Konzeptionelles Verständnis von Stress in Großen Agilen Transformationen: Fallstudien mehrerer Unternehmen

Understanding the Concept of Stress in Large-Scale Agile Transformations: A Multiple-Case Study

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Abstract

Rapid change in the business environment due to economic, political, and technological factors force organizations to adapt accordingly. Therefore, implementing agile working models can be beneficial for organizations aiming to develop an adjustable and competitive business model, which provides the ability to respond to changing market needs in a timely and effective manner. Furthermore, it enables organizations to achieve improvements in quality, flexibility, communication and collaboration, and employee as well as customer satisfaction. Originating in the field of software development, agile methodologies were designed for small, co-located, and self-organizing teams. However, successes in a small setting inclined organizations to likewise adopt these principles and methods at scale. Whilst adopting agile practices at scale, new challenges emerged, yet large organizations increasingly seek to implement agile working models due to their improved performance, flexibility and speed. Therefore, it is crucial for both, researchers and practitioners to understand factors putting such transformations at risk. Whilst there are several descriptions of challenges during large-scale agile transformations, research is yet to develop a comprehensive understanding of overarching stress situations that can occur during such transformations, endangering their progress. This thesis aims to contribute to the scientific conversation on large-scale agile transformations through developing a highly relevant construct by means of a multiple case study on stress situations, which can occur during large-scale agile transformations. This thesis uses a model of stress, known from research in natural sciences to interpret stress during such transformations. In this context, a stressor is an environmental event that distracts the process of a large-scale agile transformation away from the planned track. This situation can trigger a positive, as well as a negative perception, including combinations of both, depending on the individual or organization. Results of this thesis are twofold. First, this thesis examines reasons for companies to undergo such transformations. The second part of this thesis focuses on stress situations found in ongoing or finished large-scale agile transformation projects, as well as their origin, classification and impact. Results are presented in a comprehensive cluster scheme, which enables the analysis of different stress situations according to a common theme.
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1. Introduction

This chapter shows that understanding stress situations, which can occur during large-scale agile transformations is a relevant and valuable research field to explore. Furthermore, it presents the main goals and research questions this thesis addresses in section 1.2, and demonstrates the applied methodology used to answer these research questions in section 1.3.

1.1. Motivation

Today’s continuously changing business environment evolves at rapid pace due to economic, political, and technological factors, forcing organizations to adapt accordingly [1], [2]. Implementing agile working models, such as e.g., Scrum, LeSS (Large-Scale Scrum), therefore can be beneficial for organizations aiming to develop an adjustable and competitive business model [3], [4], providing the ability to respond to changing market needs in a timely and effective manner [1], [3], [5]. Anchored within the agile manifesto in 2001 [6], agile principles and methodologies have opened up new opportunities, whose impact are reforming entire organizations and industries by necessitating willingness to change, continuous value creation, and an collaborative approach within teams and involving customers [7], [8]. The adoption of agility can enable organizations to achieve improvements in quality, flexibility, communication and collaboration, and employee as well as customer satisfaction [4], [9]. Originating in the field of software development, agile methodologies were designed for small, co-located, and self-organizing teams [1], [10]. However, successes in a small setting inclined organizations to likewise adopt these principles and methods at scale [7], [11], [12]. In recent times, attention has been drawn to issues related to managing the actual projects [7]. Frameworks for implementing agile practices, such as LeSS, SAFe (Scaled Agile Framework), and Spotify are therefore increasingly adopted by large-scale projects [13] in the field of software development, as well as other business domains [11]. Whilst adopting agile practices at scale, new challenges emerged, such as inter-team coordination due to dependencies between projects and their teams, oftentimes including interactions of agile and non-agile teams [14]–[16] and distribution of work without a defined architecture or properly defined requirements [1]. Thus, large-scale agile methods have been criticized based on their lack of detailed descriptions for project management [8], [15], [17].

Yet organizations increasingly [1] seek to implement agile principles and methods at scale due to their improved performance, flexibility and speed [18]–[20]. Therefore, it is crucial for both, researchers and practitioners to understand factors putting such transformations at
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risk. Oftentimes these change processes can lead to stress for affected individuals or whole organizations [14], [21], [22]. Organizations in this sense are comparable to humans, who feel stress [23], [24]. A stressor is an environmental event that distracts the process of the large-scale agile transformation away from the planned track. This situation can trigger a positive, as well as a negative perception, including combinations of both, depending on the individual or organization [22], [24], [25].

As the domain gained scientific and practical relevance [1], [7], different scholars and practitioners have investigated large-scale agile transformations in established companies. Dikert et al. [20] performed a comprehensive systematic literature review, identifying nine categories to describe challenges in large-scale agile transformations. Fuchs et. al. [14] observed that challenges may arise collectively and form barriers that substantially hinder the progress of the agile transformation process. They identified challenges in the categories organization, structure, people and technologies [14]. Equal categories, namely structure, task, actors and technology were the basis to Gerster’s et. al. [21] investigation on challenges and implications of adopting agile practices at enterprises.

Whilst there are several descriptions of challenges during large-scale agile transformations, research is yet to develop a comprehensive understanding of overarching stress situations that can occur during such transformations, endangering their progress. Fuchs et. al. [14] support this claim, as they formulated the remaining question whether issues exist that completely block the transformation process or lead to its termination. Challenges are mainly seen as hindering factors that require mitigation, whereas a perspective including a potentially diverse nature of agile transformation challenges has not yet been applied [14], [20].

The understanding of such stress situations is an important foundation in order to develop large-scale agile transformation guidelines that can be applied by research in the field as well as leaders in established organizations for strategy development. This thesis aims to contribute to the scientific conversation on large-scale agile transformations by developing a highly relevant construct by the means of a multiple case study on stress situations, which can occur during large-scale agile transformations.

Results of the thesis are twofold. First, this thesis examines reasons for companies to undergo such transformations. The second part of this thesis focuses on stress situations found in ongoing or finished large-scale agile transformation projects, as well as their origin, classification and consequences. Results are presented in a comprehensive cluster scheme, which enables the analysis of different stress situations according to a common theme. Finally, this thesis provides an outlook on coping with identified stress situations.

1.2. Objective

Given the previously described research gap, this thesis contributes to extant studies by defining an understanding of stress situations during large-scale agile transformations in established organizations from different industry sectors. Scientific and practical relevance was identified prior to starting the research project through several discussions with researchers from two different international universities and an industry expert. In preparation of this study, this thesis examined existing literature on stress during
organizational transformations. Insights were applied to a guideline for later multiple case interviews. By identifying stress situations during large-scale agile transformations, the study contributes to the growing conversation on large-scale agile transformations. The insights of this study should extend existing research and provide insights on stress situations, which can be applied by change leaders in established organizations for strategy development and implementation. This thesis focuses on insights drawn from expert interviews on finished, or ongoing large-scale agile transformation initiatives in established companies. Due to their experience within these projects, representatives who participated in transformation initiatives in investigated companies were able to deliver promising industry insights. In order to answer the described scientific issue, this thesis developed the following research questions:

**1.2. Objective**

RQ1: **What are reasons for organizations to undergo agile transformations?**
Agile principles and methodologies hold the potential to transform entire business models and create new market opportunities, at the same time their implementation in established organizations involves large change efforts [7], [8], [15]. Hence, the objective of the first research question is to set the foundation for following research by identifying factors, which lead companies to undergo large-scale agile transformations. To answer this research question, this thesis draws upon existing literature in the field of large-scale agile transformations and results from a multiple case study.

RQ2: **What are stress situations organizations undergo during large-scale agile transformations?**
Introducing agile methods in large organizations is more difficult than in small organizations [15], still large companies increasingly [1] seek to implement agile working models at scale [11]–[13]. Therefore, it is crucial for both, researchers and practitioners to understand stress situations, putting such transformations at risk, in order to handle or prevent them successfully. Whilst there are several descriptions of challenges during large-scale agile transformations, research is yet to develop a comprehensive understanding of overarching stress situations [14], [20]. Thus, the second research question aims to identify stress situations that occur during large-scale agile transformations. Answering this research question yields in a definition, as well as a cluster model of different types of stress factors, which are derived from a multiple case study.

RQ3: **What are origins of stress situations in large-scale agile transformations?**
Different causes can lead to stress situations during large-scale agile transformations, therefore it is important to understand similarities and differences in these origins. Based on the second research question, the third question therefore intends to further investigate the defined stress situations, by identifying their origin. This thesis uses a systematic approach to identify different origins based on a model for causes and sources of organizational crises by Mitroff et. al. [26].

RQ4: **How can stress situations in large-scale agile transformations be classified?**
In order to gain a deeper understanding and derive applications for research and practice, the fourth research question addresses the classification of previously identified stress
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situations. The classification is performed following Burnett et. al. [27] along the dimensions threat level, response options, time pressure, and degree of control. Additionally, this research question aims to provide insights on the impact and perception of stress situations.

RQ5: How do stress situations within large-scale agile transformations impact an organization?

Large-scale agile transformations, by nature affect large parts of companies. As "agile breaks everything" [28] adopting agility in an established organization has far-reaching implications on a company’s system, i.e., actors, structures, technologies, and tasks [21]. Therefore, the goal of the fifth research question is to investigate consequences stress situations imply for the organization during large-scale agile transformations, using socio-technical systems theory (STS). The STS model is commonly applied for research in the domain of organizational change, such as large-scale agile transformations [14], [21]. It sheds light on different components of the organization, namely people, structures, processes, and technologies [29]–[31].

1.3. Research approach

In order to achieve the research objectives described in section 1.2, this thesis uses a multiple case study approach. To ensure rigor and relevance, insights derived from conversation with other researchers and practitioners, and literature review were used to form an understanding of the field, and for the development of a comprehensive interview guideline. Figure 1.1 shows a visual representation of applied research approach.

A multiple case study is a suitable research methodology for this thesis since it studies contemporary phenomena in their natural context [8], [32]. It is a valuable research method in situations where studies intend to understand phenomena in a complex, real life setting [8], [33]. The approach of this thesis is based on guidelines described by Runeson and Höst [32], integrating further elements of case study methodology described by Yin [33]. The case study research process comprises of five phases [32], [33], (see Figure 1.2). As in accordance to Runeson and Höst [32], in the first phase, the design of the case study was defined.
1.3. Research approach

Considering this thesis investigates a mostly unexplored phenomenon and seeks to generate new ideas and concepts, it can be classified as an exploratory case study. To plan the process of this study, multiple cases were selected due to their ability to provide a broad understanding of the subject. In the second phase, procedures for the subsequent data collection process were defined. Therefore, a comprehensive interview guide was developed to lead through the semi-structured interviews in a continuous, yet flexible manner. The third phase describes the actual collection of evidence on the addressed case, which was carried out by three researchers either in person or on the phone. Every interview comprising this study was fully recorded and transcribed in order to ensure data integrity. The fourth phase addresses the data analysis, which was carried out using a coding scheme within the program MAXQDA. The fifth and final phase describes the reporting of the study’s finding. A detailed description of the case study process on the specifics of this study can be found in chapter 4.

The remainder of this thesis is structured as follows. During the next chapters (see chapter 2 and 3) this thesis introduces existing literature in order to establish theoretical foundations in the context of large-scale agile transformations and challenges organizations face during such transformations. After giving an overview of extant research, this thesis introduces the examined multiple case study in chapter 4, in order to establish a basic understanding for the reader. This chapter focuses on the methodological approach by explaining the design of this multiple case study, the data collection process, which consisted of the conduction of expert interviews, and their analysis. The results of this multiple case study are presented according to formulated research questions and identified clusters of stress situations in chapter 5. The discussion of results in chapter 6 focuses on setting findings of this study into their scientific context. Furthermore, this part of the thesis includes implications for theory and practice as well as limitations of this study. Finally, the conclusion of this study in chapter 7 summarizes key results and implications for future work.
1. Introduction
2. Foundations

This chapter presents an overview of existing scientific literature on the central concepts of this thesis. First, this section shows main characteristics of agility, as well as its values and principles. In this context this thesis also sheds light on the recently emerging field of large-scale agility. Next, this thesis also describes main principles of stress, which have foundations in natural science research, and how they can be applied for organizational research. This introduction to agility and the main concepts of stress is followed by an introduction to organizational change management, tying both topics together.

2.1. Agile development

There are several definitions for agile development, based on different research backgrounds. For the scope of this thesis the definitions of Gerster et. al. [21] and Dingsøyr et. al. [34] provide an orientation. Gerster et. al. [21] describes agile development as: “an organization’s ability not only to sense, but to respond swiftly and flexibly to technical changes, new business opportunities and unexpected environmental changes”.

In an international workshop, which aimed to focus research on practice in a field of high relevance, Dingsøyr et. al. [34] developed an overview of definitions for agile development with insights from industry experts. Important terms throughout the collected definitions were: culture, reactive/responsiveness to change, and continuous improvement.

Based on these insights, this thesis understands agile development in an organizational context as: the working mode and culture of an organization, which is open to continuous change and improvement and able to respond quickly and flexibly to technical changes, new business opportunities and unexpected environmental changes.

2.1.1. Agile foundations

The establishment of the agile manifesto [6] in 2001 substantially transformed the field of software engineering [7] and has already extended its scope to other business domains [7] and large-scale projects [11], [35]. The agile manifesto is composed of four core values and twelve principles. It was developed with one leading purpose in mind: “uncovering better ways of developing software by doing it and helping others do it” [6], [21]. The values of the agile manifesto [6] are defined as follows [6]:

- “Individuals and interactions over processes and tools”
- “Working software over comprehensive documentation”
2. Foundations

- "Customer collaboration over contract negotiation"
- "Responding to change over following a plan"

Crucial focus should therefore be set on the first part of each formulated value, however the latter should accordingly never be neglected since the core values rather describe a prioritization. The formulated values aim at employee involvement and motivation, lightweight documentation, customer collaboration and flexible planning. Based on these values, the agile manifesto further defines twelve principles [6]:

- "Our highest priority is to satisfy the customer through early continuous delivery of valuable software."
- "Welcome changing requirements, even late in development. Agile processes harness change for the customers competitive advantage."
- "Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale."
- "Business people and developers must work together daily throughout the project."
- "Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done."
- "The most efficient and effective method of conveying information to and within a development team is face-to-face conversation."
- "Working software is the primary measure of progress."
- "Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely."
- "Continuous attention to technical excellence and good design enhances agility."
- "Simplicity - the art of maximizing the amount of work not done - is essential."
- "The best architectures, requirements, and designs emerge from self-organizing teams."
- "At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly."

More formal definition-proposals addressing agility have been developed by different researchers based on the agile manifesto and practical experience [7]. Dingsøyr et al. [7] gave a comprehensive overview of the most impactful definitions: Henderson-Sellers and Serour [36] describe agility as the ability to adapt to different changes while also refining and fine-tuning development processes as needed [7]. Lee and Xia [37] characterize agility as a team’s capability to efficiently and effectively incorporate user requirement changes during the project life cycle [7]. To this date, there is no generally accepted definition of agility. According to Conboy et al. [17] the reason for such a lack of consensus is that the principles of agility expressed in the agile manifesto [6] lack grounding in management theory and philosophy, and do not consider the evolution of the concept of agility in fields outside software development. However, according to Dingsøyr et al. [7], Conboy [38] provides by far the most comprehensive view of agility, describing agility as conceptualized
to include and go beyond both flexibility and leaness. They understand agility as the continued readiness to rapidly or inherently create change, proactively or reactively embrace change, and learn from change while contributing to perceived customer value in economy, quality, and simplicity, through its collective components and relationships with its environment [38]. Dingsøyr et al. [7] also conclude, that agility entails embracing lean processes with an emphasis on realizing effective outcomes.

2.1.2. Large-scale agile development

Based on agile values and principles the field of large-scale agility has recently emerged in literature and practice [1], [7], [11], [12]. Though the implementation of agile development was originally expected to be best suited for small, co-located teams [1], [10], successes and increased use of agile methods and principles have recently encouraged organizations to likewise adopt agility in different business domains and at scale [7], [11], [12], [35]. Adopting agile methodologies in large-scale transformations comes with both, benefits and also new challenges.

Large-scale agility is a rising research topic with high amounts of published research in recent years [7]. Still, a generally valid definition of the term large-scale in the conversation of agile transformation does not exist. Dikert et al. [20] describe large-scale agility as not based on the use of individual tools or practices, but rather on a holistic way of thinking. In the scientific conversation, several researchers provided input on the definition of large-scale based on team size and project scope. Dingsøyr [10] describe large-scale agility as at least more than two agile teams working together, whereas Dikert et al. [20] suggest more than fifty people or at least six teams. Power [39] and Dingsøyr [10] describe large-scale agile endeavors based on different project scopes. This thesis relies on Dingsøyr’s [10] description, which was further classified by Fuchs et. al. [14]. Accordingly, the large-scale application of agile methods has multiple interpretations: a) the use of agile methods in large firms, b) the application of agile methods in large projects or large teams, c) the use of agile methods in large multi-team settings, and d) the employment of agile practices and principles in firms as a whole.

Summarized this thesis defines the term large-scale agile transformation as follows: For the term large-scale agile, this thesis focuses on the last three options according to Dingsøyr [10], especially the adoption of agile methods and principles in established companies in a (b) large project, (c) multi-team, or (d) overall organizational setting. Furthermore, the understanding of transformation, refers to the change from a different organizational working model, such as e.g., a waterfall model based on hierarchies, to agile methods, following common values and principles [14].

2.2. Stress

The second stream of literature used in this thesis addresses the topic of stress. Naturally, there is a strong natural science focus, however further papers bridge the gap between humans and organizations.
2. Foundations

2.2.1. Definition of stress

Several different fields of literature have investigated the concept of stress in the past and developed models in order to understand and conceptualize the phenomenon and term. This study does not intend to give a fully comprehensive overview of all theories and concepts surrounding stress, but rather to provide an understanding of the most important concepts developed by previous research and their perception and use in the scientific conversation. The overview provided in the following is based on insights given by Branson [40], and further literature review.

Selye [41] provided a foundational understanding of stress in an early work, defining the term as “the non-specific response of the body to the demands made upon it” [41]. He characterized this response as twofold, including positive and negative aspects, namely distress and eustress. Later stress models retained Selye’s [41] holistic conceptualization, emphasizing the differentiation between positive and negative stress responses [40]. Lazarus and Folkman [42] used the concept to describe the dependency of an individuals’ experience of stress based on their perception of their ability to cope with the stressor. If individuals perceive their coping skills as inadequate, they experience negative stress. On the other hand, if individuals perceive their coping skills as adequate, they experience positive stress [40]. Furthermore, Nelson and Simmons [43] also differentiate positive from negative stress on the basis of an individuals’ perception, focusing more on specific differences predicting the stress response [40]. Recent work by Oken [25] focuses on the biology of stress and resilience in humans from a system science perspective. Systems science is a methodology used to understand complex systems from organizational, structural, and dynamic perspectives [25]. According to Oken [25], a stressor pushes the physiological system away from its baseline state, towards a lower utility state. While some physiological changes induced by stressors may benefit health, Oken [25] also describes negative effects mainly caused by chronic stress [25]. From a systems science viewpoint, stress often corresponds to a state away from optimal [25]. The state of stress results from an either external or internal environmental event, also called a stressor [25].

While these models coincide in the distinction between positive and negative stress responses, they differ in their specific conceptualization of the stress process [40]. However, certain key concepts can be generalized according to Branson [40]: “A stressor is any relevant stimulus that puts a demand on an individual.” The stressor can be physical or psychological. Stressors are considered to be subjective, depending on the individual’s perception of the situation. Stress responses can therefore be both, distress, the negative, undesirable, and harmful response, and eustress, the positive, desirable, and advantageous response. Both responses may vary in their extend, rather than being extreme opposites. Furthermore, individuals can simultaneously experience distress and eustress [40]. Figure 2.1 shows the described concept.
2.2. Stress

2.2.2. Applicability of the definition of stress to different domains

The adoption of these concepts, which are originally based in natural science to organizations can be justified by general systems theory. According to Kast [24], the theory was proposed as a basis for the unification of science. Research in natural sciences and social sciences has generally embraced systems concepts, however organization and management research seemed cautious to identify with this stream of literature at first [24]. General systems theory emerged from research in biology by Bertalanffy [24], [44]. Therefore, many of the characteristics are relevant to living organisms, still they remain conceptually easy to apply to social organizations accordingly [23], [24], [44]. “There is, after all, an intuitive similarity between the organization of the human body and the kinds of organizations men create” [24], [44]. Scott [45] stated that organization theory and general system theory are similar in their way of regarding organizations as an integrated whole. Characteristics of modern organization theory are “its conceptual- analytical base, its reliance on empirical research data, and most importantly, its integrating nature” [24], [45]. These qualities imply that the only meaningful way to study organizations is to study them as systems [24]. Relevant key concepts of general systems theory for this thesis are the concept of subsystems and the open systems view [24]. Thus a system by definition is composed of at least two interrelated parts or elements. Such systems can be either closed or open. Open systems exchange information, energy, or material in a dynamic relationship with their environments. Biological and social systems are inherently open systems; mechanical systems may be open or closed [24]. Several researchers have already made use of the concept of stress in different domains, such as organizational research. Insights from these studies are displayed in the following section 3.2.

Concluding this section, the notion of stress for the context of this thesis is defined as follows. A stressor is an environmental event that distracts the process of the large-scale agile transformation away from the planned track. This situation can trigger a positive, as well as a negative perception, including combinations of both, depending on the individual or organization [22], [24], [25], [40].
2. Foundations

2.2.3. Classification of stress situations

For the forthcoming sections of this study it is important to gain an understanding of how stress situations can be classified. A systematic basis for the classification of stress situations is therefore crucial. Excising literature, specifically in the field of management offers a variety of models to assess crisis situations, which can also be used in the context of this study of stress situations.

Managing crisis situations

In order to gain a deep understanding of organizational stressors, tying in with the first dimension of the stress model described by Branson [40], this study uses a model developed by Mitroff et. al. [26]. Mitroff et. al. [26] provide a study on managing crisis situations effectively. While no one can prevent or predict all crisis situations, organizations can adopt a systematic and comprehensive perspective for managing them more effectively [26]. Results drawn from this study provide a system to classify sources of organizational crises along the dimensions internal, external, people/social/organizational, and technical/ economic (see figure 2.2).

![Figure 2.2 Causes and sources of organizational crises [26]](image)

Severity of crisis situations

Furthermore, in order to gain a deep understanding of organizational stress responses, tying in with the second dimension of the stress model described by Branson [40], this study uses a model developed by Burnett et. al. [27]. Burnett et. al. [27] offer a model that can be used to assess the seriousness of crisis. The four key strategic components are time pressure, control issues, threat level concerns, and response option constraints (see figure 2.3). They also provide a crisis classification matrix, which can be used to measure the severity of the situation (see figure 2.4).
Evaluation of crisis situations

Lastly, in order to gain a deep understanding of organizational stress outcomes, tying in with the third dimension of the stress model described by Branson [40], this study uses socio-technical systems theory (STS). Socio-technical systems theory serves as a suitable model to evaluate stress situations [14], [21]. The socio-technical perspective evolved from the socio-technical model of Leavitt [29], and was further developed by Bostrom and Heinen [30], [31] to elaborate the best way to design information systems in line with the organizational work system [21], [31]. They distinguish the technical system, comprising of processes and technologies and the social system, comprising of people and structure as fundamental parts of the work system [21], as outlined in figure 2.5.
Accordingly, the socio-technical theory describes organizations as a work system of two sub-systems [30]. On the one hand the social sub-system is defined as “the individuals including the knowledge, skills, attitudes, values, and needs they bring to the work environment, as well as the reward system and authority structures that exist in the organization” [31]. The people dimension therefore includes involved people in the organization, organizational culture, capabilities and knowledge [21]. The structures dimension describes organizational structures, ways of communication, and project organizations [21]. On the other hand the technical sub-system “transforms the system inputs into outputs in a way that enhances the overall performance of the organizational work system” [31]. Thus, the processes dimension relates to the actions an organization undertakes to create value for its customers. The technologies dimension describes tools and technologies used to support business processes [21]. As these two subsystems are inseparably connected, consensus between them is optimal for organizational productivity and social aspects, such as employees’ work satisfaction [14].

In the context of this thesis, these concepts [26], [27], [29]–[31] serve as a guideline to understand stress situations in an organizational context. The overarching concept of stress provides a guideline to understand organizational stress situations. Further models refine and add to the concept in the three areas, origin, classification and consequences. Mitroff et. al. [26] provide a model to understand origins of stress situations. Burnett et. al. [27] offer a model to classify stress situations. STS theory can be used to classify consequences of stress situations. Taking the described inputs into account the understanding and further application of STS theory in this thesis refers to the model described in figure 2.6. In this study the STS model is used to investigate consequences of stress situations in an organizational setting on: (1) people, focusing on their stressor response, (2) work structures, focusing on the social system’s stressor response concerning processes within the working model of the transformation, (3) technologies, focusing on tools and technologies, which were implemented due to the stress situation, (4) organizational structures and processes,
2.3. Change management

focusing on value creation. Figure 2.6 shows a visualization of the applied STS model for this thesis.

