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Becoming Agile in the Digital Transformation: The Process of a Large-Scale Agile Transformation

Completed Research Paper

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Abstract

Confronted with the imperatives of a digital world, firms are striving to become agile, resulting in a large-scale agile transformation as part of their organizational digital transformation. Although initial research exists, empirical literature on the process, challenges, and actions of a large-scale agile transformation is scarce. Consequently, this paper conceptualizes the agile transformation process through the lens of socio-technical systems theory and employs a qualitative research approach comprising two in-depth case studies. As a result, a large-scale agile transformation can be interpreted as an episodic change process that comprises a sequence of multiple agile transformation phases. These phases include radical and incremental change and are delimited by barriers which are formed by emerging challenges. Such barriers are encountered by specific actions that serve scaling and coping purposes. Besides pertinent theoretical insights, the paper offers guidance for managers that direct an agile transformation in the wake of their firms' digital transformation.

Keywords: Digital transformation, large-scale agile transformation, agile transformation process, barriers of an agile transformation

Introduction

In an increasingly digital world, firms are confronted with a multitude of challenges such as volatile customer demands, increasing market dynamics, and the continuous emergence of novel advancements in information technology (IT) (Porter and Heppelmann 2015). As a result, firms are urged to undergo an *IT-enabled organizational business transformation* (Besson and Rowe 2012) that sparks changes for the entire firm and especially for aspects such as digital offerings, processes, and business models (Bharadwaj et al. 2013). To master their respective organizational digital transformation, firms are striving to become *agile* (Porter and Heppelmann 2015; Rogers 2016). One of the most popular options to foster the associated organizational agility and to address relevant issues of an organizational digital transformation (e.g., rapid and adaptive development of novel digital offerings) is to introduce *agile methods* (Bharadwaj et al. 2013; Lee and Xia 2010). In contrast to plan-based approaches, which entail detailed upfront planning and extensive documentation, agile methods, such as Scrum or eXtreme Programming, represent iterative development approaches that embrace quick deployment, responsiveness to change, and an emphasis on customer needs (Abrahamsson et al. 2009; Beck et al. 2001a; Beck et al. 2001b). In the digital era, agile methods are not only increasingly applied by firms outside the IT and software industry, but are also employed beyond the borders of their traditional application areas (i.e., IT-related projects and software development [SD]) in fields such as new product development (Bharadwaj et al. 2013; Rigby et al. 2016). These wider application areas often facilitate an overarching implementation of

agile methods within firms, resulting in the large-scale application of agile methods (Dikert et al. 2016). With agile methods entailing implications for work procedures, organizational structures, and cultures (Zheng et al. 2011), such extensive agile approaches often necessitate a *large-scale agile transformation* as part of the organizational digital transformation (Dikert et al. 2016; Paasivaara et al. 2018). However, the process of a large-scale agile transformation is not trivial and entails key managerial challenges and consequences for the entire firm. As a result, the *transformation process* characterized by the interplay of occurring challenges, related coping as well as scaling actions is of relevance for research and practice.

In existing empirical literature on the digital transformation of firms, aspects of agile methods are only referred to in terms of the changing role of the IT function (e.g., Jöhnk et al. 2017; Leonhardt et al. 2017). Current empirical literature on the large-scale application of agile methods discusses specific topics such as inter-team coordination in multi-team agile settings (e.g., Scheerer et al. 2014) or the challenges of realizing a large-scale agile transformation (e.g., Dikert et al. 2016). However, only a few pertinent articles on the process of large-scale agile transformations are available (e.g., Paasivaara et al. 2018) and a call for empirical research on this topic has been issued (Dikert et al. 2016; Paasivaara et al. 2018). A processual approach to study agile transformations appears particularly fruitful since such a viewpoint enables a profound understanding of "underlying organizational change processes" (Poole et al. 2000, p. 4) and thus fosters an in-depth grasp of the transformation itself. Therefore, we intend to answer the outlined call for research and discuss large-scale agile transformations in the current research context of the digital transformation. To achieve this, we investigate a large-scale agile transformation through a processual lens by capturing the interplay of challenges, coping, and scaling actions. We derive as research questions:

RQ1: How does the process of a large-scale agile transformation in the context of the digital transformation progress?

RQ2: How do challenges of a large-scale agile transformation as well as related coping and scaling actions shape the transformation process?

To answer these questions, we build on literature on large-scale agile transformations as well as related challenges and actions. We apply an explorative, qualitative-empirical approach by conducting two in-depth case studies of firms that currently undergo a large-scale agile transformation in the course of their digital transformation. To capture the change process, we employ socio-technical systems (STS) theory as a research lens and identify challenges and two types of actions (i.e., scaling and coping actions) as well as their interplay. We then compare the results in a cross-case analysis and develop an abstract explanation for a large-scale agile transformation from a processual viewpoint. We offer clarification on the *nature* of challenges and actions in such a transformation as well as their *role* in shaping the agile transformation process. In this way, we contribute to literature on large-scale agile transformations in the context of the digital transformation and provide guidance for firms to manage an agile transformation process.

Our paper is structured as follows: We begin with a discussion of relevant literature on large-scale agile transformations, related challenges and actions. We then propose our conceptual research lens building on STS theory. Next, we portray our qualitative case study approach, the selection as well as compilation of our sample and our data analysis approach. Afterwards, we present the results of the case studies and discuss these results as part of a cross-case analysis. We close our study with theoretical and practical implications as well as a conclusion including limitations and suggestions for areas of future research.

