. The extent to which the organizations have achieved Corporate Agility capabilities depends on the learning process that each

organization is undertaking individually. The foundational assumption is that the instrument, which was previously successfully applied to derive the most efficient learning journey for a certain organization in the past, should provide successful results when applied in the future. However, whether the instrument indeed contributed to the success of the Agile transformation and whether the company has successfully leveraged their Corporate Agility capabilities – is out of the scope of the current dissertation project and, therefore, is excluded from the research scope.

One of the opportunities to apply a longitudinal perspective in the future research is to follow a *process theory* as a theoretical basis, which offers an alternative approach to analyze various organizational learning journeys over time. According to Haki, Aier, and Winter (2021), the process approach captures critical events and turning points, contextual influence, and formative patterns that give overall direction to changes over time, and factors that influence the sequencing of events. Instead of analyzing the existing maturity models in the Corporate Agility domain, a potential future research may analyze the evolution of the Corporate Agility capabilities in different organizations over time, taking into consideration a set of turning points, their contextual factors, and outcomes. Such a longitudinal process is not a neutral set of change events, but rather a *process of learning*, along which different organizations learn from their own and others' success stories/failures, which in turn cause antecedents of the next event to explain key turning points (Haki et al., 2021). Therefore, a potential future research may apply the *process approach* and investigate an emergent evolution of Corporate Agility in different organizations over time.

Bibliography

Abdelilah, B., El Korchi, A., & Balambo, M. A. (2018). Flexibility and agility: evolution and relationship. *Journal of Manufacturing Technology Management, 29*(7), 1138-1162. doi: 10.1108/Jmtm-03-2018-0090

Aburub, F. (2015). Impact of ERP systems usage on organizational agility An empirical investigation in the banking sector. *Information Technology & People, 28*(3), 570-588. doi: 10.1108/Itp-06-2014-0124

Aghina, W., Handscomb, C., Ludolph, J., Rona, D., & West, D. (2020). Enterprise agility: buzz or business impact. *McKinsey & Company*.

Alqudah, M., & Razali, R. (2016). A review of scaling agile methods in large software development. *International Journal on Advanced Science, Engineering and Information Technology, 6*(6), 828-837.

Argyris, C., & Schön, D. A. (1978). *Organizational learning: A theory of action perspective*. Reading, Mass.: Addison-Wesley.

Becker, J., Knackstedt, R., & Pöppelbuß, J. (2009). Developing Maturity Models for IT Management - A Procedure Model and its Application. *Business & Information Systems Engineering, 1*(3), 213-222.

Bergkvist, L., & Rossiter, J. R. (2007). The Predictive Validity of Multiple-Item Versus Single-Item Measures of the Same Constructs. *Journal of Marketing Research, 44*(2), 175-184.

Bessant, J., Kaplinsky, R., & Lamming, R. (2003). Putting supply chain learning into practice. *International Journal of Operations & Production Management*.

Brosius, M., Aier, S., Haki, K., & Winter, R. (2019). The Institutional Logic of Harmonization: Local Versus Global Perspectives. In D. Aveiro, G. Guizzardi, S. Guerreiro, & W. Guédria (Eds.), *Advances in Enterprise Engineering XII. EEWC 2018. Lecture Notes in Business Information Processing, vol 334* (pp. 3-17). Cham: Springer.

Brosseau, D., Ebrahim, S., Handscomb, C., & Thaker, S. (2019). The journey to an agile organization. *McKinsey & Company*. from https://www.mckinsey.com/business-functions/people-and-organizational-performance/our-insights/the-journey-to-an-agile-organization

Cai, Z., Liu, H. F., Huang, Q., & Liang, L. (2019). Developing organizational agility in product innovation: the roles of IT capability, KM capability, and innovative climate. *R & D Management, 49*(4), 421-438. doi: 10.1111/radm.12305

Cegarra-Navarro, J.-G., & Martelo-Landroguez, S. (2020). The effect of organizational memory on organizational agility. *Journal of Intellectual Capital, 21*(3), 459-479.

Cepeda, J., & Arias-Perez, J. (2019). Information technology capabilities and organizational agility The mediating effects of open innovation capabilities. *Multinational Business Review, 27*(2), 198-216. doi: 10.1108/Mbr-11-2017-0088

Charbonnier-Voirin, A. (2011). The development and partial testing of the psychometric properties of a measurement

scale of organizational agility. *M@n@gement, 14*(2), 120-156.

Chin, W. W. (1998). The Partial Least Squares Approach to Structural Equation Modeling. In G. A. Marcoulides (Ed.), *Modern methods for business research* (pp. 295-336). Mahwah, NJ: Lawrence Erlbaum Associates.

Chuard, M. (2021). What's next for Open Banking? Retrieved 18 May, 2021, from https://www.weforum.org/agenda/2021/04/open-banking-future-of-finance/

Cohen, D., Lindvall, M., & Costa, P. (2004). An introduction to agile methods. *Adv. Comput., 62*(03), 1-66.

Covin, T. J., & Kilmann, R. H. (1990). Participant perceptions of positive and negative influences on large-scale change. *Group & Organization Studies, 15*(2), 233-248.

Cunha, M. P. E., Gomes, E., Mellahi, K., Miner, A. S., & Rego, A. (2020). Strategic agility through improvisational capabilities: Implications for a paradox-sensitive HRM. *Human Resource Management Review, 30*(11).

Currie, W. L., & Guah, M. W. (2007). Conflicting Institutional Logics: A national programme for IT in the organisational field of healthcare. *Journal of Information Technology, 22*(3), 235-247.

Das, T. (1995). Managing strategic flexibility: key to effective performance. *Journal of general management, 20*(3), 60-75.

