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Chair of Information Systems,
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Towards a Maturity Model to Measure Organizational Agility in the Software and IT Services Industry

by

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DOCTORAL DISSERTATION

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Preface

During my research activities on organizational agility, I have confronted mainly two different kinds of reactions from both researchers and practitioners. Many people were very interested in the topic, and supported the importance of agility for today's organizations, particularly in the software and IT services industry. However, in a considerable number of cases, people showed disapproving and pejorative reactions, calling agility nothing more than a "buzzword" and "hype" that does not provide benefits to organizations.

Although a controversial discourse is rather normal and helpful for further development of any research topic, these two opposite and hardly compatible viewpoints underscore a central aspect regarding organizational agility: while some organizations successfully benefit from the transition to an agile organization, others heavily struggle with the changes accompanied by this transition. This situation led me to the proposition that perhaps not every organization is "mature" enough to benefit from organizational agility. This idea has been further underscored by the observation that some organizations manage to become agile only in specific parts or teams, and are not able to transfer agility to every organizational level.

With this proposition in mind, I examined the topic of organizational agility from various viewpoints during the last four years, resulting in a new perspective on the dimensions of organizational agility. Those dimensions finally formed the basis of a maturity model that enables organizations in the software and IT services industry to assess their level of organizational agility and to plan further improvements. The data collected and analyzed, the discussions held, and the results obtained during this process form the present doctoral dissertation, which consists of five research papers that build upon each other.

Acknowledgments

I would like to use this opportunity to thank all who supported me in my research during the last four years. First I would like to thank my supervisor, Prof. Dr. Susanne Strahringer, for her constructive and valuable feedback on my work, my publications, and any related matter as well as the offered flexibility and leeway that gave me the opportunity to follow and cultivate my ideas regarding the topic of organizational agility. Furthermore, I thank Prof. Dr. Werner Esswein for the preparation of a second opinion to this doctoral dissertation and his numerous hints and suggestions to improve my work. I also thank Prof. Dr. Andreas Hilbert for his feedback and tips regarding the quantitative analysis of the collected data. In addition, I am very thankful to my colleagues, particularly Dr. André Gräning, Christian Leyh, and Klaus Wölfel for the countless discussions and conversations during our day-to-day work that often opened new perspectives on the topic and helped to generate new ideas.

Many thanks go to my family, particularly my partner Rosi Müller. She always showed patience regarding my research that filled many weekends and evenings, and always found some encouraging words if not everything worked as planned. Finally, I also thank my parents, Cornelia and Matthias Leibe, who always supported my aims and strengthened my intention to complete successfully an academic education from the very beginning.

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1 Motivation

Agility, especially organizational agility, is an essential concept for organizations in today's competitive and fast-changing market environment (Bessant, Knowles, Briffa, & Francis, 2002; Goodhue, Chen, Claude, Davis, & Cochran, 2009). It enables an organization to adapt "rapidly, efficiently and accurately [. . .] to any unexpected (or unpredictable) change" (Ganguly, Nilchiani, & Farr, 2009, p. 411). These changes are often driven by the customer, but can also be driven by competitors, markets, technological and social issues, or the business itself, and can be tackled only by the successful exploration of all internal competitive bases (Ganguly et al., 2009; Yusuf, Sarhadi, & Gunasekaran, 1999). It becomes clear that change is a key aspect of agility. An agile organization not only reacts to changes that are already visible but also anticipates change proactively, learns from change by improving itself, and even creates change while contributing to customer value (Conboy, 2009).

The considerations above underscore the special importance of organizational agility for the software and IT services industry (Tallon & Pinsonneault, 2011). This industry in particular is faced with an environment of rapid technological changes that are accompanied by an equal amount of change in customers' expectations and requirements. In addition, the fact that software and IT have become essential components of many other products, such as consumer electronics and automotive products, has intensified the competitive pressure (Petersen & Wohlin, 2009).

The current situation in the software and IT services industry is comparable with that of the manufacturing industry in the early 1990s (Kettunen, 2009). That time was characterized by an accelerated and more aggressive competitive environment due to rapid technological change, the exploration of new markets, globalization, and shorter product life cycles (Volberda, 1996). It was at that time that the so-called "Lehigh Report" (Iacocca Institute, 1991) was published, recommending the agile manufacturing paradigm and the transition to agile organizations in order to stay competitive (Yusuf et al., 1999). These characteristics are now also prevalent in the software and IT services industry, and an enhanced "maneuverability" enabled by organizational agility is essential to establish efficient and flexible structures to improve communication, collaboration, and decision processes (Cockburn, 2007; Sarker & Sarker, 2009).

However, despite increasing awareness that organizational agility is a key concept in coping with these challenges, the term "agility" is nowadays often inflated by many organizations without reasonable seriousness. Agility cannot simply be put into practice, because managing the transition to an agile organization is a complex and strategic task. The management of an organization has to

understand that the organization itself cannot be agile, yet its employees can be. Nevertheless, people are not independent of their environment, and they have to share the appropriate skills to work under agile conditions and with suitable technologies (Breu, Hemingway, Strathern, & Bridger, 2001; Seo & La Paz, 2008). Hence, the path to an agile organization is a development process that affects all parts of an organization, such as workforce, organizational structures, processes, technologies, and the overall organizational culture (Goldman, Nagel, & Preiss, 1995; Kettunen, 2009).

Although a lot of research regarding agility has been conducted during the last few decades, a clearly defined framework for explaining agility from an organizational perspective still does not exist (Sherehiy, Karwowski, & Layer, 2007). This is indeed surprising. In contrast, a comprehensive body of knowledge exists in the agile manufacturing domain (see for instance the literature reviews of Sherehiy et al., 2007 and Vázquez-Bustelo, Avella, & Fernández, 2007). In the domain of agile software development, which is much more related to the industry under consideration, agility has been a heavily discussed topic, particularly after the publication of the "Agile Manifesto" (Beck et al., 2001).

However, current research activities about agile software development strongly focus on the methods used by single development teams (see for instance Chan & Thong, 2009 or Dybå & Dingsøyr, 2008). Thus, an organizational point of view is often missing, although some studies show that incompatibilities may occur between agile methods and organizational culture, so managers have to understand and take into account the organizational context to benefit from the usage of agile methods (Chan & Thong, 2009; Iivari & Iivari, 2011; Mangalaraj, Mahapatra, & Nerur, 2009; Nerur, Mahapatra, & Mangalaraj, 2005). The importance of this point of view is further underscored by the fact that most agile software development methods lack the support of other business needs (Abrahamsson, Warsta, Siponen, & Ronkainen, 2003). Therefore, a number of researchers have found that a holistic and organizational perspective on agility in the software and IT services industry is important but mostly lacking (Abrahamsson, Conboy, & Wang, 2009; Ågerfalk, Fitzgerald, & Slaughter, 2009).

This insufficient analysis of the organizational determinants and dimensions of agility results in a missing consensus about what truly determines an agile organization and what limits the applicability of research results in practice. In addition, the lack restricts the possibilities to develop useful assessment tools, as shown by most available approaches assessing organizational agility (an overview is given in Tseng & Lin, 2011). Often, these approaches are very specialized, for instance on market-related activities (Ganguly et al., 2009) or the supply chain (Weber, 2002). Hence, they suffer from an insufficient reflection of the whole organization with its interaction of people, structures, processes, and technologies, as outlined above. Others utilize relatively complex algorithms like the analytic hierarchy process (AHP) (Ren, Yusuf, & Burns, 2000) or fuzzy logic (Tseng & Lin, 2011; Tsourveloudis & Valavanis, 2002), which do not help the management to use the findings intuitively or ad hoc. In addition, although the available approaches are able to

determine the current state of agility, they normally do not support the management by suggesting further actions for improvement or development.

Therefore, the aim of this work is to develop an assessment tool for organizational agility that builds on a theoretically and empirically grounded structure of the dimensions of organizational agility (see section 2.2). This scientific grounding ensures that the the whole organization is represented comprehensively and that the tool is able to determine the current state of organizational agility as well as to give directions for further improvements.

The remainder of this synopsis is structured as follows: The research design of the doctoral dissertation stating the aims and research methods used is given in section 2. In section 3, the structure of the dissertation is described. It consists of five papers that build upon each other and it explains how they fit into the overall research design. The synopsis closes with a summary of the research results and the main contributions and implications in section 4.

2 Research Design

This section describes the research design of the dissertation by explicating the epistemological position of the author, the research aims, and the research methods used according to the framework of Becker, Holten, Knackstedt, and Niehaves (2003) (see figure 1). In addition, the dissertation is categorized according to the research concepts of Chmielewicz (1994).

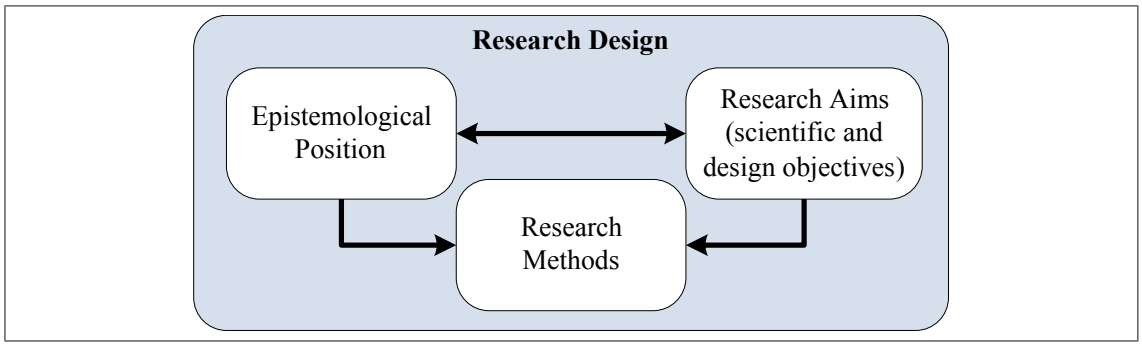

Figure 1: Elements of a research design (following Becker et al., 2003)

2.1 Epistemological Position

The dissertation is based on ontological realism and assumes the existence of an objective world (reality) that is independent from human consciousness. However, the ability to perceive this reality may vary, so the author follows an epistemological idealism supporting the position that access to reality is always affected by the subject. Hence, reality is not represented in the human mind but is constructed by the human mind. This combination of ontological realism and epistemological idealism is known as moderate constructivism (Schütte, 1999), which forms the basic position of the present dissertation.