![STS model applied in this thesis (own presentation based on [14], [21])](image)

These concepts are further used in order to formulate comprehensive questions for interviews. Furthermore, they serve as an underlying basis for the structured presentation of the multiple case study results.

2.3. Change management

Stress in an organizational context has been investigated on a broader level by the literature stream of change management [46]. An organizational transition into an agile working mode and mindset describes a radical change, which needs to be managed within the company to ensure successful implementation. Change management experts often describe organizational antibodies that begin to gather as change ideas come up within an organization [12]. Concerns regarding inadequacy or obsolescence become visible as well as jealousy about assignments, resulting in defense mechanisms. This can result in several destructive behaviors, including sabotage and refusal [12]. Such situations can be particularly damaging in an agile context since agile teams rely heavily on trust and shared knowledge and a sense of ownership [12]. Concepts in change management offer approaches to handle and classify stress situations, which might occur during large-scale agile transformations.

Bondel et. al. [47] provide comprehensive insights into change management in the domain of a large established organization, which can be applied as a basis for the understanding of change management in this thesis. The following description is based on the collected insights Bondel et. al. [47] provide throughout their work.

The literature on change management has evolved over time, and experienced influence from various streams of scientific and practical discussion e.g., publications by Kotter [46] and Lewin [48]. Kotter [46] made a major contribution to the understanding of change management through numerous publications. His studies address fundamental changes in
managing business in order to cope with a changed and competitive market environment [46]. Kotter’s change management model is particularly popular because of its easy-to-use format and its origin in practice [49]. Change management describes an organization’s objective to adapt to a changed environment or improve its business performance [50]. It guides the goal-oriented, comprehensive and oftentimes cross-departmental redesign of structures, processes, business units or entire companies [51]. According to Kotter [46], organizations pass eight steps throughout a successful change management process. In the first step a sense of urgency is created in order to convince employees to participate in the change process and to get out of their comfort zones. The second step involves the formation of a leadership coalition to guide the organizational change. The third step describes the development of a clear vision and strategy to guide and motivate participants. Communicating the developed vision in step four is a crucial action in order to gain acceptance and commitment amongst participants. The fifth step describes the empowerment of people to act on the established vision to adapt internal structures and systems to the requirements of the change strategy. In the sixth step, short-term successes should be achieved in order to maintain motivation and awareness of the urgency amongst participants. The seventh step intends to consolidate gains and encourage further change by relying on credibility, created by established short-term successes in order to tackle large-scale projects. The eighth and final step aims to anchor new approaches in the corporate culture.

Even though Kotter has largely influenced and developed the field, his model is criticized for being mostly based on his own practical experience, missing a scientific foundation. In practice, however, it quickly gained acceptance and remains an important reference [49].
2.3. Change management
3. Related work

The overall theme of this thesis is investigating large-scale agile transformations, specifically focusing on stress situations, which can occur during such projects. Empirical literature on large-scale agile transformations is mainly characterized by case study research and literature review, which examine the process and challenges of large-scale agile transformations, for instance inter-team coordination approaches or portray specific actions supporting the transformation [14]. This study is based on the stream of literature concerning large-scale agile transformations, which this thesis also aims to contribute to.

3.1. Related work on motivation to undergo large-scale agile transformations

There has been plenty of evidence that agility can benefit projects or organizations ever since its broad adoption in small teams [7], [15], [19]. In recent times organizations have also increasingly adopted agility at scale [1]. Previous literature and evidence from practice identified several reasons for organizations to undergo an agile transformation, including reasons for large-scale agility.

The 13th state of agile survey [52] provides a comprehensive overview of benefits of adopting agility in general, which is not specifically related to large-scale agility. However, similar results can be expected for large-scale agile projects. Benefits include ranked by frequency amongst survey participants: ability to manage changing priorities, project visibility, business/IT alignment, team morale, delivery speed/time to market, increased team productivity, project predictability, project risk reduction, software quality, engineering discipline, managing distributed teams, software maintainability, and project cost reduction [52].

Dingsøyr et. al. [7] describe that at its core, agility entails the ability to rapidly and flexibly create and respond to change in the business and technical domains. Furthermore, agility helps organizations to realize effective outcomes through efficient processes, reducing waste and therefore cost [7]. Overall, agile methods promise higher customer satisfaction through higher product quality, as well as fast reaction times to changing requirements [7]. In a later workshop Dingsøyr et. al. [34] validated insights from the state of agile survey [52] working with experts in the field. The participants of the workshop ranked their motivation for agile transformation after a scale taken from the state of agile survey [52]. The top three reasons include: improve business/IT alignment, enhance ability to managing changing priorities, and accelerate software delivery.
3.2. Related work on stress and challenges in large-scale agile transformations

Paasivara et. al. [15] similarly describe that agile software development approaches embrace change during development, are people-centric, and aim at constantly keeping the quality of the developing software high [15]. Successes were visible in customer and developer satisfaction [20]. They further describe that agile methods have established themselves as a suitable approach for improving performance and competitiveness [19]. In a later publication [53] they also draw conclusions from a literature review, showing that one of the top reasons for a large software development organization to start an agile transformation, was to reduce time to market in order to keep up with faster competition. Companies want to improve their competitiveness, or even fear losing competitiveness [53]. Another significant motivator was software project management related reasons, aiming at improving over-head in bureaucracy, unproductive meetings, change management and excess documentation [53]. Furthermore, slow processes with long cycle times led to late feedback, which needed to change [53].

Conboy [38] further underlines that the motivation for the emergence of agile methods has always been their ability to handle change.

Böhm [12] also names motivators for implementing agility at scale, which can be grouped in the following categories: efficiency, market fit, customer value and quality, team empowerment.

Summarized, motivations for established organizations to undergo large-scale agile transformations, as derived from previous literature include:

- Ability to handle change: time-to-market, reaction time to requirement changes
- High customer satisfaction through higher product quality
- Team empowerment and coordination
- Process efficiency and cost reduction
- Managing complexity

3.2. Related work on stress and challenges in large-scale agile transformations

Several researchers have entered the field of stress and challenges during large-scale agile transformations. They use different methods to structure their findings, which are applicable for the varying detail of findings. This section provides an overview of previous findings in the domain of stress and challenges during large-scale agile transformations and different modes of structuring them.

3.2.1. Related findings on organizational stress

Sonnentag et. al. [54] describe that organizational change can be regarded as a stressor. Examples include mergers, downsizing, or the implementation of new technologies [54]. Such stress affects both the individual, as well as the organization itself [54]. Stressors can be grouped into the categories physical stressors, work-related job stressors, role stressors, social stressors, time-related stressors, career-related stressors, traumatic events, and stressful change processes [54].
3. Related work

Furthermore, Riolli [55] investigated resilience as a result of stress, triggered by change in the information system context. He describes that a flexible and adaptable organizational culture and strategy is a key factor for individuals and organizations, in order to successfully cope with a changing environment [55].

Applied to an organizational level, Edwards [56] describes in cybernetic theory that stress is a discrepancy between an employee’s perceived and desired state, provided that this discrepancy is considered important by the employees. Hargrove [22] provides the probably most comprehensive, and fitting study in terms of stress investigations similar to this study. He uses the understanding of stressors as the physical and psychological demands, that initiate the stress response within individuals of an organization. Stressors arise from a variety of sources within organizations. Hargrove’s understanding of stress also aligns with Selye’s [41] holistic conceptualization, emphasizing the differentiation between positive (eustress) and negative (distress) responses to stressors [22] (see figure 3.1). He considers eustress as a positive, healthy response that leads to motivation and challenge, whereas distress is a deviation from healthy functioning resulting from a stress response. Distress can occur from under or over-stimulation, which results in reduced performance [22]. Hargrove further focuses on distress and describes that individual and organizational outcomes associated with distress are interdependent. Organizational stressors can generate individual distress, and individual distress can cause organizational dysfunction [22], [57]. These negative organizational outcomes can be categorized as either direct, such as reduced satisfaction, poor job performance, greater frequency of accidents, increased health-care costs and expensive legal judgments, or indirect costs, such as loss of vitality, breakdowns in communication, reduced quality of relationships, violence and bullying, and opportunity costs [22], [57].

Figure 3.1 Preventive stress management model in organizational stress (own presentation based on [22])

He describes that organizational change including technological adoption and innovation is a source of stress since individuals perceive change as stress [22]. Similar to the categories used by Sonnentag [54], Hargrove uses a framework to categorize stress factors, which was developed by Quick and Quick [58]. The framework provides four categories of stress factors: role factors, job factors, physical factors and interpersonal factors [22], [58]:

- Role based stress is induced by expectations placed upon an individual within an organization. Generally, stress is caused if role expectations are confusing,
ambiguous or conflicting. Role-confusion can arise when an individual does not understand their role within the organization, ambiguity can result from a functionally unclear definition of the role and conflict mostly results from personal reasons, such as work-family conflict or poor person-role fit.

- Job based stress includes factors, which are directly related to the quality and quantity of work performed as well as feedback that individuals receive regarding their performance for example deadlines and performance evaluations.
- Physically based stress mostly concerns an individual’s senses, such as light, noise, vibration, smell, temperature, etc.
- Interpersonally based stress can originate from customers, vendors, co-workers, subordinates and superiors. For example, situations, such as joining a new job, and personal differences between coworkers or leadership styles can cause stress.

Concluding this section, research in the field of stress situations in an organizational context oftentimes focuses on personal stress of employees e.g., [22], [58]. Employees make up a crucial part of organizations and play an important role in organizational transformations in general, and specifically large-scale agile transformations. However, for the investigation of the organization as a whole during large-scale agile transformations in this study, further studying of stress only on a personal level is not expedient. Furthermore, these studies do not investigate the specific context of agile transformation. For this reason, the following section focuses on challenges during large-scale transformations as described in literature.

3.2.2. Related findings structured on a cluster basis

Dikert et al. [20] performed a comprehensive systematic literature review based on 52 papers considering industrial large-scale agile transformations. They identified 35 challenges for large-scale agile transformations and sorted them into nine categories assorted by highest frequency in literature [20]:

- Agile difficult to implement – including the challenges misunderstanding agile concepts, lack of guidance from literature, agile customized poorly, reverting to old way of working, excessive enthusiasm
- Integrating non-development functions – including the challenges other functions unwilling to change, challenges in adjusting to incremental delivery pace, challenges in adjusting product launch activities, rewarding model not teamwork centric
- Change resistance – including the challenges general resistance to change, skepticism towards the new way of working, top down mandate created resistance, management unwilling to change
- Requirements engineering challenges – including the challenges high-level requirements management largely missing in agile, requirement refinement challenging, creating and estimating user stories hard, gap between long and short term planning
3. Related work

- Hierarchical management and organizational boundaries – including the challenges middle managers’ new role in agile unclear, management in waterfall mode, keeping the old bureaucracy, internal silos kept
- Lack of investment – including the challenges lack of training, lack of coaching, too high workload, old commitments kept, rearranging physical spaces
- Coordination challenges in multi-team environment – including the challenges interfacing between teams difficult, autonomous team model challenging, global distribution challenges, achieving technical consistency, interpretation of agile differs between teams, using old and new methods side by side
- Different approaches emerge in a multi-team environment – including the challenges Interpretation of agile differs between teams, using old and new approaches side by side
- Quality assurance challenges – including the challenges accommodating non-functional testing, lack of automated testing, requirements ambiguity affects

Dingsøyr et. al. [34] took up the described challenges in an international workshop, which aimed to focus research on practice in a field of high relevance. Participants were experienced researchers in the field. They conducted a ranking of the challenges identified by Dikert et al. [20], which identified a different order to the one Dikert et al. [20] identified:

- Hierarchical management and organizational boundaries
- Integrating non-development functions
- Resistance to change
- Coordination challenges in multi-team environment
- Agile difficult to implement
- Lack of investment
- Different approaches emerge in a multi-team environment
- Quality assurance challenges
- Requirements engineering challenge

Further research, which was not included in Dikert’s [20] literature review, oftentimes identified similar challenges described in different categories. For example, Gregory et. al. found challenges in organization, sustainability, culture, teams, scale, value and claims and limitations during a case study of a series of agile conferences and events during 2013 and 2014 [59].

Kalenda et. al. [60] address the topic through a literature review as well as case study research and state that resistance to change, an overly aggressive roll-out timeframe, quality assurance concerns, and integration into pre-existing non-agile business, are critical challenges in the scaling process of agile transformations.

Hekkala et. al. [61] conducted a case study during a large-scale agile transformation in a traditionally shaped organization. They were able to identify that most challenges stem from an organizational conflict between the assumptions made and beliefs held by the
management and the developers. They state that no common view on agility and its key principles and practices were obvious challenges for the transition [61]. Throughout several publications Gandomani et. al. studied different challenges arising in large-scale agile transformations, mainly focusing on change management processes and implications e.g., [62], [63]. Additionally Gandomani et.al. [63] specifically focused on challenges that arise on the people front. They conducted a case study using a grounded theory approach involving forty-nine agile practitioners across thirteen different countries. They specifically focused on the origin of human related challenges and found that the root of the emerged issues is the people's perceptions about agile transition and their mindset [64].

Furthermore, Uludağ et. al. [65] describe 79 challenges connected to large-scale agile projects, including transformations based on a structured literature review. Challenges are split into eleven categories, namely culture & mindset, communication & coordination, enterprise architecture, geographical distribution, knowledge management, methodology, project management, quality assurance, requirements engineering, software architecture, and tooling [65]. Similarly, Paasivara et. al. [15] describe that introducing agile methods in large organizations is more difficult than in small organizations, which is partly related to size slowing down change. Paasivara et. al. [15] specifically investigated scaling Scrum in a large globally distributed software development project by means of a case study. They describe that agile development is not founded on the use of individual tools or practices, but rather on a holistic way of thinking. Therefore, adopting agile often requires change of the entire organizational culture. One significant difference between small and large-scale adoptions is that large organizations show higher inter team, and project dependencies. This increases the need for inter-team coordination due to dependencies between projects and teams, oftentimes including interactions of agile and non-agile teams. Consequently, such projects also require more formal documentation and thus reduce agility. In the specific context of the investigated project Paasivara et. al. [15] found four challenges connected to large-scale agile transformation: the agile mindset was partially missing, the product was difficult to divide into reasonable requirement areas, the lack of a common view of the scrum implementation, and constant market pressure causing time pressure. In a later study, Paasivara et. al. [4] concludingly name four key challenges to agile adoption over different industries including change resistance, lack of communication of the adoption, lack of continuous improvement, and lack of training and support during the adoption. Furthermore, Conboy and Carroll [66] identify nine key challenges resulting from the implementation of agile methods at scale in established organizations within several industries: comparing and contrasting large-scale methods, lack of readiness and appetite for large-scale methods, the need to balance organizational structure while adhering to large-scale methods, and the lack of evidence-based use of large-scale methods. Recent insights from practice, comprised in the 13th state of agile survey [52] also show overall similar challenges, such as: organizational culture at odds with agile values, general organization resistance to change, inadequate management support and sponsorship, lack of skills/experience with agile methods, inconsistent processes and practices across teams, insufficient training and education, lack of business/customer/product owner availability, pervasiveness of traditional development methods, fragmented tooling and project-related
3. Related work

data/measurements, minimal collaboration and knowledge sharing, and regulatory compliance or government issue.

3.2.3. Related findings structured based on STS theory

In an effort to categorize challenges in a systematic and generalizable way, several researchers made use of the STS theory [14], [21], [67], [68]. STS theory (see chapter 2.2.3) provides a valuable structure for research in the domain of organizational change, such as large-scale agile transformations. Fuchs et al. [14] describe a large-scale agile transformation as an “episodic, socio-technical change”. They selected STS theory as an underlying research model for their study, because it allows for an holistic perspective on transforming firms and acknowledges that organizational change, such as a large-scale agile transformation can be viewed as an interplay of organizational structures, work procedures, technologies and organizational members [14]. Gerster et al. [21] accordingly describe that the socio-technical systems theory serves as a helpful structure for analyzing changes in the organizational context and, especially its impact on the social and technical system [21]. Carroll and Conboy [13] state that large-scale agile transformations should be regarded in a socio-technical context, as the presented challenges increase with the organization’s size and interdependencies.

Fuchs et al. [14] performed a multiple case study on two firms that differ in size, industry, and approach to large-scale agile transformation following their aim to identify challenges during large-scale agile transformations. They examined the process of 16 large-scale agile transformations in order to make exact conclusions on barriers to those transformations. Consequently, they derived three agile phases within the transformations. Each of those phases encompasses alternating sections of radical and incremental change. Each phase begins with a radical change, which significantly increases the organization’s agility. Subsequently, a period of incremental adaptations follows, which increases agility only marginally. At the point where no more barriers to the large-scale agile transformation exists, radical change is required again. Following these phases, they observed that challenges may arise collectively and form barriers that substantially hinder the progress of the agile transformation process. These barriers consequently require explicit and extensive coping actions, that go beyond the mitigation of individual issues. They identified three archetypes of barriers following categories provided by STS theory [14]:

- On a structural level they identified that the coordination of different organizational worlds holds issues in structure, such as coordination problems between multiple agile teams or between agile teams and other business units. Problems include inappropriate organizational structures, difficult leadership dynamics, and cultural issues.
- On the people level they identified the difficult selection of right people, such as involved employees lacking abilities, motivation, or agile mindset.
- Lastly, they combined challenges, which occurred in the technical sub-system formed by processes and technology. They found a barrier in the form of suitability of agile methods in both, processes and technology.
3.2. Related work on stress and challenges in large-scale agile transformations

Furthermore, in a study including ten global companies Gerster et. al. [21] identified, in accordance to STS theory, that adopting agile practices showed a high impact on products, processes, technology, people, and structure [21]:

- On a structural level, they found impacts on organizational governance. The coexistence of agile and non-agile units is predestined for conflicts due to different objectives, steering, and incentives. However, this topic can be addressed by assigning experts to teams and reducing interfaces between the agile and non-agile teams.
- On a people level, they identified a high impact on job roles, performance evaluation, corporate culture, hiring, resource allocation and roles of supervisor. In an agile setting, employees take on own initiative and actively contribute to self-organization of product teams instead of being controlled by supervisors. Therefore, new roles emerge, as not only different skills are required but also new jobs are created. Furthermore, a company culture, which is in line with agile principles is crucial for a successful transformation.
- Looking at a technology level, the observation revealed impacts on IT architecture, software development approach and tools. In an agile environment and also an environment where agile and non-agile teams work together, it is important to have a standardized and stable technology stack.
- Concerning processes, the study showed a high impact on product definition, product/service portfolio, project management, budget allocation, controlling KPIs and sourcing. Organizational budgeting changed, as agile practices focus on early time to market and optimize products in iterations based on timely customer feedback. Planning and budgeting tasks therefore also take place according to short-term sprint cycles. Furthermore, agile practices rely on self-organization of teams and individuals, which require new incentive and control mechanisms.

Gerster et. al. [21] specifically stressed that while first steps towards agility are often made quickly, challenges start when agile units need to collaborate with non-agile units.

Additionally in an earlier study, Nerur et al. [67] report challenges of implementing agile methods in organizations’ software development departments. They identified challenges along the proposed dimensions of STS theory [67]:

- On a management and organizational level, they found challenges in the organizational culture, management style, organizational form, knowledge management, and reward systems.
- In the people dimension, they report challenges in working effectively in a team, maintaining a high level of competence and customer relationships
- On a process level, challenges arose through change from a process-centric to a feature-driven, people-centric approach, with a short iterative test-driven
3. Related work

development style that emphasizes adaptability. Furthermore they identified issues in managing large, scalable projects and selecting an appropriate agile method.

• Considering technologies, challenges in maintaining an appropriate set of existing technology, tools and new skills were identified.

Furthermore, Chow and Cao [68] studied challenges in agile software projects with no special remarks to large-scale transformation, rather just agile transformation in general. They grouped the challenges and failure factors into four categories: organizational, people, process, technical. These factors have a tremendous impact on the project success in terms of quality, scope, time, and costs.

Concepts and insights described in the chapters above provide a basis for this study. Whilst there are several descriptions of challenges during large-scale agile transformations, research is yet to develop a comprehensive understanding of overarching stress situations that can occur during such transformations, endangering their progress. Current research lacks understanding whether issues exist that completely block the transformation process or lead to its termination [14]. Therefore, this study examines by means of a multiple case study, firstly reasons for organizations to undergo a large-scale agile transformation, and secondly, which stress situations can occur during such a transformation project. Furthermore, this study investigates these stress situations according to their origin, classification, and consequences for the organization.
3.2. Related work on stress and challenges in large-scale agile transformations
4. Multiple case study

This chapter describes the conducted multiple case study, starting with a description of the investigated large-scale agile transformation projects in Section 4.1. Section 4.2 describes the research process in detail. Results of the multiple case study will be presented in the following chapter 5.

4.1. Introduction to the cases

This study analyzes stress situations that can occur during large-scale agile transformations at well-established, existing companies by the means of an explorative multiple-case study. This paper comprises the results drawn from interviews, which were conducted in 2019 and 2020 in several companies, that were involved in an ongoing large-scale agile transformation, or had finished a large-scale agile transformation recently. In order to avoid potential industry bias, this thesis selected cases from diverse industries (see table 4.1).

In order to validate the findings for different organizations, the research team always interviewed several employees from different backgrounds within one organization. As this thesis is embedded within a research project, the interviews were conducted by two to three researchers, focusing on the topic of large-scale agile transformations, developing two separate theses. Background questions were applicable to both theses’ topics and in further questions, different focus points were set.

<table>
<thead>
<tr>
<th>Company</th>
<th>Number of interviews conducted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automotive Co. A</td>
<td>5</td>
</tr>
<tr>
<td>Tech Co. A</td>
<td>3</td>
</tr>
<tr>
<td>Automotive Co. B</td>
<td>2</td>
</tr>
<tr>
<td>Retail Co.</td>
<td>2</td>
</tr>
<tr>
<td>Insurance Co.</td>
<td>2</td>
</tr>
<tr>
<td>Tech Co. B</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 4.1 Case overview

This section provides a brief introduction to the investigated companies, further in-depth information concerning investigated large-scale agile transformation projects can be found in the following sections. Automotive Co. A is a German multinational company, which
produces luxury vehicles and motorcycles. The user experience, IT, manufacturing, and digital departments participated in this study. Tech Co. A is a large German multinational industrial manufacturing company. The software development department participated in this study. Automotive Co. B is a Swedish luxury vehicles brand. The engineering departments including the R&D unit participated in this study. Retail Co. is a German multinational chain of stores selling consumer electronics. The data engineering department and a department overarching agile coach participated in this study. Insurance Co. is an European multinational financial services company. The IT product development and digital service departments participated in this study. Tech Co B. is a German multinational engineering and technology company. The IT department and a department overarching agile coach participated in this study.

4.2. Methodology

According to Runeson and Höst [32], when conducting a case study, there are five major process steps to be walked through:

1. Case study design: objectives are defined, and the case study is planned
2. Preparation for data collection: procedures and protocols for data collection are defined
3. Collecting evidence: execution with data collection on the studied case
4. Analysis of collected data
5. Reporting

This chapter describes these steps in the context of the conducted multiple case study.

4.2.1. Case study design

Yin [33] describes that the case may in general be virtually anything, which is a contemporary phenomenon in its real-life context. Therefore, case study research is a suitable methodological approach for this thesis, since it exploratively studies stress situations during large-scale agile transformations in their natural context, through the experiences of employees [8], [32]. It is a valuable research method for understanding phenomena in a complex, real life setting [8], [33]. Runeson and Höst [32] describe that, in software engineering, the case may be a software development project, which is the most straightforward choice. Alternatively, it could be an individual, a group of people, a process, a product, a policy, a role in the organization, an event, or a technology. For this thesis, the investigated cases fall into these categories, since they address organizational transformation projects and processes. Furthermore, a multiple case study research approach allows for cross-case analysis and is therefore less vulnerable to critique concerning the generalizability of results [33]. Following, the cases and units of analysis were selected intentionally based on project progress, expertise, and in order to enable a broad view over different industry sectors and companies, while ensuring validity within individual cases by interviewing several experts from one company.
4.2.2. Preparation for data collection

In order to prepare for this multiple case study, this thesis reviewed literature in the respective field (see chapter 2, 3), including similar case studies [11], [14], [21], [69], [70]. Since semi-structured interviews intend interview-questions to be planned in advance with a combination of open and closed questions [32], a major amount of time was spent developing the questionnaire. The interview questions are based on the defined research questions, however not formulated in the same way [32]. The guide includes four sections on: personal and project background, background on stress situation, origin of stress situation, classification of stress situation, impact of stress situation, and solution of stress situation and further outlook (see figure 4.1)

This thesis developed the single questions for these sections according to insights from the previous literature review. For background questions on the personal and agile transformation project, as well as on stress situations, this thesis relied on best practice in the field and on discussions with other researchers. Concerning the origin of the stress situation this thesis developed questions based on insights from theory. Oken [25] described that the state of stress results from an either external or internal environmental event, also called a stressor. Mitroff et. al. [26] provided a model of internal and external sources for crises on a corporate spectrum. Therefore, the questionnaire specifically asked for internal or external factors leading to the stress situation, and their further elaboration. Similarly, questions for the classification of the stress situation were based on insights derived from classification models from Burnett et. al. [27]. Questions on the consequences of the stress situation were based on STS theory [29]–[31] (see chapter 3.2.1) and insights from related work [14], [21].