Daugherty, P. J., & Pittman, P. H. (1995). Utilization of time-based strategies: creating distribution

flexibility/responsiveness. *International Journal of Operations & Production Management*.

de Bruin, T., Rosemann, M., Freeze, R., & Kulkarni, U. (2005). *Understanding the Main Phases of Developing a Maturity Assessment Model.* Paper presented at the 16th Australasian Conference on Information Systems (ACIS 2005), Sydney, Australia.

Dekleva, S., & Drehmer, D. (1997). Measuring Software Engineering Evolution: A Rasch Calibration. *Information Systems Research, 8*(1), 95-104.

DeLoach, J. (2004). The new risk imperative–an enterprise-wide approach. *Handbook of Business Strategy*.

Dikert, K., Paasivaara, M., & Lassenius, C. (2016). Challenges and success factors for large-scale agile transformations: A systematic literature review. *Journal Of Systems And Software, 119*, 87-108. doi: 10.1016/j.jss.2016.06.013

Dingsøyr, T., & Moe, N. B. (2013). Research challenges in large-scale agile software development. *ACM SIGSOFT Software Engineering Notes, 38*(5), 38-39.

Donaldson, L. (2001). *The Contingency Theory of Organizations*. Thousand Oaks: Sage.

Dubey, R., & Gunasekaran, A. (2015). Agile manufacturing: framework and its empirical validation. *The International Journal of Advanced Manufacturing Technology, 76*(9-12), 2147-2157.

Eck, D. J. (2018). Bootstrapping for multivariate linear regression models. *Statistics & Probability Letters, 134*, 141-149.

Eisenhardt, K. M. (1989). Building Theories from Case-Study Research. *Academy of Management Review, 14*(4), 532-550. doi: 10.2307/258557

Eisenhardt, K. M., & Martin, J. A. (2000). Dynamic capabilities: What are they? *Strategic Management Journal, 21*(10-11), 1105-1121.

Felipe, C. M., Roldan, J. L., & Leal-Rodriguez, A. L. (2017). Impact of Organizational Culture Values on Organizational Agility. *Sustainability, 9*(12).

Ferrier, W. J. (2001). Navigating the competitive landscape: The drivers and consequences of competitive aggressiveness. *Academy Of Management Journal, 44*(4), 858-877.

Fowler, M., & Highsmith, J. (2001). The agile manifesto. *Software Development, 9*(8), 28-35.

Fraser, P., Moultrie, J., & Gregory, M. (2002). *The Use of Maturity Models/Grids as a Tool in Assessing Product Development Capability.* Paper presented at the IEEE International Engineering Management Conference, 2002 (IEMC 2002), Cambridge, UK.

Galankashi, M. R., Helmi, S. A., Rahim, A. R. A., & Rafiei, F. M. (2019). Agility assessment in manufacturing companies. *Benchmarking: An International Journal*.

Gandomani, T. J., Zulzalil, H., & Nafchi, M. Z. (2015). Agile Transformation: A Multi-Dimensional Process. *Jurnal Teknologi, 77*(9).

Ganguly, A., Nilchiani, R., & Farr, J. V. (2009). Evaluating agility in corporate enterprises. *International Journal of Production Economics, 118*(2), 410-423. doi: 10.1016/j.ijpe.2008.12.009

Gardner, D. G., Cummings, L. L., Dunham, R. B., & Pierce, J. L. (1998). Single-Item Versus Multiple-Item Measurement Scales: An Empirical Comparison. *Educational and Psychological Measurement, 58*(6), 898-915. doi: 10.1177/0013164498058006003

Gregor, S., & Hevner, A. R. (2013). Positioning and Presenting Design Science Research for Maximum Impact. *MIS Quarterly, 37*(2), 337-355. doi: 10.25300/Misq/2013/37.2.01

Gunasekaran, A. (1999). Agile manufacturing: a framework for research and development. *International Journal of Production Economics, 62*(1-2), 87-105.

Gunsberg, D., Callow, B., Ryan, B., Suthers, J., Baker, P. A., & Richardson, J. (2018). Applying an organisational agility maturity model. *Journal of Organizational Change Management, 31*(6), 1315-1343. doi: 10.1108/jocm-10-2017-0398

Hair Jr, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a Silver Bullet. *Journal of Marketing Theory and Practice, 19*(2), 139-151.

Haki, K., Aier, S., & Winter, R. (2021). Studying Digital Initiatives: Applying Established Perspectives to Emerging Digital Phenomena. *AIS Transactions on Enterprise systems*.

Harsch, K., & Festing, M. (2020). Dynamic talent management capabilities and organizational agility-A qualitative exploration. *Human Resource Management, 59*(1), 43-61. doi: 10.1002/hrm.21972

Holmqvist, M., & Pessi, K. (2006). Agility through scenario development and continuous implementation: a global aftermarket logistics case. *European Journal of Information Systems, 15*(2), 146-158. doi: DOI 10.1057/palgrave.ejis.3000602

Horlach, B., & Drechsler, A. (2020). *It's Not Easy Being Agile: Unpacking Paradoxes in Agile Environments*. Paper presented at the International Conference on Agile Software Development, Cham. https://doi.org/10.1007/978-3-030-58858-8_19

Hovorka, D. S., & Larsen, K. R. (2006). Enabling agile adoption practices through network organizations. *European Journal of Information Systems, 15*(2), 159-168.

Izenman, A. J. (2008). Multivariate Regression *Modern Multivariate Statistical Techniques: Regression, Classification, and Manifold Learning* (pp. 159-194). New York, NY: Springer New York.

Jensen, J.-P. (2021). The Need for Resilience and Agility in Finance *The Digital Journey of Banking and Insurance, Volume I* (pp. 43-51): Springer.

Joachim, N., Beimborn, D., & Weitzel, T. (2011). *An Instrument for Measuring SOA Maturity*. Paper presented at the ICIS 2011, Shanghai. Retrieved from https://aisel.aisnet.org/icis2011/proceedings/breakthroughideas/3

Jones, L., Watson, B., Hobman, E., Bordia, P., Gallois, C., & Callan, V. J. (2008). Employee perceptions of organizational change: impact of hierarchical level.