Furthermore, this dissertation is based on the coherence theory of truth, which is supported by the consensus theory. As Frank points out, "the theories of truth do not mutually exclude one another," and a combination "can help with overcoming specific weaknesses and hence may contribute to a more appropriate, multi-perspective concept of truth" (2006, p. 15). Although consensus is a worthwhile aim, it is not suitable as a universal theory of truth on its own, because scientific results are usually accompanied by controversial discussions and opposing opinions (Rescher, 1993; Schütte, 1999). Hence, this dissertation primarily follows the coherence theory of truth,

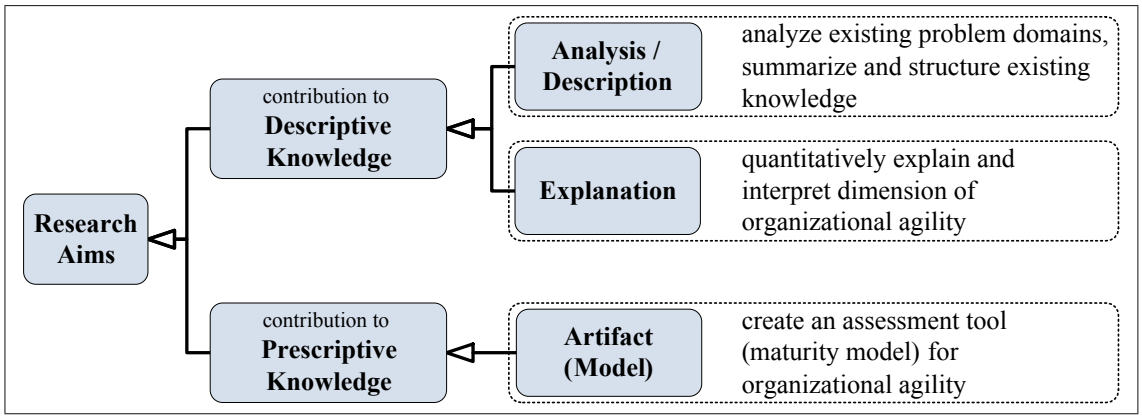

Figure 2: Research aims and knowledge contribution (following Gregor, 2006; Gregor & Hevner, 2013)

stating that new results must be coherent with an existing body of knowledge and must make sense in light of accepted wisdom (Frank, 2006).

2.2 Research Aims

Research aims in the field of Information Systems are generally distinguished into descriptive and design aims. Descriptive aims focus on understanding and describing observed phenomena, while design aims contain the development of innovative concepts and artifacts that are able to change existing phenomena or create new phenomena (Becker et al., 2003; Lange, 2005). This classification is consistent with the two types of useful knowledge in design science according to Gregor and Hevner (2013), namely descriptive knowledge and prescriptive knowledge. Descriptive knowledge can further be divided into analysis/description and explanation. Analysis/description-related aims state "what is" by analyzing and describing natural phenomena and their relationships to each other. Explanation-related aims state "what is, how, why, when, and where" by explaining the issues of interest with varying methods and views. However, there are normally no testable propositions, and explanation aims at promoting better understanding and insights (Gregor, 2006). Prescriptive knowledge consists of artifacts developed by humans, and normally forms constructs, models, methods, instantiations, and design theories (Gregor & Hevner, 2013; March & Smith, 1995).

As the motivation (see section 1) already indicated, multiple aspects are relevant to this work that contribute to both of the mentioned types of knowledge. Figure 2 shows the concrete aims for this work and assigns them to the areas of descriptive and prescriptive knowledge, respectively.

The study aims to contribute to descriptive knowledge by providing an understanding of the dimensions of organizational agility in the software and IT services industry and an understanding of the related problems that are discovered by organizations. The first sub-aim (analysis/description) is to summarize and structure existing knowledge about organizational agility. Regarding the second sub-aim (explanation), quantitative exploratory research was conducted on this body of knowl-

edge to identify the dimensions of organizational agility. This step also contributes to prescriptive knowledge by developing a maturity model as an assessment tool of organizational agility that is grounded in the descriptive knowledge findings.

According to these research aims, this doctoral dissertation is categorized as a technological research concept following Chmielewicz (1994). Technology in this context is a generalized yet application-focused, end-means system. It is based on theoretical assumptions, and attempts to translate theoretical effects into practical ends by designing causes as means as long as they are configurable (Chmielewicz, 1994). To fulfill this task, the aforementioned descriptive aims support the analysis and understanding of the underlying theoretical system of causes and effects. Likewise, the design aim focuses on the end-means system by developing the maturity model.

2.3 Research Methods

The here presented doctoral dissertation is based on a design science approach (Hevner, March, Park, & Ram, 2004; Österle et al., 2010; Peffers, Tuunanen, Rothenberger, & Chatterjee, 2007). Österle et al. (2010) declare that a typical design science project includes four basic phases: analysis, design, evaluation, and diffusion. As shown in section 2.2, this dissertation combines descriptive aims and design aims. Therefore, empirical and conceptual elements are utilized to fulfill appropriately both aspects of problem understanding and problem solving (Hevner et al., 2004; Niehaves & Stahl, 2006). This course of action is supported by the selection of a set of research methods that fit the specific requirements of the research phases (Frank, 2006). Particularly, the intensified utilization of empirical (exploratory) research methods within design-oriented research combines the strengths of both research streams of Information Systems (IS) and "Wirtschaftsinformatik" (WI), is useful to increase the accountability and foundation of the developed artifact, and underpins the design aim with additional descriptive aims (Riedl & Roithmayr, 2007; Schauer & Frank, 2007).

Hence, the focus lies on the analysis phase, which includes the identification and description of the business problem, the specification of research gaps, and the analysis of external factors affecting the problem (Österle et al., 2010). This phase is mainly reflected by the research aims focusing on analysis and description (see section 2.2) and put into practice by an exploratory case study showing that agile practices in software development may work in single teams but may cause obstacles at the organizational level, indicating that organizations have to reach a particular state of maturity before they can wield organizational agility. The case study approach is suitable to gain a deep qualitative understanding of the problems being investigated (Gable, 1994; Yin, 2009). Especially in the rapidly changing field of Information Systems, case studies offer the opportunity to deliver valuable insights into organizational behavior (Gable, 1994). Furthermore, the exploratory character of the research aim strengthens the applicability of a case study approach. To take advantage of the use of qualitative and quantitative data (Jick, 1979; Kaplan & Duchon,

1988; Yin, 2009), expert interviews and discussions as well as a web-based survey are combined for data collection.

Furthermore, a quantitative study was conducted to fulfill the research aims of explanation (see section 2.2) and garnering a detailed understanding of what makes an organization agile and what external and internal factors affect that agility. Prior to this study, a systematic review and comparison of agility-related frameworks delivered the conceptual basis for the empirical work. The survey was administered using a web-based approach and was limited to organizations that belong to the software and IT services industry. Due to the fact that agility should be assessed from an organizational point of view, the target group included general decision makers as well as IT-related decision makers, such as CEOs, CIOs, (IT-)Managers, and (IT-)Architects, because they are responsible for processes, structures, people, etc. and because they have the required strategic knowledge that allows an overall evaluation of the organization (Augier & Teece, 2009; Charbonnier-Voirin, 2011).

As a first step, the collected survey data is analyzed using exploratory factor analysis with the objective of summarizing the data and identifying the underlying latent factors that describe the structure of organizational agility. This approach is suitable in this context, since the abovementioned literature review did not deliver a useful a priori factor structure of dimensions and indicators (Hair, Black, Babin, & Anderson, 2014; Sharma, 1996).

To get another perspective on organizational agility that is independent of the factor analysis, a second approach has been chosen to identify a possible structure among the items. A suitable approach for exploratory research is the cluster analysis. In most cases, this method is used to group similar objects into homogeneous clusters. In the present case, a variable-oriented cluster analysis serves to identify items that are answered in a similar way among the respondents based on distance measures instead of correlations (Bacher, 1996; Everitt, 1993). Hence, the underlying assumptions of cluster analysis differ from factor analysis, and a similar result compared to the factor analysis is an additional indicator that the obtained structure does indeed underlie the data.

As another step within the analysis phase, a systematic mapping study about maturity models is conducted to search for available solutions (Hevner et al., 2004; Peffers et al., 2007) and to analyze research gaps in existing maturity models, which can be later addressed during the actual model development. Mapping studies are a suitable method for structuring a broad research field concerning research questions about contents, methods, and trends in the available publications (Kitchenham, Budgen, & Brereton, 2011; Petersen, Feldt, Mujtaba, & Mattsson, 2008).

The results and insights obtained within the analysis phase are then consolidated in the design and evaluation phases by developing a maturity model to assess organizational agility. These phases are reflected by the research aim focusing the artifact creation (see section 2.2). Here, it is important to justify the artifact as much as possible during its development (Hevner et al., 2004; Österle et al., 2010). The comprehensive design phase fulfills this requirement by grounding the

artifact in theory as well as in empirical data. Particularly, the underpinning of the conceptual development with empirical evidence in the initial design of the maturity model greatly enhances the model's quality and applicability from the very start.

During the evaluation phase, the focus lies on validating the designed artifact (Österle et al., 2010; Peffers et al., 2007). The collected survey data proved useful for this phase. A cluster analysis was carried out to identify different patterns of agile organizations. The cluster analysis utilized both hierarchical and non-hierarchical methods (particularly the Ward method and fuzzy clustering), and is based on the (sub-)dimensions of the maturity model as clustering variables and the Mahalanobis Distance due to the correlation inherent to the clustering variables (Hair et al., 2014; Kaufman & Rousseeuw, 2005). The obtained clusters are used afterwards for a first proof-of-concept evaluation by comparing them to the structure of the developed maturity model, resulting in an adjustment of the maturity levels.

Finally, the aim of the diffusion phase is to create the broadest diffusion possible among the target group (Hevner et al., 2004; Österle et al., 2010), which is ensured by publishing the research results in scientific journals, conference proceedings, and presentations (see tables 2 and 3 in the appendix).

3 Structure of the Doctoral Dissertation

This doctoral dissertation consists of this synopsis and five research papers that build upon each other. Each of the five papers makes unique contributions to the overall research aims while supporting the other papers. The structure, including the research phases and methods, is illustrated in figure 3. The five papers are published in academic journals and conferences. Hence, they are briefly outlined subsequently regarding their specific contents and their contributions to the doctoral dissertation and the original source of publication is given as reference.