After developing the questionnaire this study went through several feedback loops with other experienced researchers in the field to make sure all necessary conditions are met. Figure 4.1 describes the outline of the semi-structured interviews. The questionnaire can be found in appendix 1.

4.2.3. Collecting evidence

The research team conducted sixteen interviews with sixteen different interviewees participating in large-scale agile transformation projects in six different companies. Table 4.2 gives an overview of the data collection procedures and their duration. Due to the interviews being semi-structured, open-ended questions were planned, but not necessarily asked in the same order they were listed [32]. Throughout these interviews, the development of the conversation lead the order the different questions were handled in, however the research team made sure that all relevant questions were addressed by maintaining a checklist [32].
This approach ensured data integrity while leaving room for flexibility for the specific case. All interview partners were ensured that only anonymous data would be presented externally. An electronic version of the questionnaire was sent to the participants prior, in order to allow them to familiarize with the topic. However, it was always indicated that the document is used as guideline and the aim is to have an open conversation about respective topics. Interviews were carried out by two to three researchers, of which one was a senior researcher. All interviews were conducted either in person or via phone, and were audio recorded, and later transcribed. The interviewers also took notes on topics they spontaneously identified as relevant [32]. The interviews took 60 to 120 minutes, including a typically 60-minute part, which was relevant for this thesis. Overall, the data set consists of 1626 minutes of interview recordings, including 813 minutes particularly relevant for this thesis. Fifteen interviews were held in English and one interview was held in German and translated later.

<table>
<thead>
<tr>
<th>ID</th>
<th>Company</th>
<th>Role</th>
<th>Agile Experience Level</th>
<th>Duration in min</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>I1</td>
<td>Automotive Co. A</td>
<td>Transformation Agent UX</td>
<td>Advanced / Expert</td>
<td>66</td>
<td>in person</td>
</tr>
<tr>
<td>I2</td>
<td>Automotive Co. A</td>
<td>Technology Product Owner</td>
<td>Advanced</td>
<td>104</td>
<td>in person</td>
</tr>
<tr>
<td>I3</td>
<td>Automotive Co. A</td>
<td>IT Specialist</td>
<td>Advanced</td>
<td>99</td>
<td>in person</td>
</tr>
<tr>
<td>I4</td>
<td>Automotive Co. A</td>
<td>Project Management, Agile-Coach / Scrum-Master</td>
<td>Expert</td>
<td>74</td>
<td>phone</td>
</tr>
<tr>
<td>I5</td>
<td>Automotive Co. A</td>
<td>Change Transformation Manager</td>
<td>Advanced</td>
<td>121</td>
<td>in person</td>
</tr>
<tr>
<td>I6</td>
<td>Tech Co. A</td>
<td>Platform Software Architect</td>
<td>Advanced</td>
<td>86</td>
<td>phone</td>
</tr>
<tr>
<td>I7</td>
<td>Tech Co. A</td>
<td>Senior Agile Transition Manager</td>
<td>Advanced / Expert</td>
<td>98</td>
<td>phone</td>
</tr>
<tr>
<td>I8</td>
<td>Tech Co. A</td>
<td>Head of Software Development</td>
<td>Expert</td>
<td>85</td>
<td>phone</td>
</tr>
<tr>
<td>I9</td>
<td>Automotive Co. B</td>
<td>Team Director Vehicle Engineering; Agile Change Leader</td>
<td>Advanced</td>
<td>122</td>
<td>phone</td>
</tr>
<tr>
<td>I10</td>
<td>Automotive Co. B</td>
<td>Management Vehicle Engineering</td>
<td>Expert</td>
<td>97</td>
<td>phone</td>
</tr>
<tr>
<td>I11</td>
<td>Retail Co.</td>
<td>Chapter Lead Data Engineering</td>
<td>Expert</td>
<td>120</td>
<td>phone</td>
</tr>
<tr>
<td>I12</td>
<td>Retail Co.</td>
<td>Senior Agile Coach</td>
<td>Advanced / Expert</td>
<td>106</td>
<td>in person</td>
</tr>
<tr>
<td>I13</td>
<td>Insurance Co.</td>
<td>Agile Master</td>
<td>Advanced</td>
<td>91</td>
<td>in person</td>
</tr>
<tr>
<td>I14</td>
<td>Insurance Co.</td>
<td>Head of Customer Processes Digital Services</td>
<td>Expert</td>
<td>142</td>
<td>phone</td>
</tr>
<tr>
<td>I15</td>
<td>Tech Co. B</td>
<td>Agile Master</td>
<td>Advanced / Expert</td>
<td>109</td>
<td>phone</td>
</tr>
<tr>
<td>I16</td>
<td>Tech Co. B</td>
<td>Agile Coach</td>
<td>Expert</td>
<td>106</td>
<td>phone</td>
</tr>
</tbody>
</table>

Table 4.2 Overview of conducted interviews
4. Multiple case study

4.2.4. Analysis of collected data

According to Runeson and Höst [32], the basic objective of qualitative data analysis is to derive conclusions while keeping a clear chain of evidence. Thus a reader should be able to follow the derivation of results and conclusions from the collected data [33]. Therefore, sufficient information from each step of the study is presented in this section. First, this study went through every interview transcript line by line giving parts of the text a code representing a certain theme, area, or construct of its content [33]. One code can be assigned to many pieces of text, and one piece of text can be assigned more than one code [33]. This first step lead to approximately 900 single codes, including codes from a hierarchy of codes and sub-codes [33]. The second step intends to code on a selective basis, focusing on the identification of categories that are related to presented research questions and topics of interest [32]. The third step includes identifying relationships and clusters between the identified codes [32]. During this iterative process a small set of generalizations was formulated, and reported through a structured approach, using models developed by previous research [33]. The following table 4.3 shows an exemplary illustration of the coding scheme.

<table>
<thead>
<tr>
<th>Exemplary interview statement</th>
<th>Descriptive code (first step)</th>
<th>Code cluster (second step)</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Of course, if you want to keep knowledge in your company, you need to think about how you approach things. In their case maybe there was no other way, because we wanted to do things fast, but we lost many people with a lot of knowledge. And also, many people left very fast, so they didn’t really get the chance to do a knowledge transfer.”</td>
<td>knowledge loss</td>
<td>Consequences: people</td>
</tr>
<tr>
<td>“[...] the felt urge to understand and to get this system running and to decrease the stress level from everybody that is just coming from uncertainty. I think [it] drives in a way the openness to adopt new ways of interaction and to interconnect with others.”</td>
<td>new ways of interaction</td>
<td>Consequences: work structures</td>
</tr>
<tr>
<td>“They also changed, they needed to change, like organizing the code was done in different ways now we have some better tools to do it and optimizing the code reviews were done that in one way, now we have some tools to make it much more efficient.”</td>
<td>tools for optimization of code review</td>
<td>Consequences: technologies</td>
</tr>
</tbody>
</table>

Table 4.3 Exemplary illustration of applied coding scheme

4.2.5. Reporting

According to Runeson and Höst [32], an empirical study cannot be distinguished from its reporting. Therefore, the following result section communicates the findings of this study. Reports may have different audiences, such as peer researchers, policy makers, research sponsors, and industry practitioners [32], [33]. This study addresses a scientific and practitioner audience to the same extend. Since the structure of case studies based on qualitative results can be created flexibly and in accordance to the case [32], this work chose to structure the presented results according to the investigated research questions.
4.2. Methodology
5. Results

This chapter describes the results of sixteen conducted expert interviews and is structured according the previously defined research questions. Figure 5.1 provides an overview of concepts and relations covered in this chapter.

![Figure 5.1 Overview of concepts and relations](image)

5.1. Descriptive data analysis

In order to provide a comprehensive basis for further investigation, focusing on the personal and company specific background of the large-scale agile transformations is crucial. Characteristics were identified on a five item scale measuring experience in the field of agility, consisting of (1) no experience, (2) beginner, (3) advanced, (4) advanced/expert, (5) expert, all interviewees considered themselves to be at least on an advanced level. All sixteen showed a high level of expertise in the field of agility due to their long-term experience in the field, and also regarding the transformation process due to their job position and mostly longstanding company affiliation. Figure 5.2 provides an overview of these characteristics.
This thesis derived the underlying notion of large-scale agile transformation from previous work on in the field. Thus the term large-scale agile means the adoption of agile methods and principles in established companies in a large project, multi-team, or overall organizational setting [10]. The term agile refers to the working mode and culture of an organization, which is open to continuous change and improvement and able to respond quickly and flexibly to technical changes, new business opportunities and unexpected environmental changes [21], [34]. Furthermore, the understanding of the term transformation in this thesis, refers to the change from a different organizational working model, such as e.g., a waterfall model based on hierarchies, to agile methods, following common values and principles [14].

In order to ensure validity for results of this study and to interpret results correctly, the research team asked participants at the beginning of each interview to provide their understanding of the term. The participants proposed different definitions for large-scale agile transformation as shown in the table 5.1 below. The terms new working mode, multiple teams, and customer centricity figured in several of them.

<table>
<thead>
<tr>
<th>Interview</th>
<th>Definition of large-scale agility</th>
</tr>
</thead>
<tbody>
<tr>
<td>I1</td>
<td>[…] large-scale agile transformation [is] a definition of, how to get the transformation from classical waterfall large organization to an agile working environment.</td>
</tr>
<tr>
<td>I2</td>
<td>[…] I think that’s generally the idea, how do we scale up the smaller team development work and try to make it agile where it is possible, where it makes sense in terms of shipping an MVP to a customer, getting feedback, trying to change the product accordingly and not making plans for the next seven years, but to do this with a mindset of not everything needs to be agile for any price and also setting up the organizational aspects behind that: how are leadership roles defined, how are departments structured and so on.</td>
</tr>
</tbody>
</table>
5. Results

13 That we develop the product itself in an agile way. So, it is not defined in the beginning what will be the end product so that we work in sprints and define what we have to do, the requirement and then in the end we will have a super MVP, so minimal viable product, which will be the end solution. And large-scale, what I would interpret is that we start for example at one single MVP and if it is successful, we scale it to the other markets, what we also do. We changed our whole structure here [...]. We have the line managers now, we have the products, we have the domain owners. I guess this was a huge step towards an agile transformation. And also, we as a feature team are working together. This makes in my opinion a lot of value.

14 Large-scale agile transformation is a new way of handling problems or orders. It has been found that with agility you can divide topics into smaller portions and develop them better to better express the customer's needs. Then you thought about how to scale this so that you can handle large topics or large blocks of topics and then you called it large-scale. The transformation starts because you have a flat hierarchy, that you have a clear task topic and by writing the user stories you can better formulate the customer's wishes and bring the functions into it.

15 I understand that a transformation in itself has to tackle certain aspects and can't be implemented only with pilots. You have to start with pilots, but at a certain point you have to say, okay how we take the next step and what might be the next step in our success stories we developed so far. So, large-scale agile transformation is, how can we transform an organization with different goals, with different setups, with different people with a lot of diversity, a lot of know how into something and I say something new, it's never the end right, we still continue to be better and still strive for excellence.

16 Transformation implies that you have worked somehow differently before I would say. So, what we had was more the waterfall or a rational unified process before. Agility at large-scale, hard to say when that starts, we have roughly 30-40 Scrum teams nowadays, so it is not only transformed in two teams, which might not be large-scale. I would say when you have a two digit number of teams, large-scale starts here for me when it comes to agile transformation, because you have to deal with effects of how to coordinate the different backlogs and the scrum teams and so on.

17 Usually it depends I would say. In our context it's about transforming large organizations, so not just teams, but team of teams and particular large teams. So, not only about 40 or 50 people, but more about 400 people building one product and I think an agile setup for these many people is a challenge, so you need more approaches than just scrum or scrum of scrum.

18 Large-scale would be in our terms for at least category B project, so that starts around ten million Euro project budget and that is starting not material, but personnel resources ten million, and that would be large-scale. Agility is for me the usual application let's say of lean or agile or SAFe or LESS or some methods like these. The transformation would be having something other than before, then you need to apply agility to a larger scale organization.

19 [...] What we are trying to do is to do an agile based implementation but also to adjust using values and mappings to optimize values and we talk a lot about being agile not doing agile, which was important and then we are doing it for hardware engineering and for software engineering, so we are doing it for the entire R&D not just for the software part, which is something other businesses tend to do. We also try to involve top management to empower teams.

10 We talked a lot about the different models of large-scale transformations, or transformations overall with the different phases every individual needs to follow through before they are contributors with the concern they raise and the value of despair and curiosity to be a contributor.

11 In my opinion this means that you take a whole organization and that you try to transform it and that you take one steering mechanism or one framework to steer the whole organization. It is not about starting in a domain or in single product teams in a specific area, it is more about doing an enterprise transformation. This also affects the business - IT alignment, so in my opinion it is not worth if you for example only train the IT side, you should take the business perspective into account as well in a large-scale transformation.

12 For me it is a transformation, which has many aspects. So, it is not only about software engineering, it is more about the whole transformation in an organization. So, it is also the case for us. We did
Descriptive data analysis

not only transform the way we do software implementation but also the way we think and the way we collaborate, the way we communicate in the whole organization.

I13 My understanding is that the current state of the art in agility is that we figured quite substantially how to build a single agile team. There are many methods, many approaches and there is a huge knowledge of this how-to setup single team, but we haven’t yet figured out how to scale up this approach to many different teams. [...] 

I14 A single agile team is usually considered to be six plus minus two or three people. And if you have a small product of something that can address with this type of product team agile is a very well defined and usually quite easy to use framework. You can use Kanban, extreme programming, scrum, whatever and everything is said and done and so no problems. If you enter the world of large enterprises and complex application landscapes, by this it’s even quite problematic to define individual products then you enter the world of large-scale agile transformation. Because the tailored model that you usually follow in an enterprise where you have marketing functions, sales functions, product support functions, operations and insurances claims, and reinsurance functions, financials, it all needs to come together in order to make a product work. So, large-scale agile transformation I would understand anything that addresses organizations of 200, 500 people upwards from a classical tradition and function based organizational model towards a product centric and customer centric organization.

I15 So, for me it’s project related. So, you need to have a product where you build this scale around. So, it’s about handling complexity, so if you’re like product is growing and you need to know like create the structures, that you can still, but they deliver it in time, it’s in a certain amount of quality, you need to scale sooner or later, and let’s say if you need to scale from one team to seven or to more than seven like twenty teams, this is what I understand behind large-scale agile transformation. On the one hand and on the other one is, sooner or later you will like to reach a point where you also have to adapt a company structures, to serve your product development. This is let’s say something where the company then starts to be involved and I would separate those two topics, because here from my point of view there is totally different fields of expertise needed here.

I16 I'm not sure what you understand, but as I heard this word for me it was a understanding of okay you have some maybe as small or bigger agile project or another waterfall project or whatever and you want to switch this to an agile working model, but it's that big that one agile team is not sufficient. So, you have to scale somehow and then you are coming to a large-scale agile working method or working pattern.

Table 5.1 Definitions of large-scale agile transformation according to interviewees

As mentioned, the research team interviewed at least two employees of each investigated organization in order to ensure construct validity. Since these transformations were of large-scale, single transformation projects may vary in their background information, such as department, starting point and time frame. This thesis studied large-scale agile transformations, in the categories large project (I4, I7, I8, I9, I13), multi-team setting (I1, I2, I3, I5, I6, I10, I14, I15, I16), and overall organizational setting (I11, I12). The transformations were mostly prepared through training activities and involvement of external help, as well as the formation of core groups, which consisted of motivated employees, who could support the transformation from the inside. All investigated large-scale agile transformations were initiated from the top (I1 – I16), e.g., by top-management, whilst some also showed bottom-up activities in parallel. A detailed description of the investigated large-scale agile transformations’ background is displayed in table 5.2.
5. Results

<table>
<thead>
<tr>
<th>ID</th>
<th>Starting Point</th>
<th>Timeframe</th>
<th>Scope</th>
<th>Preparation</th>
<th>Direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>I1</td>
<td>3 years ago</td>
<td>continuous; milestone in 2020</td>
<td>100 employees; 14 teams</td>
<td>training, town hall meetings</td>
<td>top-down</td>
</tr>
<tr>
<td>I2</td>
<td>1 year ago</td>
<td>continuous</td>
<td>15 teams; 1/3 of the whole company</td>
<td>training, internal agile coach</td>
<td>top-down</td>
</tr>
<tr>
<td>I3</td>
<td>2 years ago</td>
<td>continuous</td>
<td>2000 employees; whole IT department</td>
<td>external training</td>
<td>top-down</td>
</tr>
<tr>
<td>I4</td>
<td>3 years ago</td>
<td>continuous; milestone in 2019</td>
<td>2000 employees</td>
<td>external training, train the trainer approach</td>
<td>top-down</td>
</tr>
<tr>
<td>I5</td>
<td>1 year ago</td>
<td>continuous</td>
<td>3000 employees; 3 business lines, one whole department</td>
<td>external consulting, workshops</td>
<td>top-down</td>
</tr>
<tr>
<td>I6</td>
<td>12 years ago</td>
<td>continuous; milestone finished</td>
<td>250 employees; 40 teams; whole software development department</td>
<td>external coaches, training, workshops, train the trainer approach, formation of a core group</td>
<td>mix of top-down and bottom-up</td>
</tr>
<tr>
<td>I7</td>
<td>3 years ago</td>
<td>continuous</td>
<td>800 - 1300 employees</td>
<td>training</td>
<td>mix of top-down and bottom-up</td>
</tr>
<tr>
<td>I8</td>
<td>1 year ago</td>
<td>continuous; milestone finished</td>
<td>60 employees</td>
<td>/</td>
<td>mix of top-down and bottom-up</td>
</tr>
<tr>
<td>I9</td>
<td>3 years ago</td>
<td>end milestone in 2019</td>
<td>100 employees</td>
<td>external consulting, training</td>
<td>top-down</td>
</tr>
<tr>
<td>I10</td>
<td>6 years ago</td>
<td>continuous; milestone in 2022</td>
<td>R&amp;D department with interfaces in the whole company</td>
<td>external competence, training, formation of a core group</td>
<td>mix of top-down and bottom-up</td>
</tr>
<tr>
<td>I11</td>
<td>2 years ago</td>
<td>end milestone in 2019; mindset milestone in 2027</td>
<td>whole company</td>
<td>external consulting, establish change management</td>
<td>top-down</td>
</tr>
<tr>
<td>I12</td>
<td>2 years ago</td>
<td>continuous; milestone in 2019</td>
<td>whole company</td>
<td>core group for transformation support</td>
<td>top-down</td>
</tr>
<tr>
<td>I13</td>
<td>4 years ago</td>
<td>continuous</td>
<td>3000 employees</td>
<td>training</td>
<td>mix of top-down and bottom-up</td>
</tr>
<tr>
<td>I14</td>
<td>13 and 4 years ago</td>
<td>continuous</td>
<td>3600 employees; whole IT department with interfaces in whole company</td>
<td>formation of a training center, core group offsite training</td>
<td>top-down</td>
</tr>
<tr>
<td>I15</td>
<td>2 years ago</td>
<td>continuous; several milestones</td>
<td>80 employees; 7 teams</td>
<td>external coaches, training</td>
<td>mix of top-down and bottom-up</td>
</tr>
<tr>
<td>I16</td>
<td>2 years ago</td>
<td>continuous; milestone in 2019</td>
<td>80 employees</td>
<td>external coaches, training</td>
<td>mix of top-down and bottom-up</td>
</tr>
</tbody>
</table>

Table 5.2 Background on investigated large-scale agile transformations
5.2. Reasons organizations undergo large-scale agile transformations

This thesis investigated reasons for organizations to undergo agile transformations. First, this thesis was able to identify several goals for large-scale agile transformations, which are based on the interviewees’ expectations of agility and the organization’s internal vision and ideas. Furthermore, this thesis identified several triggers for adopting agility, which were mainly caused by market requirements and competition.

Through selective coding this thesis grouped identified motivating factors into four categories, which align with results from previous literature review. Categories for goals include time to market, customer centricity, organizational benefits, efficiency, and handling complexity. Furthermore, this thesis was able to identify three categories for triggers, which push organizations to undergo large-scale agile transformations: competition, clear responsibilities, and legislation. These categories are described in more detail in the following.

The category **time to market** refers to the organizations’ ability to react to changes quickly. Overall, thirteen out of sixteen experts identified a quick reaction to change as a major motivator for large-scale agile transformations (I1-I8, I10-I13; I16). The goal of implementing agility, is to handle uncertainties in requirements and planning and specifically manage changes in large projects in a timely manner.

> [...] So, those were changing requirements regarding the delivery phases of a plant, and we had to react on that and we had to adapt to it, because when you exactly know that you have to implement a plant completely then you don’t need agility at all. [...] And the thing here is, it is a multi-project management and the changing requirements, you need to be agile on that. (I8)

> [...] the end goal [is] to be more adaptable to the market, the changing market conditions [...] the goal of the agile transformation was actually to be able as a company to cope with this market conditions, to be able to react more quickly to new demands from the market to be able to provide the customer with new products much, much more quickly. (I13)

Experts connected a fast time to market reaction with reductions in planning efforts, which were perceived as oftentimes unnecessary, timely and costly (I3, I4, I11, I12, I16).

> The second goal was to be faster, so to avoid all this classical delivery approaches like you first write a concept and then you organize money and then you implement it and you test it and you roll it out and then no one needs the feature because it took two years. So, be more reactive on changes on the market on customer needs, this was one goal. (I11)

Instead, incorporating customer feedback in an early project stage can reshape the plan and is crucial to later product success (I2, I6).

> [...] at the end it comes down to that [...] you are able to incorporate the feedback earlier into your product again. (I6)
The categories time to market and customer centricity were often referred to in combination. The fast pace of the business environment requires organizations to react to new customer requirements and feedback quickly, which also means to be more customer centric in general.

I think one thing that is hard to measure is customer centricity. From our experience in the past you could say that usually the feedback that you got within one [product] generation you were not able to bring in that particular [product] generation, so only in the next one and only if you got the feedback early on in the current generation as you have a three year generation in our [waterfall] world. (I2)

Customer centricity appears in various different functions of the organization, not limited to product development, where agile methods are typically implemented first. For example, customer centricity also plays an important role in public communication, as customer expectations have shifted in recent years. Public communication of digital natives focuses on final product presentation and following customer feedback, rather than a planned stepwise communication, months in advance.

Another thing is, it sounds trivial, but I think also the way we do communication planning and all that kind of stuff and the way we do communication is also sometimes restraining you from getting stuff to the public as you would want to have it. If we have a cool feature we usually need to have a couple of months before that we need to be sure that it will be shipped to that specific point in time, need to do detailed descriptions to that also need to have final screens already. […] From my understanding companies like Google, Apple, Facebook and so on, they do it differently, they don’t do so early recommmunication, they don’t prepare the communication months in advance, but rather they go to the audience and say look this is our new stuff, try it out if you like it give us feedback, if you don’t, as well. So, this is the ways how the digital generation would expect to have communication, which is probably different to what we did earlier with printed high gloss catalogues. (I2)

In general, customer centricity is a major motivator for the implementation of agility since the customer should be at the core of every business model (I4, I9, I10, I11).