Leadership & Organization Development Journal, *29*(4), 294-316.

Kanter, R., Stein, B., & Jick, T. (1992). The challenge of organizational change: How people experience it and manage it: New York City: The Free Press.

Kazanjian, R. K., & Drazin, R. (1989). An empirical test of a stage of growth progression model. *Management Science*, *35*(12), 1489-1503.

Kim, T. K. (2015). T test as a parametric statistic. *Korean journal of anesthesiology*, *68*(6), 540.

Kimberly, J. R. (1980). The life cycle analogy and the study of organizations: Introduction. *The organizational life cycle*, 1-17.

Klimenko, R., Winter, R., & Rohner, P. (2019). *Designing Capability Maturity Model for Agile Transformation Excellence.* Paper presented at the Proc. itAIS&MCIS 2019, Naples, italy. Retrieved from http://www.itais.org/ITAIS-MCIS2019_pub/ITAISandMCIS2019-pages/pdf/15.pdf

Kline, P. (1999). *Handbook of Psychological Testing* (2 ed.). London: Routledge.

Kumar, R., Singh, K., & Jain, S. K. (2021). Agility enhancement through agile manufacturing implementation: a case study. *The TQM Journal*.

Lahrmann, G., & Marx, F. (2010). *Systematization of Maturity Model Extensions.* Paper presented at the DESRIST 2010, St.Gallen. Lecture Notes in Computer Science, vol 6105. Springer, Berlin, Heidelberg.

Lahrmann, G., Marx, F., Mettler, T., Winter, R., & Wortmann, F. (2011). *Inductive Design of Maturity Models: Applying the Rasch Algorithm for Design Science Research.* Paper presented at the DESRIST 2011. Lecture Notes in Computer Science, vol 6629. Springer, Berlin, Heidelberg.

Lee, O. K., Sambamurthy, V., Lim, K. H., & Wei, K. K. (2015). How Does IT Ambidexterity Impact Organizational Agility? *Information Systems Research, 26*(2), 398-417. doi: 10.1287/isre.2015.0577

Lehn, K. (2018). Corporate Governance, Agility, and Survival. *International Journal of the Economics of Business, 25*(1), 65-72. doi: 10.1080/13571516.2017.1396661

Leybourn, E. (2019). The Business Agility Report: Raising the BAR (2nd Edition ed., pp. 24): Business Agility Institute.

Liang, H. G., Wang, N. A. X., Xue, Y. J., & Ge, S. L. (2017). Unraveling the Alignment Paradox: How Does Business-IT Alignment Shape Organizational Agility? *Information Systems Research, 28*(4), 863-879. doi: 10.1287/isre.2017.0711

Liermann, V. S. C. (2021). *The Digital Journey of Banking and Insurance, Volume I : Disruption and DNA*.

Lin, T. H. (2010). A comparison of multiple imputation with EM algorithm and MCMC method for quality of life missing data. *Quality & Quantity, 44*(2), 277-287.

Linacre, J. (1994). Sample size and item calibration stability. *Rasch Measurement Transactions, 7*, 328.

Linacre, J. M., & Wright, B. D. (1998). Bigsteps Rasch Software, Version 2.82. from http://www.winsteps.com/bigsteps.htm

Liu, H. M., & Yang, H. F. (2020). Network resource meets organizational agility Creating an idiosyncratic competitive advantage for SMEs. *Management Decision, 58*(1), 58-75. doi: 10.1108/Md-10-2017-1061

Lu, Y., & Ramamurthy, K. (2011). Understanding the Link between Information Technology Capability and Organizational Agility: An Empirical Examination. *MIS Quarterly, 35*(4), 931-954.

Ludlow, L. H., & Haley, S. M. (1995). Rasch model logits: Interpretation, use, and transformation. *Educational and Psychological Measurement, 55*(6), 967-975.

Ludlow, L. H., Haley, S. M., & Gans, B. M. (1992). A hierarchical model of functional performance in rehabilitation medicine: the Tufts assessment of motor performance. *Evaluation & the Health Professions, 15*(1), 59-74.

Luthans, B. C., & Sommer, S. M. (1999). The impact of downsizing on workplace attitudes: Differing reactions of managers and staff in a health care organization. *Group & Organization Management, 24*(1), 46-70.

Maull, R. S., Tranfield, D. R., & Maull, W. (2003). Factors Characterising the Maturity of BPR Programmes. *International Journal of Operations & Production Management, 23*(6), 596-624.

McLeod, S. (2019). What does effect size tell you. *Simply psychology*. Retrieved 22 May, 2021, from https://www.simplypsychology.org/effect-size.html

Meehan, S., & Dawson, C. (2002). Customer responsiveness: getting it fast and right through impatience and intolerance. *Business Strategy Review, 13*(4), 26-37.

Mettler, T. (2011). Maturity Assessment Models: A Design Science Research Approach. *International Journal of Society Systems Science, 3*(1/2), 81-98.

Mettler, T., & Rohner, P. (2009). *Situational Maturity Models as Instrumental Artifacts for Organizational Design.* Paper presented at the 4th International Conference on Design Science Research in Information Systems and Technology (DESRIST 2009), Philadelphia, PA. Retrieved from http://doi.acm.org/10.1145/1555619.1555649

Miles, M. B., Huberman, A. M., & Saldana, J. (2013). *Qualitative Data Analysis: A Methods Sourcebook* (3rd edition ed.). Thousand Oaks, Californinia: Sage Publications Ltd.

Moschogianni, G. (2021). Combined effects of self tuning model and innovation Capability on digital innovation: A study of German pharmaceutical firm. *Journal of Digitovation and information system, 1*(1), 15-27.