Literature Background

Large-Scale Agile Transformation

Research on the large-scale application of agile methods often entails a discussion about what "agile in the large" (Rolland et al. 2016, p. 2) means and how large-scale agile development can be conceptualized (Dingsøyr and Moe 2014). 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 usage of agile methods in large multi-team settings, and d) the employment of agile practices and principles in firms as a whole (Dingsøyr and Moe 2014). For this study, we focus on the last two options. In terms of definitions, we understand the large-scale application of agile methods on an organizational level with multi-team settings that consist of "50 or more people or at least six teams" (Dikert et al. 2016, p. 88). The second part in the term large-scale agile transformation, namely transformation, refers to the

switch from a different development approach or work organization concept to agile methods. A large-scale agile transformation can cover a one-time big bang transfer to agile methods in a large setting (e.g., switch in a firm's entire SD unit) or a stepwise approach where an agile pilot is subsequently scaled up into a large setting. Consequently, we understand the process of *scaling up* as the extension of an initial adoption of agile methods. This scaling up can take the form of more organizational members employing agile methods (e.g., hiring employees to extend the SD), extending the application of agile methods within the firm (e.g., transforming further business units) or deepening the application of agile methods (e.g., integrating further agile practices from various agile methods) (Dikert et al. 2016; Paasivaara et al. 2018).

Empirical literature on large-scale agile transformations is mainly characterized by in-depth single case studies which, for instance, examine inter-team coordination approaches (e.g., Scheerer et al. 2014) or portray specific actions (e.g., communities of practice) supporting the transformation (e.g., Paasivaara and Lassenius 2014). Given that the work of Paasivaara et al. (2018) represents one of the first studies to depict a large-scale agile transformation process of a firm from an empirically founded perspective, further research in this area is called for (Dikert et al. 2016; Paasivaara et al. 2018).

In addition to such academic literature, practitioners and consultants offer frameworks for large-scale agile approaches in SD, such as the Scaled Agile Framework (SAFe) (Scaled Agile 2017), Large Scale Scrum (LeSS) (Vodde and Larman 2014) and Disciplined Agile Delivery (DAD) (Ambler and Lines 2012). Although these frameworks provide pertinent insights on how large-scale agile approaches manifest themselves, they cannot explain the process of a large-scale agile transformation (Paasivaara et al. 2018).

Overall, an initial empirical basis for research on large-scale agile transformations exists. However, more research is required to extend the understanding of the process and the inherent interplay of challenges and actions of such a transformation, specifically in the novel context of the digital transformation.

Challenges and Actions of Large-Scale Agile Transformations

Challenges are a common topic in agile methods' research also besides the specific field of large-scale agile transformations. Cao et al. (2009), for instance, investigate the adaptation of agile methods and thereby build on development process-related, customer-related, developer-related and organization-related challenges to better comprehend firms' motivations to customize agile methods. Additionally, early works such as Nerur et al. (2005) report on the challenges of implementing agile methods in organizations' SD departments, considering issues such as the selection of an appropriate agile method or the problem of lacking developers' competences. Nonetheless, also current empirical studies provide pertinent insights on this topic. For instance, Hekkala et al. (2017) examine an information systems (IS) development team that transitioned to agile methods, revealing, amongst others, the challenges of misunderstanding agile practices and unsuitable organizational structures for agile principles and values being in place. However, large-scale agile transformations entail unique challenges that go beyond the issues of an initial agile transition or the introduction of agile methods in small settings such as individual teams. In large-scale agile settings, additional challenges such as coordination issues between agile teams as well as between agile and non-agile teams emerge (Scheerer et al. 2014; Zheng et al. 2011).

Overall, an extensive body of literature comprising empirical investigations on (e.g., Hekkala et al. 2017) and comprehensive summaries of (e.g., Dikert et al. 2016; Gregory et al. 2015) challenges of the (large-scale) application of agile methods exists. However, we do not aim to validate, revise or extend this body of knowledge. Instead, we build on the comprehensive findings of the existing works and aim to capture relevant challenges of large-scale agile transformations. We intend to carve out more in-depth insights on their nature as well as their role in shaping the agile transformation process. We specifically focus on the interplay of such challenges with actions coping with these issues and actions scaling the overall agile transformation. Considering the nature of these challenges, the question remains 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 manifold nature of agile transformation challenges is not yet applied (Dikert et al. 2016; Paasivaara et al. 2018). We propose an abstract categorization of large-scale agile transformation challenges to which commonly examined issues can be assigned. While we provide a general description of these categories, the empirical validation and exact depiction of individual challenges is provided elsewhere in the literature (e.g., Dikert et al. 2016; Gregory et al. 2015; Hekkala et al. 2017). To arrive at these categories, we reviewed diverse studies: a) those with a focus on the large-scale application of agile methods and on large-scale agile

transformations (e.g., Dikert et al. 2016; Paasivaara et al. 2018; Rolland et al. 2016), b) those that address general challenges of agile methods' adoption without an emphasis on large settings (e.g., Boehm and Turner 2005; Gregory et al. 2015; Hekkala et al. 2017; Nerur et al. 2005), and c) those discussing challenges with specific focuses such as people-related issues (e.g., Conboy et al. 2011). By building on existing categorizations (e.g., Dikert et al. 2016; Nerur et al. 2005) and revising the groupings on the basis of the allocation of the challenges, we developed the categorization proposed in Table 1 which includes a general explanation of the categories and pertinent examples of individual challenges. This categorization provides us with an overview of challenges that can occur in a large-scale agile transformation.