The faster implementation - that doesn’t even work with agile. You are not necessarily faster, you simply have a better understanding of the customer. (I4)

The purpose of [Automotive Co. B] has moved from building cars, to freedom to move in a personal and sustainable way, and that could be a car, or it could be a taxi, or it could be something else. It is a huge difference in mindset really. (I9)

Therefore, the theme also transfers into further categories, as the category efficiency also includes goals towards customer satisfaction. Efficiency was described as a motivator concerning the reduction of wasteful developing and planning efforts. Especially in large and long-term projects the motivation to adopt agile methods stems from aiming to […] reduce redundancies and you foster the usability […]. (I11)
5.2. Reasons organizations undergo large-scale agile transformations

For example, if you are in the classic project world, you would do a project for one year and then figure out this is not what our clients want. So, it is to be more effective in that way. (I12)

We are not trying to maximize output. We’re not trying to be faster in terms of project completion, but what we really want to achieve is that we want to reduce the waste. Waste in building stuff that nobody really needs. (I14)

Furthermore, experts described handling complexity (I5, I6, I7, I11, I15) within the project or even the whole organization as a motivating factor for agility.

I would say, the major question is, how much agility do you need, it’s not we are doing agile for the sake of agility, but because we have a certain demand. So, in our case it was to handle the complexity. (I15)

Since the conducted interviews took place in a large-scale context, complexity was persistent and constantly needed to be managed. Agile methods provide appropriate tools to tackle complexity.

It was not reducing the complexity, it was handling the complexity, because the complexity is basically let’s say technical speaking it’s growing, and it’s becoming more and more difficult to handle this complexity with a waterfall approach. We cannot plan things in advanced, it just doesn’t work. So, the main driver is to handle the complexity in a way, that we can still maintain our product and even develop it in the quality the customers are expecting it. (I15)

Furthermore, interviewees established the goal of high employee commitment. Agility serves as a fitting methodology in this context since it fosters a sense of ownership for teams and individuals.

The final goal was to reduce the complexity of our organization and to foster the emergent, so people should take ownership and people should drive and we want to really use the knowledge of the people, who are working in the different product teams. (I11)

[…] we want to empower the employees to put in their own expertise, because they know where the whole organization and where their product is destined to, so they know the aim. (I14)

Another one is the satisfaction level of our let’s say team, team is also quite important, because since we are having our sprints and so on, we have a much stronger team feeling, and people […] identify themselves much more with the product they are creating. […] So, this is a really big motivation for the entire project. (I15)

An interesting result is, that customer centricity and speed were the factors, which were named the most, especially also in combination with other factors, so they embody the underlying motivation. Oftentimes many of the described goals are intertwined.
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That’s the main goals, reduce the time to customer, use the development resources in a more efficient way, increase the quality because you reduce the feedback time. (I6)

Apart from goals, specific triggers oftentimes serve as the final decision point to undergo large-scale agile transformations. Therefore, this thesis used two separate questions in order to gain a clear perspective on both factors. It should be noted however, that identified triggers can mostly also be found within the identified goals since the identified goals provide solutions to the identified triggers. For example, I7 stated: [...] so this is the motivation why we do this, and this is also driving us. [...] we are number one in the market, and we want to stay there. (I7) External factors, such as competition play a major role in starting such transformation processes (I1, I4, I5, I7, I9, I10, I11, I12, I13, I14).

When you look at other competitors, they’re getting new digital products every year [...]. And it turns out, that we need to change our working model or working set up to also be able to deliver as fast as possible. (I1)

So, really to adopt and be able to meet market transition and market needs much, much faster and quicker than we have in the past. (I9)

We want to stay in the market. We want to continue to contribute, to strengthen our position and there are many drivers. And then the other way of working is a perquisite for us to continue to survive, otherwise we think that we would be another Kodak or similar company. (I9)

[...] we thought for thirty years that our business model is running and then unfortunately the market changed, so the whole peer players, online players, cross channel players came up and we faced a lot of problems because customer behavior and market changed so we also had to change. One of our answer was being agile, being more reactive, being more efficient. (I11)

Interviewee I9 also named changing legislation as an external factor, which was pushing the company towards implementing agile methods.

It is coming from all the triggers that are happening in the world. [...] Development has never been as fast as it is today, and it will continue to grow. So, it will be a factor for the future, so we will need to adopt to that. We have rapidly changing legislation and we need to be agile to meet the requirements and the identification of these drives a new business model. (I9)

On the other hand, company internal factors, such as trouble in responsibility management also played a role in pushing them to implement agile methods.

The trigger [...] was that the company and also customers felt that there wasn’t an end to end responsibility behind the entire personalization feature line up and this was intended to change and this was basically the responsibility that I was given: So, take all the excising resources, forge them together and set up an end to end responsibility where you as a backlog owner decide what is necessary to have a consistent user experience. I think that was the main driver behind that change. (I12)
5.3. Identification of stress situations in large-scale agile transformations

Table 5.3 provides an overview of the identified goals and triggers for large-scale agile transformations.

<table>
<thead>
<tr>
<th>Goals for adapting agility in established organizations</th>
<th>Triggers</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Time to market (I1, I2, I3, I4, I5, I6, I7, I8, I10, I11, I12, I13, I16)</td>
<td>• Competition (I1, I4, I5, I7, I9, I10, I11, I12, I13, I14)</td>
</tr>
<tr>
<td>o Responding to changing market conditions and customer expectations and new requirements</td>
<td>• Clear responsibilities (I2, I11)</td>
</tr>
<tr>
<td>o Short planning horizons</td>
<td>• Legislation (I9)</td>
</tr>
<tr>
<td>o Incorporating feedback in an early project stage</td>
<td></td>
</tr>
<tr>
<td>• Customer centricity (I2, I4, I5, I9, I10, I12, I13, I14)</td>
<td></td>
</tr>
<tr>
<td>o Customer satisfaction,</td>
<td></td>
</tr>
<tr>
<td>o High quality</td>
<td></td>
</tr>
<tr>
<td>• Organizational benefits (I3, I5, I10, I11, I14, I15)</td>
<td></td>
</tr>
<tr>
<td>o High employee commitment</td>
<td></td>
</tr>
<tr>
<td>o Flat hierarchies / agile culture</td>
<td></td>
</tr>
<tr>
<td>• Efficiency (I2, I3, I6, I11, I12, I14, I16)</td>
<td></td>
</tr>
<tr>
<td>• Handling Complexity (I5, I6, I7, I11, I15)</td>
<td></td>
</tr>
</tbody>
</table>

Table 5.3 Overview of identified goals & triggers for large-scale agile transformations

5.3. Identification of stress situations in large-scale agile transformations

5.3.1. Definition of stress situations according to case study results

In order to identify and describe stress situations, which can occur during large-scale agile transformations, this thesis analyzed collected data from sixteen interviews, providing a comprehensive view on their characteristics. Similar to background information on large-scale agile transformations in general, the research team asked interviewees to provide their understanding of stress situations in an organizational setting at the beginning of every interview. Many definitions include terms, such as uncertainty, crisis, and returning to familiar processes. Interviewees initially had a strong focus on human factors known from personal experiences with stress, which makes sense since the concept of stress originates from natural sciences (see chapter 2.2.2). However, the research team made sure, that further focus was kept on the organizational view. Table 5.4 provides an overview on definitions of stress according to interviewees.

<table>
<thead>
<tr>
<th>ID</th>
<th>Definition of stress situation</th>
</tr>
</thead>
<tbody>
<tr>
<td>I1</td>
<td>Stress situation is, when you might have the issue that you’re not getting your change done immediately the transformation will maybe stop or the product development process is getting critical.</td>
</tr>
<tr>
<td>I2</td>
<td>Everything that inflicts uncertainty or bad feelings or bad mood influence that is not part of the traditional product focus stuff that you feel. As organizational change inflicts uncertainty, for me, for everybody probably, or not knowing about how the future will look like, how everything will go forward in the next two or ten whatever years, creates an uncertainty that I think very often specifically for the older generations causes stress.</td>
</tr>
</tbody>
</table>
5. Results

I4 That’s the question how I implement it. How successful am I in implementing it, how do I reach people? That is the question that can be answered in this way, what means do I use to move people there so that I can achieve a successful transformation. This stress is generated by the environment and the environment that has several factors: What is the current industrial situation, what is the economic situation, what is the labor market, what is the political situation, these are the factors that create this stress.

I6 For me personally a stress situation is when I have to deal with something I don’t know. So, when I have uncertainty and I cannot plan accordingly.

I7 Having a crisis would be more like a stress factor. […] And of course within a crisis, or let’s say within a stress situation, as I already said, humans tend to pick things they worked in the past, which means they say no, let me do that with project management or whatever, I know, I can do it; it has the approve to work for me in the past, and they then stick to these old practices again.

I7 Let me think a little bit about it, but I think, of course when you only about large-scale I would say, then it is in particular the management do we already get all the benefits out of it, because always when you start some changes, people are not immediately starting to work in the new way, in this always causes some kind of delays maybe or at least it feels like this, because it is some kind of confusion, people are still having questions, a lot of discussions are going on, and then the management may become impatient, and says okay enough of this, back to the roots, we were so successful with the way we worked in the past, and let’s just continuous.

I7 Most people always try to avoid change, so every time people are faced with change it is a stress situation. If you change your work place, if you change your team, if you change your style of working, if you change your responsibility, the system, the application, if you change the boss finally, it is stress.

I11 Besides the people part being stressed, a stress situation could be that the behavior of a stakeholder, who is working in an old way still and trying to give work to the teams directly without collaborating with product owners. This could be a stress situation because then the developers would have to figure out how to resolve this situation. A stress situation could also be that the management have to set deadlines and make some nice roadmaps and then product teams would say we will never archive that. This is also causing stress because then you have to somehow resolve these things. Also, when you get rid of roles, but people are directly affected by that and they have fears, they also need to take care about it. And it is not only affecting one person, also the persons around them. Because if your colleague is affected, you would also have emotions. Also having a limited time to do something, for example a team in a few days and only giving them a few weeks to adapt everything, their project structure into a backlog within short time.

I13 That’s quite an interesting question, I think a stress factor could be if many employees get the idea that the agile transformation is targeted only for the benefits of the company but not for the benefits of the employees. And then for example when people get the idea, we do that agile transformation in order to fire half of the employees for example, so this is a basic fear that comes up quite often, because especially in big companies they have been some cases, […] were restructurings of the whole company have taken place in order to fire many employees and I think this is a big risk, because then employees don’t support the initiative anymore.

I15 So, for me I think the most important point is the adaption time, that people have and create new habits, to learn a new cycle, the sprint cycle for instance. This is something people are used to the way they are working and then from time to time it comes the new approach and it’s regardless if it’s improving your situation or not this is always a stress situation for you, for the organism like you said before. This is on the team level, and for the customer it’s also stress, because right now if the customer is used to get some new functionalities once a year, and now it’s coming every month, then they will also need to adapt the processes, because they need to test the product right.

Table 5.4 Overview on the definitions of stress according to interviewees
5.3. Identification of stress situations in large-scale agile transformations

5.3.2. Clusters of stress situations

Stress situations during large-scale agile transformations occur in different ways. It is important to note that within one company several stress situations can occur, as described by different interviewees, however purposely only one stress situation was identified in each interview in order to gain an in-depth view on the situation. A stress situation in context of this thesis therefore, can capture several challenges on an overarching level, also incorporating insights on its origin, classification and consequences. The interviews described the following stress situations (see table 5.5), which this thesis clustered into four categories according to similarities in their characteristics: transformation management complications (I1 I8, I10, I13, I14), role complications (I2, I5, I6), c-level complications (I3, I4, I7, I9, I11, I12), and textbook approach complications (I15, I16). Table 5.5 provides an overview of stress situations and their assigned clusters. The following section describes each stress situation in detail.

<table>
<thead>
<tr>
<th>ID</th>
<th>Company</th>
<th>Stress Situation</th>
<th>Cluster</th>
</tr>
</thead>
<tbody>
<tr>
<td>I1</td>
<td>Automotive Co. A</td>
<td>Project management and product definition</td>
<td>Transformation management complications</td>
</tr>
<tr>
<td>I8</td>
<td>Tech Co. A</td>
<td>Missing change management</td>
<td>Transformation management complications</td>
</tr>
<tr>
<td>I10</td>
<td>Automotive Co. B</td>
<td>Unclear communication / Broken information flow</td>
<td>Transformation management complications</td>
</tr>
<tr>
<td>I13</td>
<td>Insurance Co.</td>
<td>Unclear communication</td>
<td>Transformation management complications</td>
</tr>
<tr>
<td>I14</td>
<td>Insurance Co.</td>
<td>Collaboration issues between agile and traditional working model</td>
<td>Transformation management complications</td>
</tr>
<tr>
<td>I2</td>
<td>Automotive Co. A</td>
<td>Understanding of roles</td>
<td>Role related complications</td>
</tr>
<tr>
<td>I5</td>
<td>Automotive Co. A</td>
<td>Understanding of roles</td>
<td>Role related complications</td>
</tr>
<tr>
<td>I6</td>
<td>Tech Co. A</td>
<td>Role definition of product owners and scrum masters</td>
<td>Role related complications</td>
</tr>
<tr>
<td>I3</td>
<td>Automotive Co. A</td>
<td>C-level change</td>
<td>C-level complications</td>
</tr>
<tr>
<td>I4</td>
<td>Automotive Co. A</td>
<td>C-level change</td>
<td>C-level complications</td>
</tr>
<tr>
<td>I7</td>
<td>Tech Co. A</td>
<td>Fear of failure on the management level</td>
<td>C-level complications</td>
</tr>
<tr>
<td>I9</td>
<td>Automotive Co. B</td>
<td>Middle management blocking the transformation</td>
<td>C-level complications</td>
</tr>
<tr>
<td>I11</td>
<td>Retail Co.</td>
<td>C-level change</td>
<td>C-level complications</td>
</tr>
<tr>
<td>I12</td>
<td>Retail Co.</td>
<td>C-level change</td>
<td>C-level complications</td>
</tr>
<tr>
<td>I15</td>
<td>Tech Co. B</td>
<td>Textbook approach not applicable in company specific situation</td>
<td>Textbook approach complications</td>
</tr>
<tr>
<td>I16</td>
<td>Tech Co. B</td>
<td>Textbook approach not applicable in company specific situation</td>
<td>Textbook approach complications</td>
</tr>
</tbody>
</table>

Table 5.5 Overview of the stress situations and assigned clusters
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5.3.2.1 Transformation management complications

Five interviewees (I1, I8, I10, I13, I14) described stress situations, which can be classified as transformation management complications. Details to the respective transformation project are described in the following.

Automotive Co. A – Missing product definition (I1)

Automotive Co. A started a top-down large-scale agile transformation in the user experience department about three years ago, currently involving fourteen teams. The transformation was initiated top-down. In the project plan, product categories were not defined prior to starting their development. Thus, the granularity of different products and their sub-parts was not clear to the involved developers. Therefore, the progress of the project was endangered since product deliveries could have been delayed, affecting several teams. The interviewee described the stress situation during large projects, such as a large-scale agile transformation in general, as difficult to predict and set behind the daily business.

_The problem is that you will always get some major issues during the transformation that you never think about when you start with the transformation. And of course, the running civil jobs that we have here, so delivering new products is always more important than the transformation._ (I1)

He sees his role as transformation agent within the transformation, and more specifically also concerning the described stress situation, as being responsible to define a product structure to ensure that all sub-parts can be developed accordingly. The situation directly affected him, but indirectly impacted the whole large-scale agile transformation since failure in this planning step could affect the team organization, placing the risk of not being able to deliver products in time. The stress situation was discovered at the beginning stages of the transformation by the transformation agent and was currently being resolved at the time of the interview.

Tech Co. A - Change management issues (I8)

Tech Co. A started a large-scale agile transformation in the software development department one year ago, involving sixty employees. The transformation affected the whole value chain of the unit, with a scope from selling the project to maintenance and service at different sites. The transformation was initiated from the top as well as the bottom, as the management level realized that change is needed in their business situation and developers provided a solution using agile methodologies. All set milestones were accomplished, still the interviewee described the process as continuous. The interviewee described missing aspects of change management as a stress situation resulting in lower motivation and even resistance towards the transformation project. The stress situation affected all involved employees. He described that establishing the right mindset, making enough time, explaining and interacting with involved employees is a crucial point to the transformation, which was missing during the large-scale agile transformation. When implementing change to the whole working mode, stress situations can occur if not enough time is provided to
5.3. Identification of stress situations in large-scale agile transformations

establish a new mindset and understanding of the new working mode. The interviewee described that missing time has a negative impact on the success of the transformation.

*I think you need also in the team a little bit relaxation and be able to conduct retrospectives and go over perspectives. If you are completely in a crunching mode and don’t have time for that, it is a hindrance for agility or maybe for any process improvement. If you are under stress, I think the quality in such transformations might lack, but under negative stress of course.* (I8)

Furthermore, he mentioned that motivating key employees for the transformation did not take place, which could have helped in preventing or minimizing resistance from other employees and management positions.

**Automotive Co. B - Unclear communication / Broken information flow (I10)**

Automotive Co. B started a large-scale agile transformation in the R&D unit within the engineering department six years ago. The R&D unit was transformed, however effects spread through the whole company through interfaces. Though the finishing point was reached last year by the implementation of a new development system, the transformation is still continuously improving with a major milestone set in 2022. The transformation was initiated top down, whilst there were also bottom-up initiatives in the company, with teams already using agile methodologies in software development. The interviewee described that in a big unit, such as R&D, a top-down initiation is important because there are many dependencies to other units and everyone, who is impacted also needs to go through a change. During the large-scale agile transformation, the company established a new working system, including new routines. Whilst these new routines broke up old hierarchical processes, the company struggled to build new work processes. The interviewee empathized that former communication processes were split up and therefore, the information flow was missing in the new working mode, which created a stress situation for the large-scale agile transformation.

*How information should flow was broken and then we tried to create some kind of system in between and this caused of course a lot of disturbance and a lot of people that didn’t feel that they belong there anymore or didn’t understand how things worked anymore.* (I10)

Several teams faced control problems, because the former information flow was broken and the company had not re-established a new information flow, that was adjusted to the agile organization. The stress situation was identified early in the transformation process as information flows did not work from the start. The interviewee described that the stress situation was connected to the missing establishment of new processes. Instead the company tried to use old processes in the new agile working mode, which did not align.

*[…] this was discovered quite early to be honest, but it was never really successful worked out and very much connected to that we never solved the root cause that we basic tried to run an old way of running a project with a new development system. We didn’t change how should we run these intersections of this weekly releases in a way that actually supports the new development system.* (I10)
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During the cause of the stress situation, customer expectations could not be met, which caused a severe impact on the transformation.

**Insurance Co. Unclear communication (I13)**

Insurance Co. started a large-scale agile transformation four years ago, currently involving three thousand employees in the IT product development department. The IT product development department is currently a focus area for the implementation of an agile working mode, however Insurance Co. plans to continuously spread agile principles and methodologies to ultimately every department of the company. The transformation was initiated from the top but implemented from the bottom. The use of agile principles and methodologies was decided by the c-level, while the implementation was set up by a few agile teams, who tested the working mode prior to the large-scale agile transformation. The interviewee described issues in the wide-ranging communication approach as a stress situation during the large-scale agile transformation. Although the company set up several new communication modes, such as platforms, conferences, and open spaces, a large-scale communication failed at the beginning of the transformation. As there were three thousand employees involved, it was hard to reach everyone and communicate in a way that every involved employee understands the purpose and key aspects of the transformation.

*There are a couple of employees, who were very unsure or didn’t really know where to belong.*

(I13)

The stress situation was visible from the beginning of the transformation, due to negative employee feedback and confusion towards the agile transformation and the reasons behind it.

*I think we might have seen this from the very beginning, because there are many employees, who gave us the feedback that they are not happy with the approach, that they don’t know everything they want to know, that they don’t understand situations. They just gave us the feedback that they didn’t like some of our approaches from which we could infer that they didn’t have the full understanding of how it was intended to be.* (I13)

**Insurance Co. – Issues in collaboration between agile and traditional working model (I14)**

A second interview with Insurance Co., highlighted the large-scale agile transformation from a different viewpoint. The interviewee was able to describe two separate large-scale agile transformation efforts at Insurance Co. The initial transformation started in 2007 and was the first large-scale agile transformation project for the company, which later failed in 2010. The start of the second described large-scale agile transformation in 2016 (see also I13) was the following attempt to restart the project and implement learnings from the first transformation. The second transformation is still ongoing. The transformations affected the whole IT department with interfaces to the whole company. The company was able to analyze documentation and memos from the first transformation, and therefore benefit from these learnings for the second transformation. They focused on documentation from meetings with business stakeholders and stakeholders, who place requirements for new products or IT processes, identifying the team perspective, the stakeholder perspective and
why agile processes that were in place at that time did not meet the expectations of stakeholders. The interviewee described a stress situation leading to failure that occurred during the first transformation, as complications in the collaboration between agile and non-agile teams. In this case the collaboration between a business unit following a traditional planning cycle, and a development department, which implemented an agile working style, clashed, resulting in the teams not being able to deliver requirements. This caused stress to the process as well as stress to the involved employees.

We had a lot of processes that came under stress, for example user acceptance tests. A very typical situation is, an agile team is doing two week sprints, at the end of those two weeks they do a sprint review and they expect the business stakeholders to participate in that sprint review in order to look at the functionality that has been build, give feedback and come up with new ideas. In 2007 the business departments were not really part of this process. They were used to writing down business requirements in February and looking at finished software with a big software release in September. So, no one participated in those sprint reviews, because the business departments have a lot of activity that is planned during the year and they simply were not able to spare the time. So, the development teams continued and they had a product owner that was part of IT, not part of business because business did not have any staff to take of that role, they did their sprint reviews without anyone from business. And in September when the business departments had time because they had planned for employees to be available for user acceptance testing, we would basically have even more defects and not accepted requirements than before. Because no one was there to adjust quickly and there was functionality that was built in ten or fifteen sprints ago that needed to be completely reworked. So, that was obviously where a lot of stress was caused, because the product team assumed that they would get quick feedback and would be able to react swiftly to changes and would be able to continuously improve their product and the business departments simply didn’t have time to do that and they were expecting to work in the fashion that they had worked previously. So, with two months in the year where they would have enough staff and manpower available for specifications and user acceptance testing. (I14)

The interviewee further described that it took three years to identify this stress situation since time and planning circles of the agile and non-agile teams were completely different. In a cyclical business, such as insurance, problems usually occur once a year during high peak season, in this case October, November and December. Therefore, the described stress situation only occurred for around nine months in total, rather than three years. Thus the first transformation was stopped after these three years. During the second transformation, which started in 2016 the company tried to avoid these mistakes, which led to the described stress situation. However, they still faced similar problems within a different setting, due to different people and different technology being involved in the different setup.

Whilst the individual analysis of these stress situations within the setting of each company and project is important in order to understand the background and scope of the occurring stress, generalizable conclusions can be drawn from their comparison. These stress situations commonly describe problems known from project management and aspects of change management (see chapter 2.3). Automotive Co. A. described a stress situation in the
planning phase of the transformation, which further affected the project because details in the plan were missing. Tech Co. A faced a stress situation described by several missing aspects from change management, mindset, time and communication. Similarly, Automotive Co. B and Insurance Co. also describe stress situations based on missing communication within the large-scale agile transformation project. Insurance Co. further provided a different viewpoint into their transformation history, emphasizing collaboration between different teams, which is also an aspect found in change management. This section provided an overview and definition of stress situations comprising the cluster transformation management complications. Whilst the four involved companies described individual situations, a general focus laid in managing large changes within organizations. The described projects were lacking aspects in different areas of change management, however most commonly in communication, as described by Tech Co. A, Automotive Co. B, and Insurance Co..

5.3.2.2 Role related complications

Three interviewees (I2, I5, I6) described stress situations, which can be classified as role related complications. Details to the respective transformation project are described in the following.

Automotive Co. A – Issues in the understanding of roles (I2)
The interviewee described a different large-scale agile transformation project within the user experience department of Automotive Co. A from the one already explained by I1, however both projects have common touchpoints. The transformation described by I2 was initiated top-down involving fifteen teams. It started about one year ago and is still ongoing. During the transformation, the company faced a stress situation regarding the understanding of new roles in the new agile working environment. This stress situation occurred in several different cases, putting the success of the transformation at risk. On the one hand, employees were uncertain about the persistence of their role and responsibilities in the new agile environment. On the other hand, new roles in the agile working environment, such as service owner and function owner were not defined and communicated clearly to everyone involved. Both situations lead to uncertainty for the involved employees causing danger for the transformation progress. When initial issues occurred, affected employees tried to talk to management positions, revealing that there were problems. Directly affected roles were mostly on middle management level, however naturally their interfacing positions were also affected indirectly.

Working level has had some effects because also on working level you had split up responsibilities. Management level of course in terms of disciplinary leadership. Leadership in terms of product ownership has changed also, because [...] coming from engineering looks at leadership in terms of the content and the work you are doing and you team is doing, so you have to be an expert in that field of work next to being also a peoples man. This is now being split up in a way and of course that is change for the middle management as well. (I2)
5.3. Identification of stress situations in large-scale agile transformations

Automotive Co. A - Understanding of roles (I5)
Automotive Co. A started a further large-scale agile transformation in its digital department one year ago, currently involving three business lines. The interviewee described that the top-down initiation set an important basis for the transformation and also needs management support for further progress.