Narasimhan, R., Swink, M., & Kim, S. W. (2006). Disentangling leanness and agility: an empirical investigation. *Journal of Operations Management, 24*(5), 440-457.

Nejatian, M., Zarei, M. H., Nejati, M., & Zanjirchi, S. M. (2018). A hybrid approach to achieve organizational agility: An empirical study of a food company. *Benchmarking-an*

International Journal, 25(1), 201-234. doi: 10.1108/Bij-09-2016-0147

Nonaka, I. (1994). A Dynamic Theory of Organizational Knowledge Creation. *Organization Science: A Journal of the Institute of Management Sciences, 5*(1), 14-37.

Nonaka, I., & Toyama, R. (2005). The theory of the knowledge-creating firm: subjectivity, objectivity and synthesis. *Industrial and Corporate Change, 14*(3), 419-436.

Nonaka, I., Von Krogh, G., & Voelpel, S. (2006). Organizational knowledge creation theory: Evolutionary paths and future advances. *Organization Studies, 27*(8), 1179-1208.

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). New York: McGraw-Hill.

Nurdiani, I., Börstler, J., Fricker, S., Petersen, K., & Chatzipetrou, P. (2019). Understanding the order of agile practice introduction: Comparing agile maturity models and practitioners' experience. *Journal Of Systems And Software, 156*, 1-20.

OECD. (2012). PISA Technical Report. Retrieved 19 May, 2021, from https://www.oecd.org/pisa/pisaproducts/PISA-2012-technical-report-final.pdf

Paasivaara, M., Lassenius, C., Heikkilä, V. T., Dikert, K., & Engblom, C. (2013). *Integrating global sites into the lean and agile transformation at ericsson.* Paper presented at the 2013 IEEE 8th International Conference on Global Software Engineering, Bari, Italy.

Packlick, J. (2007). *The agile maturity map a goal oriented approach to agile improvement.* Paper presented at the Agile 2007 (AGILE 2007), Washington, DC, USA.

Panda, S., & Rath, S. K. (2018a). Modelling the Relationship Between Information Technology Infrastructure and Organizational Agility: A Study in the Context of India. *Global Business Review, 19*(2), 424-438. doi: 10.1177/0972150917713545

Panda, S., & Rath, S. K. (2018b). Strategic IT-business alignment and organizational agility: from a developing country perspective. *Journal of Asia Business Studies, 12*(4), 422-440. doi: 10.1108/Jabs-10-2016-0132

Park, Y., El Sawy, O. A., & Fiss, P. C. (2017). The Role of Business Intelligence and Communication Technologies in Organizational Agility: A Configurational Approach. *Journal of the Association for Information Systems, 18*(9), 648-686.

Paulk, M. C., Curtis, B., Chrissis, M. B., & Weber, C. V. (1993). Capability Maturity Model, Version 1.1. *IEEE Software, 10*(4), 18-27.

Pavlou, P. A., & El Sawy, O. A. (2010). The "Third Hand": IT-Enabled Competitive Advantage in Turbulence Through Improvisational Capabilities. *Information Systems Research, 21*(3), 443-471.

Peffers, K., Tuunanen, T., Rothenberger, M., & Chatterjee, S. (2007). A Design Science Research Methodology for Information Systems Research. *Journal of Management Information Systems, 24*(3), 45-77.

Pfeffer, J., & Sutton, R. I. (1999). Knowing "What" To do is not enough: Turning knowledge into action. *California Management Review, 42*(1), 83-108.

Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common Method Biases in Behavioral Research - A Critical Review of the Literature and Recommended Remedies. *Journal of applied psychology, 88*(5), 879-903.

Pöppelbuß, J., & Röglinger, M. (2011). *What Makes a Useful Maturity Model? A Framework of General Design Principles for Maturity Models and Its Demonstration in Business Process Management.* Paper presented at the European Conference on Information Systems (ECIS), Helsinki, Finland.

Pugh, D. S., & Hickson, D. J. (1976). *Organizational structure in its context: The Aston Programme I* (Vol. 1): Lexington Books.

Qosasi, A., Permana, E., Muftiadi, A., Purnomo, M., & Maulina, E. (2019). Building SMEs' Competitive Advantage and the Organizational Agility of Apparel Retailers in Indonesia: The role of ICT as an Initial Trigger. *Gadjah Mada International Journal of Business, 21*(1), 69-91. doi: 10.22146/gamaijb.39001

Quinn, R. E., & Cameron, K. S. (1983). Organizational life cycles and shifting criteria of effectiveness: Some preliminary evidence. *Management Science, 29*(1), 33-51.

Raber, D., Epple, J., Rothenberger, M., & Winter, R. (2016). *Closing the Loop: Evaluating a Measurement Instrument for Maturity Model Design.* Paper presented at the 49th Hawaii International Conference on System Sciences (HICSS), Koloa, HI, USA. Retrieved from

http://conferences.computer.org/hicss/2016/content/papers/5670e444.pdf#page=1

Raber, D., Winter, R., & Wortmann, F. (2012). *Using Quantitative Analyses to Construct a Capability Maturity Model for Business Intelligence.* Paper presented at the 45th Hawaii International Conference on System Sciences (HICSS), Maui, HI, USA. Retrieved from doi 10.1109/hicss.2012.630

Raber, D., Wortmann, F., & Winter, R. (2013a). *Situational Business Intelligence Maturity Models: An Exploratory Analysis.* Paper presented at the 46th Hawaii International Conference on System Sciences (HICSS), Wailea, HI, USA. Retrieved from doi 10.1109/hicss.2013.483

Raber, D., Wortmann, F., & Winter, R. (2013b). *Towards the Measurement of Business Intelligence Maturity.* Paper presented at the European Conference on Information Systems 2013, Utrecht.