Category	Explanation: Challenges regarding…	Examples of Challenges
Method-related	…the appropriate application of agile methods and the respective employment areas within organizations.	• Misunderstanding of agile methods • Poor customization of agile methods • Inappropriate application area of agile methods
Technology-related	…the infrastructural features of firms and the supporting structures of technological tools within firms.	• Inappropriate technological equipment • Inappropriate IT infrastructure
Organization-related	…the organizational structures, occurring coordination issues and organizations' overall management.	• Problematic coordination with other business units • Inappropriate organizational structures • Lack of top management engagement
Culture-related	…the social and overall cultural aspects of organizations.	• Inappropriate leadership dynamics • Incompatible social structures
Ability-related	…the abilities of organizational members involved in the agile transformation.	• Lack of hard skills • Lack of knowledge transfer
Motivation-related	…the attitudes about and opinions on the transformation of organizational members involved in the agile transformation.	• Missing agile mindset • Fear of consequences

Table 1. Proposed Categorization of Challenges of a Large-Scale Agile Transformation

Referring to the processual viewpoint of our study, it is crucial to capture the actions of an organizational change process to gain a holistically understanding of it (Poole et al. 2000). By building on pertinent empirical literature on large-scale agile transformations (e.g., Dikert et al. 2016; Paasivaara et al. 2012; Paasivaara et al. 2018), we derive two types of actions that are undertaken in an agile transformation. We differentiate them according to the *purpose* that is to be achieved by performing them in the course of a large-scale agile transformation process. As a result, we identify *coping actions* which depict actions with the purpose to mitigate emerging challenges of the change process (Paasivaara et al. 2018). Communities of practice, which represent expert panels that meet to deepen their knowledge on one common topic, are one example of coping actions. We classify communities of practice as a coping action since their implementation is often undertaken to tackle issues such as a lacking knowledge transfer between agile team members in the course of an agile transformation (Paasivaara and Lassenius 2014; Paasivaara et al. 2018). As a second type of relevant actions for a large-scale agile transformation, we derive *scaling actions*. According to our aforementioned understanding of "scaling up", the purpose of these scaling actions is to advance a large-scale agile transformation, for instance, by including more people in the change process, extending the agile approach by introducing additional agile practices, or implementing specific organizational structures to enable further organizational change. One pertinent example of scaling actions is the involvement of additional organizational members in the large-scale agile transformation process, for instance, as new agile team members (e.g., by hiring new employees or transferring existing organizational member into agile teams) (Dikert et al. 2016; Paasivaara et al. 2012).

Conceptual Research Lens: Socio-Technical Systems Theory

We aim to better comprehend a large-scale agile transformation as part of the organizational digital transformation from a processual view by observing pertinent challenges and actions of the organizational change as well as their interplay. Therefore, we select STS theory as our underlying research lens, because it allows for an holistic perspective on transforming firms and acknowledges that organizational change

(i.e., a large-scale agile transformation) can be viewed as an interplay of organizational structures, work procedures, technologies and organizational members (Alter 2013; Sarker et al. 2013). The socio-technical lens also enables us to apply a processual approach towards agile transformations (Poole et al. 2000; Sarker et al. 2013). However, we do not aim to make explicit contributions to STS theory but employ it as a lens that guides our overall empirical research approach as well as the interpretation of our findings.

In the socio-technical approach firms consist of two subsystems: a *social subsystem* that comprises "the individuals and 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" (Bostrom et al. 2009, p. 18) and a *technical subsystem* that includes "the tools, mechanisms, and techniques used within the social subsystem to carry out organizational work" (Ryan et al. 2002, p. 89). Since these two subsystems are inseparably connected, harmony between them is optimal for organizational outcomes (e.g., productivity) and social aspects (e.g., employees' work satisfaction) (Mumford 2003; Sarker et al. 2013). The socio-technical approach has sparked manifold applications in IS literature, for instance in the field of IT-induced change (e.g., Lyytinen and Newman 2008). Through the socio-technical research lens we understand a firm as an *organizational work system*, defined as "a system in which human participants and/or machines perform work (processes and activities) using information, technology, and other resources to produce specific products/services for specific internal and/or external customers" (Alter 2013, p. 75). We assume reciprocal interactions between the social subsystem – consisting of *structure* (i.e., organizational structures, hierarchies, and authority system) and *people* (i.e., employees of the firm, their skills, knowledge, attitudes, and values) – and the technical subsystem – encompassing *technologies* (i.e., IS, software, hardware, or machines) and *business processes* (i.e., techniques employed in the task area) (Bostrom et al. 2009; Lyytinen and Newman 2008; Ryan et al. 2002; Sarker et al. 2013).