It was top down. This is a good thing and it has to be top down, because leadership is so important if you want to do [a] large-scale transformation. (I5)

During the transformation, this business unit also faced a stress situation regarding the understanding of new roles in the agile working environment, which are similar to the ones described by I2. Involved employees struggled to understand their new tasks and responsibilities since no clear definition was provided. Furthermore, colleagues within their team questioned their managing role and responsibilities.

For instance if I were to be a project manager and then at a certain point overnight they’d say okay now you are a product owner and I roughly have an idea of what’s going on with the product owner, but I’m even more if I have a position as a line manager and I used to work really in content and people approach me for my knowledge of technical skills and now I have to develop people. This is something that puts a lot of stress, not only on the role, but from inside I’d say, because people really ask our line managers what do you do the whole day. Or they ask the agile master what do you do the whole day, because they don’t understand or maybe don’t want to understand soft factors, which are equally important to agile transformation, I guess. So, this is a lot of stress, not only for the roles, but as well as for the rituals they’re all in different cadences and different synchronizations. (I5)

The interviewee described that this stress situation caused stress for both, the affected employees, but also for the progress of the transformation. The interviewee’s role as a transformation coach enabled him to get deep insights into the problems, employees were facing with new roles.

They were a bit more silent. To the people I have a bit like a deeper contact, of course they open up, but not very freely. You really have to ask them directly or you know as being a coach certain methods on how to appreciative interviews and stuff like that. But also, if you’d change to a more private setting they’d say, oh man I would love to fill in this role and I think I really see this opportunity, but I don’t know how to. But being that honest, it was really impressive for me, because not a lot of people let down their guard when they have a new role. They think okay I have to know everything, the company expects everything from me. (I5)

Roles on different levels were affected. However, the stress situation had the biggest impact on line managers.

I’d say the main roles that had the biggest impacts and the biggest confusion I guess where the line managers. I guess, because originally, we had [group-heads], which had two parts they had a very successful career as let’s call it product owners in a new term speaking and add on
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had to do the people’s business, because it was an approach you are a leader you have to do both and equally good. Of course, equally well and of course not everyone can lead people not everyone can develop people, but they’re really good product owners, but these positions were already filled. So, how do you convince someone that’s your new role. You have to fill it. If you’re really strong then product owner area and you have to be line manager. So, I guess this is the most confusing role for all of us. Even though it’s one of the most important roles. (I5)

He furthermore described that the way these roles were assigned was problematic since people were assigned to predefined roles oftentimes not taking their skills and wishes into account.

We have a position we have people that have to fill the position, but they’re probably not suited, or they don’t want to do it, but they have to, because they are in a leadership role. (I5)

**Tech Co. A - Role definition of product owners and scrum masters (I6)**

Tech Co. A underwent a large-scale agile transformation for the complete software development department twelve years ago, involving forty teams. Though set milestones are finished, the agile transformation process is continuous. The interviewee described this process as:

> Being agile also means that you should reflect yourself so in the retros you should identify potential improvement areas, so it is more or less a never-ending process if you really follow the agile mindset. (I6)

The transformation was initiated from the top as well as the bottom, as the management level decided on an agile working mode within teams, and the rollout was performed in a bottom-up approach. The bottom up approach was based on pilot teams and the formation of a core group, supporting the transformation from within. The interviewee described that the following roll-out phase was executed too quickly, leading to uncertainties in role definitions and responsibilities. Especially the unclear definition of product owners and scrum masters inflicted stress for the transformation because they could not act true to their role, delivering what was expected from them at the right point in time.

> […] the role definition was there in a quite lengthy description, I purposely don’t say clear, because when you work with a lot of people you cannot describe something in such a way that everybody understands the same thing. (I6)

Regarding this matter, the interviewee provided an exemplary situation from the project.

> […] the communication in the beginning was not so good because it was not clear for example, who owns the backlog in the iteration. There were product owners, who always wanted to change the order of stuff during the iteration, because they said it is theirs. There were scrum masters, which were not really defending the iteration backlog. I think that was the most stressful part for our development teams, because at the end if you have to deal with such a
5.3. Identification of stress situations in large-scale agile transformations

...scrum master and product owner, you are never sure if you are going in the right direction with your work. (I6)

The stress situation affected around ten teams within the transformation, which were led by around five product owners, directly affected by the unclear definition of their roles. The stress situation was discovered within the according communities of practice, where the issue was announced. Furthermore, one team was not able to deliver what they committed to, which was due to unclear expectations of the product owner.

These stress situations commonly described role related complications. During a large-scale agile transformation, roles are typically redefined. Both, stress situations described by Automotive Co. A, and the stress situation described by Tech Co. were based on issues in the definition of or expectations from new agile roles in managing positions, such as product owners or scrum masters. Whilst both companies described individual situations, all stress situations showed complications in role understanding and acceptance from directly affected employees as well as their teams, which affected the success of the transformation because role responsibilities could not be met.

5.3.2.3 C-level complications

Five interviewees (I3, I4, I7, I9, I11, I12) described stress situations, which can be classified as c-level complications. Details to the respective transformation project are described in the following.

Automotive Co. A - C-level change (I3)
Automotive Co. A started a further large-scale agile transformation in the IT department two years ago, involving two thousand employees. It was initiated top down by a former CIO. The transformation is still ongoing, however a recent change of the CIO slowed down the process. The interviewee described the recent CIO change as a stress situation, affecting and endangering the whole large-scale agile transformation in the IT department. The first CIO developed a fully agile strategy involving the whole IT department, also incorporating agile values and principles behind the agile methods in daily life. The unexpected leaving of the first CIO after one year and sudden introduction of the second CIO, who follows a different strategy, inflicted enormous stress for the whole transformation project.

We got the message that [the first CIO] left from my boss. It was a huge shock in this moment for all of us. […] And actually, one week later [Automotive Co. A] had the new CIO. (I3)

The change of a CIO or higher management position itself generally placed uncertainty towards the further progress of a transformation, regardless of actions a new CIO takes.

We are all sad about it because we don’t know what to expect now. We knew his mindset and his strategy what he wants, we knew his vision. So, we could expect what kind of milestones we have, but now it is unsecure what will happen. (I3)
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In the case of the investigated department, the new CIO followed a different approach to continue the large-scale agile transformation in the department, focusing less on agile values and principles. This new approach inflicts additional stress to the already existing stress from the CIO change itself. The interviewee described their perception of the stress situation as a step back within the transformation. Exemplary, the interviewee named that the new CIO refused to participate in the open desk policy that was introduced in the department as part of the agile transformation process. This behavior could endanger the transformation progress in two ways. On the one hand, the different strategic outlook towards agility endangers the transformation from a management level, on the other hand it endangers the transformation because the behavior can transfer to employees participating in the transformation.

 [...] he wants to have his own desk. If the management is not living this then the others will not follow. (I3)

Automotive Co. A - C-level change (I4)

Automotive Co. A started a further large-scale agile transformation in a manufacturing department, involving two thousand employees three years ago. The transformation was initiated top-down, however the interviewee stated that he would have wished for more bottom-up involvement to achieve a successful transformation, not only in methods but also in culture.

Yes, unfortunately it was top down, I would have liked a cultural change. But it was forced by the divisional management level, i.e. one level below the management board. And it was then accepted and driven by the board of directors. [the company] is classically hierarchical, so the motivated employee doesn’t have much to say. (I4)

Similar to the stress situation described by I3, the stress situation shown by I4 also described a C-level change. However, both changes happened completely separate from each other since they occurred in different organizational departments. The interviewee described that the first CIO started the transformation in 2017 with a two-year project plan. However, by the end of 2018, the CIO changed, and the new CIO implemented a different strategy. The new CIO significantly slowed down the large-scale agile transformation, returning to classical development working models, only keeping some already established agile methods.

That means agile work as we know it, we have strongly reduced and went back to the classic view of V model, waterfall and left agile methods in the software area. They said ok, the [specific product] development is done agile and we have agile elements, we don’t do Scrum or any other right method, but we have agile moments, for example Kanban Boards or Dailies, which we kept because they are good for the group but the development itself has been reduced to the classical planning over several years and less to the function development and product development. (I4)
5.3. Identification of stress situations in large-scale agile transformations

The interviewee mentioned that the effects of the new strategy were visible immediately after the CIO change, affecting several areas of the large-scale agile transformation.

_The first thing is simply that the resources were folded in. So, resources, that is money and events: For example, a forum was canceled, we had an ideas fair every year, that was stopped, resources were simply folded in. That then dragged down to jobs, jobs are also resources. All this happened successively one after the other._ (I4)

The interviewee described that the stress situation of the CIO change has not led to a complete failure of the large-scale agile transformation, but rather a step back to using agile methods at a smaller scale.

_We have a group here that develops the software, of the seven hundred people, there are about one hundred and ten to twenty people, they are agile, they drive Scrum and LeSS and have feature teams and their back log and their product owner and that’s where they live it. But outside this community there is nothing. There are isolated agile methods like standup or a Kanban board, and that’s it. There was just more there before._ (I4)

Similar to the previously described (I3) stress situation at Automotive Co A., this stress situation (I4) also was twofold. First, stress is introduced to the transformation by the CIO change itself and secondly the strategy change by the second CIO introduced additional stress.

**Tech Co. A - Fear of failure on c-level (I7)**

Tech Co. A started a large-scale agile transformation in the software development department three years ago, involving eight hundred to one thousand three hundred employees from different business departments. However, first agile initiatives were started twelve years ago. The transformation was initiated top-down, with additional bottom-up activities supporting the movement. While milestones Tech Co. A set for the agile transformation were already accomplished, continuous change in scope and mindset remains. The first-year milestone focused on acceptance and mindset change for the involved employees.

[…] _this was the first thing we did, making them aware of the benefits, the values, the principles behind it, and how to gain from these benefits in the daily business._ (I7)

The second-year milestone focused on scaling the agile development in a team of teams approach. Even after this milestone was reached the goal of scaling further and improving remains.

_In the second year we started the transformation with a team of teams approach, we had the goal that we wanted to have at least five agile release trains running. Which we have accomplished, we have more. And right now, we are starting to transform some organizations to even larger, which means putting trains together or building large solutions and improving that and spreading around the company._ (I7)
The interviewee described that there is not an end to the large-scale agile transformation since it should be improved continuously.

There is no real end of a transformation, and there will never be. Otherwise you don’t really understand it. (I7)

The interviewee described the stress situation Tech Co. A experienced during its large-scale agile transformation as fear of failure on the c-level. At the beginning of the transformation process, management postponed the starting date several times due to feeling uncomfortable about changing a running system. The interviewee described that this situation occurred due to cultural reasons within the company, which do not allow for failure. At the beginning of the transformation there was an underlying fear in management that the transformation would fail. Thus, these positions did not want to be responsible to set the starting point, resulting in a delay and even a potential cancellation of the transformation. The stress situation affected around fourteen teams at the time.

I think it’s something about everyone knows that this project will crash, and no one wants to be blamed for the crash, so once you start a new approach, which might be helpful, but you still don’t reach the goal, then everyone will tell you, it’s just because you have changed this, and no one wants to be responsible for a failure. So, this is still a cultural thing, that we struggle with some fundamental believes, which are wrong, and this actually one of the problems we need to address. (I7)

Automotive Co. B - Middle management blocking the transformation (I9)
Automotive Co. B started a large-scale agile transformation three years ago in an engineering department, involving one hundred employees. At the time of the interview, the transformation was still ongoing with an end milestone at the end of 2019. The transformation was initiated top-down, whilst there were also bottom-up initiatives in the company supporting the transformation. The interviewee described top-down support as crucial for the success of the transformation.

The huge implementation was indeed top-down. We had some movement in the company, but without management support we would not have succeeded. We have had a hard push from our top management to do this. (I9)

Whilst support from management pushed the large-scale agile transformation, resistance from the management level was also perceived as a major stress situation for its success.

When we had our CEO and our head of product creation saying we should do this, that is a huge push to support the transformation. If we have individuals that are actively acting against it, we had such quick development so that would not have ruined the entire transformation. But we had situations that have delayed the transformation based on management questioning themselves. (I9)
5.3. Identification of stress situations in large-scale agile transformations

The interviewee described that especially middle management positions showed resistance towards the transformation during the first half of the process, endangering its success.

We had key persons, middle management persons, that actively have been working against the transformation. Some of these people have been actively moved by their managers. And we developed concerns, who should be the ultimate owner of this part of the business for the future. These kind of things have also been blockers for us and if they hadn’t been solved they could have ruined the entire transformation. (I9)

Middle managers, who have been questioning the transformation and have actively worked against it, therefore were removed from the transformation and either given other positions within the company or left the company.

Retail Co. - C-level change (I11)
Retail Co. underwent a large-scale agile transformation, which started two years ago. The transformation was initiated top-down because it affected the whole company, also internationally.

[…] finally I think if you really do this enterprise wide transformation it is not possible without the buy in of the c level and the top management, because you are changing everything. (I11)

They reached an end milestone at the end of 2019, however continuous improvement is still ongoing. The interviewee described milestones they are yet to reach as bottom-up involvement and mindset change.

In officially and my personal opinion is that it is about to reach a specific maturity, because everything that you want to have is that you have an emergent organization, so that a lot of stuff is done bottom up and that it is coming from the people, who are doing the work. And to reach this state I would say it takes another two or three years. It’s a total change, in mindset, in the steering framework, also on the business side, in the people’s heads and so on. This is something, which normally any change program takes five up to seven years and I see the same timeframe here. (I11)

The large-scale transformation faced stress situations caused by several c-level changes throughout the process. Throughout the transformation process the CEO and the CTO changed three times and the CFO changed five times. The interviewee described that these changes caused stress for the transformation process, endangering its success.

I think the person, who is in the driving seat of this whole transformation should not change in between. This costs you a lot of time and a lot of buy in. […] In my opinion we lost so much from this initial change approach on the way and people realize it. And then it is not the same story you tell over years and people realize it and it is somehow working against your changeability. (I11)
5. Results

The interviewee named the CTO changes as the most impactful stress situations for the large-scale agile transformation.

So, you have someone here, who is telling the story why we have to change, but then after it is granted that we can change, then he is leaving and a new person is joining saying we have to do this change. And then the importance and the reliability of this whole program is somehow gone. (I11)

In the described large-scale agile transformation, the first CTO remained only for the planning stage. An interims external CTO then came to the company for a limited amount of time of one year. He implemented the refinement, definition and rollout phase. Just when the new organization and principles were in place, the project was handed over to the second CTO, who is since leading the transformation. All mentioned CTOs followed a different agenda, which put the process of the transformation at stress. The interviewee described that, whilst they followed the same overall strategy of a large-scale agile transformation, their approach differed.

With the [interims CTO] it was the question, which way of work we will have, how will the organization be like. He was not so much focusing on what to do with the applications or what to do with technology. He said the organization and the people stuff is more important. Then the second CTO came and for him having an engineering mindset, he is not looking at the people that much and are they happy, are they feeling comfortable, do they have the right skills. This was very important for the first CTO, but with the second CTO it is not important for him, for him it is more important to have the java script or type script, so he has different priorities. (I11)

Furthermore, the interviewee described that the process of changing the CTO generally causes stress in itself because the system is taken away from its original path. After the implementation phase of this project, there should have been a revision and improvement phase, however that was skipped by the introduction of the new CTO. Additionally, there was denial about that situation from the middle management level.

The last change we had was directly after we introduced the product organization. So, if everything was done and we rolled out the new organization and principles and way of working and the new roles and everyone and every role and management had new roles and people had new roles and then we changed it. So, directly after it was decided and in place, then normally the work begins and you have to improve, adapt, inspect, you have to work with the people and managers and somehow keep on doing the change, but that was skipped. And the impression of our new CTO was that he was coming to an organization and everything is in place and everything works because all of these middle management people told him that they did a great job and everything works, but behind the scenes we really needed further support to roll out this agile organization. But the new CTO thought everything was in place because the guy before him told him that he did a great job and that we are fully agile. (I11)
5.3. Identification of stress situations in large-scale agile transformations

Retail Co. - C-level change (I12)
The interviewee described the same large-scale agile transformation at Retail Co. as I11 from a different perspective, therefore background information on the transformation and itself and the stress situation can be applied from previous description. The interviewee stated that a top-down transformation was the right approach in this case since the scope of the transformation was very large, including the whole organization and international divisions of the organization. However, bottom-up support is important for such a project.

We had some agile teams and also, we had some departments working agile. But it was difficult for everyone to spread it into the organization. So, it would have taken years. That’s why the top down approach was faster, but maybe not the best way to start working agile, because it should be bottom up in the best case. (I12)

The interviewee described that the situation was identified when the first role related problems appeared at the very beginning of the transformation and rumors were spread amongst the employees.

I think not many people realized it until it happened. I think the higher management realized something a little bit earlier because they were more directly involved or they had faster rumors. This was also a part of the culture that rumors got spread really fast in this company. So, this was maybe the first identifier when you hear rumors, that something happens and in most of the cases there really is something happening then. (I12)

Furthermore, the interviewee mentioned that whenever there is a high c-level change, such as the described CTO change, there are consequently also changes on other levels, especially the middle management, because a new CTO generally builds up support within the middle management. Therefore, in the case of Retail Co. the CTO change also affected several layers of the hierarchy.

[…] it was also a problem on management level, so for my boss then left after 30 years at [Retail Co.]. It was a great impact on the higher management also. (I12)

[…] every time you change the top management a lot of changes happen at every level. (I12)

Concluding this cluster, this section was able to identify two types of c-level related stress. Overarching terms can be defined as stress due to the c-level change itself, stress due to problematic behavior on c-level. On the one hand a change within the c-level could cause stress situations because it causes uncertainty towards the further progress of the transformation (I3, I4, I11) and oftentimes also implies a change in strategy and mindset towards the large-scale agile transformation (I3, I4, I11). Changes in c-level could also lead to the loss of trust from involved employees, because the manager, who formerly led the transformation no longer acts as a motivator or leader, but rather as a negative figure since they no longer supported the project. On the other hand, problematic behavior from the management level can inflict stress for the transformation due to two reasons. Resistance from the c-level, which could occur in combination with a c-level change or without, could
cause stress situations for the transformation, because these managers could block the transformation (I7, I9) and the process could lose credibility (I11). Furthermore, the c-level behavior towards the transformation could transfer to the involved employees. This could occur due to two reasons. Firstly, the c-level holds a leading role in the transformation, which employees respond to and follow (I3, I7). Secondly, the c-level builds their support basis in different hierarchy levels, and therefore surrounds themselves with people supporting his decisions towards the transformation (I12).

5.3.2.4 Textbook approach complications

Two interviewees (I15, I16) described stress situations, which can be classified as textbook approach complications, which relate to the adaption of an external guideline within an organization. Details to the respective transformation project are described in the following.

Tech Co. B - Textbook approach complications (I15)

Tech Co. B started a large-scale agile transformation in the IT department two years ago, including seven teams. The transformation was initiated top-down, however the management level directly involved the teams in the transformation process by providing them freedom to make own decisions.

_This is where we had the support the top part, and from the bottom we involved the team quite heavily._ (I15)

Management decided to hire external experts to implement agile practices according to the LeSS framework for the company. The interviewee described the stress situation for the large-scale agile transformation as a missing adaption of the external framework to the company specific needs. By using the external framework, the transformation seemed easy at the beginning, but stress occurred when product quality and expectations decreased.

_We adapted [LeSS and] really stuck to the handbook, without questioning [if] this part is necessary for us or not. We just adapted it, really mapped it in a perfect way and sooner or later realized that it’s not working for us._ (I15)

The interviewee further described that the issue was not lying within the framework itself, but specifically the missing adaption to the company specific context.

_I wouldn’t say that LESS does not work, so it did not work for us, because we forgot somewhere the important points at that point of time. So, we had quite a let’s say strong learning curve here._ (I15)

Within the early steps of the project, the company identified the stress situation on customer level due to not being able to meet expectations and on the team level due to difficulties in the working mode, which caused delay in the delivery and transformation project. At the time this stress situation directly affected teams of the consultant department, the end-user department, and of the IT departments.
5.3. Identification of stress situations in large-scale agile transformations

Tech Co. B - Textbook approach complications (I16)
The interviewee described the same large-scale agile transformation at Retail Co. as I15 from a different perspective, therefore background information on the transformation and itself and the stress situation can be applied from previous description. The interviewee provided further insights on the stress situation, also empathizing that the chosen approach for a large-scale agile transformation should be adopted to company specific needs. In this context, he described the missing ability to flexibly adopt the chosen approach as “agile fundamentalism”.

I have invented a new word so it’s called ‘agile fundamentalism’ and if you talk to fundamentalists your project you’ll never be successful, because a fundamentalist says within a description of LESS you have to do every day your daily and in the daily you have to ask three questions and the fourth question is not allowed, in five minutes it must be over something like this. And if you talk to the fundamentalist, they force you to do it exactly how it is written. [But] Each project has a different environment, a different process and you have to see the description of how a model is working as an example or as advise. But you have to adopt it. You cannot use it one to one to your project. It’s impossible. (I16)

The interviewee further described that the stress situation was identified mainly due to not being able to meet customer expectations form the beginning of the transformation.

Concluding this cluster, this analysis was able to identify stress related to the missing adaption of a textbook approach to the company specific situation. This particular stress situation was, in contrast to previously described stress situations, only faced by one company in this multiple case study. However, two independent interviewees described this stress situation from different viewpoints, which empathizes its relevance for the large-scale agile transformation in Tech Co. B.

5.3.2.5 Summary of clusters for stress situations

- Project management complications
- Communication complications
- Transformation management complications
- C-level complications
- C-level change
- Problematic c-level behavior
- Uncertainty
- Role related complications
- Textbook approach complications
- Missing adaption of external concept

Figure 5.3 Clusters of stress situations
5. Results

In order to provide a comprehensive and systematic description of stress situations, this thesis clustered described situations into four clusters displayed in figure 5.3. The analysis of the conducted multiple case study revealed most stress situations in the cluster c-level complications, followed by the clusters transformation management complications, role complications, and textbook approach complications. Whilst the sample of this multiple case study is not sufficiently large to draw generalizable conclusions for all stress situations that could occur during large-scale agile transformations according to the identified clusters, it provides a clear categorization of the field of stress situations in the context of this study and is applicable for similar projects.

5.4. Origin of described stress situations

In order to identify the origin of above-mentioned stress situations, this thesis analyzed the collected data according to Mitroff’s et. al. [26] model whilst also keeping the underlying model of stress in mind [40]. Mitroff’s et. al. [26] model is suitable in this context, because it empathizes internal and external factors, as stressors can lie within or outside of the company (see [25]). Furthermore, the model differentiates between a social- and a technical dimension, similar to STS theory (see chapter 2.2.3). The stress situation’s origin is referred to as a stressor in the underlying model of stress. Understanding the origin is particularly important since it provides the starting point of the model and is a means to modification or even prevention in practical application. This thesis provides a breakdown of different origins to identified clusters of stress situations and additionally provides an overall conclusion, describing all identified origins.

5.4.1. Origin of transformation management complications

Five (I1, I8, I10, I13, I14) interviewees described stress situations in the cluster transformation management complications. Automotive Co. A (I1) explained during I1, that the reason for their stress situation of missing product definition was based in project management. The interviewee described missing transparency in the product planning stage as the main stressor for the situation. Tech Co. A (I8) described missing aspects in change management as an origin to their perceived stress situation. Especially not providing enough time for the organization and involved employees to adopt to the new working model caused stress for the transformation. Automotive Co. B (I10) and Insurance Co. (I13) commonly described missing communication during large-scale agile transformations as a stressor. Whilst Automotive Co. B (I10) experienced a broken information flow due to the implementation of a new working model, Insurance Co. (I13) faced issues due to failure in large-scale communication. Automotive Co. B went through a large-scale agile transformation in order to change the way they develop products and to change their internal interaction, however when they started the transformation, they missed to implement new means of communication.

_And in this case to say that yeah it was due to the agile transformation, because we broke the information flow, that is true. But we have to remember that we broke the flow, because the old development system wasn’t good enough._ (I10)

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5.4. Origin of described stress situations

Insurance Co. (I13) described that the origin of their experienced stress situation laid in missing large-scale communication, which was suitable for their complex organization and transformation project involving three thousand employees. The interviewee described that finding a communication strategy that spoke to every employee, addressing their uncertainty and in some cases fear, was difficult.