Rai, V. K. (2016). Run the Business/Change the Business: What delivery excellence has to do with it? *Future Trends in Project, Programme and Portfolio Management 2016*.

Rasch, G. (1960). *Studies in mathematical psychology: I. Probabilistic models for some intelligence and attainment tests*: Nielsen & Lydiche.

Ravichandran, T. (2018). Exploring the relationships between IT competence, innovation capacity and organizational agility. *Journal of Strategic Information Systems, 27*(1), 22-42. doi: 10.1016/j.jsis.2017.07.002

Reginaldo, F., & Santos, G. (2020). *Challenges in Agile Transformation Journey: A Qualitative Study.* Paper presented at the Proceedings of the 34th Brazilian Symposium on Software Engineering.

Rosemann, M., & De Bruin, T. (2005). *Towards a Business Process Management Maturity Model.* Paper presented at the Thirteenth European Conference On Information Systems (ECIS 2005), Regensburg.

Rubin, D. B. (1987). *Statistical analysis with missing data*: Wiley.

Salo, O., & Abrahamsson, P. (2008). Agile methods in European embedded software development organisations: a survey on the actual use and usefulness of Extreme Programming and Scrum. *IET software, 2*(1), 58-64.

Sambamurthy, V., Bharadwaj, A., & Grover, V. (2003). Shaping Agility through Digital Options: Reconceptualizing the Role of Information Technology in Contemporary Firms. *MIS Quarterly, 27*(2), 237-263.

Santos Bernardes, E., & Hanna, M. D. (2009). A theoretical review of flexibility, agility and responsiveness in the operations management literature. *International Journal of Operations & Production Management, 29*(1), 30-53.

Senapathi, M., & Srinivasan, A. (2012). Understanding post-adoptive agile usage: An exploratory cross-case analysis. *Journal Of Systems And Software, 85*(6), 1255-1268.

Shakhour, N. H. T., Obeidat, B. Y., Jaradat, M. O., & Alshurideh, M. (2021). AGILE-MINDED ORGANIZATIONAL EXCELLENCE: EMPIRICAL INVESTIGATION. *Academy of Strategic Management Journal, 20*, 1-25.

Sidky, A., Arthur, J., & Bohner, S. (2007). A disciplined approach to adopting agile practices: the agile adoption framework. *Innovations in systems and software engineering, 3*(3), 203-216.

Simon, H. A. (1969). *The Sciences of the Artificial*. Cambridge, MA: MIT Press.

Sinharay, S., Stern, H. S., & Russell, D. (2001). The use of multiple imputation for the analysis of missing data. *Psychological Methods, 6*(4), 317.

Sommer, A. F. (2019). Agile Transformation at LEGO Group: Implementing Agile methods in multiple departments changed not only processes but also employees' behavior and mindset. *Research-Technology Management, 62*(5), 20-29.

Stachowiak, A., & Oleśków-Szłapka, J. (2018). Agility capability maturity framework. *Procedia Manufacturing, 17*, 603-610.

Storey, J., Emberson, C., & Reade, D. (2005). The barriers to customer responsive supply chain management. *International Journal of Operations & Production Management*.

Suresh, M., Roobaswathiny, A., & Lakshmi Priyadarsini, S. (2021). A study on the factors that influence the agility of COVID-19 hospitals. *International Journal of Healthcare Management, 14*(1), 290-299.

Tallon, P. P., & Pinsonneault, A. (2011). Competing Perspectives on the Link Between Strategic Information Technology Alignment and Organizational Agility: Insights from a Mediation Model. *MIS Quarterly, 35*(2), 463-486.

Tallon, P. P., Queiroz, M., Coltman, T., & Sharma, R. (2019). Information technology and the search for organizational agility: A systematic review with future research possibilities. *Journal of Strategic Information Systems, 28*(2), 218-237. doi: 10.1016/j.jsis.2018.12.002

Teece, D., Peteraf, M., & Leih, S. (2016). Dynamic Capabilities and Organizational Agility. *California Management Review, 58*(4), 13-35. doi: 10.1525/cmr.2016.58.4.13

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic Capabilities and Strategic Management. *Strategic Management Journal, 18*(7), 509-533. doi: https://doi.org/10.1002/(SICI)1097-0266(199708)18:7<509::AID-SMJ882>3.0.CO;2-Z

Theodore, W., Kasali, R., Balqiah, T. E., & Sudhartio, L. (2021). The effects of task environment and organizational agility on perceived managerial discretion and strategy implementation in a pharmaceutical company. *International Journal of Pharmaceutical and Healthcare Marketing*.

Tumbas, S., Berente, N., & vom Brocke, J. (2017). *Born Digital: Growth Trajectories of Entrepreneurial Organizations Spanning Institutional Fields.* Paper presented at the 38th International Conference on Information Systems (ICIS), Seoul, Korea.

Turetken, O., Stojanov, I., & Trienekens, J. J. (2017). Assessing the adoption level of scaled agile development: a maturity model for Scaled Agile Framework. *Journal of software: Evolution and Process, 29*(6).

van Manen, H., & van Vliet, H. (2014). Organization-Wide Agile Expansion Requires an Organization-Wide Agile

Mindset. *Product-Focused Software Process Improvement, Profes 2014, 8892*, 48-62.

Van Oosterhout, M., Waarts, E., & van Hillegersberg, J. (2006). Change factors requiring agility and implications for IT. *European Journal of Information Systems, 15*(2), 132-145.

Walter, A.-T. (2021). Organizational agility: ill-defined and somewhat confusing? A systematic literature review and conceptualization. *Management Review Quarterly, 71*(2), 343-391. doi: 10.1007/s11301-020-00186-6

Warner, K. S. R., & Wager, M. (2019). Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal. *Long Range Planning, 52*(3), 326-349. doi: 10.1016/j.lrp.2018.12.001

Webster, J., & Watson, R. T. (2002). Analyzing the Past to Prepare for the Future: Writing a Literature Review. *MIS Quarterly, 26*(2), 13-23.