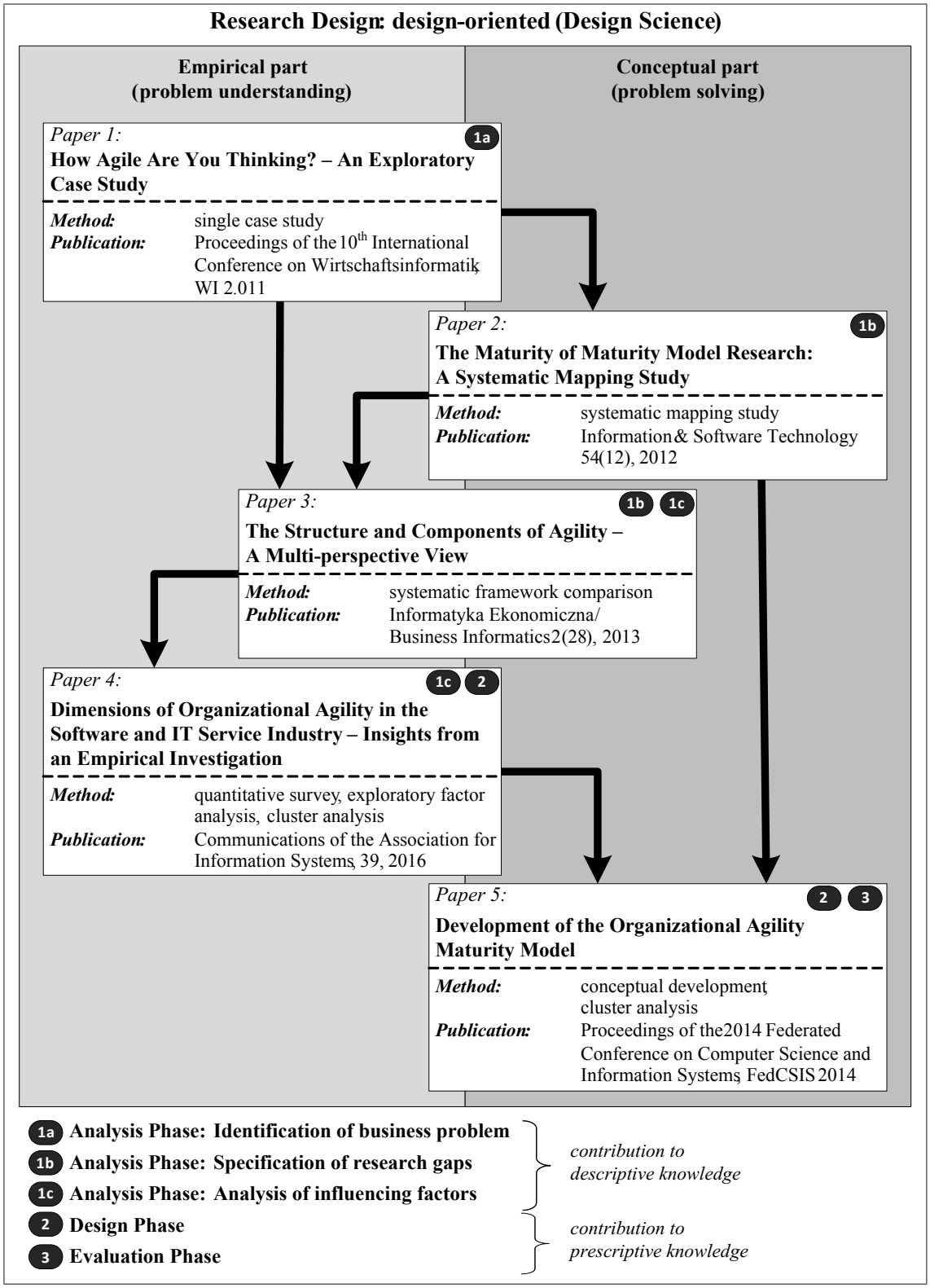

Figure 3: Structure of the doctoral dissertation

3.1 Paper 1: How Agile Are You Thinking? – An Exploratory Case Study

Title	*How Agile Are You Thinking? – An Exploratory Case Study*
Authors	Roy Wendler *roy.wendler@tu-dresden.de* André Gräning *andre.graening@tu-dresden.de*
Publication	Proceedings of the 10th International Conference on Wirtschaftsinformatik, WI 2.011, February 16-18, 2011, Zurich, Switzerland, 818-827
Available at	`http://aisel.aisnet.org/wi2011/33/` `https://files.ifi.uzh.ch/WI2011/Volume2_WI2011_Proceedings.pdf` (complete proceedings)

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Abstract Agile software development methods reduce project costs and development time by simultaneously enhancing quality. But despite these advantages, agile principles are rarely adopted by the whole organization. In order to gain a deeper understanding of this issue, we conducted an initial exploratory qualitative case study in one medium-sized company. The goal of this study was to find out whether this company is "thinking" agile or traditional. Although we discovered a tendency towards an agile way of thinking, we identified several factors where the way of thinking remained traditional among management as well as employees. Our study reveals that cost-related aspects, a lack of self-responsibility, uncertainty with customer interaction and the urge for comprehensive documentation are obstacles to adopting agile methods beyond the development team. Hence, the results of our study provide useful implications for research and practice by identifying critical problem domains when implementing agile methods at the organizational level.

Summary The paper *"How Agile Are You Thinking? – An Exploratory Case Study"* contains a single exploratory case study in a medium-sized software developing and consulting company to gather some first impressions as to why agile practices work on the team level yet are ineffective at an organizational level. This paper is part of the analysis phase, because it identifies the business problem and motivates the following research activities (see figure 3).

In the concrete situation of the case study, a development team used Scrum for the first time in a software development project. Despite the benefits they experienced, the team was not able to convince other project teams of this value and Scrum was not adopted or only partially adopted in the organization. Therefore, questions about the causes of this situation arose. The initial assumption prior to the study was that the ways of thinking (i.e., the attitudes, opinions, knowledge, etc.) when referring to agility and agile methods are different among several groups, particularly employees and decision makers, within an organization.

In order to gain a deeper understanding of this issue, the aim of this study is to identify "how agile" the staff of the company "is thinking." Particularly, the characteristics that lead to a more or less agile way of thinking in software development projects among project members, project managers, and other stakeholders within the organization are investigated. Likewise, potential obstacles that would cause employees or decision makers to show resistance against agile practices and therefore hinder their effective use and further adoption are identified.

Interestingly, the authors' assumption that the differing attitudes between decision makers and employees offer a possible explanation for the unsuccessful implementation of agile practices has to be revised. Only minor differences were observable in the way of thinking between different organizational roles. Although a tendency towards an agile way of thinking was discovered, several factors hindering the adoption of agile approaches were also identified. The study thus reveals that cost-related aspects, a lack of self-responsibility, uncertainty with the intensity of customer interaction and the urge for comprehensive documentation are obstacles to adopting agile methods beyond the development team.

Hence, the results of the study support the idea that organizations have to reach a particular state of maturity regarding agility before agile practices may benefit the whole organization. This idea is underscored by the identified critical problem domains when implementing agile methods at the organizational level, because these domains arise from aspects like organizational structure and culture or the skills and attitudes of employees and managers.

3.2 Paper 2: The Maturity of Maturity Model Research: A Systematic Mapping Study

Title	*The maturity of maturity model research: A systematic mapping study*
Author	Roy Wendler
	roy.wendler@tu-dresden.de
Publication	Information and Software Technology, 54(12), 2012, 1317-1339
Available at	`http://dx.doi.org/10.1016/j.infsof.2012.07.007`

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Abstract ***Context:*** Maturity models offer organizations a simple but effective possibility to measure the quality of their processes. Emerged out of software engineering, the application fields have widened and maturity model research is becoming more important. During the last two decades the publication amount steadily rose as well. Until today, no studies have been available summarizing the activities and results of the field of maturity model research.

Objective: The objective of this paper is to structure and analyze the available literature of the field of maturity model research to identify the state-of-the-art research as well as research gaps.

Method: A systematic mapping study was conducted. It included relevant publications of journals and IS conferences. Mapping studies are a suitable method for structuring a broad research field concerning research questions about contents, methods, and trends in the available publications.

Results: The mapping of 237 articles showed that current maturity model research is applicable to more than 20 domains, heavily dominated by software development and software engineering. The study revealed that most publications deal with the development of maturity models and empirical studies. Theoretical reflective publications are scarce. Furthermore, the relation between conceptual and design-oriented maturity model development was analyzed, indicating that there is still a gap in evaluating and validating developed maturity models. Finally, a comprehensive research framework was derived from the study results and implications for further research are given.

Conclusion: The mapping study delivers the first systematic summary of maturity model research. The categorization of available publications helps researchers gain an overview of the state-of-the-art research and current research gaps. The proposed research framework supports researchers categorizing their own projects. In addition, practitioners planning to use a maturity model may use the study as starting point to identify which maturity models are suitable for their domain and where limitations exist.

Summary The paper *"The Maturity of Maturity Model Research: A Systematic Mapping Study"* contributes to the analysis phase by conducting a systematic mapping study to structure and analyze the available literature of the field of maturity model research to search for existing solutions, to identify state-of-the-art research, and to reveal research gaps. With this scope, the paper supports the sub-aim of summarizing and structuring existing knowledge about maturity models (see figure 3).

The mapping of 237 scientific articles (journal and conference papers) shows that the current maturity model research is applicable to more than 20 domains, and is heavily dominated by software development and software engineering. However, it becomes obvious that organizational agility or agility in general has not been covered by the body of maturity model literature until today, so no applicable or suitable solution to the identified business problem is available.

The study furthermore analyzes the relation between conceptual and design-oriented maturity model development. The analysis revealed that purely conceptual designs outweigh design-oriented model developments, which has significant consequences for validation. Many maturity models suffer a lack of a proper validation of their structure and applicability and therefore of their usefulness. Additionally, when validation takes place, the study identifies a preference of qualitative validation methods, in particular case studies, which build up nearly the half of all used validation methods.

These results support the applicability of a design-oriented research design with a focus on the

analysis phase to gain a well justified solution early in the design phase (see section 2.3). Furthermore, the idea of utilizing a quantitative survey instrument to collect empirical data that can be used during the design phase is strengthened (see sections 3.3 and 3.4). In addition to confirming that there are no available solutions to the business problem, a comprehensive research framework was derived from the study results, integrating the principles of design science and maturity model research. This framework supports the classification of research projects regarding maturity models, and helps to identify critical issues for a successful maturity model development that enhances the quality of the final maturity model (see section 3.5).

3.3 Paper 3: The Structure and Components of Agility – A Multi-perspective View

Title	***The Structure and Components of Agility – A Multi-perspective View***
	[short version: The Structure of Agility from Different Perspectives]
Author	Roy Wendler
	roy.wendler@tu-dresden.de
Publication	Informatyka Ekonomiczna / Business Informatics, 2(28), 2013, 148-169
	[short version: 2013 Federated Conference on Computer Science and Information Systems, FedCSIS 2013, September 8-11, 2013, Kraków, Poland, 1177-1184]
Available at	`http://www.dbc.wroc.pl/dlibra/publication?id=26939&tab=3`, [short version: `http://ieeexplore.ieee.org/document/6644163/`]

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Abstract Agility is a term that is widely used. However, a common understanding of what agility means and what it consists of is missing. Many frameworks have been developed for how to approach agility, but they are very heterogeneous regarding content and structure. This paper approaches this issue by conducting a systematic comparison of 28 available agility frameworks out of the domains of agile manufacturing, agile software development, agile organization, and agile workforce. Altogether, 33 concepts related to agility were identified. The results of the comparison show that even within the specifically examined domains, a lack of consensus is obvious. In addition, the utilized concepts are very ambiguous and overlapping. As such, the interdependencies between the identified concepts were analyzed in detail. This revealed five recurring "clusters," each of which combines several concepts with similar content, but despite the amount of available frameworks, none of them reflects these clusters directly. Hence, the study shows that factors beyond the construct of agility are not yet fully uncovered.

Summary The third paper, entitled *"The Structure and Components of Agility – A Multi-perspective View,"* completes the identification of research gaps by a systematic comparison of frameworks that deal with agility in general. In addition, it represents the first step in a detailed analysis of the factors that are affecting and influencing organizational agility by extracting a first conceptual framework of agility-related concepts from the analyzed literature. Therefore, this paper chiefly contributes to the sub-aim of summarizing and structuring the existing knowledge about agility (see figure 3).

The initial trigger for this paper arose from the attempt to select a suitable agility framework that represents the structure and components of agility in an organization to develop the maturity model. Although many studies researched agility and its related concepts, they have not generated a common understanding of what constitutes agility. Although many frameworks and models describe agility and its characteristics, they often heavily differ in content and structure, making it difficult to build upon the insights obtained without further research activities.

Therefore,selecting of one specific framework seemed unsatisfactory due to the risk of missing important aspects of agility not covered by the chosen one. Hence, 28 available frameworks out of the domains of agile manufacturing, agile software development, agile organization/enterprise, and agile workforce are compared systematically with the aim of identifying common ground, differences, and recurring concepts.