*I think the reason or the origin where it is coming from is, that our company is an organization with many employees, and this is basically a complex system and then you need to find ways in order to change this system without wanting to change it. It sounds a bit weird, because if you try change the system from the outside like basic change management, many people resist this change because they don’t want to be changed. However, what we are trying to do is to show them a new situation or show them the new world they are now in, so that they’re figure out for themselves how to change, and this is maybe the origin, that we still have a system where people work together and if you have a complex system where people work together you need to apply change management.* (I13)

During another interview, Insurance Co. furthermore described a previously failed transformation, which faced a stress situation concerning inter-team collaboration between agile and non-agile teams. The situation was a stressor for a transformation since both teams follow a completely different working mode including different deadlines and iterations. In the described stress situation, the interviewee did not describe the origin as a people issue, but rather the definition of new work and collaboration processes on an organizational level.

*I think that everybody wanted to cooperate, but it is a matter of making clear how that cooperation changes when you work in an agile manner. It is no longer that you can take a whole month at the beginning of the year to write down requirements and then you take another month for user acceptance testing. But I need to be involved over the full year. […] Now if you don’t make sure that everyone knows this and has adjusted the organization, I mean they have other things to do as well, there is daily business, those business departments have to deal with. […] They need to reorganize their work load and that is something that only the whole organization can do and that is something that IT cannot initiate on its own.* (I14)

In order to conclude findings towards the origin of the stress situation transformation management complications, this section provides a visual orientation based on Mitroff et. al. [26] (see figure 5.4). All described stressors were of internal nature, based within the company, and more specifically within the transformation project itself since all of them describe a missing component of project management. Automotive Co. A described missing transparency in project planning, Tech Co. A described several missing aspects of change management, mostly focusing on time to adopt to changes, Automotive Co. B and Insurance Co. described missing communication, additionally Insurance Co. described problems in inter-team collaboration, which was not planned sufficiently. Furthermore, all described stressors were of organizational nature, described by organizational planning (I1, I14) or organizational communication strategy (I8, I10, I13).
5. Results

5.4.2. Origin of role related complications

Three (I2, I5, I6) interviewees described stress situations in the cluster role related complications. Automotive Co. A (I2) described that uncertainties concerning new roles endangered the success of their large-scale agile transformation due to unclear definition and communication of new roles from upper management.

[...] the origin of the situation was that clear roles and responsibilities within the new environment were not specified and communicated with all of the employees. (I2)

The interviewee described that the stress situation originated from role change, which like any change, caused stress for the individual on a personal level but in this case also on a role level, because the new role likely comes with new requirements and responsibilities. This general uncertainty was further enhanced by missing communication from management side, and because new roles were decided by management based on external criteria for agile roles, rather than in consultation with affected employees.

[...] I mean the decision to change roles to become more agile definitely was an internal one. So, this was the basis of that kind of conflict.[...] Sometimes although it is inside change it feels like this is something that comes from the outside. (I2)

Similar to the stress situation described by I2, Automotive Co. A (I5) faced further role related complications during a large-scale agile transformation of another department. Interviewee I5 described that confusion and frustration was caused by management implementing roles which did not fit the company culture and skills, but were necessary for the transformation.

[...] we are agile now so we need a line manager and we need a product owner and maybe these roles don’t really fit the company, but this is what we’re doing. (I5)
Similar to Automotive Co. A, Tech Co. A experienced unclear expectations of new roles and missing communication as stressors within the transformation. Contrarily to Automotive Co. A, Tech Co. A bases these stressors on the internally defined, too fast transformation rollout.

*There are always guys, who are reluctant to change, as mentioned. So, we always have that one out of ten. And that was based on that the rollout was done too fast and it was not very clear what is the expectation [for the new roles].* (I6)

In order to conclude findings towards the origin of the stress situation role related complications, this section provides a visual orientation based on Mitroff et. al. [26] (see figure 5.5). Unlike the previously described cluster, some stress situations were of internal nature and some of external nature. Automotive Co. A described both internal stressors in communication and individual role adaption (I2) and external stressors in organizational planning (I5). Whilst in Automotive Co. A, new, externally defined roles in the context of agile development did not fit the current company culture and role expectations (I2, I5), Tech Co. A stated that the origin of the stress situation was of internal nature only, based on the too fast implementation of change (I6). All described stressors were of people- and organizational nature since role related issues describe personal fit on the one hand, and organizational incorporation and definition on the other hand.

**Figure 5.5 Origin of role related complications**

### 5.4.3. Origin of c-level complications

Six (I3, I4, I7, I9, I11, I12) interviewees described stress situations in the cluster c-level complications.

Automotive Co. A described in Interview I3, that c-level complications arose in the context of a CIO change due to management internal budgeting disagreements. The first CIO did not receive the budget amount he claimed he needed and therefore, left the company unexpectedly, which caused stress for the transformation. During another large-scale agile transformation at Automotive Co. A, described by Interview I4, the CIO, who started and
planned the large-scale agile transformation left to join another automotive company for political reasons during recent emission scandal. Automotive Co. A faced two different types of stressors during the described stress situations, I3 is an internal stressor based on company internal issues, while I4 is an external stressor based on market and political events that happened separately from the transformation.

Tech Co. A experienced a stress situation through fear of failure on the c-level during the first steps of their large-scale agile transformation. The interviewee (I7) described that the origin of this situation laid in the culture of the company, which lacked error acceptance. The lack of error acceptance showed through resistance and doubt mainly on management level, but also on team level. Thus, the respective managers did not want to start the large-scale agile transformation, and therefore be responsible for the failure that was assumed from colleagues.

There were people, who were not so afraid, who said just do it, it won’t get any better. There were people still reluctant to say anything. Then there were some people, who said don’t do that right now, and the people, who said no are right now winning. (I7)

Automotive Co. B (I9) faced a stress situation in which middle management positions showed resistance towards the transformation during the first half of the process. The interviewee described that similar to the stress situation described by Tech Co. A (I7), resistance and doubt towards the agile working model were company, as well as transformation internal problems focusing on the people component.

In this specific case it was the behavior of the two management positions that was causing problems. I think that for the entire transformation, in every sense it has been an internal challenge. (I9)

In two Interviews, Retail Co. described the same transformation project, including the same stress situation and similar perceptions towards the origin of those situations (I11, I12). Interviewee I11 described that the stress situation’s origin laid in the management’s decision to implement a large-scale agile transformation and to therefore change the CTOs. The first CTO change was required in order to start the transformation, because the CTO at the time did not support the project sufficiently. The interim CTO was contracted for a limited amount of time, which was defined before he joined the company. The interviewee’s perception was that no other person provided the right skills for the position and no other person was available (I11). The second CTO change was therefore planned by management and reflects an internal stressor. Interviewee I12 further adds that external shareholders and upper management from the group influenced the CTO change.

I don’t think the change would come from the organization itself, it comes from outside. It is more shareholders or other higher management people from the group […]. (I12)

In order to conclude findings towards the origin of the stress situation c-level complications, this section provides a visual orientation based on Mitroff et. al. [26] (see figure 5.6). This
5.4. Origin of described stress situations

section identified stressors in two categories. All mentioned companies described internal stressors connected to people and organization related categories, which can be explained by the strong influence, the respective management person or organizational structure has in this situation. Therefore, stressors occurring people- or organization- internally could cause a large impact. Furthermore, this section identified a second category of stressors, which none of the other clusters shows. External economic stressors influenced the change of c-level in Automotive Co. A and Retail Co.. Both stressors caused the change of a c-level member.

![Figure 5.6 Origin of c-level complications](image)

5.4.4. Origin of textbook approach complications

Two (I15, I16) interviewees described stress situations in the cluster textbook approach complications. Both interviewees described the same transformation project at Tech Co. B, as well as the same stress situation from different perspectives and understandings towards the origin of the stress situation. The interviewees (I15, I16) described the stress situation for the large-scale agile transformation as the missing adoption of an external framework to the company specific needs. Whilst interviewee I15 only identified internal origins for the stress situation, I16 suggested internal and external stressors. Interviewee I15 described that management simply decided on implementing the framework, which was not adapted to company specific needs. Interviewee I16 described a mixture of internal and external stressors. He described that the implemented framework was an external stressor, because it was not adapted to the transformation and therefore an external factor negatively impacting the transformation. Regarding the internal factor, the interviewee described a mindset issue as a stressor, which did not fit the implemented framework.

[... people inside had some mindset issues, which has also forced [the large-sale agile transformation] to go this way [face a stress situation]. [...] So, if a project is running well, then it’s running well, because the persons in the projects have the correct mindset and they have a good atmosphere working together and if a project is not going well, which means the persons in the project have some problems. (I16)
5. Results

In order to conclude findings towards the origin of the stress situation textbook approach complications, this section provides a visual orientation based on Mitroff et. al [26] (see figure 5.7). As both stress situations affected Tech Co. B, this section does not provide specific inter-company conclusions. However, it should be noted that even though both situations happened in the same transformation, the perception of stressors differed between both interviewees. Both interviewees described the implementation of the agile framework differently. One considered it to be an internal stressor since the management decision to implement it was internal, the other interviewee considered it to be an external stressor since the framework itself was developed externally. Both interviewees described stressors, which were of people- and organizational nature since the adaptation of a framework involved organizational decisions and employees’ adaption to the new system.

![Figure 5.7 Origin of textbook approach complications](image)

5.4.5. Summary of origins of described stress situations

Concluding the answer to this research question, this section described and compared stressors within different companies and transformation projects according to their previously defined clusters of stress situations. In a general view, this section was able to conclude three internal categories and three external categories. Internal stressors include: Firstly, communication and collaboration (I1, I2, I6, I10, I13, I14), comprising of missing transparency (I1), missing communication (I2, I6, I10, I13), and problems in inter-team collaboration (I14). Secondly, internal stressors include management (I2, I3, I6, I8, I11, I12, I15), comprising of missing time and change management efforts (I8), management decision to change (I2, I11, I12, I15), rollout was implemented too fast (I6), expectations were not clear (I2, I6), and inaccurate budgeting from management side (I3). And thirdly, agile mindset (I7, I9, I16), comprising of resistance and doubt towards agile working model (I7, I9), and mindset (I16). External stressors include: Firstly, Political events (I4), secondly shareholder pressure (I12), and thirdly external guidelines (I2, I5, I16), comprising of definition of roles according to external criteria (I2, I5) and transformation process according to external criteria (I16). It should be noted that most stressors were of internal, and organizational nature, which means that the origin of most of the defined stress situations lies within the transformation and management thereof.
5.5. Classification of described stress situations

In order to classify the above-mentioned stress situations, this thesis analyzed the collected data according to Burnett’s et. al. [27] model, whilst also keeping the underlying model of stress in mind [40]. To provide a clear visual representation, this section does not present the single stress situation clusters according to Burnett’s model structure, but rather explained by means of its four dimensions: threat level, time pressure, response options and degree of control. The dimension threat level describes the threat towards the success of the overall large-scale agile transformation, emanating from the experienced stress situation. The dimension time pressure describes how fast involved parties had to act in order to prevent greater damage due to the stress situation for the transformation. The dimension response options describes degrees of freedom the company and employees had in reacting to the stressor. The dimension degree of control describes whether the company and employees were reliant on factors of the process of the stress situation. After the detailed classification of every cluster of stress situations this thesis fit the identified clusters into Burnett et. al. [27] model in order to gain a broad perspective. Based on this abstract classification model this analysis was able to place generalizable statements about stress situations during large-scale agile transformation. Furthermore, this section describes the impact of the stress situation in order to bring the classification into context. This section also provides information on the individual perception of the stress situation, resulting in eustress or distress.

5.5.1. Classification of transformation management complications

Stress situations identified in the cluster transformation management complications commonly described problems known from project management. Five (I1, I8, I10, I13, I14) interviewees described stress situations in this cluster.

Automotive Co. A (I1) faced complications in product definition at the beginning of their transformation. They experienced the impact of the stress situation in terms of time delay, as the missing product definition from management side endangered product deliveries. This missing product definition had to be made up for later, on a team level. Since no measurable damage had been caused to the transformation by delayed product deliveries at the point of the interview, the interviewee described the threat level of this stress situation to the overall transformation as medium. Consequently, the time pressure was high in this situation, because the transformation agent had to act quickly to prevent product delays as a consequence from missing product definitions. Response options in this case were mostly communication based. The transformation agent I1 contacted several involved employees in order to define missing aspects of product planning as quickly as possible.

[...] my tactic was to ask every employee that I need every day if he has time now or in one hour or two hours, so give him [enough] freedom as he needs that he can say, okay I can arrange right now a meeting [...]. I was also prepared in the meetings, so I was not there blanc with what [needed to be discussed in the meeting]. (I1)
5. Results

Since the interviewee was in charge of the measures, which were to take in this situation, he had a clear understanding of the degree of control in this case. He described his control as medium, because he was able to take and coordinate actions, but still relied on colleagues to support his efforts.

Depending on other people that I think middle, so you can actually affect this by working a way harder on this, but it is also limited. I don’t know, when there’s only one person that can ask you a question and it turns out that this person is on vacation for two weeks, you can work as hard as you want to, he’s not there. (I1)

Overall, he perceived the situation as eustress for himself because he felt more motivated to get the task done as he realized that he could have an important impact to the transformation. Since he was in charge of this part of the transformation, the stress situation can ultimately be seen a eustress for the whole transformation.

[…] it turned out that [my] work is urgent and the organization needs this, of course it motivates [me] to do more. (I1)

Automotive Co. B (I10) faced control problem, as with the implementation of the large-scale agile transformation, the former information flow was broken, and the company had not re-established a new information flow that was adjusted to the new working mode. This stress situation created a lack of responsiveness, which endangered product delivery and consequently business success. Therefore, the interviewee described the threat level as high. The interviewee further described that the time pressure during the experienced stress situation was low, as Automotive Co. B almost never had delivery time delays. However, this was only possible because the company employed additional workforce in a taskforce mode, to secure product delivery. Management decided to take these task force actions, because such measures of the traditional way of working had been reliable in the past.

The thing is that what we traditionally do when we have a problem like this, is to go back to the old ways of the sign by running task force and that is what we have done and probably we will continue to do it tomorrow in the agile system as well. (I10)

The interviewee further described that due to the broken information flow, there was an overall lack of control in the project, which also led to a low degree of control during the stress situation.

Insurance Co.’s (I13) latest large-scale agile transformation, as described by I13 and touched on by I14 faced problems due to inadequate communication, as not every involved employee could be reached to provide a broad understanding and acceptance for the transformation at the beginning. The interviewee described the threat level of this stress situation as medium because general information about the transformation was still provided, and the stress situation encouraged the company to implement new communication formats, which proved as helpful in the further development. Furthermore, the interviewee described that the time pressure for this stress situation was low because
measures had been taken from the start and communication in general was in place. Insurance Co. responded through different communication and training methods, which helped to inform and educate all employees.

[…] we have a team that concerns about change management and tries to come up with new ideas of how to spread the word about our agile approaches in the whole company and they set up those many communication channels, via conferences, via personal connections within the company and open spaces as I mentioned and those are some examples of many different approaches we have taken to inform our employees. (I13)

Since Insurance Co. acted quickly and implemented several measures to ensure wider and better communication, they were able to gain control over the stress situation. However, the interviewee still described their degree of control as medium because the influence on how the individual employee receives the information is limited.

[…] you still have […] employees you don’t fully reach and this could lead to just people, who are not informed, but then in the long run we hope that the more people are informed about this and get involved in agile working the more the word spreads within the colleagues and then one person is talking to the next and so information is more spread in the whole company. (I13)

Overall, Insurance Co. perceived the situation as eustress because it enabled new ways of communication.

The positive effects are basically that the more people know about our agile progress the more people become interested and the fear level goes down. The employees, so many people realize that it is not that bad, it is actually something good, it’s actually a working environment that feels good, in which people are happy, and in which we can do meaningful work, developing products that are actually being used and actually are being meaningful. What we see is that now more and more employees get in contact with us in order to ask us questions like how I can get involved in this agile approach, how can I be an agile master, how can I be a product owner or something like this. (I13)

Insurance Co. (I14) faced another stress situation during their first attempt of an agile transformation, which interviewee (I14) described as complications in team coordination between agile and non-agile teams. Ultimately this stress situation led to failure of the first attempt of a large-scale agile transformation, because customer expectations could not be met. In this case the IT system broke down, which led to an immense amount of additional work for Insurance Co.

Lots of bugs, systems that were not working, failures situations, huge levels of items that were not dealt with. Usually if a customer sends us a letter saying I have moved this is my new address, that gets put into the systems within hours. At this point in time because of failures in the systems we had people that needed to key that information in and there were thousands letters, calls emails that weren’t processed. (I14)
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Since the transformation ultimately failed the threat level, as well as time pressure of the respective stress situation were high. The interviewee described that not meeting the customers’ expectations in times of a fast-evolving business environment posed a high threat connected to described difficulties in collaboration. IT costs significantly went up during the project, which posed a high time pressure on the transformation. The only response option that Insurance Co. had left after system failure in their first transformation, was going back an old, non-agile way of working since it had proofed to be reliable in the past.

So, I think the only option that was available at this time was to go back to processes and methodologies that were known to work and that were known to reduce the problems quickly.

(I14)

Overall, Insurance Co. perceived the situation during their first attempt towards a large-scale agile transformation as distress, leading to ultimate failure. However, the interviewee empathizes that the company was able to take away valuable learnings for their most recent transformation project (see I13).

Concluding this section, companies experienced different threat levels to the success of their large-scale agile transformation. All companies faced threats to product delivery, however, companies which had taken measures to resolve the situation immediately, perceived the threat level only as medium, instead of high like companies, who had not. Automotive Co. B (I10) and Insurance Co. (I14) faced product delivery threats endangering their business success. Automotive Co. A and Insurance Co. during their second transformation however, took measures, such as quick communication from the start, and therefore only perceived the threat as medium. The same observation was made concerning the time pressure of the stress situation. In the cases of Automotive Co. B and Insurance Co., time pressure was perceived as low because actions had already been taken in both cases. Automotive Co. A felt a high time pressure, while the threat level was low because the interviewee was taking actions at the time of the interview, and therefore had to act quickly. Automotive Co. B (I13) felt a high threat level, while time pressure was low because they implemented additional workforce. Companies within this cluster, that felt a high threat level resorted to traditional solutions to resolve the stress situation, while companies that felt a medium threat level resorted to communication, time management and training efforts. Since all companies had interdependencies in teams and also on a personal level within the company, they perceived their degree of control as medium. Table 5.6 provides an overview of the described classification according to Burnett’s et. al. [27] dimensions and the investigated companies within the cluster.
5.5. Classification of described stress situations

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threat level</td>
<td>high (I10, I14), medium (I1, I13)</td>
</tr>
<tr>
<td>Time pressure</td>
<td>high (I1, I14), low (I10, I13)</td>
</tr>
<tr>
<td>Response options</td>
<td>communication (I1, I13), time management (I1), traditional solutions (I10, I14), training(I13).</td>
</tr>
<tr>
<td>Degree of control</td>
<td>medium (I1, I13, I14), low (I10)</td>
</tr>
</tbody>
</table>

Table 5.6 Classification of transformation management complications

5.5.2. Classification of role related complications

Stress situations identified in the cluster role related complications commonly described problems in role understanding and acceptance from directly affected employees as well as their teams. Three (I2, I5, I6) interviewees described stress situations in this cluster.

**Automotive Co. A (I2)** experienced a high threat level due to uncertainties concerning new roles. The interviewee described that the highest impact of this stress situation was in terms of acceptance on employee level.

\[I\] think this [role understanding and therefore acceptance of the transformation] is the major point of that it works or we are losing it. Because what you have to consider there is that yes people talk about this, but there is a larger share and also thoughts behind that are not expressed. (I2)

The threat level was high in this situation because the problem was not directly visible, therefore it was unclear how many employees were experiencing uncertainty and fear towards their new role, or the effect of a new role on them within the transformation. The interviewee described that uncertainty poses a high threat on any transformation.

\[I\] think even if you are very uncertain, not against it but very uncertain if it might work or not, this is already doomed in a way. (I2)

As the threat level was high in this case and the scope of the stress situation within the company and affected employees was not clearly visible, the time pressure to react was high. As a result, the stress situation gained management attention and Automotive Co. A tackled it through communication and training on a personal level for affected employees, but also made sure that everyone affected by the transformation was involved through sufficient information.

Basically, raise to management level, what I actually did, to have some sort of systemic empathy and understanding that only communicating the new roles won’t do the job. Rather also go into discussion with people that had very high visibility roles, which had a lot of responsibilities and talk to these people and give them a clear picture of what their future work will look like and that it has the same or higher value. Other than that I think you on the organization also
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on people's hearts and ask them also how their general gut feeling on all this is, and where there is criticism you have to at least cope with it. (I2)

Since Automotive Co. was able to implement these measures, they perceived their degree of control as high during the stress situation.

The interviewee described the stress situation as eustress since it required every level of the involved organizational unit to participate, which had a positive effect on collaboration.

It surely has some driving aspect to it to solve it. A certain level of stress can also be fruitful because participation on every level is required and if you do not inflict some sort of pressure to be part of that change and to shape it in a way that it also suits you, I think then you are just passively looking at it and a thing that always is a danger is that people at the end say I say at the beginning that it doesn't work and we are not part of the change and just waiting on the side for it to fail. (I2)

Similar to the stress situation described by I2, Automotive Co. A (I5) faced further role related complications during a large-scale agile transformation of another department. Interviewee I5 described that at the beginning of the transformation, confusion and frustration was caused by management implementing roles, which did not fit the company culture and skills, but were necessary for the transformation. In contrast to the first stress situation described by Automotive Co. A in this cluster, the stress situation described by I5 was not of a high threat level for the overall transformation. The interviewee described the threat level as low, as shared responsibility in a collaborative approach relieved stress from single roles, which might have faced uncertainty during the transformation. In the new agile working mode, no leadership role has to bear all the responsibility. Time pressure was therefore also low, because even if certain employees faced uncertainty towards their new role at the beginning, they were given enough time to grow into it. To help this process Automotive Co. A also implemented a coaching center where affected employees could get help and ask questions. Still their degree of control during the situation was medium because uncertainties arose on an individual level, which cannot be entirely controlled, as they depended on how open employees were towards communicating these issues with upper leadership and coaches. Overall, Automotive Co. A perceived this stress situation as eustress because employees mostly were more motivated to get to know their new roles and they had the possibility to adapt them to a certain extend to what fits them and the company best.

Similar to Automotive Co. A, Tech Co. A (I6) described unclear expectations of new roles and missing communication as stressors within the transformation, based on a too fast transformation rollout. Threat level and time pressure were both low for the company in facing the stress situation. Teams worked slower due to the stress situation, which caused cost, but there was not an overall threat to stop the transformation. Tech Co. A had several response options and mainly resorted to communication measures since the stress situation was caused by missing communication and uncertainty. They also involved management
and implemented trainings for affected employees. Overall, Tech Co. A perceived the stress situation as distress because frustration was the main response to the situation.

So, that specific situation was definitely only negative for the transformation. People were frustrated because it didn’t work out, it took longer, and of course it was not that people said the reason is because the product owner is misbehaving, it’s always the assumption that the transition doesn’t work, the agile stuff is rubbish. I cannot imagine anything positive in that situation. (I6)

Concluding this section, companies experienced different threat levels for the success of their large-scale agile transformation. As the described stress situations in this cluster are very similar compared to situations within other clusters, it is interesting that the severity of the situation was perceived differently in every stress situation. Table 5.7 provides an overview of the described classification according to Burnett et. al. [27] dimensions and the investigated companies within the cluster.

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threat level</td>
<td>high (I2), low (I5, I6)</td>
</tr>
<tr>
<td>Time pressure</td>
<td>high (I2), low (I5, I6)</td>
</tr>
<tr>
<td>Response options</td>
<td>involvement of management (I2, I6), communication (I2, I5, I6), training (I6)</td>
</tr>
<tr>
<td>Degree of control</td>
<td>high (I2), medium (I5, I6)</td>
</tr>
</tbody>
</table>

Table 5.7 Classification of role related complications

5.5.3. Classification of c-level complications

Stress situations identified in the cluster c-level complications commonly described problems imposed by management. Six (I3, I4, I7, I9, I11, I12) interviewees described stress situations in this cluster, including c-level change and problematic behavior towards the transformation.