To examine the process of a large-scale agile transformation, we capture the actions and challenges of the transformation by means of these four dimensions. To this end, we allocate observed challenges and actions to the appropriate socio-technical dimensions and thus retrace the dimensions that are addressed in the change process. Based on this mapping of actions and challenges to the abstract dimensions of STS theory, we are able to capture their interplay as well as the more abstract co-evolution of the social and technical subsystem. Therefore, we can portray the transformation process within the organizational work system. This enables us to make more generalized statements about an organizational large-scale agile transformation and its processual flow (Orlikowski 1992; Sarker et al. 2013). The starting point of a large-scale agile transformation lies within the process dimension since such a change process is typically triggered by the introduction of agile methods (i.e., techniques of the organizational work system).

Research Method

Case Study Research

We employ a *positivist*, *multiple-case study* research design. We postulate, given our positivist stance towards epistemology, that a physical world with fixed social relationships exists independently from the researcher that can be analyzed objectively (Myers 2009; Paré 2004). Also, we follow an *exploratory* approach with the intent to define "questions, constructs, propositions, or hypotheses to be the object of a subsequent empirical study" (Paré 2004, p. 235). We select qualitative case studies, since they are best suited to answer how and why questions and to explore a current phenomenon within its real life context (Yin 2013). In accordance with the requirements of Benbasat et al. (1987) our research objective (to study the process of a large-scale agile transformation in the context of the digital transformation) a) cannot be studied outside its natural setting, b) represents a contemporary development, c) requires no control or manipulation of research subjects, and d) does not have the advantage of an established theoretical basis. Overall, we closely follow common guidelines and recommendations from literature (e.g., Dubé and Paré 2003; Paré 2004) to foster the rigor of our empirical approach and control for quality criteria of positivist case studies such as construct validity, internal validity, external validity, and reliability (Yin 2013).

Case Selection and Sample Description

We apply a multiple-case study research approach, because it allows for cross-case analysis and is less vulnerable to critique concerning the generalizability of results (Yin 2013). Following Patton (2002), we purposefully chose firms in a two-step process. First, we followed a criterion sampling logic and selected

firms outside the IT and software industry that undergo a large-scale agile transformation as part of their digital transformation. Second, we employed a theoretical replication logic to generate contrasting results by choosing heterogeneous cases, thus enhancing the study's external validity (Yin 2013). We selected two firms that differ in size, industry, and approach to a large-scale agile transformation. With sample sizes of case study research often being a focal point of critique, we captured two case studies on suitable firms in-depth to generate insights on large-scale agile transformations and to be able to offer meaningful answers to our research questions (Paré 2004). We added information in form of interviews and secondary data to the cases until we were no longer receiving relevant, new information on the change process (Yin 2013).

Since firm 1 is significantly larger, thus entailing a more extensive change process, we conducted twice the number of interviews for case 1 than for case 2. All our interviewees had detailed knowledge of the firms' present and past agile transformation activities enabling us to reconstruct both transformation processes. We employed a case study protocol, including all relevant data (e.g., project overview, interview guide, rules for field procedures) to ensure the reliability of our research (Paré 2004; Yin 2013). An overview of the sample is shown in Table 2. To ensure confidentiality, we call the firms InsureTech and EventCom.

	Case 1: InsureTech	**Case 2: EventCom**
Industry	Insurance and finance	Retail and events
Revenue (2017)	approx. 32 billion €	approx. 75 million €
Employees (2017)	approx. 29,000	>550
Number/Dates of Interviews	11 / April 2017 – January 2018	5 / May 2017 – December 2017
Interviewees by Position (Numbers represent the amount of interviewees in this position) *Interviewees work outside the IT or SD department. † One of two interviewees works outside the IT or SD department.	• Chief Information Officer (CIO) • Manager of agile transformation (2x) † • Agile coach (2x) † • Senior project manager (2x) † • Product owner (1x) • Scrum Master (1x) • Agile team member (2x)	• Manager of agile transformation* • Product owner (2x) • Scrum Master (1x) • Agile team member (1x)

Table 2. Overview of Sample and Interviewees

Data Collection and Analysis

Data collection took place April 2017 – January 2018 and data on both firms was collected continuously for at least half a year mainly by means of semi-structured interviews. This time span was needed for us to be able to capture the large-scale agile transformations of the firms and include current developments in this regard. The authors used their professional networks to arrange the interviews. All but one interview were conducted face-to-face, on-site at the firms (one via telephone) and lasted 45 – 90 minutes. A semi-structured interview guide with open-ended questions was used. The guide included four sections on: a) the organizational digital transformation, b) the implementation and scaling history of agile methods used in the firms, c) the challenges and coping actions of the firms in the course of the agile transformation and d) the adaptations made to the organizational work system of the firms. Selected interviews were carried out by two researches of which one was a senior researcher. All interviews were tape-recorded and transcribed verbatim. We also prepared field notes following our on-site visits as well as memos based on informal talks with organizational members. We also had access to selected internal documents such as presentations relevant for the agile transformations. In case of InsureTech, one author also participated in a two-day, on-site agile workshop. Besides this internal data, we also performed data triangulation and included external secondary data in our analysis (e.g., press releases, firm websites, and management reports) to enhance the rigor and construct validity of our study. Finally, we employed the software ATLAS.ti to store, code, and analyze all gathered data (Miles et al. 2013; Paré 2004; Yin 2013).