In the end, the study produced a comprehensive conceptual framework that includes 33 consolidated concepts related to agility that can be grouped into five overlapping conceptual clusters. It becomes clear that the existing frameworks in the literature are rife with gaps regarding the covered concepts. To date, there is no empirical study that delivers a comprehensive picture of agility in an exploratory manner. So it remains unclear which concepts of the frameworks are prevalent in practice and how the factors behind agility are composed. To close this gap, the results of the third paper are used as a structural basis for the following empirical investigation (see section 3.4).

3.4 Paper 4: Dimensions of Organizational Agility in the Software and IT Services Industry – Insights from an Empirical Investigation

Title	***Dimensions of Organizational Agility in the Software and IT Service Industry – Insights from an Empirical Investigation***
Author	Roy Wendler *roy.wendler@tu-dresden.de*
Publication	Communications of the Association for Information Systems, 39, 2016 *[forthcoming]*
Available at	`http://aisel.aisnet.org/cais/vol39/`

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Abstract Agility has increasingly gained attention in the software and IT services industry over the last years, with a heavy emphasis on research about agile software development methods. However, an organization does not only consist of development teams, and an organizational perspective on agility is often missing. Presently there is no consensus about what constitutes an "agile organization". Hence, the objective of this study is to identify the structure to be found be-

hind the concept of organizational agility using an exploratory research approach. A survey among organizations in the software and IT services industry was conducted and exploratory factor analysis as well as cluster analysis (based on the variables) was carried out. The results show that organizational agility can be described using six interrelated factors that can be further aggregated into the three basic dimensions of "Agility Prerequisites", "Agility of People", and "Structures Enhancing Agility". The identified structure is a first step towards a common understanding of organizational agility and helps to guide further research activities while simultaneously supporting practitioners in assessing the agility of their organization.

Summary The completion of the analysis phase and the first steps toward designing the assessment tool are covered by the paper *"Dimensions of Organizational Agility in the Software and IT Services Industry – Insights from an Empirical Investigation."* By utilizing exploratory factor analysis and cluster analysis on data collected by a quantitative survey, the sub-aim of explaining the dimensions of organizational agility is fulfilled (see figure 3).

By building on the results of paper 3 (see section 3.3), a comprehensive questionnaire with 68 items was developed, tackling all identified agility-related concepts. The questionnaire was distributed worldwide to organizations in the software and IT services industry with a final sample of 437 valid and complete responses that are included for further analysis.

The applied exploratory factor analysis reveals a meaningful structure of six latent factors determining organizational agility (each including five to eleven items) that are able to cumulatively explain 67% of the total variance. The obtained structure is additionally confirmed by a variable-based cluster analysis that results in three distinct clusters, each combining two content-wise related factors. Therefore, the clusters represent three dimensions of agility on a higher level of abstraction. They are namely *Agility Prerequisites* (including the factors *Agile Values* and *Technology*), *Agility of People* (including the factors *Workforce* and *Management of Change*), and *Structures Enhancing Agility* (including the factors *Collaboration and Cooperation* and *Flexible Structures*). This structure of three dimensions detailed into six factors is further illustrated in section 4.

From an academic perspective, paper 4 appears to report the first study to examine empirically the construct of organizational agility from a comprehensive point of view that is based on a conceptual literature review (see section 3.3). Furthermore, the results of this study can be used directly to develop an effective measurement tool for organizational agility. The identified dimensions and factors highlight different domains for potential improvements, and offer the possibility to compare organizational agility among different organizations on a standardized and simply structured basis. Therefore, the study results represent an empirically grounded basis for the structural design of the maturity model that is developed in paper 5 (see section 3.5).

3.5 Paper 5: Development of the Organizational Agility Maturity Model

Title	*Development of the Organizational Agility Maturity Model*
Author	Roy Wendler *roy.wendler@tu-dresden.de*
Publication	Proceedings of the 2014 Federated Conference on Computer Science and Information Systems, FedCSIS 2014, September 7-10, Warsaw, Poland, 1197-1206
Available at	`http://dx.doi.org/10.15439/2014F79`

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Abstract The importance of organizational agility in a competitive environment is nowadays widely recognized and accepted. However, despite this awareness, the availability of tools and methods that support an organization in assessing and improving their organizational agility is scarce. Therefore, this study introduces the Organizational Agility Maturity Model in order to provide an easy-to-use yet powerful assessment tool for organizations in the software and IT services industry. Based on a design science research approach with a comprehensive literature review and an empirical investigation utilizing factor analysis, both scientific rigor as well as practical relevance is ensured. The applicability is further demonstrated by a cluster analysis identifying patterns of organizational agility that fit to the maturity model. The Organizational Agility Maturity Model further contributes to the field by providing a theoretically and empirically grounded structure of organizational agility supporting the efforts of developing a common understanding of the concept.

Summary The final paper, entitled *"Development of the Organizational Agility Maturity Model,"* directly and indirectly builds on the results of all aforementioned papers (see sections 3.1-3.4). It fulfills the design aim with a focus on the design and evaluation phase of the research design (see figure 3) by developing a maturity model to measure organizational agility and demonstrating its applicability by a cluster analysis identifying empirical patterns of organizational agility that fit to

the maturity model. Additionally, the paper shows the weaknesses of already available assessment tools for organizational agility, and illustrates the potential of a maturity model prior to the model's development.

In an analogy of the results obtained by the factor and cluster analysis in paper 4 (see section 3.4), the proposed maturity model consists of three dimensions, each of them further detailed in two sub-dimensions. Furthermore, the maturity model consists of four distinct maturity stages that are assessed independently for every sub-dimension. To determine the maturity stage of an organization, a list of assessment questions is offered. The structure of the model is illustrated in figure 5 (see section 4). In addition, the survey data collected in paper 4 (see section 3.4) is used to perform a cluster analysis to assess if the maturity stages of the model are able to represent real-life configurations of organizations.

With the development and the evaluation of the Organizational Agility Maturity Model, the final step of the design science research approach is reached (see figure 3). To support the achievement of practical applicability as well as theoretical grounding and rigorous development, the results of extensive literature reviews and an exploratory empirical investigation were used to develop the model. In their entirety, all five papers contribute to fulfilling the stated research aims completely (see section 2.2), and the developed maturity model incorporates the results and insights from all preceding papers.

4 Results and Implications

The doctoral dissertation and the single papers described in section 3 deliver several meaningful results and implications for research as well as for practice that are summarized within this chapter.

4.1 Summary of Results

First of all, paper 1 makes clear that the successful adoption of agile software development methods is hindered by a number of potential obstacles caused by individual, team-oriented, and organizational issues. The paper furthermore shows that only "Agile Thinking," i.e., the willingness to act in an agile manner, of every individual in an organization is able to enhance the agility of the whole organization, including its structures, processes, attitudes, and so on.

To take a closer look at the issue of organizational agility, particularly with regard to the research aim of summarizing the existing knowledge about the elements that affect and enable organizational agility, paper 3 reveals an interesting picture. Analyzing and comparing 28 frameworks of agility revealed that these frameworks are very different in their structure and content and that there is absolutely no consensus of what truly constitutes the construct of (organizational) agility.

The third study identifies 33 recurring concepts of agility within all analyzed frameworks. However, it is not possible to strictly divide these concepts from each other because they are characterized by numerous interdependencies, for instance overlapping contents or similar meanings on different abstraction levels. Therefore, the concepts that are related to each other are identified, and a network with the concepts as nodes and the connections between them as unweighted edges is created. The resulting graph is given in figure 4.

By visualizing the network, some areas, or "clusters," around concepts that have connections to many other concepts become visible. These are illustrated as colored ellipses in figure 4 and are namely *Organizational Culture*, *Workforce*, *Customer*, *Organizational Abilities*, and *Technology*. It is important to keep in mind that this structure is not based on a cluster analysis or similar methods; rather, it is derived from a structured content analysis. Hence, some open questions remain unanswered, which have to be investigated in more detail. For instance, the areas "Customer" and "Organizational Abilities" overlap to a huge degree, and are difficult to distinguish. In addition, the concepts "Processes" and "Change" have very central positions in the network, and might represent new areas in and of themselves.

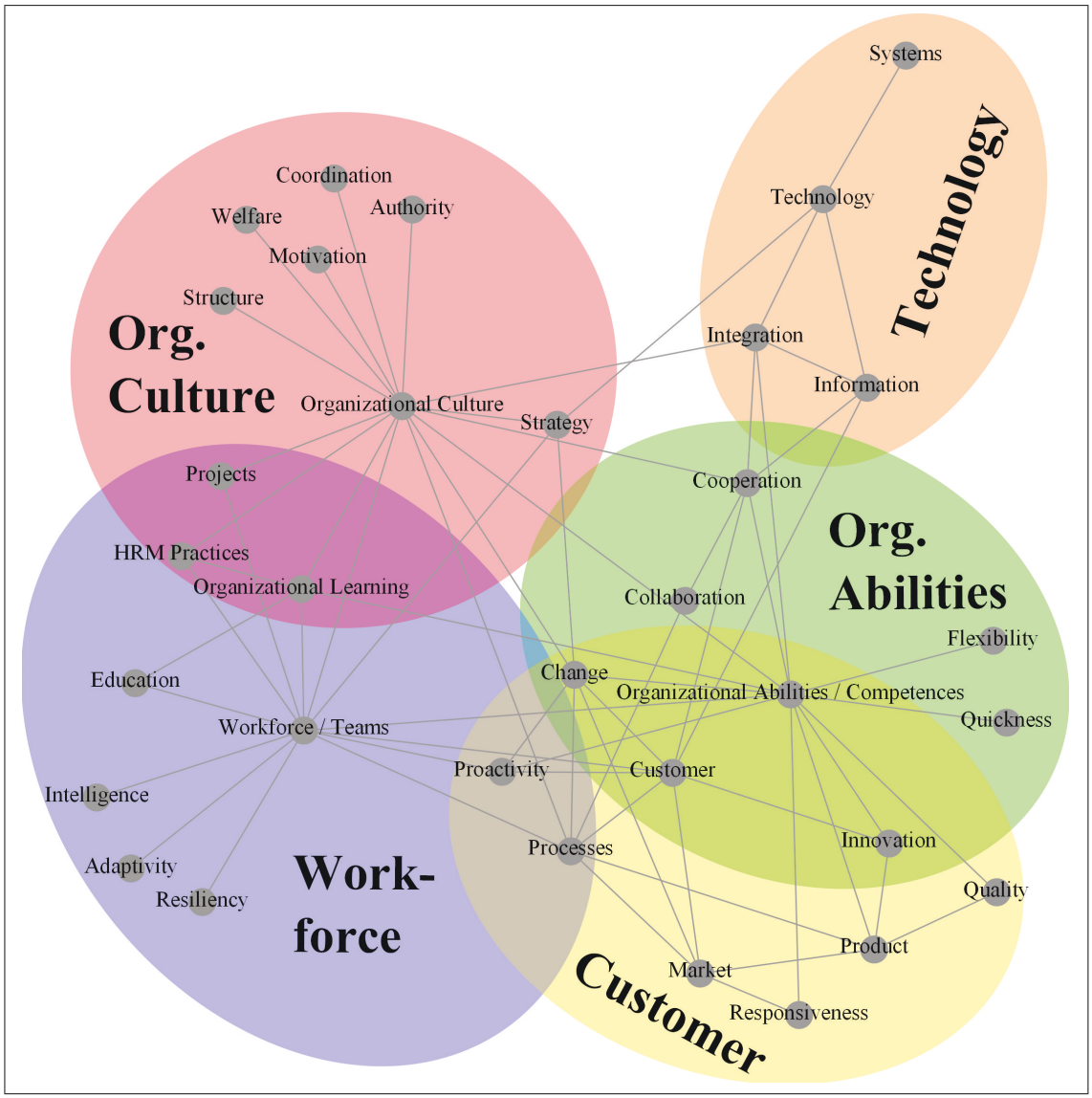

Figure 4: Interdependencies of agility-related concepts

Therefore, paper 4 is grounded in the results of paper 3, and further investigates what constitutes an agile organization from an exploratory and empirical perspective. To fulfill the aim of explaining the dimensions of organizational agility, the identified concepts of agility (see figure 4) were merged into a questionnaire with 68 items targeting decision makers in the software and IT services industry. In contrast to currently available studies, the present survey contains all of the 33 concepts covered by a majority of agility frameworks, and thus is able to deliver a comprehensive view of agility that has not been available to date.