The CIO of the IT department at Automotive Co. A (I3) changed, which inflicted stress for the ongoing large-scale agile transformation, additionally the new CIO followed a different, more traditional transformation strategy, which posed further stress on the project and slowed it down. The threat level of the described stress situation was high, as a lot of money had already been spent throughout the cause of the transformation and the sudden change of the CIO caused uncertainty for the further progress of the transformation. The time pressure, however was medium because the transformation was already ongoing and the new CIO had not made majorly impactful decisions on the transformation yet, as he had only been in the position for about a month at the time of the interview. Response options were limited in this case, as the stress situation came from only one managing position. Automotive Co. A however tried with the help of other managing positions, to communicate with the new CIO and demonstrated positive outcomes of the ongoing
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transformation and its strategy. The company therefore had a medium level of control in this situation since they were able to undertake actions, however they still relied on the CIO to accept and implement them.

Automotive Co. A (I4) faced another CIO change in a manufacturing department. Similar to the stress situation faced in I3, the CIO change itself caused stress, and additionally the new CIO followed a traditional strategy, deconstructing parts of the already established agile working model. The new CIO returned to a classic development model and cut resources for agile development, which had an enormous impact on the transformation and the progress, which had been reached so far. The threat level, as well as the time pressure were therefore high for this stress situation. This situation did not leave Automotive Co. A any other option than following the path and resorting to traditional solutions within a classical, non-agile working model.

And then it just became that by taking away the resources from people, who have no work base or can’t move or transform anything, the system stagnates. And then people quickly change to the classic one because they have to continue. That’s the way it is in a hierarchical organization, the king says where it goes. (I4)

Overall, Automotive Co. A perceived the stress situation as distress because frustration and loss of trust and motivation was the main responses to the situation. The interviewee described that the overall negative impact also had an impact on the company culture.

We have five core values at [Automotive Co. A], including transparency and trust, and they have now been trampled on. And if you currently ask the cultural question at [Automotive Co. A], then you get relatively bad feedback. And the statement from the board of management is that we do have core values, then we have to live them, but the Board of Management itself does not live them. (I4)

Tech Co. A (I7) experienced fear of failure on the c-level during their large-scale agile transformation due to cultural reasons within the company, which do not allow for failure. The stress situation led to time delay of the transformation process, therefore both, threat level and time pressure were high. The threat level was especially high because the stress situation impacted a product of the company, which had a major impact on business figures. The company responded to this stress situation through communication measures, which were implemented in order to convince people, who doubted the transformation and agile working mode. Workshops showed benefits and concrete measures of the transformation to inform employees. On the other hand, the interviewee also described that some employees resorted to classical project management practices. Tech Co. A had a common understanding of the direction in which the company should head, that was backed by company principles. However, they were still depended on the individual acceptance of the project from involved employees. Therefore, the interviewee described the degree of control during the stress situation as medium. Overall, Tech Co. A perceived the stress situation as distress, however the interviewee also described that there were some positive takeaways, like better communication within the teams.
5.5. Classification of described stress situations

**Automotive Co. B (I9)** faced a stress situation where especially middle management positions showed resistance towards the transformation during the first half of the process, endangering its success. The transformation was delayed due to the stress situation. The interviewee described that the threat level of the experienced resistance from middle management was high because it could have led to failure of the overall large-scale agile transformation. However, the time pressure was not high during the stress situation. The interviewee described that they could have finished the transformation earlier if they had taken actions earlier on. Yet the company wanted to keep the middle managers, who showed resistance in the project and in the company and therefore tried everything to resolve the situation. For this reason, the interviewee described the time pressure as medium.

> We tried to convince them, we tried to train them, we tried to debate with them, we tried to meet their arguments we tried everything we could think of for a very, very long time. (I9)

Automotive Co. B therefore did not have many response options. They implemented trainings for the middle managers, who showed resistance in the project. However, as these measures did not show positive outcomes, two middle managers were actively helped to take on new positions, one within the company, and one left the company. Automotive Co. B had a high degree of control during the stress situation. They were able to take described actions, however they could not control the individual behavior and acceptance towards the transformation project of the middle managers. Yet they did not depend on these middle managers, as new employees were appointed to the positions quickly ensuring further progress of the transformation. Overall, the interviewee described the stress situation as distress, however he empathized that when the affected middle managers left, the transformation gained energy and they were able to take a step forward.

**Retail Co. (I11, I12)** faced multiple CTO changes throughout their large-scale agile transformation, which negatively impacted the transformation’s success. These c-level changes cost the transformation time, trust, and employee buy-in. Interviewee I11 described that the threat level was medium because stopping the transformation was never up to debate.

> […] the why and the what was somehow stable over time. The how changed a little bit, but it was never the discussion that we would stop the agile transformation. (I11)

Interviewee I12 perceived the threat level as high because it changed the company and transformation immensely. Interviewee I11 described that Retail Co. faced a high time pressure to find a new CTO throughout the changes in order to continue the transformation. He furthermore stated that finding a CTO, who is willing to take on an ongoing transformation project of their scope was especially hard. Interviewee I12 described that because of the high time pressure employees did not have the chance to understand the changes. Furthermore, both interviewees (I11, I12) described that Retail Co. only had one response option during the stress situation, which was to find a new CTO and continue the transformation according to him. Both interviewees described the degree of control during
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the stress situation as medium. Retail Co. was always able to control the search of a new CTO, and therefore had control over the further progress of the transformation. However, both interviewees describe that employees lost control over participation in decisions and collaborative debates concerning the further progress of the transformation with the CTO switch. Overall, Retail Co. perceived the multiple CTO changes as distress for the transformation project, as they caused mistrust and confusion in the company.

I had the chance to talk to a lot of people and there was a lot of mistrust at the beginning. Because not only change was happening, but the people also had the feeling that people were not valued anymore. So, they were not really happy with it. Of course, many did their work and were more concentrating on the product level on their own teams and their bubble, but they were also a little bit lost because of these changes. (I12)

All companies and most interviewees classified c-level complications within a large-scale agile transformation project as high threat to the project. Automotive Co. A and Retail Co. faced changes in c-level, whilst Tech Co. and Automotive Co. B faced complications during their transformation due to c-level behavior. Both sub-categories of c-level complications pose a high threat on such transformation projects because management plays a leading role during the transformation, with their behavior also impacting their employees and the general mindset of the transformation. Changes and negative behavior towards the transformation can therefore impact its success negatively. Since almost all situations were critical most companies also experienced high time pressure in responding to the situation. Table 5.8 provides an overview of the described classification according to Burnett et. al. [27] dimensions and the investigated companies within the cluster.

<table>
<thead>
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<tr>
<td>Threat level</td>
<td>high (I3, I4, I7, I9, I12), medium (I11)</td>
</tr>
<tr>
<td>Time pressure</td>
<td>high (I4, I7, I11, I12), medium (I3, I9)</td>
</tr>
<tr>
<td>Response options</td>
<td>training (I9), communication (I3, I7), going back to traditional solutions (I4, I7), none (I11, I12)</td>
</tr>
<tr>
<td>Degree of control</td>
<td>high (I9); medium (I3, I7, I11, I12), low (I4)</td>
</tr>
</tbody>
</table>

Table 5.8 Classification of c-level complications

5.5.4. Classification of textbook approach complications

Stress situations identified in the cluster textbook approach complications described the missing adaption of an externally given transformation concept to the company specific needs. Two (I15, I16) interviewees described stress situations in this cluster.

Similar to the stress situation described by Retail Co. both interviewees from Tech Co. (I15, I16) also experienced the same stress situation and were able to provide insights from different angles. Tech Co. faced a stress situation during their large-scale agile transformation, as they lacked adaption of a textbook approach to the company specific
5.5. Classification of described stress situations

situation. Therefore, the company was not able to meet customer expectations. Both interviewees described the stress situation as high threat, which would have led to failure of the project if they continued without adapting the framework.

\[\ldots\] if you do not adapt you will fail, so the threat level was quite high, and we needed to do it fast. (I15)

Time pressure was perceived differently by both employees. While I15 stated that adapting quickly was important, I16 placed the learnings the company was able to take away from the stress situation before a timely solution. Both interviewees described that the company had no other option than adapting the framework to their needs, because continuing this model would have led to failure of the large-scale agile transformation. However, the interviewees described Tech Co.’s degree of control during the situation as medium (I15) and high (I16) because they were able to identify, and tackle the stress situation by stopping this working model and implementing a more adapted one. Overall, Tech Co. perceived the stress situation as eustress because employees were more motivated to create an own version of the framework and provide impact to the transformation.

I think it had only positive once, yes. So, people are believing that we are shaping our own framework, we are doing this together. So, this had like a really huge positive side effect on the motivation of the team. As I already mentioned, the customers were quite happy, so without those structural changes or changes it wouldn’t have been possible to deliver the way we delivered in the quality we delivered. So, it was a good investment. (I15)

Table 5.9 provides an overview of the described classification according to Burnett et. al. [27] dimensions and the investigated companies within the cluster.

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threat level</td>
<td>high (I15, I16)</td>
</tr>
<tr>
<td>Time pressure</td>
<td>high (I15), medium (I16)</td>
</tr>
<tr>
<td>Response options</td>
<td>none (I15, I16)</td>
</tr>
<tr>
<td>Degree of control</td>
<td>high (I16), medium (I15)</td>
</tr>
</tbody>
</table>

Table 5.9 Classification of textbook approach complications

5.5.5. Summary of classifications of stress situations

As a conclusion, this chapter provides an overall model (see figure 5.8) of all stress situation clusters allocated to Burnett’s et. al. [27] model. The model provides a possibility to visualize the established classification and compare different stress situation clusters according to their average severity for the large-scale agile transformation. C-level complications showed the highest average level of severity followed by transformation management complications, textbook approach complications, and role related complications. Concerning the classification of the stress situation according to positive or negative stress,
most interviewees described their experienced stress situation as distress (I4, I6, I7, I9, I12, I14). It should be noted that some interviewees showed a tendency towards interpreting the stress situation as eustress (I1, I2, I5, I15), because they tried to take away the positive aspects of the stress situation, even if the overall impact of the stress situation was mostly negative for the company.

<table>
<thead>
<tr>
<th>Threat level</th>
<th>Time pressure</th>
<th>Intense</th>
<th>Minimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Many</td>
<td></td>
<td>Role-related complications</td>
</tr>
<tr>
<td></td>
<td>Few</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>Many</td>
<td>Transformation management complications</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Few</td>
<td>C-level complications</td>
<td>Textbook approach complications</td>
</tr>
</tbody>
</table>

Figure 5.8 Classification of clusters of stress situations

5.6. Analysis of consequences of described stress situations

The impact of stress situations on an organization undergoing large-scale agile transformation is determined through perceived consequences on four dimensions. STS theory (see chapter 3.2.1) serves as a conducive concept to evaluate consequences of stress situations in different organizational dimensions. This section analyzed the impact of such stress situations by means of four dimensions: people, work structures, technology, organizational structures. Furthermore, it allocated observed consequences of stress situations to the appropriate socio-technical dimensions. Based on the mapping of actions and challenges to the abstract dimensions of STS theory, this thesis captured their interplay, as well as the more abstract co-evolution of the social and technical subsystem [14]. Therefore, this section was able to place generalized statements about stress situations during large-scale agile transformations [14]. The single dimensions were adapted slightly in order to fit the purpose of this study, and to align to the flow of the interviews. The technical subsystem was adapted to describe the reorganization of processes within the agile team setup, which also ultimately leads to value creation for the companies’ customers, however this was not the focus point of the dimension, as applied in this study.

5.6.1. Consequences of transformation management complications

Stress situations identified in the cluster transformation management complications showed consequences along the dimensions described by the STS model (see chapter 2.2.3). Five (I1, I8, I10, I13, I14) interviewees described stress situations in this cluster.

Automotive Co. A (I1) faced complications in product definition at the beginning of their transformation. Although the stress situation impacted the transformation at the beginning,
the interviewed transformation agent was able to resolve the situation quickly, which led to no changes along the dimensions of the underlying STS model.

Automotive Co. B (I10) faced a control problem, as with the implementation of the large-scale agile transformation, the former information flow was broken and the company had not re-established a new information flow that was adjusted to the new working mode. In the social sub-system, the stress situation caused frustration amongst employees, which resulted in new ways of interaction within teams to cope with the stress situation. In the technical sub-system, Automotive Co. B implemented new roles in order to cope with the missing information flow.

Insurance Co. (I13) faced issues in the wide-ranging communication approach as a stress situation during the large-scale agile transformation. Not every involved employee could be reached to provide a broad understanding and acceptance for the transformation at the beginning of the transformation. In the social sub-system, this resulted in more communication amongst employees and between management and employees through new ways of interaction and communication. Since the problem in this transformation was set within the communication strategy, a consequently higher focus on communication from the employee side helped to further evolve the project.

[…] there’s either the situation that people come to us and say hey I want to be involved in this as well, it sounds cool I want to be part of it, or what happened as well, not in so many cases, but in a few cases that people came to us and share their thoughts about what they are afraid of or what’s situations they didn’t understand, for example things like, we now have a new work initiative where you are allowed to work at home and do远程 work, and they ask us questions like how does this fit together with your co-location approach, where everyone has to sit in the same room, it’s not really fitting together, those things. These are convinced that we could learn from, and then either sharpen our communication or actually change something at the approach. (I13)

Furthermore, the stress situation led to no consequent changes in the technical sub-system since the company focused on the people-side throughout this people driven stress situation (see chapter 5.4.1).

Insurance Co. (I14) faced another stress situation during an earlier transformation project, as complications in team coordination between agile and non-agile teams arose. Ultimately this stress situation led to failure of the first attempt of a large-scale agile transformation because customer expectations could not be met. One of the learnings of this project was, that having one vision is crucial for the interaction of teams. Therefore, consequences for the social subsystem were the empowerment of employees and uniting teams in order to create one vision, which required new ways of interaction in an agile team setup. In order to help this process, Insurance Co. implemented new technologies for agile communication and interaction, such as Jira, Confluence and Slack. Furthermore, the interviewee was able to provide interesting insights in the consequences that arose on a process level and team
setup. He described that higher transparency caused by agile working models can be demanding for employees, who have not worked in this way before.

You need to have focus, you need to make sure that if you commit to something that you really get it done or that you seek help if you can’t get it done in time. You need to be open about what you are doing at this point in time. Dailies only make sense if everyone tells exactly what he has done yesterday and what he is going to do today. Given our body of colleagues, specifically people, who are more or less satisfied with working in an office and doing what they are told and if they are not told anything they are also happy not doing anything. In the agile setting those people tend to cause problems for the whole team. Usually new teams that are told that they are strategically very important tend to develop the self-expectation to overachieve, and then when they have such a colleague it doesn’t work out in the team. And this is a problem of the team because the colleague is not actually required to overachieve if he doesn’t want to. And I think that this is something that will level out over time if everyone is working in agile teams. I think every team will have the usual distribution of highly motivated colleagues, colleagues that are doing their job, colleagues that are a little slower and everything will fit together.

Figure 5.9 provides an overview of the described classification according to the dimensions of the STS model in a simplified visual representation. Overall, transformation management complications caused a strong impact on inter- and intra-team interaction, as this was the response to missing structure and coordination on a team level. A stronger focus is therefore set on the social sub-system, rather than the technical sub-system for consequences of this stress situation cluster.

![Figure 5.9 Consequences of transformation management complications](image)

**5.6.2. Consequences of Role Related Complications**

Stress situations identified in the cluster role related complications showed consequences along the dimensions described by the STS model (see chapter 2.2.3). Three (I2, I5, I6) interviewees described stress situations in this cluster.

**Automotive Co. A (I2)** experienced uncertainties concerning new roles during their large-scale agile transformation. As described earlier, involved employees consequently experienced confusion towards their roles, and also changed responsibilities on a team level.
5.6. Analysis of consequences of described stress situations

However, the interviewee described that this stress situation opened new ways of interaction.

[...] the felt urge to understand and to get this system running and to decrease the stress level from everybody that is just coming from uncertainty, I think drives in a way the openness to adopt new ways of interaction and to interconnect with others. (I2)

Furthermore, on the work structure dimension, the stress situation also fostered lean decision making within the teams for pragmatic reasons. In the technical sub-system Automotive Co. A faced consequences through process reorganization, which came naturally with the changes in roles, both originating from general changes through agile roles and changes because roles were unclear at the start.

Automotive Co. A (I5) faced further role related complications during a large-scale agile transformation of another department. At the beginning of the transformation, confusion and frustration was caused by management implementing roles, which did not fit the company culture and skills, but were necessary for the transformation. The affected employees ignored the situation at the beginning, as they thought the change in roles was just by definition and would not affect their daily business, however when they realized the scope and impact of changes they initially were confused and frustrated. In the technical sub-system, Automotive Co. A realized changes due to the stress situation because roles with leading responsibilities could not handle the defined scope of their new role. Therefore, Automotive Co. A implemented an additional management layer in order to relieve the process and ensure continuous performance.

Tech Co. A (I6) faced unclear expectations of new roles and within their large-scale agile transformation. In the social sub-system, this stress situation caused frustration amongst employees because product owners and scrum masters could not act true to their role, delivering what was expected from them at the right point in time, which also affected the team. Therefore, some teams were rearranged, however overall, this was not a common consequence of the stress situation. The stress situation led to no consequent changes in the technical sub-system.

Figure 5.10 provides an overview of the described classification according to the dimensions of the STS model in a simplified visual representation. The strongest consequences due to the stress situation were identified in the people dimension, as the stress situation mainly affects people related topics. A stronger focus is therefore set on the social sub-system, rather than the technical sub-system for consequences of this stress situation cluster.
5. Results

5.6.3. Consequences of c-level complications

Stress situations identified in the cluster c-level complications show consequences along the dimensions described by the STS model (see chapter 2.2.3). Six (I3, I4, I7, I9, I11, I12) interviewees described stress situations in this cluster.

Automotive Co. A (I3) faced a stress situation as the CIO of the IT department changed, causing stress for the ongoing large-scale agile transformation. Additionally, the new CIO followed a different, more traditional transformation strategy, which posed further stress on the project and slowed it down. However, at the time of the interview the stress situation through the change of the CIO had only just occurred, which is why the interviewee was not able to provide detailed insight on its consequences.

Automotive Co. A (I4) faced another CIO change in a manufacturing department. The CIO change itself caused stress, and additionally the new CIO followed a traditional strategy, deconstructing parts of the already established agile working model. Consequently, involved employees also lost trust in the transformation and they were less motivated to participate in the project. Furthermore, in the social sub-system work structures were reorganized according to classical project management structures, as agile models were no longer supported by the c-level. In the technical sub-system, the stress situation the interviewee described did not have consequences. Automotive Co. A is still using Jira and Confluence however, only because once such systems are implemented it is hard and costly to change them again. However, the interviewee described that they could be used more

Tech Co. A (I7) experienced fear of failure on the c-level during their large-scale agile transformation due to cultural reasons within the company, which do not allow for failure. Consequences in the social sub-system showed that even though some people were willing to support the transformation, many management positions lost the motivation to undergo such a transformation due to the described fear of failure. Consequently, people also resorted to classical project management practices, as they were perceived to provide a safe and already approved option. As the stress situation mostly affected people on a personal level, no consequences for the technical subsystem were identified.
Automotive Co. B (I9) faced a stress situation where especially middle management positions showed resistance towards the transformation during the first half of the process, endangering its success. In the social sub-system, the interviewee described confusion within the people dimension. Due to the resistance of middle management positions, employees did not receive information concerning the project, because it was actively kept away from them. As they did not get management information and support, they experienced confusion towards the transformation. Furthermore, work structures were reorganized due to the stress situation. As blocking middle managers left the project, teams were reorganized to work in an efficient way in agile teams to support the agile transformation. In the technical sub-system Automotive Co. B started to use Jira in order to help teams that are struggling to find the purpose of the transformation. Due to the stress situation, several teams were only able to start developing an agile team setup later in the project.

Retail Co. (I11, I12) faced multiple CTO changes throughout their large-scale agile transformation, which negatively impacted the transformation’s success. These c-level changes cost the transformation time, trust, and employee buy-in. Interviewee I11 empathized the consequences of the change itself, while I12 focused on consequences of the strategy change caused by the CTO change. Consequences in the people dimension, as described by I11 were lower motivation and confusion.

If the guys, who are telling you to change suddenly leave the company it is like what am I doing here. They promise me everything and then the work is done and they leave. So, it is like oh it was just a job and it is not that they meant it by heart. So, people always need trust and reliability and psychological safety to feel comfortable and to contribute and maybe to somehow leave their comfort zone. If you have to leave the comfort zone, you have to understand why, and there has to be someone you trust, so you say ok maybe I do not understand this but I know this guy and he never told bullshit and I follow him. And then if this guy is leaving or several guys are leaving then it is like ok I left my comfort zone and everything they told me seems like bullshit so what am I doing here. And then you don’t trust the new one, you don’t feel safe, you would like to recreate your comfort zone but it is not there anymore and this is a very bad situation. (I11)

Furthermore, in the social sub-system work structures faced consequences, as the second CTO introduced a new leadership team, which was less transparent about decisions for example about the backlog (I11). In the technical sub-system, the change of the CTO did not cause major changes in technology, even though he tried to because he had connections to technology companies he wanted to involve in the transformation. However, Retail Co.’s technology blueprint stayed stable because many technologies had already been in place. Organizational processes changed slightly due to small changes in roles, team responsibilities and tasks, however the interviewee described that this consequence was about rebalancing between the roles, rather than completely defining a new organization.
5. Results

Consequences of the stress situation on a people level, as described by I12 were also lower motivation and frustration due to mistrust and confusion amongst employees. Because the second CTO was an English native the company language was switched from German to English. The language switch was also part of the second CTO’s aim to internationalize the company, which fostered the communication between countries successfully. However, it caused frustration for some employees, because they could not understand the contents of meetings anymore and felt left behind.

Because we started having townhall meetings in English and some people didn’t get anything from it. Some people were left completely behind, some people left the room because they said I don’t understand any word what is happening here. That was the first culture shock and it wasn’t really pushed like a change process, it was just change and people had to follow. (I12)

The culture clash caused a lot of frustration for people, and therefore many left the company quickly. The interviewee described that a further consequence was therefore knowledge loss in the teams, because as people left quickly, knowledge was oftentimes not transferred. Furthermore, in the social sub-system, interviewee I12 positively described that through the new strategy of the second CTO the company was able to break up silos that existed between the teams and create a better interaction.

Because now it is obvious that we have dependencies, which is not the best thing because in a perfect agile world you would not have dependencies between product teams but we learned that we need to collaborate and we need to really work on eye level as well not in a manager hierarchical way. (I12)

In the technical subsystem consequences in technologies were an increased use of data driven technologies due to the strategy change. Furthermore, organizational structures faced consequences because of the change of several role descriptions. Some employees felt like their value on the market decreased because they received a lower role description.

[…] because of the role change some people became junior in a role. So, we have some senior managers or managers, who are now agile coaches, not senior coaches. (I12)

Figure 5.11 provides an overview of the described classification according to the dimensions of the STS model in a simplified visual representation. Employee motivation suffered noticeable negative consequence due to c-level complications, which was mostly due to a consequent lack of trust towards the transformation. The strongest consequences due to the stress situation were identified in the people dimension, even though c-level complications imply consequences for all areas of an organization. Furthermore, c-level complications often showed consequent changes in structure and project organization. Overall, a strong focus is therefore set on the social sub-system, rather than the technical sub-system for consequences of this stress situation cluster.
5.6. Analysis of consequences of described stress situations

Figure 5.11 Consequences of c-level complications

5.6.4. Consequences of textbook approach complications

Stress situations identified in the cluster textbook approach complications show consequences along the dimensions described by the STS model (see chapter 2.2.3). Two (I15, I16) interviewees, who were part of the large-scale agile transformation at Tech Co. B described stress situations in this cluster. Stress situations identified in the textbook approach complications describe the missing adaption of a given transformation concept to the company specific needs. Interviewee I15 focused on consequences that were taken to cope with the stress situation, while interviewee I16 had a strong focus on the reorganization during the stress situation.

Interviewee I15 described that employees were uncertain towards the transformation because of the stress situation. Thus, communication was fostered. Management therefore implemented changes to the work structures, providing regular communication formats in order to continuously inform teams. In the technical sub-system, Tech Co. B implemented tools to optimize code reviews to counteract inefficiencies they were facing during the stress situation.

Interviewee I16 described that employees were empowered through the stress situation. On the one hand they were given the possibility to test out the textbook approach, on the other hand they received more freedom when they reorganized and adapted the approach to their specific needs. After changing from the textbook approach to an individual approach, employees received time for self-development, as they were able to finish projects more quickly. During the stress situation Tech Co. B implemented changes for their work structures in order to secure the business. They changed the structure, introducing a different hierarchy model. In this case backlog periodization and sprint planning were not done by the teams anymore, but responsibility was given to the product owner. The product owner was then also the main face to the customer. Furthermore, they introduced a company specific role called process consultant, who was responsible for technical details within the project and the face to the customer in this matter. In the technical sub-system,
5. Results

Tech Co. B focused on only developing products that provide business value and ultimately bring value to the customer.