We performed two cycles of coding. The first cycle consisted of descriptive coding to build an initial understanding of the cases. This stage included codes deduced from our literature background (e.g., challenges) and emerging codes which were inductively added to the coding scheme (see Table 3). In the second round of coding, we revised and refined our initial codes and searched for patterns in the codes to cluster our data. This clustering was guided by the four dimensions of the STS theory. Considering the

challenges of a large-scale agile transformation, we initially coded the occurring issues descriptively in reference to the literature. In addition, we allocated these challenges to the six abstract categories that we developed in our literature background and noted the category in the descriptive codes. In the second cycle of coding, we revised and refined these codes and abstracted the challenges to the four dimensions of the STS theory. Consequently, method-related challenges refer to the process dimension, technology-related issues to the technology dimensions, organization- and culture-related problems to the structure dimension and ability- and motivation-related challenges to the people dimension. In terms of the actions performed, we initially coded them descriptively and noted whether we classify them as scaling or coping actions. In the second coding cycle, we allocated them to the dimensions of the STS theory. By abstracting the codes and mapping them to our socio-technical research lens, we were better able to capture the interplay of the two types of actions and the challenges, thus revealing the mutual adaptations to as well as the co-evolution of the organizational work system undergoing a large-scale agile transformation. The coding was conducted by two researchers to ensure data analysis quality. Each coder performed the first, descriptive cycle of coding independently, and then a consensual approach was used for the second cycle of coding. Significant differences in refining the codes, clustering patterns and mapping to the socio-technical dimensions were discussed bilaterally and consensually resolved (Miles et al. 2013).

Exemplary Interview Statement	**Revised, Descriptive Code** (First Cycle)	**Code Cluster** (Second Cycle)
"There was the [top management commitment] to develop an app and in 2015 an entire team of [another firm] switched to EventCom and this is how we acquired a further team."	Action: Hiring new agile employees (scaling)	Scaling actions: People
"[…] to address our coordination issues [between the agile teams and the business units] we now thankfully work with [the strategic goal alignment tool] which really helps us to reach general alignment."	Action: New alignment approach (coping)	Coping actions: Structure
"Especially the middle management is having a hard time since they cannot identify their role in the new [agile] setting."	Challenge: Fear of consequences (motivation-related)	Challenges: People

Table 3. Illustration of the Coding Scheme

We present our case study results in two stages. First, we describe the two case studies individually (i.e., within-case results) using *narratives*, because they provide an accessible and easily comprehendible vehicle for our results (Miles et al. 2013; Myers 2009). A narrative is a story written by researchers that represents "an edited reconstruction of events or aspects that are seen as relevant to the subject or theory being discussed" (Myers 2009, p. 212). Narratives are useful for exploratory case studies with a positivist stance towards epistemology (Myers 2009) and also represent an appropriate medium to convey our processual perspective to the reader (Pentland 1999). The structure of our narratives emerged in the course of the two cycle coding process. We discovered that the large-scale agile transformation process of both firms could be depicted in four phases (i.e., before agile, 1. agile phase, 2. agile phase and 3. agile phase) which both firms passed through. Consequently, we present a chronological narrative with a consistent structure for both cases. Subsequent to the single case narratives, we compare and discuss our findings by means of a cross-case analysis and derive common insights into the process of a large-scale agile transformation and the role of challenges and both types of actions in shaping this process.

Results

Within-Case Results

Case 1: InsureTech

Firm Context and *Before Agile Phase*: InsureTech is the national division of a large, multi-national insurance and finance group. It has a longstanding firm history and is currently undergoing a large-scale agile transformation as part of its organizational digital transformation. The firm is built on a matrix structure and a complementary project organization. Prior to its agile transformation, IT-related projects were completed using a waterfall approach and involved the demanding business unit, the IT unit and a specific organizing unit that coordinated the projects and defined the projects' technical specifications.

1. Agile Phase: In 2007, a first, bottom-up agile pilot in the IT department of InsureTech was initiated. Initially, the pilot was well accepted in the IT department and was successfully scaled up to 60 agile teams by 2011. The agile approach was developed to a holistic concept including practices from Scrum (e.g., team roles and meetings) and eXtreme Programming (e.g., pair programming), combined with insights from change management (e.g., implementing an agile transition team). A training program with agile coaches was available for IT teams and thus the initiative "*was able to train teams, build teams and accompany new teams during their first sprints*" (agile coach_1). In the beginning, the bottom-up initiative had management backing since IT projects were under pressure owing to the trend of IT outsourcing. However, this backing crumbled with the introduction of new middle managers and the emerging perception of the agile transformation approach as being "*too dogmatic and too sophisticated resulting in too big of a change*" (manager of agile transformation_1). Also, the overall backend legacy system has always been monolithic and hard to integrate into the short-cycled, iterative workflows of agile methods. In addition, the initiative was never able to scale outside the IT department, resulting in firm-wide skepticism of the initiative. This aspect is especially crucial since only overarching, structural change could have prevented the agile teams from "*[getting] grinded between several projects, whereas the agile [project] was only one of them*" (agile coach_1). Consequently, the combination of these challenges evolved into an insuperable problem for the agile transformation culminating in its termination in 2013.