The key contribution of this empirical investigation is the reduction of the demonstrated confusing amount of ambiguous concepts and frameworks of agility. The conducted exploratory factor analysis delivers six conceptually relevant factors describing organizational agility. This solution is further confirmed by a variable-oriented cluster analysis (i.e., the items were treated as “objects”) showing only minor inconsistencies. In addition, the cluster analysis approach groups pairs of factors into one of three distinct clusters. So they can, on a higher level of abstraction, be treated

Table 1: Empirically determined structure of organizational agility (factors and dimensions)

Element	Name	Content
Factor analysis		
Factor F1	Workforce	Capabilities of employees, mainly regarding skills, intelligence, adaptability, responsiveness, etc.
Factor F2	Technology	Technological prerequisites enabling communication, information sharing, and integration of the organization.
Factor F3	Management of Change	Capabilities (of managers) to cope with changes (customer requirements, new markets, innovations, etc.), to inform the people of the organization accordingly, and to inspire them to welcome these changes.
Factor F4	Collaboration and Cooperation	Internal and external collaboration and cooperation between departments and functions of the organizations as well as with customers and partners.
Factor F5	Agile Values	Establishing a culture following agile values like proactivity, responsiveness, trust, support of employee proposals, etc.
Factor F6	Flexible Structures	Ability to quickly adapt organizational structures and processes to implement changes and stay competitive.
Cluster analysis		
Dimension 1 (F2+F5)	Agility Prerequisites	Includes factors "Technology" and "Agile Values": The degree to which the people of an organization share agile values (mental prerequisites) and the ability of the organization to establish the required technological prerequisites.
Dimension 2 (F1+F3)	Agility of People	Includes factors "Workforce" and "Management of Change": Summarizes all necessary capabilities of the members of an organization to translate the agile values into actions.
Dimension 3 (F4+F6)	Structures Enhancing Agility	Includes factors "Collaboration and Cooperation" and "Flexible Structures": The ability of an organization to flexibly change itself combined with an organizational culture that supports collaboration on every level.

as dimensions, and are namely *Agility Prerequisites*, *Agility of People*, and *Structures Enhancing Agility* (see table 1).

The identified structure of organizational agility differs from the initial framework deduced from the literature (see figure 4). Although some of the conceptual areas remain in the factor solution (for instance the areas "Technology" and "Workforce"), it is not directly comparable, and the empirical research approach yields some interesting and new insights. First, this result confirms the assumption that organizational agility does consist of dimensions that can be further detailed into several decision domains (Gunasekaran, 1999; Ren et al., 2000; Yusuf et al., 1999), which are, in turn, represented by the identified factors.

In addition, none of the analyzed frameworks directly reflects the structure that resulted from the investigation, and only the review of Sherehiy et al. (2007) includes all of the obtained factors. Interestingly, one of the most cited publications in this area, the book by Goldman et al., already states, "the competitive power of the modern industrial corporation did not come from the technologies it exploited. [. . .] Its power did not come from its organizational structure, either. [. . .]

Its power certainly did not come from the exploitation of the talents of its workforce [...]. The competitive power [...] came from the way people, organizations, and technology were systematically coordinated with one another" (1995, pp. 71f.).

Notably, these three aspects are very clearly reflected in the structure that this study has empirically identified. This structure may indicate that organizational agility is better reflected with simply structured frameworks rather than with more complex structures weighted down by a high number of sub-concepts, as shown in figure 4.

This insight supports the aim of developing a maturity model to measure organizational agility. Maturity models are tools that are easy to use and simultaneously offer a comprehensive representation of the whole organization. The applicability of a maturity model is ensured by an intuitive structure of a number of distinct and simplified maturity stages, or levels, which measure the current state of the analyzed objects via different sets of (multi-dimensional) criteria (Ahlemann, Schroeder, & Teuteberg, 2005; Becker, Knackstedt, & Pöppelbuß, 2009; Klimko, 2001; Lyytinen, 1991).

Furthermore, the results of paper 2 show that it is important for newly developed maturity models to include empirical data at the earliest research stages to improve the suitability of the model, particularly when a practical application is the stated research aim. Hence, the structure of organizational agility that has been revealed in paper 4 forms the basis of the Organizational Agility Maturity Model that was developed in paper 5. Additionally, the maturity model is further validated by comparing its maturity stages to empirically derived patterns of organizations. Figure 5 displays a summarizing illustration of the maturity model consisting of three dimensions and four maturity stages.

Although the highest maturity stage is always the best one theoretically, many maturity models state that the highest stage should not automatically be the goal for every organization using the model. However, this assumption has disadvantages for practical applicability. Conflicting interpretations and viewpoints may lead to difficulties for organizations in finding this optimal degree of maturity (Kohoutek, 1996; McBride, 2010). For the Organizational Agility Maturity Model, another approach has been chosen that is more related to the life cycle of an organization that is striving to become agile. The single stages are seen not only as desirable improvement but also a representation of the steps of the transition over time (McBride, 2010). Therefore, the highest maturity stage is always the "final" goal, and the maturity model should be used by organizations that have the clear objective of achieving organizational agility and that want to use the maturity model as a roadmap for this transition.

In an analogy to the empirical results (see table 1), each of the three dimensions of the maturity model are further detailed into two sub-dimensions. Hence, the maturity model incorporates a structure of organizational agility that is grounded in theory and that is based on an empirical investigation, so it exists in practice. Furthermore, the proposed maturity model consists of four

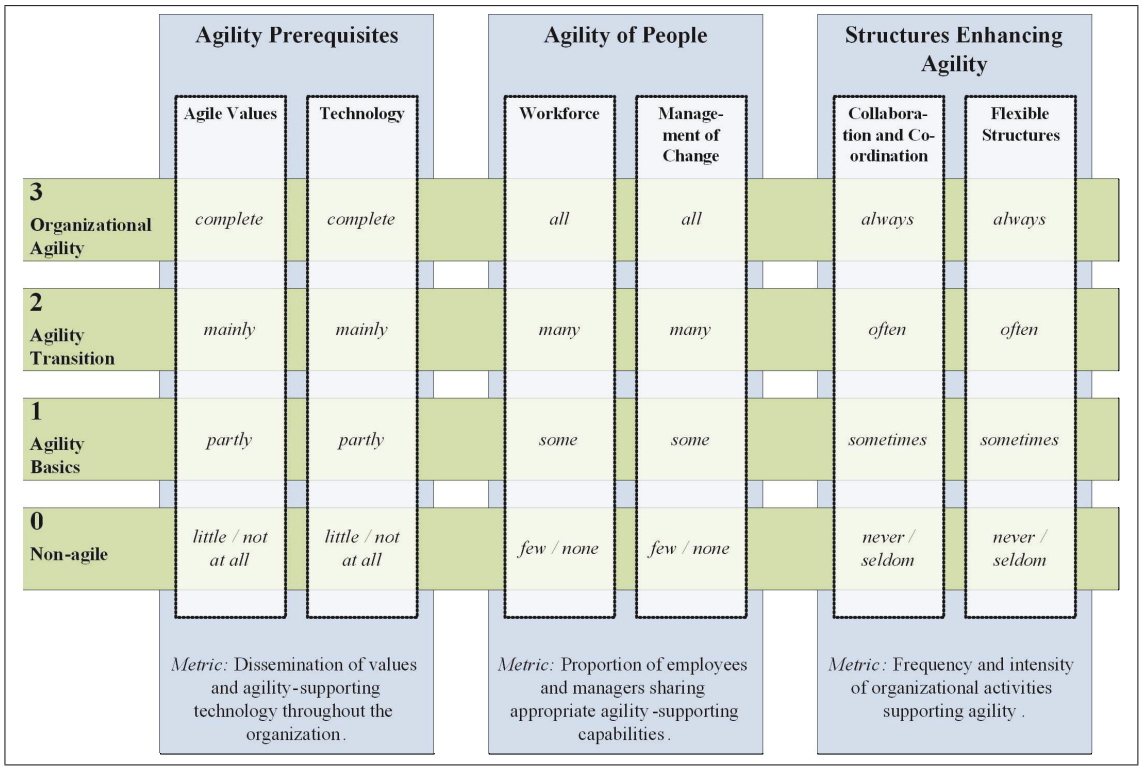

Figure 5: Structure of the Organizational Agility Maturity Model

distinct maturity stages that are assessed independently for every sub-dimension. While the initial model had five maturity stages due to the scales of the assessment questions used (see papers 4 and 5), a first evaluation of the model revealed that four stages are more suitable to represent the state of organizational agility in the software and IT services industry. This evaluation is based on an additional cluster analysis on the collected survey data to assess whether the maturity stages are able to represent the real-life configurations of organizations.

The evaluation covers the sub-dimensions of the maturity model (i.e., the identified factors). Hence, average summed scales above a cut-off value of a factor loading of 0.3 are calculated for every factor (DiStefano, Zhu, & Mîndrila, 2009) and used for cluster analysis. This procedure allows for the computation of a factor score for every sub-dimension, which is easily interpretable. Based on hierarchical clustering with the Ward method, a number of five clusters is the most appropriate solution. The results of the following fuzzy clustering approach are summarized in figure 6. The figure illustrates the mean values of the five clusters for every sub-dimension of the maturity model. Based on this cluster analysis, the four maturity stages are (see paper 5 for a detailed description):

- *0 – Non-agile:* Organizations at maturity stage 0 show no or rare properties of organizational agility. This stage is represented by the "empty space" at the bottom of the graphic in figure 6. However, only very few organizations in the analyzed sample earned such a low score, so they do not form a separate cluster.