Weisberg, S. (2005). *Applied linear regression* (Vol. 528): John Wiley & Sons.

Wendler, R. (2014). Development of the Organizational Agility Maturity Model *Federated Conference on Computer Science and Information Systems, 2014* (Vol. 2, pp. 1197-1206). New York: Ieee.

Williams, C. K., & Karahanna, E. (2013). Causal Explanation in the Coordinating Process: A Critical Realist Case Study of Federated IT Governance Structures. *MIS Quarterly, 37*(3), 933-964.

Winter, R., & Aier, S. (2020). Designing Evolution Paths for Enterprise-wide Information Systems. In J. vom Brocke,

A. R. Hevner, & A. Mädche (Eds.), *Design Science Research. Cases* (pp. 75-104): Springer International Publishing.

Wright, B. D., & Douglas, G. A. (1975). *Best test design and self-tailored testing*: Statistical Laboratory, Department of Education, University of Chicago.

Wright, B. D., & Stone, M. H. (1979). *Best test design*. Chicago, IL: MESA Press.

Yang, C., & Liu, H. M. (2012). Boosting firm performance via enterprise agility and network structure. *Management Decision, 50*(6), 1022-1044. doi: 10.1108/00251741211238319

Yin, A., Figueiredo, S., & da Silva, M. M. (2011). *Scrum maturity model.* Paper presented at the International Conference on Software Engineering Advances (ICSEA), Barcelona, Spain.

Yin, R. K. (2009). *Case Study Research: Design and Methods* (4th ed.). Los Angeles: Sage Publications.

Zaheer, A., & Zaheer, S. (1997). Catching the wave: Alertness, responsiveness, and market influence in global electronic networks. *Management Science, 43*(11), 1493-1509.

Zhang, Z., & Sharifi, H. (2000). A methodology for achieving agility in manufacturing organisations. *International Journal of Operations & Production Management, 20*(4), 496-512.

Appendix A

Corporate Agility Capabilities and Measurement Items (Questionnaire)

Dim	Capabilities	Measurement items	As is / To be	Measurement scale (from 1 to 7).
1. INNOVATION-DRIVEN CORPORATE STRATEGY	1.1. Continuous revising of Corporate Strategy	1.1. Frequency of strategic plan re-development and re-evaluation.		1 - not on a regular basis (e.g., once in 10 years) 7 - very often (e.g., annually)
	1.2. Predicting far-future changes	1.2. Intensity of discussions about possible far-future challenges		1 - Far-future scenarios are rarely discussed on a corporate level. 7 - Constantly trying to define far-future changes in the environment (incl. analyzing assumptions, prerequisites and dependencies).
	1.3. Testing new business ideas or models	1.3. Degree of collaboration with innovative start-ups		1 - No attempts to test new technology/business models. 7 - Extensive collaboration with start-ups, incl. testing new disruptive ideas, launching hackathons, etc.
	1.4. Integrating new business ideas/models into organization	1.4. Extent to which old and new business models can co-exist		1 - There is no mechanism of integrating a new business model into the system without disrupting the business. 7 - Management team is capable of orchestrating various business models (allowing new business model run in parallel with existing business model).
	1.5. Striving for continuous improvement	1.5. Extent to which change initiatives are promoted by top management.		1 – Top management is hesitant to implement any changes. 7 – Top management calls for absolute commitment for change initiatives and highly prioritizes these initiatives in the Corporate Strategy.

Dim	Capabilities	Measurement items	As is / To be	Measurement scale (from 1 to 7).
	1.6. Prioritizing innovation portfolio	1.6. Degree to which the value of the innovation project portfolio is optimized.		1 - Portfolio is poorly optimized resulting in strategically important innovation projects being suppressed. 7 - Investments are optimally balanced with risk, rewards (e.g., EBIT), 'newness' of product/technology.
	1.7. Promoting enterprise-wide digitalization	1.7. Extent to which digital initiatives are prioritized in corporate strategy		1 - The importance of digital initiative is not reflected in the corporate strategy. 7 - Digital initiatives are described as a core part of Corporate Strategy with specifically allocated position responsible for digitalization.
	1.8. Integrating into business Ecosystem	1.8. Degree of integration with other partners in business ecosystem		1 - No integration on a process or technical level between the organization and other partners in business ecosystem. 7 - Full integration with partners in business ecosystem, the cooperation framework is clearly defined and regulated.
2. INFORMATION TECHNOLOGY	2.1. Flexible IT architecture	2.1. Extent to which IT infrastructure can be modified (modularity).		1 - IT System components are tightly coupled, modifications are painful or not possible. 7 - Highly modular IT system that allows to effortlessly add, modify, and remove any components.
	2.2. Keeping IT infrastructure up-to-date	2.2. The degree to which current IT infrastructure is modernized and up-to-date.		1 - Existing legacy systems that can't be updated. The hardware or operating systems regularly fail. 7 - Current IT infrastructure is modernized and fully up-to-date.
	2.3. Dynamic scalability enhancement	2.3. Extent to which all data and applications are hosted in the cloud.		1 - No cloud solutions are available. 7 - Cloud-based data and applications hosting for all workloads. Immediate access to IT infrastructure from public/private cloud services (e.g. XaaS).