2. Agile Phase: With changes in the top management (TM) of InsureTech and the increasing importance of the organizational digital transformation, the topic of agile methods was again placed on the agenda around 2015. However, owing to the TM's perception that the previous bottom-up agile initiative "*left scorched earth*" (manager of agile transformation_1), an entirely fresh implementation approach for agile methods was chosen. Therefore, a top-down, large-scale digital change process was initiated, including the large-scale agile transformation of InsureTech as one focal point. As a result, in early 2016 an *agile boot camp* was launched. The boot camp was, and still is, in a separate location where IT teams are trained for about one year in "*agile working, but also […] to learn to work cross-functional and enable self-initiative [to become] autonomous teams*" (manager of agile transformation_2). A holistic approach to the agile transformation was developed which not only enabled co-location (e.g., separate rooms) and provided the newest technological equipment (e.g., hardware and software), but also offered an adapted agile framework outlining team roles and practices as well as integrating aspects of "*lean start-up, minimum viable products, and 100 day cycles [of funding]*" (CIO). The camp was launched exclusively for front-end SD teams, in response to the yet unsolved issues of the incompatible IT infrastructure on the back-end side. The initial approach started with one agile team (ten members), whereas this number was subsequently upped and more teams were invited, based on a top-down decision considering the suitability of the projects for an agile way of working. In 2017, 200 agile team members were part of the agile boot camp working in various teams of up to twelve people on diverse products. Multiple teams were responsible for one product coordinated within or even across the structures of the boot camp. Novel technological achievements (e.g., cloud services) were integrated in the development stack. However, several issues emerged across time, for instance, the approach was initially promoted in terms of "*only the best can go there*" (agile coach_2). This led to the perception of a two-tier society within the firm sparking envy and a shared fear of consequences on the part of all IT members left out of the agile transformation process. Also, the social structures of the organization became complicated with team members and entire teams being relocated to a shielded site hindering communication with colleagues and further team members which were not included in the agile boot camp. The agile boot camp also increased firm-wide interest in agile methods. However, outside of the agile boot camp "*only two people [had] the role [of an agile coach] in the entire firm*" (senior project manager_1). Projects outside of the boot camp aiming to work agile had to implement agile methods on their own, reach out to one of the agile coaches or bring in external consultants. Consequently, besides the top-down agile boot camp, bottom-up agile initiatives existed and still exist that require synchronization and management. Finally, there was no exit strategy for the agile teams in the boot camp. Originally, the teams were to stay in the training facility for a year and then return to their original organizational context, however, as agile coach_2 stated: "*we recognized that we cannot transform the organization outside [of the boot camp] fast enough to bring the teams back*."

3. Agile Phase: To face these accumulated challenges, in 2017, InsureTech founded an *agile hub* within its core structures to enable the return of the trained agile teams to their traditional working environment and thus allow further teams to enter the boot camp. The returning teams kept the shielded status of the boot camp but at the same time introduced the agile mindset into the traditional structures by "*showing*

what [they] do" (agile team member_1). With this new structure for the large-scale agile transformation some of the challenges were addressed, such as the flow jam at the agile boot camp and the issues related to social structures within the firm. Nonetheless, the two-tier society issue remained. Therefore, the agile transformation approach was further scaled by implementing an agile transformation team that offers coaching support outside the agile boot camp as well as beyond the IT and SD contexts. However, further challenges erupted such as the issue of leadership dynamics. Middle managers were typically not included in the agile teams trained in the boot camp. Consequently, these managers lost parts of their staff and thus control and power. With the institutionalization of the agile hub, this loss became permanent and some of the team leaders "*found it very difficult to let their people go and let them actually work 100% in agile teams*" (product owner). Additionally, owing to the progress of the large-scale agile transformation, projects and products grew and thus could no longer be kept isolated in the front-end SD, but increasingly developed interfaces to non-agile, mostly back-end development tasks. This meant a "*clash of two [development] speeds*" (agile team member_1). One of the most current issues is that "*skill represents the limiting factor*" (CIO), referring to hard skills, soft skills, as well as an agile mindset, what makes it difficult to select the right projects and the respective fitting teams to enter the agile boot camp.

Case 2: EventCom

Firm Context and Before Agile Phase: EventCom operates in a multi-national market environment and retails event and entertainment offers. In the course of its ongoing digital transformation, EventCom adopted facets of electronic commerce and online retail and engages in a large-scale agile transformation. Prior to the agile transformation, the firm employed only two IT members that cooperated with external IT service providers to ensure IT operations. With firm growth and the rising importance of digital offerings, more IT members were hired and less tasks were outsourced. However, the newly staffed IT/SD unit was not able to handle the enquiries and "*could not manage to actually develop and deliver a specific piece of software*" (product owner_2) by means of traditional, plan-based development methods.

1. Agile Phase: To address this issue, EventCom built a central project management office (PMO) with ten team members in 2011 that followed initial agile practices and employed Kanban boards (i.e., typically physical whiteboards that show tasks arranged in three categories: to do, doing, done) to organize the workflow of the IT/SD unit. The approach's focal point was a monthly meeting where one representative of each business unit came together with the IT/SD team and presented the demands of the unit "*in the form of a user story. Everybody had three to five minutes [to pitch] and there was a template for a poster that needed to be presented. Afterwards, one could ask questions and then, by means of play money, all those present – that was the [TM], the department heads and the representatives – could invest in the ideas*" (product owner_1). Although this idea worked initially, problems occurred over time. The main challenge was that the PMO was not able to handle the growing enquiries, and the stakeholders became increasingly frustrated with the fact that only a minimal percentage of ideas could be realized. Therefore, if a project was "bought" the internal clients designed their projects to "*get as much as possible if [they] had access [to the SD unit] for once*" (product owner_2). As a result, a vicious circle of excessive demands and increasing frustration emerged. In the end, departments refused to send representatives to the PMO meeting because they thought there was little chance of success.