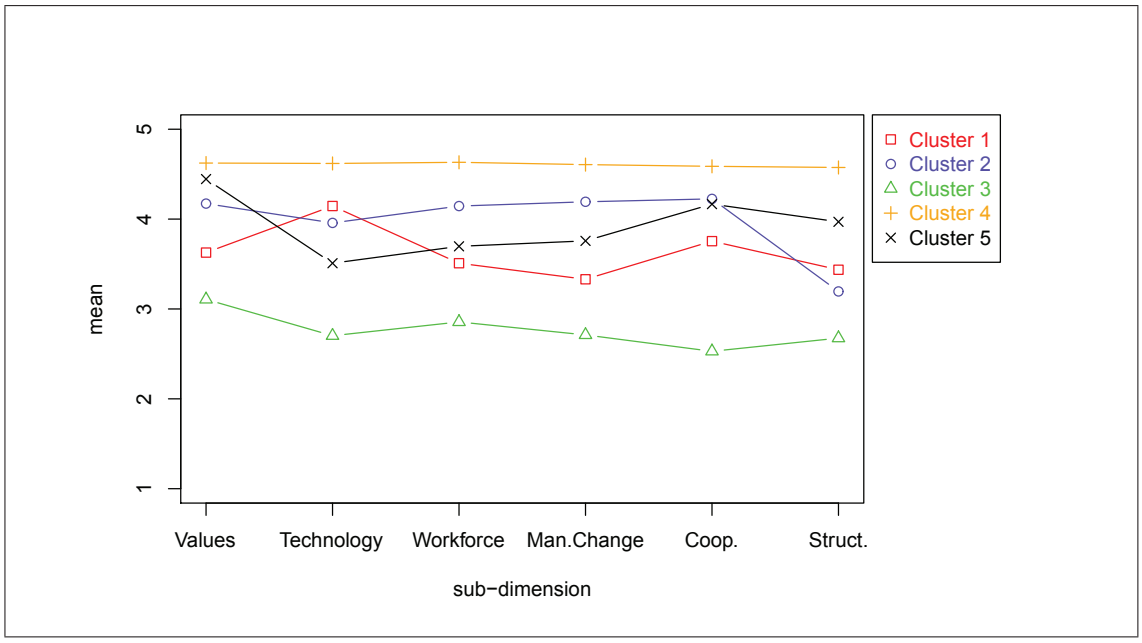

Figure 6: Mean values of the clusters per sub-dimension

- *1 – Agility Basics:* Organizations at maturity stage 1 share basic properties of organizational agility. This stage is represented by cluster 3. The organizations in cluster 3 score at a medium level on average for every sub-dimension. They show initial initiatives, hence a basic development towards an agile organization.
- *2 – Agility Transition:* Organizations at maturity stage 2 have advanced in becoming organizationally agile, and are represented by clusters 1, 2, and 5. This phase underscores the presence of different approaches to becoming an agile organization by concentrating on different dimensions or sub-dimensions of the maturity model.
- *3 – Organizational Agility:* Organizations at maturity stage 3 score high in every sub-dimension of the model and have overcome the partial weaknesses of the transition phase. This stage is represented by cluster 4, including the organizations that have achieved a balance between every dimension of the model on a high level.

4.2 Implications for Research

This doctoral dissertation has significant implications for research on agility. First, it has shown that looking at only specific agile methods does not fully reveal why some organizations benefit from agility and others do not. Paper 1 identifies a number of potential obstacles hindering the adoption of agile methods that are often outside the scope of the single development team. The first paper has thus made clear that investigating the topic from an organizational perspective, including values, culture, processes, structures, and people, is necessary.

Additionally, paper 3 reveals a lack of consensus regarding the understanding of organizational agility that makes it difficult to conduct empirical studies or to build upon existing frameworks. It furthermore illustrates that the available frameworks from different domains (for instance, agile software development vs. agile manufacturing) are very distinct from each other and, according to Conboy, "the search for a definitive, all-encompassing concept of agility might not be found simply through an examination of agility in other fields" (2009, p. 334).

Hence, the exploratory empirical study in paper 4 supports the efforts of achieving an increasing consensus of what constitutes agility. It delivers a meaningful structure of organizational agility that consists of three dimensions further detailed into six factors. This structure contributes to establishing a commonly shared consensus about the elements of organizational agility, because it is the first exploratory study to be based on a comprehensive literature review that incorporates a majority of available conceptual frameworks of agility.

As a much more simplified structure compared to the existing collection of agility-related concepts (see figure 4), it offers the possibility to develop new structural and causal models as well as new hypotheses about what influences organizational agility and how the identified factors affect each other mutually. The identified structure represents a new framework that summarizes and standardizes already existing frameworks, and for that reason may serve as a basis for further research.

In addition to the implications regarding organizational agility, paper 2 yields some interesting implications for research about and with maturity models. Many maturity models are developed on a purely conceptual basis without validation. Moreover, the existing industrial or academic maturity models are often adapted without examining the suitability of the used maturity model for the intended research purpose. Therefore, the second paper introduces a comprehensive research framework based on the principles of design science research to guide researchers in their research actions.

4.3 Implications for Practice

Formulating the aim of developing a maturity model that can be used to assess organizational maturity and that should be practically applicable generates implications for practice.

A more general implication resulting from paper 2 is the very broad and general applicability of the maturity concept. The paper's systematic comparison of 237 maturity models from more than 20 application domains revealed that practitioners may find an available maturity model for their problems and assignments, so this second paper serves as a possible starting point. However, practitioners must be aware that many of the identified maturity models lack sufficient validation, so they have to pay attention to the individual context when using these models while they contribute to ongoing research by providing new cases for empirical validations.

However, more important are the implications resulting from papers 4 and 5. The structure of organizational agility identified by the empirical investigation supports an understanding of what an agile organization comprises. The study highlights different domains for potential improvements, and supports organizations in preparing a roadmap for the "journey to an agile organization."

Furthermore, these results are used to develop the Organizational Agility Maturity Model as an effective measurement tool that creates useful benefits for organizations and that underscores the strategic character of organizational agility. This model provides practitioners with self-assessments, and helps consulting companies or research agencies to compare organizational agility among different organizations on a standardized and simply structured basis. The model also generates awareness of what constitutes organizational agility, and sheds light on the complexity of organizational agility. Furthermore, it may serve as a reference frame to implement a systematic and well-directed approach for improvements and for continuous assessment of actions taken.

As a final and positive remark, the initial empirical investigation and the cluster analysis used for the model validation show that the software and IT services industry is actually aware of the benefits of an increased organizational agility. Very few organizations are classified as "Non-agile" in some dimensions, and the number of such organizations is not even enough to form a separate cluster. Nearly all of the participating organizations have at least reached the stage "Agility Basics," and the majority is situated in the stage "Agility Transition," advancing towards "Organizational Agility."

Interestingly, further analyses did not find any significant relationship between the clusters and the defining characteristics of the organizations, such as size, location, role, or customers. This lack indicates that organizational agility can be achieved by any organization that is willing to take the necessary actions; it also suggests that the maturity model is generally applicable to the organizations in the analyzed industry.

References

Abrahamsson, P., Conboy, K., & Wang, X. (2009). 'Lots done, more to do': the current state of agile systems development research. *European Journal of Information Systems*, *18*(4), 281–284. Retrieved from http://dx.doi.org/10.1057/ejis.2009.27 doi: 10.1057/ejis.2009.27

Abrahamsson, P., Warsta, J., Siponen, M. T., & Ronkainen, J. (2003). New Directions on Agile Methods: A Comparative Analysis. In *Proceedings of the 25th International Conference on Software Engineering, ICSE 03* (Vol. 6, pp. 244–254). Portland, OR, USA. Retrieved from http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=1201204

Ågerfalk, P. J., Fitzgerald, B., & Slaughter, S. A. (2009). Introduction to the Special Issue – Flexible and Distributed Information Systems Development: State of the Art and Research Challenges. *Information Systems Research*, *20*(3), 317–328. Retrieved from http://dx.doi.org/10.1287/isre.1090.0244

Ahlemann, F., Schroeder, C., & Teuteberg, F. (2005). Kompetenz- und Reifegradmodelle für das Projektmanagement: Grundlagen, Vergleich und Einsatz. In *ISPRI-Arbeitsbericht, No. 01/2005*. Osnabrück, Germany: Universität Osnabrück, ISPRI-Forschungszentrum für Informationssysteme in Projekt- und Innovationsnetzwerken. Retrieved from http://www.bow.uni-osnabrueck.de/reifegradmodelle.pdf

Augier, M., & Teece, D. J. (2009). Dynamic Capabilities and the Role of Managers in Business Strategy and Economic Performance. *Organization Science*, *20*(2), 410–421. Retrieved from http://dx.doi.org/10.1287/orsc.1090.0424 doi: 10.1287/orsc.1090.0424

Bacher, J. (1996). *Clusteranalyse* (2nd ed.). Munich, Germany: Oldenbourg.

Beck, K., Beedle, M., van Bennekum, A., Cockburn, A., Cunningham, W., Fowler, M., ... Thomas, D. (2001). *Manifesto for Agile Software Development.* Retrieved 30.07.2012, from http://agilemanifesto.org/

Becker, J., Holten, R., Knackstedt, R., & Niehaves, B. (2003). Forschungsmethodische Positionierung in der Wirtschaftsinformatik: Epistemologische, ontologische und linguistische Leitfragen. In *Arbeitsberichte des Instituts für Wirtschaftsinformatik, No. 93*. Münster, Germany: University of Münster. Retrieved from http://www.econstor.eu/bitstream/10419/59562/1/718131274.pdf

Becker, J., Knackstedt, R., & Pöppelbuß, J. (2009). Developing Maturity Models for IT Management. *Business & Information Systems Engineering*, *1*(3), 213–222. Retrieved from

http://dx.doi.org/10.1007/s12599-009-0044-5 doi: 10.1007/s12599-009-0044-5

Bessant, J., Knowles, D., Briffa, G., & Francis, D. (2002). Developing the agile enterprise. *International Journal of Technology Management*, *24*(5), 484–497. Retrieved from http://dx.doi.org/10.1504/IJTM.2002.003066 doi: 10.1504/IJTM.2002.003066

Breu, K., Hemingway, C. J., Strathern, M., & Bridger, D. (2001). Workforce agility: the new employee strategy for the knowledge economy. *Journal of Information Technology*, *17*(1), 21–31. Retrieved from http://dx.doi.org/10.1080/02683960110132070 doi: 10.1080/02683960110132070

Chan, F. K., & Thong, J. Y. (2009). Acceptance of agile methodologies: A critical review and conceptual framework. *Decision Support Systems*, *46*(4), 803–814. Retrieved from http://dx.doi.org/10.1016/j.dss.2008.11.009 doi: 10.1016/j.dss.2008.11.009

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), 120–155. Retrieved from http://www.management-aims.com/PapersMgmt/142CharbonnierEnglish.pdf

Chmielewicz, K. (1994). *Forschungskonzeptionen der Wirtschaftswissenschaft* (3rd ed.). Stuttgart, Germany: Schäffer-Poeschel.

Cockburn, A. (2007). *Agile Software Development: The Cooperative Game* (2nd ed.). Boston, MA, USA: Pearson Education.

Conboy, K. (2009). Agility from First Principles: Reconstructing the Concept of Agility in Information Systems Development. *Information Systems Research*, *20*(3), 329–354. Retrieved from http://dx.doi.org/10.1287/isre.1090.0236 doi: 10.1287/isre.1090.0236

DiStefano, C., Zhu, M., & Mîndrila, D. (2009). Understanding and Using Factor Scores: Considerations for the Applied Researcher. *Practical Assessment, Research & Evaluation*, *14*(20), 1–11. Retrieved from http://pareonline.net/pdf/v14n20.pdf

Dybå, T., & Dingsøyr, T. (2008). Empirical studies of agile software development: A systematic review. *Information and Software Technology*, *50*(9-10), 833–859. Retrieved from http://dx.doi.org/10.1016/j.infsof.2008.01.006 doi: 10.1016/j.infsof.2008.01.006

Everitt, B. S. (1993). *Cluster Analysis* (3rd ed.). London, UK: Edward Arnold.