Dim	Capabilities	Measurement items	As is / To be	Measurement scale (from 1 to 7).
	2.4. Building customer-experience APIs at scale	2.4. Prevalence of services provided through customer-facing APIs.		1 - There are no services available for external consumption through Public APIs. 7 - All customer journeys are covered with customer-facing APIs.
	2.5. Integrating Big Data analytics with BI systems	2.5. Degree of integration between BI tools and Big Data Analytics.		1 - BI tools and Big Data Analytics are not integrated. 7 - Real-time Big Data is fully integrated with self-Service BI tools.
3. HUMAN RESOURCES AND ORGANIZATIONAL STRUCTURE	3.1. Fostering future-driven skills and competences	3.1. Degree to which personnel's skills and competences are developed based on far-future requirements.		1 – On-call approach: personnel's skills are developed based on the current project requirements. 7 – Organization actively improves personnel's capabilities based on future scenarios and predicted demand of certain skills and competences.
	3.2. Failure-tolerant mindset	3.2. Tolerance for failure		1 - The organization is not tolerant of early failure, financing is likely to be liquidated prematurely upon initial unsatisfactory progress. 7 - Exceptional tolerance for failure, motivating and nurturing innovation regardless of unsatisfactory progress.
	3.3. Knowledge sharing	3.3. Degree of knowledge transparency within the organization		1 - Employees (incl. Top management) block the knowledge sharing across the teams or expect some favor in return of sharing information. 7 - Top Management rewards and encourages employees who share their knowledge. There is transparent and proactive communication of failed projects and lessons learned.

Dim	Capabilities	Measurement items	As is / To be	Measurement scale (from 1 to 7).
	3.4. Virtual collaboration	3.4. Extent to which employees are using virtual collaborative ways of working		1 - All meetings are conducted face-to-face on site. No virtual chat rooms are organized. 7 - Networked / virtual collaborative ways of working are widely implemented throughout the organization.
	3.5. Constantly evolving organizational structure	3.5. Flexibility of organizational structure and governance		1 - Overall hierarchical organizational structure with isolated departments, steering committees, and project managers. 7 - Traditional hierarchy is replaced with an Agile organizational model that constantly evolves through formation of ‘Squads’, ‘Chapters’, and 'Tribes'.
4. LEADERSHIP / TOP MANAGEMENT	4.1. Purpose-driven leadership	4.1. Degree to which employees are motivated by the purpose.		1 - There is no united purpose for employees to focus on. 7 - Employees demonstrate their unquenchable desire to win, sharing their determination to achieve goals.
	4.2. Experienced leadership of Agile Transformation	4.2. Extent to which experienced Agile transformation specialists are sufficiently represented in the organization.		1 - The organization does not have specialists with previous Agile transformation experience. 7 - Organization has sufficient amount of Agile transformation professionals with rich experience of organizational change.
	4.3. Measuring Corporate Agility performance (KPIs)	4.3. Frequency of measuring Corporate Agility through KPIs		1 - There are no initiatives to measure the effect of being Agile on a corporate level. 7 - Agility performance of the organization is frequently assessed via KPIs and discussed on a corporate level.

Dim	Capabilities	Measurement items	As is / To be	Measurement scale (from 1 to 7).
	4.4. Delegating tasks to self-organized teams	4.4. Maturity of delegation practices aimed to develop self-organized teams.		1 - Teams have no decision in distributing roles and responsibilities, all tasks are directed and controlled from the top. 7 - A progressive delegation process is in place to assure gradual and intentional development of self-organized teams.
	4.5. Defining relevant KPIs for Corporate Agility	4.5. Extent to which the company has clear KPIs to measure agility on a corporate level.		1 - There are no KPIs available to measure the enterprise-wide agility. 7 - Direct measurements and KPIs for Corporate Agility are clearly formulated and defined.
	4.6. Scaling lean and agile practices	4.6. Degree to which organization has integrated lean and Agile practices (e.g., SAFe, LeSS, DAD, Nexus, etc.).		1 - Organization has a highly regimented waterfall environment and is at the very beginning of implementation. 7 - There is a fully-adopted enterprise-wide framework (e.g., SAFe, LeSS, DAD, Nexus, etc.) that connects all layers of organization in Agile manner.
	5.1. Consolidating customer data	5.1. Degree to which the customer data is consolidated.		1 – There is no consolidated customer view, no understanding of what potential customers may really want/need. 7 – Big Data Analytics consolidates detailed customer's data and provides sufficient insight into customers' behavior.
	5.2. Customer engagement	5.2. Intensity of collaboration between customers (B2C or B2B) and product development team.		1 - There is limited to no collaboration with customers regarding product development. 7 - Customers are actively engaged in the creation of innovative products

Dim	Capabilities	Measurement items	As is / To be	Measurement scale (from 1 to 7).
5. CUSTOMER-CENTERED PRODUCT DEVELOPMENT	5.3. Iterative software development	5.3. Degree to which software development process is iterative.		1 - Software development follows single step approach (e.g., Waterfall). 7 - Software development follows well-established Agile ceremonies with vigorously involved product team (incl. Product owner) and potential users.
	5.4. Continuous software deployment	5.4. Degree to which software deployment is automated.		1 - Code changes are reviewed and verified manually, which involves the developing team moving an iteration along a predefined pipeline to the operations team. 7 - Full end to end, automated software deployment through cloud automation. Teams can immediately respond and deploy responses to customer feedback.
	5.5. Utilizing customer data	5.5. Degree of data-driven personalization		1 - Available data is disorganized. Structuring and managing data is a big issue. Sales transactions lie 'buried' in a company's CRM and ERP systems. 7 - Big Data Analytics is applied to analyze data and to offer highly individualized services / products specifically tailored to customers' expectations and needs.
	5.6. Rapid scaling from prototype to product launch	5.6. Speed of moving from the prototype to market launch.		1 - A product launch is always late; it takes significant time until a final version is introduced to the market. 7 - Product/service is introduced early enough to catch the market window before competitors.