*We have only one criterion where we are matching everything. This one point, which is the most important and this is a business value. We don’t look at all the other stuff we just only look in whatever we are doing what is a business value out of it. If there is no business value, we don’t discuss topics anymore.* (I16)

This mindset also affected the use of technologies. Due to experiences Tech Co. B made during the stress situation, they now only implement technologies if they provide business value, not for the sake of implementing a new technology.

Figure 5.12 provides an overview of the described classification according to the dimensions of the STS model in a simplified visual representation. Tech Co. B faced strong consequences in the social sub-system due to structural changes, however they also faced strong consequences in the technical sub-system unlike other described clusters. Consequences in the technical subsystem mainly stem from Tech Co. B’s vision to evaluate the business value for every decision.

![Figure 5.12 Consequences of textbook approach complications](image)

### 5.6.5. Summary of consequences of stress situations

Consequences were analyzed according to the four dimensions of STS, which were slightly adapted to fit the context of this study, and the empathize interviewees made on their specific stress situations. Overall, every stress situation cluster showed stronger consequences in the social sub-system, compared to the technical sub-system. Consequences in the social sub-system were mainly based on loss of motivation in employees and measures to improve communication and collaboration between employees and teams. Consequences in the technical sub-system mainly focused on enforcing improvements needed in the social sub-system through incorporating new tools for communication and tools and technologies to support the business processes of the company.

Consequences on the people dimension comprised of more communication (I13, I15), lower motivation (I4, I7 I11, I12), confusion (I2, I5, I9, I11, I15), frustration (I5, I6, I12, I10),
5.7. Outlook for resolving stress situations

Describing solutions to stress situations was not part of the intended research scope of this study. Furthermore, not all investigated transformations had already finished crucial milestones, and not all of the investigated large-scale agile transformations were successful. However, the conducted multiple case study revealed interesting coping mechanisms, and learnings from experienced stress situations. Therefore, the following section describes insights towards resolving described stress situations based on two constructs, coping mechanisms and learnings resulting from stress situations during large-scale agile transformations.

The main themes described for coping with the stress situation were, sorted by importance: communication, coaching/training, exchanging roles if personal or role related problems were not possible to solve, and developing a clear vision. Communication was the measure, which was addressed most by several companies in order to cope with the experienced stress situation (I1, I2, I5, I6, I7, I9, I10, I14, I15). The companies mostly used communication in order to understand stress, which they were facing (I1, I2, I5, I6, I10), or in order to convince involved actors and resolve problems they already had established solutions to (I3, I7, I9, I14, I15). Four companies (I3, I5, I12, I14) identified implementing trainings as an important coping mechanism, as it helps employees to get involved in the transformation and understand the meaning behind it. A few companies required to exchanging roles because personal or role related problems were not possible to solve (I4, I7, I9, I11). Such mechanisms are oftentimes needed to cope with resistance issues on the middle management level.

In my opinion in most change programs, if you don’t change the middle management, they officially say yes I am part of the change, but in-officially they exactly understand that if the transformation is in place they have no reason to be here any longer, so they are working against it. In our case everyone was kicked out. (I11)

Developing a clear vision is a measure, which ties in with communication measures. Two companies (I12, I16) identified the development of a clear vision as a crucial measure to cope with stress situations as it provides a clear guideline for the transformation and employees...
5. Results

to follow. Providing a clear vision is also a common and important measure established by change management (see chapter 2.3).

Furthermore, described learnings varied according to the respective stress situation. Most of the learnings included counter measures or avoiding certain stress factors that occurred during the stress situation. A common theme however, which was not necessarily always mentioned during the interview section outlook/solution, but rather mentioned as a general takeaway, was the importance of establishing an agile mindset within the company. Several interviewees described that whilst methods were already implemented in their company the general mindset had not changed. It is easier to understand the practices and execute them, than to understand why practices have changed and what the value behind it is (I3, I6, I10).

[…] we are not doing agile for the sake of agility, but because we have a certain demand. (I15)

Therefore, mindset is also often described as the most important part of the transformation (I4, I5, I6). However, the process of becoming agile and having an agile mindset requires effort.

I think you’re not born agile, but you can learn, if you’re open, you can learn a lot about a new way of thinking and this is I think the biggest kind of thing you have to be open. If you’re narrow minded, if you’re close and you think everything is going to fall into place like it used to the last twenty years you will fail, that is for sure. (I5)

This also transfers to leadership in an agile environment (I5). High positions oftentimes have to put their position and pride aside to work for what is best for the team and the final value output (I5).

[…] new times request, I guess new ways of thinking, new roles. Bravery in a way. (I5)

Since the mindset portrayed by management oftentimes also affects the team level, management support is crucial (I4, I7), however it is not the sole factor for successful company mindset. Involved employees also need to take ownership in order to push the agile transformation (I11).
5.7. Outlook for resolving stress situations
6. Discussion

This part of the thesis discusses the results, which were explained in the last chapter, with regard to previous research. Furthermore, it summarizes key implications for both, researchers and practitioners. Finally, it shows the limitations of this study and introduces suggestions for future research based on the findings and limitations of this thesis.

6.1. Key findings

This study showed that, though it is important to regard every stress situation individually, they also share similarities between them. The broad view over sixteen inspected stress situations during large-scale agile transformations enabled this thesis to provide generalizable results for both, scientific conversation and companies undergoing such change. The major contribution of this thesis is the development, and detailed description of stress situations in the four clusters, transformation management complications, role complications, c-level complications, and textbook approach complications. In the following, this section presents key findings according to the formulated research questions. Focus points of this work and according research questions were the identification of reasons for organizations to undergo large-scale agile transformations, the identification of stress situations during such transformations, and the in-depth description and analysis of identified stress situations. This section describes and summarizes key findings of this thesis and sets them into context of existent related work.

Reasons for organizations to undergo large-scale agile transformations

Based on previous publications in the field of agile and large-scale agile transformations, this thesis was able to derive the following motivators for established organizations to undergo large-scale agile transformations. Categories, which were established through the presented literature review (see chapter 3.1) include:

- Ability to handle change: time-to-market, reaction time to requirement changes
- High customer satisfaction through higher product quality
- Team empowerment and coordination
- Process efficiency and cost reduction
- Managing complexity

These categories serve as a basis to validate findings on established organizations’ motivations to undergo large-scale agile transformations, as identified during the multiple
6.1. Key findings

Case study. Findings derived from presented multiple case study align with the categories previously described by literature review. First, this thesis was able to identify several goals for large-scale agile transformations, which were based on the interviewees’ expectations of agility and the organization’s internal vision and ideas. Furthermore, this thesis identified several triggers for adopting agility, which were mainly caused by market requirements and competition. Categories of identified goals show great similarity to findings in previous literature, identified triggers add a new perspective, which has not been evaluated to a large extend by previous literature. As findings of this multiple case study were similar to the categories found in previous work, insights from this thesis are of general validity to a certain extend. Similar categories of goals are displayed in the same order in both descriptions. However, it should be noted, that both, categories found in related work and categories established through this multiple case study were interpreted by the same researcher. Table 6.1 provides an overview of findings from the multiple case study.

<table>
<thead>
<tr>
<th>Goals for adapting agility in established organizations</th>
<th>Triggers</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Time to market (I1, I2, I3, I4, I5, I6, I7, I8, I10, I11, I12, I13, I16)</td>
<td></td>
</tr>
<tr>
<td>• Customer centricity (I2, I4, I5, I9, I10, I12, I13, I14)</td>
<td></td>
</tr>
<tr>
<td>• Organizational benefits (I3, I5, I10, I11, I14, I15)</td>
<td></td>
</tr>
<tr>
<td>• Efficiency (I2, I3, I6, I11, I12, I14, I16)</td>
<td></td>
</tr>
<tr>
<td>• Handling Complexity (I5, I6, I7, I11, I15)</td>
<td></td>
</tr>
<tr>
<td>• Competition (I1, I4, I5, I7, I9, I10, I11, I12, I13, I14)</td>
<td></td>
</tr>
<tr>
<td>• Clear responsibilities (I2, I11)</td>
<td></td>
</tr>
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Table 6.1 Overview of identified goals & triggers for large-scale agile transformations

Clusters of stress situations during large-scale agile transformations

To the best knowledge of this work, to this day, no studies exist that investigate large-scale agile transformations based on stress situations and an underlying stress model with focus on in-depth analysis. Stress situations identified in this thesis share similarities and therefore can be clustered along four dimensions. This thesis identified four clusters of stress situations based on insights from sixteen expert interviews in six different companies. Clusters of stress situations developed in this thesis are: transformation management complications, role complications, c-level complications, and textbook approach complications. Former research supports the general themes in these clusters. Especially Dikert et al. [20] and Dingsøyr et. al. [34] had previously described similar challenges through a comprehensive literature review. However, to the best knowledge at the point of time this thesis was written, no other work exists which describes stress situations during large-scale agile transformations in detailed clusters. Therefore, this thesis is able to extend existing literature by providing four clusters of stress situations and their detailed description along the dimensions origin, classification and consequences. In doing so, this thesis addressed a research gap mentioned by Fuchs et. al. [14], who stated a lack of research
on, whether issues exist that completely block the transformation process or lead to its termination.

The cluster transformation management complications commonly described problems known from project management and aspects of change management (see chapter 2.3). Common themes identified by this thesis were missing project planning (I1), issues in mindset (I8), lack of dedicated time for the transformation (I8), communication (I8, I10, I13,) and collaboration (I14). The described projects lacked aspects in different areas of change management, most commonly in communication. Change management offers concepts for project planning that include these themes, e.g. the eight steps of change management by Kotter [46]. Furthermore, previous literature on large-scale agile transformations identified similar situations in coordination of challenges in a multi team environment [14], [20], [52], including the collaboration between agile and non-agile teams [14], [21], [60], and communication issues [65]. Therefore, this thesis identified results that align with previous findings, and extends the range of identified issues in the project management area.

The cluster role related complications commonly described issues in the understanding and acceptance of new roles during large-scale agile transformations (I2, I5, I6). Several employees of different levels experienced stress due to changes in their responsibilities. Previous literature on large-scale agile transformations identified similar challenges in the understanding of roles [22], [58] and definition of new roles especially on management level [20], [21]. This study’s findings especially align with Gerster et. al. [21]. They described that adopting agile practices impacts job profiles as not only different skills are required but also new jobs are created. Results of this thesis align with these findings, as Automotive Co. A (I2, I5) also faced confusion and frustration because management implemented roles, which did not fit the company culture and skills, but were necessary for the transformation.

The cluster c-level complications was able to identify two types of c-level related stress. On the one hand a change within the c-level can cause stress situations because it inflicts uncertainty towards the further progress of the transformation and oftentimes also implies a change in strategy and mindset within the large-scale agile transformation. Changes on c-level can also lead to loss of trust from involved employees, because the manager, who formerly led the transformation no longer acts as a motivator or leader, but rather as a negative figure since he no longer supports the project himself. On the other hand, resistance from the c-level, which can occur in combination with a c-level change or without, can cause stress situations for the transformation because the process can lose credibility. Furthermore, the c-level behavior toward the transformation can transfer to the involved employees. Change resistance also was a common theme in previous literature. Several researchers identified similar challenges [4], [52], [60]. Previous literature on large-scale agile transformations identified similar situations in change resistance, including the challenges general resistance to change, skepticism towards the new way of working, top down mandate created resistance, unwillingness to change on management level [20]. The categorization of c-level complications into two types, comprising of on the one hand uncertainty due to c-level change, and on the other hand problematic c-level behavior, which

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is split up into c-level resistance and the influencing behavior on employees, provides a new viewpoint for research and practice.

The cluster textbook approach complications identified stress related to the missing adaption of a textbook approach to the company specific situation. This cluster aligns with findings in previous literature concerning challenges in misunderstanding of agile concepts, lack of guidance from literature and poorly customized agile approaches [20]. The company specific view on this problem provides a new perspective in the scientific conversation.

Overall, it should be noted, that similar challenges to the stress situations described and clustered in this study, have been identified by previous literature. However, stress situations in this study can contribute further insights based on their unique characteristics and add to the set of investigated companies in the field. Furthermore, previous challenges were usually not described in comparable depth. Furthermore, previous challenges were usually not described in comparable depth and along the structure of a stress model [40].

In depth description of stress situations during large-scale agile transformations
This thesis described every cluster of stress situations and respective single stress situations in depth. In order to achieve an in-depth view on investigated stress situations, this study used an overarching model of stress by Branson [40], and included additional models aligned along the dimensions of the stress model. Therefore, this study used a model by Mitroff et. al. [26] in order to gain a deeper understanding on stressors, a model by Burnett et. al. [27] in order to gain a deeper understanding of organizational stress responses, furthermore, in order to gain a deeper understanding of organizational stress outcomes, this study uses socio-technical systems theory (STS). Origins of the stress situation, also called stressors varied between different stress situations. The categorization of different stressors was based on a model by Mitroff et. al. [26] to ensure a structured and comprehensible procedure. It should be noted, that most stressors were of internal, and organizational nature, which means that the origin of most of the defined stress situations lies within the transformation and management thereof. Internal stressors included: communication and collaboration, management, and agile mindset. External stressors included: political events, secondly shareholder pressure, and external guidelines. The classification of clusters of stress situations according to their severity was based on Burnett et. al. [27]. C-level complications showed the highest level of severity followed by transformation management complications, textbook approach complications, and role related complications. Concerning the classification of the stress situation according to positive or negative stress, most interviewees described their experienced stress situation as distress. It should be noted that some interviewees showed a tendency towards interpreting the stress situation as eustress, because they tried to take away the positive aspects of the stress situation, even if the overall impact of the stress situation was mostly negative for the company. Furthermore, this thesis analyzed the impact of stress situations during large-scale agile transformations according to dimensions of STS theory (see chapter 2.2.3). Stress situations during large-scale agile transformations show a strong impact and consequences on the whole company. Overall, every stress situation cluster showed stronger consequences in the social sub-system, compared to the technical sub-system. Consequences in the social sub-system were
mainly based on loss of motivation on team- and c-level, and measures to improve communication. These findings align with previous literature in the field as adopting agility in an established organization was found to have far-reaching implications on a company’s work system, i.e., actors, structures, technologies, and tasks [21]. Previous findings also showed a strong empathies on the social sub-system of organizations during such transformations, as people and work structures make up a crucial part of the transformation [61], [63]. Paasivara et. al. [15] similarly described that agile development is not founded on the use of individual tools or practices, but rather on a holistic way of thinking. Therefore, adopting agile often requires change of the entire organizational culture [4], [15]. Holistic change and consequences were also found in this study, as stress situations had far reaching impacts on several dimensions of the company. Results of this study align with, as well as extend previous research, as they provide an in-depth view on origins, classification and consequences of stress situations, rather than a sole description of challenges and their consequences.

**A key factor for successful large-scale agile transformations is mindset change**

Throughout the analysis of the multiple case study one construct was mentioned repeatedly by different interviewees, besides the general concepts investigated in this thesis. Many interviewees mentioned experiences with agile values and agile mindset even if there were no explicit questions asked in that direction. Similar to excising research in the field, this thesis found a strong focus of companies towards agile principles and mindset in general. In previous work, Paasivaara [4], [15] found that introducing agile development means changing the culture and mindset based on insights from several agile projects around the world. Furthermore, several researchers found that the lack of an agile mindset or at least openness towards it can be damaging to agile transformations [14], [65]. Several interviewees described that whilst methods were already implemented in their company the general mindset had not changed. It is easier to understand the practices and execute them, than to understand why practices have changed and what the value behind it is (I3, I6, I10). Therefore, mindset is also often described as the most important part of the transformation (I4, I5, I6). However, the process of becoming agile and having an agile mindset requires effort (I5). This also transfers to leadership in an agile environment (I5). High positions oftentimes have to put their position and pride aside to work for what is best for the team and the final value output (I5). Since the mindset portrayed by management oftentimes also affects the team level, management support is crucial (I4, I7), however it is not the sole factor of successful company mindset. Involved employees also need to take ownership in order to push the agile transformation (I11). These insights on the importance of establishing and maintaining an agile mindset align with previous work, mainly by Paasivaara [4], [15]. Findings also extend research in the field by empathizing the interplay of c-level and employee mindset.

**6.2. Implications for theory and practice**

This paper provides implications to theory and practice. On a theoretical level the primary contribution is the investigation of a new field and the derived clusters of stress situations
6.3. Limitations

This thesis underlies limitations, which should be considered when drawing conclusions from the presented results. The most important limitations of this study are explained in the further course of this chapter along the suggested scheme of threats to validity by Runeson and Höst [32]. The scheme distinguished between four aspects of validity, which are explained in context of this thesis in the following.

Construct validity: This aspect of validity reflects to what extent the investigated subjects represent what the research intends and what is investigated according to the research questions. This thesis took counter measures to improve construct validity by interviewing multiple companies and interviewing multiple roles for each studied organization. However, threats to construct validity exist in this study, as only one researcher analyzed the results of the case study, which leaves the possible threat that constructs discussed in the interview questions are not interpreted in the same way by the researcher and the interviewed persons or different researchers.

Internal validity: This aspect of validity is of concern when causal relations are examined. When the researcher is investigating whether one factor affects an investigated factor there is a risk that the investigated factor is also affected by a third factor. However, threats to internal validity do not need to be discussed for this thesis, as the research was neither explanatory nor causal.

External validity: This aspect of validity describes to what extent findings of the case study are generalizable, and to what extent the findings are of interest to other people outside the investigated case. Case studies intend to enable analytical generalization where the results are extended to cases, which have common characteristics and hence, for which the findings are relevant. As this thesis investigated sixteen stress situations in six different organizations undergoing large-scale agile transformations, generalizable implications are profound, however not holistic.

Reliability: This aspect describes the extent the data and the analysis are dependent on the specific researchers. This thesis took several counter measures to minimize threats to reliability. This study established and consistently uses a case study protocol, which defined the process of data collection and provided a guideline of its later analysis. Furthermore, audio recordings for every interview were saved, interviewers took notes on important observations during the interviews, and all interviews were fully transcribed for later analysis.
6. Discussion
7. Conclusion and outlook

The final chapter of this thesis provides a summary based on investigated research questions and presents an outlook for further work.

7.1. Summary

The following section summarizes answers developed in this thesis to the research questions presented in section 1.2.

Encouraged by the increasing adoption of large-scale agile principles and methodologies in organizations, the goal of this thesis was (1) to identify reasons for large organizations to undergo agile transformations (2) to identify stress situations organizations undergo during large-scale agile transformations (3) to describe origins of stress situations in large-scale agile transformations (4) to classify stress situations in large-scale agile transformations (5) to describe the impact of stress situations within a large-scale agile transformations for organizations. By examining sixteen stress situations during large-scale agile transformations in six different companies, this thesis contributes to both, research and practice. To answer the first research question, this work used a mixed approach. First, this work conducted a short literature review in order to identify reasons for organizations to undergo large-scale agile transformations, which set the basis for the understanding and interpretation of late results from the multiple case study. In the following interviews this thesis identified several reasons for investigated organizations to undergo large-scale agile transformations. These categories of goals aligned with the ones found in literature and comprise of: time to market, customer centricity, organizational benefits, efficiency, and handling complexity. Furthermore, this thesis identified several triggers, which push organizations to undergo large-scale agile transformations: competition, clear responsibilities, and legislation. In order to answer the second research question, this thesis assigned insights on stress situations gained from the conducted interviews to four clusters. The clusters were defined according to similarities in their characteristics and comprise of: transformation management complications, role complications, c-level complications, and textbook approach complications. To answer the third research question, the interviewees were asked to describe and elaborate the origin of their stress situation. Most identified stressors were of internal, and organizational nature, which means that the origin of most of the defined stress situations lies within the transformation and management thereof. Internal stressors included: communication and collaboration, management, and agile mindset. External stressors included: political events, shareholder pressure and the use of
7. Conclusion and outlook

external guidelines. To answer the fourth research question, this thesis drew upon questions to classify the severity of stress situations in large-scale agile transformations. C-level complications showed the highest level of severity followed by transformation management complications, textbook approach complications, and role related complications. To answer the fifth research question, this thesis used the structure provided by STS theory (see chapter 2.2.3). Overall, the investigated stress situations showed stronger consequences in the social sub-system. Consequences in the social sub-system were mainly based on loss of motivation on team- and c-level, and measures to improve communication. Consequences in the technical sub-system were mainly based on supporting the transformation by providing tools to improve business value creation and internal communication.

7.2. Future work

The limited timeframe and scope of this master thesis leave possibilities for future research. A second iteration of interviews at a later point in time would be interesting in order to draw additional conclusions on further development and severity of identified stress situations. As described large-scale agile transformations and consequent stress situations were mostly still ongoing, it would be interesting to gain insights on the further progress and potential changes in origin, classification and consequences of the stress situations. Furthermore, it would be interesting to investigate whether different additional stress situations occurred in investigated transformation projects, and whether these stress situations align with described clusters.

Furthermore, adding more companies to the scope of the multiple case study could provide further valuable insights and enable a higher generalizability of results. Through the investigation of six different companies from different industry backgrounds, this thesis already set a broad basis. However, adding further companies to already investigated industries, and furthermore adding companies from different industries could provide a deeper understanding of the matter and increase generalizability.

This study already touched on possibilities to resolve the experienced stress situations, however further insights into the matter could provide a valuable guideline for research as well as practitioners on how to cope with or even resolve stress situations during large-scale agile transformations. As the described stress situations were mostly not resolved yet, a second iteration of this multiple case study could provide insights on the solution of these stress situations. Furthermore, investigating companies which have already started a large-scale agile transformation at an earlier point in time, and therefore made more progress could provide insights on this matter.
7.2. Future work
Bibliography


Bibliography


Bibliography


Appendix

Appendix 1: Interview Guideline

Following questions were used as a guideline during all interviews for this thesis.

1. General questions
   1.1 How many years have you been working in your current position?
   1.2 Could you name your current position and main responsibilities within your company?
   1.3 How many years of experience do you have with the topic of “Agility”?
   1.4 How would you rate your experience in the topic of “Agility”? [Scale of 5 – no experience, beginner, advanced, advanced/expert, expert]

2. Background questions
   2.1 Transformation background
      2.1.1 What do you understand by “large-scale agile transformation”?
      2.1.2 When did you start the large-scale agile transformation?
      2.1.3 What is/was the planned timeframe for implementing the large-scale agile transformation? Has the timetable been met / can it still be met?
      2.1.4 What goals are expected or were achieved by the large-scale agile transformation?
      2.1.5 What were/are the triggers/drivers that initiated the large-scale agile transformation?
      2.1.6 Which parts of the organization were/are affected by the large-scale agile transformation?
      2.1.7 Which general conditions were defined, or which prerequisites had to be met, before starting the large-scale agile transformation?
   2.2 Stress situation background
      2.2.1 What do you understand by “stress situations” in large-scale agile transformations?
      2.2.2 Which stress situation(s) did you identify during the large-scale agile transformation?
      2.2.3 How was stress identified or discovered?
      2.2.4 At which stage of the large-scale agile transformation was stress identified or discovered?
      2.2.5 How many people/ agile teams / departments were / are affected by the large-scale agile transformation?
Appendix

3. Origin
   3.1 Is the origin (stressor) of the stress situation internal or external?
   3.2 Could you please further elaborate the origin (stressor) of the stress situation?

4. Classification
   4.1 What was the threat level of the stress situation?
   4.2 Which response options did you have during the stress situation?
   4.3 What was the time pressure for the stress situation?
   4.4 How would you describe your degree of control within the stress situation?
   4.5 What was the impact of the stress situation in terms of costs, extent, etc. for the organization?
   4.6 How did you perceive the stress situation’s impact for the progress of the large-scale agile transformation?
      4.6.1 Did you notice benefits due to the stress situation for the progress of the large-scale agile transformation?
      4.6.2 Did you notice a negative impact due to the stress situation for the progress of the large-scale agile transformation?

5. Consequences
   5.1 What were the consequences of the stress situation for the organization?
      5.1.1 How did people respond?
      5.1.2 How did work structures change?
      5.1.3 How did the used technologies change?
      5.1.4 How did organizational structures change?

6. Solution
   6.1 How did you deal with the stress situation in the large-scale agile transformation?
      6.1.1 How did you cope with the stress situation?
      6.1.2 Did you learn from the stress situation?
   6.2 Could you further elaborate the actions which were taken?
      6.2.1 Were these actions short and/or long term?
      6.2.2 Were these actions proactive and/or reactive?
   6.3 Who was responsible and involved in the execution of the actions?
   6.4 Were your actions successful?

7. Feedback
   7.1 What are your expectations regarding our further analysis?
   7.2 Do you have any further comments or open points?