2. Agile Phase: To solve the paralysis of the PMO, a bottom-up agile pilot project was initiated in 2013. This pilot included one cross-functional, agile team (six members) working according to Scrum and focusing on one specific customer topic, whereas the rest of the PMO continued working according to Kanban. Also, external coaching support was sought to assist the agile transformation. The approach was subsequently scaled by hiring more SD members, resulting in six cross-functional, agile teams with six to nine team members working according to Scrum and focusing on specific customer groups. New tools (e.g., Jira and Confluence) were implemented to improve the coordination of the six agile teams. With the presence of these six teams, a structure for the coordination between the six teams as well as between the teams and other business units emerged. The resulting steering board included the TM, which was directly responsible for the agile teams, and department heads. However, challenges developed along the way. Initially, the pilot project and its scaled successor were lacking visibility and acceptance outside the SD unit owing to their strong bottom-up approach. One team member that started off in another business unit and then became Scrum Master explained: "T*o be honest, I did not realize everything going on, it felt like [the agile approach] exploded […]. It was really like a parallel world, a blackbox.*" This invisibility was also perceived as a signal of absent TM support since "*the test of one single cross-functional team*

shows that not a 100% commitment of [the TM] is present" (manager of the agile transformation). In fact, the steering board partially lost trust that the agile teams "*were actually developing the right things*" (product owner_1) since the coordination between business units and agile teams was problematic.

3. Agile Phase: At the beginning of 2017, the TM of EventCom restructured the entire SD department to address problems of the agile transformation and to holistically state its support of the transformation. A new organizational role, the product lead, was implemented. EventCom currently has two product leads responsible for three cross-functional agile teams each, broken down into electronic commerce topics and further topics (e.g., community building). The product leads build the structure between the agile teams, the TM, and the business units and are responsible for a value-based SD. To ensure that the "right" products are developed, the firm introduced a strategic alignment tool that serves as a goal achievement measure and enables a goal-oriented coordination between the agile teams and the business units. On the basis of this alignment tool and the new role of the product leads, Scrum-of-Scrums like meetings are employed to bring together department heads, product owners and product leads to discuss future development projects. The agile transformation at EventCom was also advanced by implementing the strategic alignment tool beyond the SD unit to establish a common coordination structure. Agile methods spread beyond the boundaries of the SD unit and there are now "*teams [e.g., marketing] that think about agile and already adopt individual agile practices*" (Scrum Master). A continuous knowledge transfer is fostered by diverse communities of practice that "*enable general knowledge and experience exchange*" (agile team member) and which are available for all agile team roles (e.g., product owner, Scrum Master, front-end developer). However, EventCom still faces challenges that hinder its large-scale agile transformation. Although agile practices spread beyond the SD unit, not all business units are equally suitable for implementing agile methods. In some areas agile methods might be "*too much of a good thing since in the haptic product development things are not going as fast as in the context of digital [products and services]*" (manager of agile transformation). Consequently, there are two worlds within EventCom, one agile and one non-agile, which might be getting closer but still are far enough apart to require careful coordination. Additionally, although the strategic alignment tool was implemented beyond the SD unit, it was not introduced in the entire firm resulting in interfaces of the two worlds that require coordination.

Cross-Case Analysis and Discussion

Large-Scale Agile Transformation Process

We discovered that the large-scale agile transformation process at both firms can be portrayed according to four phases. Thereby, the starting point of each of the three agile change phases is characterized by a significant organizational effort which noticeably advances the transformation. The resulting leap between the phases enables us to distinguish them. Although the *contents* of the phases (i.e., precise challenges and actions) differ between the cases, an in-depth look reveals a similar *sequence* of *processual events* in terms of challenges and actions in the course of both large-scale agile transformations (see Table 4 for an overview). Both firms used a stepwise approach to an agile transformation. First, the initial transition from plan-based approaches to agile methods was undertaken in both firms. InsureTech began with a bottom-up initiative in the IT unit that was initially promising but later was terminated owing to diverse issues. At EventCom the TM implemented a central PMO in "*Kanban mode*" (product owner_2). Although the concepts differ between the cases (bottom-up vs. top-down), both approaches represent the initial engagement with agile methods in the respective firm. In both cases, a second agile phase was started with several coping actions addressing challenges that developed during the first agile phase. At InsureTech, the TM addressed earlier mistakes and initiated an extensive, top-down agile approach. In contrast, at EventCom the accumulated challenges were addressed by means of a bottom-up initiative characterized by cross-functionality, focus realignment and external coaching support. Scaling actions were undertaken in both firms during this second phase ranging from extending the technological stack (InsureTech) to hiring new employees for the agile teams (EventCom). Again, multiple challenges piled up and were then addressed by coping actions that led to a third phase of the respective transformations. Thereby, the TM of EventCom recognized the need to signal its support for the agile transformation and addressed this issue in combination with further challenges by restructuring the SD unit, implementing the new organizational role of product leads, and introducing a strategic alignment tools to foster coordination within the entire firm. At InsureTech, the "*traffic jam*" (CIO) within the agile boot camp and the lack of an exit strategy were approached by the introduction of a new organizational structure (i.e., the

agile hub). Again, the agile approaches were scaled on the basis of various aspects (e.g., establishing agile approaches outside the SD unit) in both cases. At the end of our data collection, we identified current challenges hindering the progress of the firms' agile transformation. To sum up, although our two cases are heterogeneous in terms of firm features, encountered challenges, undertaken actions and overall approaches to the agile transformation, they can be compared on the basis of the processual flow of their agile transformations. In both cases, this process can be clustered according to agile phases leading to the assumption that the process of a large-scale agile transformation appears as a *sequence of transformation waves*, whereas the transition between the phases seems more as a *leap* than a continuous flow.