Corporate Agility Performance Indicators (Questionnaire)

Aspect	Measurement indicators	As is	Measurement scale
1. Strategic Prediction	Accuracy of predicting significant disturbances in the external environment (market fluctuation, disruptive competitor, new technology, etc.)		1 - The organization continuously fails to predict significant disturbances in the external environment due to a high degree of forecast error. 7 - Organization understands and predicts significant external disturbances with high accuracy. Effective 'early warning' helps management to prepare for upcoming events in advance.
2. Customer Satisfaction	Degree to which customers' changing needs are satisfied by organization's products and services		1 - Offered products and services do not solve customer's problems. The organization does not keep up with changing customer needs. 7 - Customers are fully satisfied with the products and services. The organization meets customer's changing requirements through early and continuous product delivery.
3. Independence from Suppliers	Switching cost of service providers and other suppliers		1 - High switching cost from existing service providers, long-term contracts with large penalties in case of cancellation. 7 - The organization can quickly switch service providers (suppliers) to avail of lower costs or better quality.
4. Business Model Reconfiguration	The ease with which organization can change its business model		1 - Organization takes significant amount of time to change its business model, thus making it unable to seize new opportunities. 7 - Organization can keep up easily with new innovative market entrants by swiftly adapting its business model.

Aspect	Measurement indicators	As is	Measurement scale
5. Business Strategy Reconfiguration	The ease with which organization can change its business strategy		1 - Organization takes significant amount of time to change its business strategy, thus making it unable to seize new opportunities. 7 - Organization can swiftly adapt a new business strategy to enter a new market or offer a new type of product/service.
6. Organizational Capabilities Reconfiguration	The ease with which organization can reconfigure its organizational capabilities.		1 - Organization takes significant amount of time to identify and develop new organizational capabilities, thus making it unable to seize new opportunities. 7 - Organization can swiftly develop new organizational capabilities beyond the normal level of flexibility.
7. Business Processes Reconfiguration	The ease with which organization can change business processes		1 - Organization takes significant amount of time to change its business processes, thus making it unable to seize new opportunities. 7 - Organization can swiftly change business processes beyond the normal level of flexibility.
8. Organizational Structure Reconfiguration	The ease with which organization can change organizational structure		1 - Organization takes significant amount of time to change its organizational structure, thus making it unable to seize new opportunities. 7 - Organization can swiftly change organizational structure beyond the normal level of flexibility.
9. Information Technology Reconfiguration	The ease with which organization can adopt new (IT) technology		1 - Organization does not keep up with new technologies. It takes significant amount of time to change IT infrastructure. 7 - Organization can swiftly re-design IT infrastructure and adopt new technology to seize the opportunity.

Appendix B

Semi-structured interview questions to qualitatively assess the Corporate Agility maturity in the organizations

The questionnaire is designed following the qualitative guide of Charbonnier-Voirin (2011):

1. How would you define organizational agility? Do you think your firm could be called agile? Why?
2. Scope of the application. To what organizational scope do your answers refer to (division, business unit, the whole organization)?
3. Strategic prediction (clarity of strategic vision)
   a) Do the decisions taken at your level (within the firm) seem to you to be based on a clear and precise definition of the company's strategy?
   b) Are the strategic objectives made explicit to all members of the organization? How often and by what means? Do you think your employees really understand these objectives?
4. Knowledge of competitors and response to their actions
   a) Do you have a dedicated function of watching/scanning the external environment to anticipate threats and opportunities?
   b) Does your firm know a lot about the current and potential competition?
   c) Does your firm seem to you to be ready to react quickly to competitor action (sales and prices, new products and services)?
5. Efficiency of the organization's response to change
   a) Does your firm seem able to understand changes coming from its environment rapidly (and to define an appropriate line of conduct)?
   b) Generally, in your company, is change considered as a threat or an opportunity?
   c) Do you think that your firm/its teams have the capacity to make rapid decisions? Why?
   d) Do the structure, processes and practices used seem suited to rapid decision making and implementation of action? Why?

6. Human Resources and Organizational Structure
   a) How would you describe your employees' power to make decisions?
   b) Is responsibility delegated in your firm? Why?
   c) Is it possible for employees to be involved in decisions made by the firm's directors? Are they encouraged to have their say about the choices made by the firm?
   d) What practices are used to develop employees' competencies?
   e) How are the employees' contributions to the firm's overall performance taken into account (performance management and recognition)?
   f) Which practices are implemented for a cross-functional cooperation and teamwork among employees? Is the information necessary for internal cooperation readily and easily available?
   g) Are firm's different units/departments able to cooperate in synergy with one another?
7. Customer-Centered Value Creation
   a) How would you measure the level of creativity and innovation established within the organization?
   b) Do you think that your firm clearly identified customers' expectations? Which practices are used to achieve this?
   c) Do you think that your firm is quick to detect developments in customers' expectations? How?
   d) Does your firm try to go beyond customer's expectations (for example by proposing completely new options)?
   e) Are clients involved in designing products and services?
   f) To what extent are the products and services customized and made to evolve? Or are they standardized? Why?
   g) How frequently are new products and services launched?
8. Information Technology
   a) How efficient/effective is Information Technology system in your organization (IT infrastructure, IT deployment, IT-Business synergy)?

Curriculum Vitae

Name	Roman Klimenko
Nationality	Russian Federation
Residence	St. Gallen, Switzerland

Education

2018-2021	**University of St. Gallen (HSG), Switzerland** Ph.D. Program in Management (Business Innovation)
2012-2013	**University of Warwick, United Kingdom** Master of Science (MSc) in Programme and Project Management
2010-2012	**Bauman Moscow State Technical University, Russia** Engineer, Computer Science and Engineering
2006-2010	**Bauman Moscow State Technical University, Russia** Bachelor of Engineering, Computer Science and Engineering

Professional Experience

2019-2021	**University of St. Gallen, Switzerland** Research Associate and PhD Candidate
2019-2019	**BEG & Partners AG, Switzerland** Project Manager
2014-2018	**University of Khon Kaen, Thailand** Lecturer, Head of Global Business division
2015-2016	**University of Kyorin, Japan** Visiting Lecturer
2011-2012	**Accenture, Russia** Business Analyst