Frank, U. (2006). Towards a Pluralistic Conception of Research Methods in Information Systems Research. In *ICB-Research Report, No. 7*. Essen, Germany: Universität Duisburg-Essen, Institut für Informatik und Wirtschaftsinformatik (ICB). Retrieved from http://www.icb.uni-due.de/fileadmin/ICB/research/research_reports/ICBReport07.pdf

Gable, G. G. (1994). Integrating Case Study and Survey Research Methods: An Example in Information Systems. *European Journal of Information Systems*, *3*(2), 112–126. Retrieved

from http://dx.doi.org/10.1057/ejis.1994.12 doi: 10.1057/ejis.1994.12

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

Goldman, S. L., Nagel, R. N., & Preiss, K. (1995). *Agile Competitors and Virtual Organizations: Strategies for Enriching the Customer*. New York, NY, USA: Van Nostrand Reinhold.

Goodhue, D. L., Chen, D. Q., Claude, M., Davis, A., & Cochran, J. D. (2009). Addressing Business Agility Challenges with Enterprise Systems. *MIS Quarterly Executive*, *8*(2), 73–87. Retrieved from http://misqe.org/ojs2/index.php/misqe/article/view/220

Gregor, S. (2006). The Nature of Theory in Information Systems. *MIS Quarterly*, *30*(3), 611–642. Retrieved from http://aisel.aisnet.org/misq/vol30/iss3/5/

Gregor, S., & Hevner, A. R. (2013). Positioning and Presenting Design Science Research for Maximum Impact. *MIS Quarterly*, *37*(2), 337–355. Retrieved from http://aisel.aisnet.org/misq/vol37/iss2/3/

Gunasekaran, A. (1999). Agile manufacturing: A framework for research and development. *International Journal of Production Economics*, *62*(1-2), 87–105. Retrieved from http://dx.doi.org/10.1016/S0925-5273(98)00222-9 doi: 10.1016/S0925-5273(98)00222-9

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2014). *Multivariate Data Analysis* (7th ed.). Harlow, UK: Pearson Education.

Hevner, A. R., March, S. T., Park, J., & Ram, S. (2004). Design Science in Information Systems Research. *MIS Quarterly*, *28*(1), 75–105. Retrieved from http://aisel.aisnet.org/misq/vol28/iss1/6/

Iacocca Institute. (1991). *21st Century Manufacturing Enterprise Strategy: An Industry-Led View*. Bethlehem, PA, USA: Iacocca Institute, Lehigh University.

Iivari, J., & Iivari, N. (2011). The relationship between organizational culture and the deployment of agile methods. *Information and Software Technology*, *53*(5), 509–520. Retrieved from http://dx.doi.org/10.1016/j.infsof.2010.10.008 doi: 10.1016/j.infsof.2010.10.008

Jick, T. D. (1979). Mixing Qualitative and Quantitative Methods: Triangulation in Action. *Administrative Science Quarterly*, *24*(4), 602–611. Retrieved from http://www.jstor.org/stable/2392366

Kaplan, B., & Duchon, D. (1988). Combining Qualitative and Quantitative Methods in Information Systems: A Case Study. *MIS Quarterly*, *12*(4), 571–586. Retrieved from http://aisel.aisnet.org/misq/vol12/iss4/4/

Kaufman, L., & Rousseeuw, P. J. (2005). *Finding Groups in Data: An Introduction to Cluster Analysis*. Hoboken, NJ, USA: John Wiley & Sons.

Kettunen, P. (2009). Adopting key lessons from agile manufacturing to agile software product development – A comparative study. *Technovation*, *29*(6-7), 408–422. Retrieved

from http://dx.doi.org/10.1016/j.technovation.2008.10.003 doi: 10.1016/j.technovation.2008.10.003

Kitchenham, B. A., Budgen, D., & Brereton, O. P. (2011). Using mapping studies as the basis for further research – A participant-observer case study. *Information and Software Technology*, *53*(6), 638–651. Retrieved from http://dx.doi.org/10.1016/j.infsof.2010.12.011 doi: 10.1016/j.infsof.2010.12.011

Klimko, G. (2001). Knowledge Management and Maturity Models: Building Common Understanding. In *Proceedings of the 2nd European Conference on Knowledge Management* (pp. 269–278). Bled, Slovenia: The IEDC-Bled School of Management.

Kohoutek, H. J. (1996). Reflections on the Capability and Maturity Models of Engineering Processes. *Quality and Reliability Engineering International*, *12*(3), 147–155. Retrieved from http://dx.doi.org/10.1002/(SICI)1099-1638(199605)12:3<147::AID-QRE14>3.0.CO;2-R doi: 10.1002/(SICI)1099-1638(199605)12:3⟨147::AID-QRE14⟩3.0.CO;2-R

Lange, C. (2005). Ein Bezugsrahmen zur Beschreibung von Forschungsgegenständen und -methoden in Wirtschaftsinformatik und Information Systems. In *ICB Research Report, No. 1*. Essen, Germany: Universität Duisburg-Essen, Institut für Informatik und Wirtschaftsinformatik (ICB). Retrieved from http://www.icb.uni-due.de/fileadmin/ICB/research/research_reports/No1.pdf

Lyytinen, K. (1991). Penetration of Information Technology in Organizations: A Comparative Study Using Stage Models and Transaction Costs. *Scandinavian Journal of Information Systems*, *3*(1), 87–109. Retrieved from http://aisel.aisnet.org/sjis/vol3/iss1/3/

Mangalaraj, G., Mahapatra, R., & Nerur, S. (2009). Acceptance of software process innovations – the case of extreme programming. *European Journal of Information Systems*, *18*(4), 344–354. Retrieved from http://dx.doi.org/10.1057/ejis.2009.23 doi: 10.1057/ejis.2009.23

March, S. T., & Smith, G. F. (1995). Design and natural science research on information technology. *Decision Support Systems*, *15*(4), 251–266. Retrieved from http://dx.doi.org/10.1016/0167-9236(94)00041-2 doi: 10.1016/0167-9236(94)00041-2

McBride, T. (2010). Organisational theory perspective on process capability measurement scales. *Journal of Software Maintenance and Evolution: Research and Practice*, *22*(4), 243–254. Retrieved from http://dx.doi.org/10.1002/spip.440 doi: 10.1002/spip.440

Nerur, S., Mahapatra, R., & Mangalaraj, G. (2005). Challenges of Migrating to Agile Methodologies. *Communications of the ACM*, *48*(5), 73–79. Retrieved from http://dx.doi.org/10.1145/1060710.1060712 doi: 10.1145/1060710.1060712

Niehaves, B., & Stahl, B. C. (2006). Criticality, Epistemology, and Behaviour vs. Design – Information Systems Research Across Different Sets of Paradigms. In *14th European Conference on Information Systems, ECIS 2006* (pp. 1–12, Paper 166). Gothenburg, Sweden.

Österle, H., Becker, J., Frank, U., Hess, T., Karagiannis, D., Krcmar, H., ... Sinz, E. J. (2010).

Memorandum on design-oriented information systems research. *European Journal of Information Systems*, *20*(1), 7–10. Retrieved from http://dx.doi.org/10.1057/ejis.2010.55 doi: 10.1057/ejis.2010.55

Peffers, K., Tuunanen, T., Rothenberger, M. a., & Chatterjee, S. (2007). A Design Science Research Methodology for Information Systems Research. *Journal of Management Information Systems*, *24*(3), 45–77. Retrieved from http://dx.doi.org/10.2753/MIS0742-1222240302 doi: 10.2753/MIS0742-1222240302

Petersen, K., Feldt, R., Mujtaba, S., & Mattsson, M. (2008). Systematic Mapping Studies in Software Engineering. In *Proceedings of 12th International Conference on Evaluation and Assessment in Software Engineering, EASE 2008* (pp. 1–10). Bari, Italy: University of Bari. Retrieved from http://www.rbsv.eu/courses/rmtw/mtrl/SM.pdf

Petersen, K., & Wohlin, C. (2009). A comparison of issues and advantages in agile and incremental development between state of the art and an industrial case. *Journal of Systems and Software*, *82*(9), 1479–1490. Retrieved from http://dx.doi.org/10.1016/j.jss.2009.03.036 doi: 10.1016/j.jss.2009.03.036

Ren, J., Yusuf, Y. Y., & Burns, N. D. (2000). A prototype of measurement system for Agile enterprise. In G. J. McNulty (Ed.), *Proceedings of the 3rd. International Conference on Quality, Reliability and Maintenance* (pp. 247–251). Oxford, UK: University of Oxford.

Rescher, N. (1993). *Pluralism: Against the Demand for Consensus*. New York, NY, USA: Oxford University Press.

Riedl, R., & Roithmayr, F. (2007). Zur Verbreitung der Fallstudie in der Wirtschaftsinformatik. In F. Lehner & S. Zelewski (Eds.), *Wissenschaftstheoretische Fundierung und wissenschaftliche Orientierung der Wirtschaftsinformatik* (pp. 35–60). Berlin, Germany: GITO-Verlag.

Sarker, S., & Sarker, S. (2009). Exploring Agility in Distributed Information Systems Development Teams: An Interpretive Study in an Offshoring Context. *Information Systems Research*, *20*(3), 440–461. Retrieved from http://dx.doi.org/10.1287/isre.1090.0241 doi: 10.1287/isre.1090.0241

Schauer, C., & Frank, U. (2007). Wirtschaftsinformatik und Information Systems: ein Vergleich aus wissenschaftstheoretischer Sicht. In F. Lehner & S. Zelewski (Eds.), *Wissenschaftstheoretische Fundierung und wissenschaftliche Orientierung der Wirtschaftsinformatik* (pp. 121–154). Berlin, Germany: GITO-Verlag.

Schütte, R. (1999). Basispositionen in der Wirtschaftsinformatik – ein gemäßigt-konstruktivistisches Programm. In J. Becker, W. König, R. Schütte, O. Wendt, & S. Zelewski (Eds.), *Wirtschaftsinformatik und Wissenschaftstheorie: Bestandsaufnahme und Perspektiven* (pp. 211–241). Wiesbaden, Germany: Gabler.

Seo, D., & La Paz, A. I. (2008). Exploring the Dark Side of IS in Achieving Organizational Agility. *Communications of the ACM*, *51*(11), 136–139. Retrieved from http://dx.doi.org/10.1145/1400214.1400242 doi: 10.1145/1400214.1400242

Sharma, S. (1996). *Applied Multivariate Techniques*. New York, NY, USA: John Wiley & Sons.

Sherehiy, B., Karwowski, W., & Layer, J. K. (2007). A review of enterprise agility: Concepts, frameworks, and attributes. *International Journal of Industrial Ergonomics*, *37*(5), 445–460. Retrieved from http://dx.doi.org/10.1016/j.ergon.2007.01.007 doi: 10.1016/j.ergon.2007.01.007

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. Retrieved from http://aisel.aisnet.org/misq/vol35/iss2/12/

Tseng, Y.-H., & Lin, C.-T. (2011). Enhancing enterprise agility by deploying agile drivers, capabilities and providers. *Information Sciences*, *181*(17), 3693–3708. Retrieved from http://dx.doi.org/10.1016/j.ins.2011.04.034 doi: 10.1016/j.ins.2011.04.034

Tsourveloudis, N. C., & Valavanis, K. P. (2002). On the Measurement of Enterprise Agility. *Journal of Intelligent and Robotic Systems*, *33*, 329–342. Retrieved from http://dx.doi.org/10.1023/A:1015096909316 doi: 10.1023/A:1015096909316

Vázquez-Bustelo, D., Avella, L., & Fernández, E. (2007). Agility drivers, enablers and outcomes: Empirical test of an integrated agile manufacturing model. *International Journal of Operations & Production Management*, *27*(12), 1303–1332. Retrieved from http://dx.doi.org/10.1108/01443570710835633 doi: 10.1108/01443570710835633

Volberda, H. W. (1996). Toward the Flexible Form: How to Remain Vital in Hypercompetitive Environments. *Organization Science*, *7*(4), 359–374. Retrieved from http://dx.doi.org/10.1287/orsc.7.4.359

Weber, M. M. (2002). Measuring supply chain agility in the virtual organization. *International Journal of Physical Distribution & Logistics Management*, *32*(7), 577–590. Retrieved from http://dx.doi.org/10.1108/09600030210442595 doi: 10.1108/09600030210442595

Yin, R. K. (2009). *Case Study Research: Design and Methods* (4th ed.). Thousand Oaks, CA, USA: SAGE Publications.

Yusuf, Y. Y., Sarhadi, M., & Gunasekaran, A. (1999). Agile manufacturing: The drivers, concepts and attributes. *International Journal of Production Economics*, *62*(1-2), 33–43. Retrieved from http://dx.doi.org/10.1016/S0925-5273(98)00219-9 doi: 10.1016/S0925-5273(98)00219-9

A Appendix

A.1 Complete List of Publications and Presentations

Table 2: Complete list of publications

Publication	Ranking[1] / Impact[2]
2016	
Wendler, R. (2016). Dimensions of Organizational Agility in the Software and IT Services Industry – Insights from an Empirical Investigation. Communications of the Association for Information Systems, 39, 2016 *[forthcoming]*.	VHB: C (6,58); WKWI: B; SJR Impact Factor: 0,535
2014	
Wendler, R. (2014). Development of the Organizational Agility Maturity Model. In: M. Ganzha, L. Maciaszek, & M. Paprzycki (eds.), Proceedings of the 2014 Federated Conference on Computer Science and Information Systems, FedCSIS 2014, September 7-10, Warsaw, Poland, 1197-1206.	-
Wendler, R. (2014). Reifegradmodelle: Anwendungspotenziale in der Betriebswirtschaftslehre. Der Betriebswirt, 55(1), 32-36.	VHB: E (3.96)
Wendler, R. & Stahlke, T. (2014). What Constitutes an Agile Organization? – Descriptive Results of an Empirical Investigation. Dresdner Beiträge zur Wirtschaftsinformatik, No. 68/14. Dresden: Technische Universität Dresden.	-
2013	
Wendler, R. (2013). The Structure and Components of Agility – A Multi-perspective View. Informatyka Ekonomiczna / Business Informatics, 2(28), 148-169.	-
Wendler, R. (2013). The Structure of Agility from Different Perspectives. In M. Ganzha, L. Maciaszek & M. Paprzycki (eds.), 2013 Federated Conference on Computer Science and Information Systems, FedCSIS 2013, September 8-11, Kraków, Poland, 1177-1184.	-

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1. VHB: VHB-JORQUAL 2.1 (2011);
   (`http://vhbonline.org/service/jourqual/vhb-jourqual-21-2011/`)
   WKWI: "WI-Orientierungsliste der WKWI" (2008);
   (`http://www.uni-kassel.de/fb07/fileadmin/datas/fb07/5-Institute/IBWL/Leimeister/WI_Journal_Ranking.pdf`)
2. Impact according to journal / publisher information

Table 2: Complete list of publications [continued]

Publication	Ranking / Impact
Wendler, R., Bukvova, H. & Leupold, S. (2013). Qualitative Comparative Analysis in Information Systems and Wirtschaftsinformatik. In R. Alt & B. Franczyk (eds.), Proceedings of the 11th International Conference on Wirtschaftsinformatik, WI 2013, February 27 - March 1, Leipzig, Germany, 1457-1471.	VHB: C (6.73); WKWI: A
2012	
Hertzog, S. & **Wendler, R.** (2012). ITIL V3 für Massenverarbeitungsprozesse in der Energieversorgung. itService Management, 22, 13-16.	-
Wendler, R. (2012). Towards a Maturity Model to Measure Enterprise Agility in the Software and IT Services Industry. In S. Sackmann & M. Hofmann (eds.), Diskussionsbeiträge zu Wirtschaftsinformatik und Operations Research (No. 30, pp. 3-12), Halle (Saale): Martin-Luther-Universität Halle-Wittenberg.	-
Wendler, R. (2012). The Maturity of Maturity Model Research: a Systematic Mapping Study. Information and Software Technology, 54(12), 1317-1339.	1-Year Impact: 1.569; 5-Year Impact: 2.016
Förster, K. & **Wendler, R.** (2012). Theorien und Konzepte zu Agilität in Organisationen. Dresdner Beiträge zur Wirtschaftsinformatik, No. 63/12. Dresden: Technische Universität Dresden.	-
Wendler, R. (2012). Reifegradmodelle für IT-Projektmanagementfähigkeiten. In S. Kammerer, M. Lang & M. Amberg (eds.), IT-Projektmanagement Methoden: Best Practices von Scrum bis PRINCE2 (pp. 237-259). Düsseldorf: Symposion Publishing GmbH.	-
2011	
Wendler, R. & Leupold, S. (2011). Alignment als Entscheidungsgrundlage für die IT-Projektauswahl. HMD Praxis der Wirtschaftsinformatik, 280, 94-103.	VHB: D (5.16); WKWI: B
Wendler, R. & Gräning, A. (2011). How Agile Are You Thinking? – An Exploratory Case Study. In A. Bernstein & G. Schwabe (eds.), Proceedings of the 10th International Conference on Wirtschaftsinformatik, WI 2.011, February 16-18, Zurich, Switzerland, 818-827.	VHB: C (6.73); WKWI: A
2010	
Gräning, A., **Wendler, R.**, Leyh, C. & Strahringer, S. (2010). Rigorous Selection of Input Artifacts in Design Science Research – TAVIAS. In Proceedings of 16th Americas Conference on Information Systems, AMCIS 2010, August 12-15, Lima, Peru.	VHB: D (5.92); WKWI: B

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Table 2: Complete list of publications [continued]

Publication	Ranking / Impact
Gräning, A., **Wendler, R.** & Leyh, C. (2010). TAVIAS: Tool for Assessing and Visualizing Input Artifacts' Suitability. In: Tagungsband des zwölften interuniversitären Doktorandenseminars. Dresdner Beiträge zur Wirtschaftsinformatik, No. 56/10. Dresden: Technische Universität Dresden, 78-87.	-
Gräning, A., **Wendler, R.**, Leyh, C. & Strahringer, S. (2010). Research about before research with standards. Dresdner Beiträge zur Wirtschaftsinformatik, No. 55/10. Dresden: Technische Universität Dresden.	-
2009	
Gräning, A., **Wendler, R.** & Leyh, C. (2009). Using Standards in Design Science Research. In T. Mellouli (ed.), Diskussionsbeiträge zu Wirtschaftsinformatik und Operations Research (No. 22, pp. 17-23). Halle (Saale): Martin-Luther-Universität Halle-Wittenberg.	-
Wendler, R. (2009). Reifegradmodelle für das IT-Projektmanagement. In G. Buchenau & S. Rietz (eds.), Geschäftsprozesse im Projektmanagement: Best Practices der Implementierung (pp. 239-356). Hamburg: Diplomica Verlag.	-
Wendler, R. (2009). Reifegradmodelle für das IT-Projektmanagement. Dresdner Beiträge zur Wirtschaftsinformatik, No. 53/09. Dresden: Technische Universität Dresden.	-

Table 3: Complete list of conference presentations

Title, Conference	Date	Location
Development of the Organizational Agility Maturity Model, *2014 Federated Conference on Computer Science and Information Systems, FedCSIS 2014*	07-10.09.2014	Warsaw, Poland
The Structure of Agility from Different Perspectives, *2013 Federated Conference on Computer Science and Information Systems, FedCSIS 2013*	08.-11.09.2013	Kraków, Poland
Qualitative Comparative Analysis in Information Systems and Wirtschaftsinformatik, *11th International Conference on Wirtschaftsinformatik*, WI 2013	27.02-01.03.2013	Leipzig, Germany
Towards a Maturity Model to Measure Enterprise Agility in the Software and IT Services Industry, *16. Interuniversitäres Doktorandenseminar*	09.-10.11.2012	Wittenberg, Germany
How Agile Are You Thinking? – An Exploratory Case Study, *10th International Conference on Wirtschaftsinformatik, WI 2.011*	16.-18.02.2011	Zurich, Switzerland
Rigorous Selection of Input Artifacts in Design Science Research – TAVIAS, *16th Americas Conference on Information Systems, AMCIS 2010*	12.-15.08.2010	Lima, Peru
TAVIAS: Tool for Assessing and Visualizing Input Artifacts' Suitability, *12. Interuniversitäres Doktorandenseminar*	02.07.2010	Dresden, Germany

A.2 Declaration of Authorship

Table 4: Summary of the papers of the doctoral dissertation and declaration of authorship

Paper 1	
Title	How Agile Are You Thinking? – An Exploratory Case Study
Publication	Proceedings of the 10th International Conference on Wirtschaftsinformatik, WI 2.011, February 16-18, 2011, Zurich, Switzerland, 818-827
Authors	Roy Wendler (RW), André Gräning (AG)
Authors' contribution	The research project included the collection, analysis, and interpretation of empirical data. These tasks as well as the preparation of the manuscript were mainly carried out by RW and additionally supported by AG. Both authors have equally contributed to the initial idea, the formulation of the research concept, the preparation of the fundamentals, and the incorporation of changes after reviews.
Paper 2	
Title	The Maturity of Maturity Model Research: A Systematic Mapping Study
Publication	Information and Software Technology, 54(12), 1317-1339
Author	Roy Wendler (RW)
Authors' contribution	Complete paper: RW
Paper 3	
Title	The Structure and Components of Agility – A Multi-perspective View [short version: The Structure of Agility from Different Perspectives]
Publication	Informatyka Ekonomiczna / Business Informatics, 2(28), 148-169 [short version: 2013 Federated Conference on Computer Science and Information Systems, FedCSIS 2013, September 8-11, 2013, Kraków, Poland, 1177-1184]
Author	Roy Wendler (RW)
Authors' contribution	Complete paper: RW
Paper 4	
Title	Dimensions of Organizational Agility in the Software and IT Services Industry – Insights from an Empirical Investigation
Publication	Communications of the Association for Information Systems, 39, 2016 *[forthcoming]*
Author	Roy Wendler (RW)
Authors' contribution	Complete paper: RW
Paper 5	
Title	Development of the Organizational Agility Maturity Model
Publication	Proceedings of the 2014 Federated Conference on Computer Science and Information Systems, FedCSIS 2014, September 7-10, Warsaw, Poland, 1197-1206
Author	Roy Wendler (RW)
Authors' contribution	Complete paper: RW