Challenges of a Large-Scale Agile Transformation

Considering the nature of challenges of large-scale agile transformations, we observed that challenges may arise collectively and form *barriers* that substantially hinder the progress of the agile transformation process. Such barriers require explicit and extensive coping actions that go beyond the mitigation of individual issues. Based on our data analysis and interpretations, we derive three archetypes of barriers that comprise multiple challenges that occurred together and that match the socio-technical dimensions of the challenges. First, the *coordination of different organizational worlds* pertains to issues of structure such as coordination problems between multiple agile teams or between agile teams and other business units. This archetype includes issues, such as inappropriate organizational structures, difficult leadership dynamics, and cultural issues. Second, the barrier *difficult selection of the right people* pertains to people-related challenges such as organizational members involved in the agile transformation lacking abilities, motivation and/or an agile mindset. Finally, the barrier *suitability of agile methods* pertains to a combination of challenges attached to the process as well as the technology dimension. Such challenges encompass the overall fit of agile methods to their focal application field but also firms' IT prerequisites that may not be feasible for an agile approach. In addition to the archetypes, we found that challenges may occur repeatedly throughout the process of a large-scale agile transformation. This can be seen in the case of EventCom where the coordination of agile and non-agile teams remains an ongoing issue. Finally, if challenges are not addressed, this can lead to the complete termination of an agile transformation as in the case of InsureTech and its first, bottom-up agile initiative. In terms of the role of challenges in shaping the large-scale agile transformation process, the presented barriers may be one reason why no continuous flow between the processual phases is possible and a leap is necessary to transition between the phases.

Actions of a Large-Scale Agile Transformation

Since it is not the aim of this paper to provide best practices on how to react to certain challenges, we do not discuss the wide range of scaling and coping actions that we captured in detail. Instead, we view these actions as a means to depict the process of a large-scale agile transformation. Similar to the challenges and barriers, both types of actions can be clustered according to the dimensions of the STS theory. However, some actions of both types can be viewed in the light of multiple socio-technical dimensions since they are general and can, for instance, be performed to address diverse challenges. As an example, providing external coaching support as in the case of EventCom, can pertain to the process (e.g., supporting agile methods' tailoring in the firm) and the people dimension (e.g., training soft skills and fostering an agile mindset) in terms of coping actions. In addition to the finding that individual coping actions can address multiple challenges, we also came to the conclusion that our initial differentiation of actions in scaling and coping actions might be too narrow and may thus not represent the reality of large-scale agile transformations appropriately. By examining the nature of the observed actions in-depth, we found that actions initially classified as coping actions do not solely follow the purpose of mitigating emerging transformation challenges but can also support the scaling of agile approaches. We came to the same interpretation in terms of actions initially classified as scaling actions. For instance, we initially categorized the introduction of new organizational structures as scaling action, since we determined the underlying purpose as an approach to advance an agile transformation. However, as in the case of InsureTech, the implementation of a new organizational structure (i.e., agile hub) for the return of trained agile teams can be considered as scaling action – since more agile teams can be trained in the boot camp and thus more agile teams emerge – but also as a coping action – since it represents an exit strategy that mitigates the "*traffic jam*" (CIO) issue. Additionally, by establishing communities of practice at EventCom, the firm did not only address the people-related challenge of missing knowledge transfer between agile team members (i.e., coping action), but also advanced the overall agile approach (i.e.,

scaling action). These examples indicate that the two types of actions are not exclusive to each other but overlap and that the purpose of actions in an agile transformation process can be diverse. By referring back to literature, we found support that communities of practice, for instance, are not solely applied to mitigate occurring challenges but can also "[support] continuous organizational improvements [in the context of agile transformations]" (Paasivaara and Lassenius 2014, p. 1556). Consequently, by taking into account our assumptions about the process of a large-scale agile transformation and its progression as a sequence of transformation waves, we propose a differentiation of actions in *between-phase* and *within-phase actions*, whereas both types of actions can follow the purpose of scaling and coping. This illustrates the role of actions as enabler of the transition between and progression within the transformation phases.

	Case 1: InsureTech	**Case 2: EventCom**
1. Agile Phase	• Bottom-up agile pilot (2007 – 2013) *Within-Phase Actions*: • Developing an integrated agile concept • Offering sophisticated trainings • Transition of further IT teams (60 teams) *Challenges/Combination Resulting in Termination:* • Lack of top management engagement • Inappropriate IT infrastructure • Inappropriate agile implementation approach	• Initiating central PMO (2011) • Application of first agile practices (e.g., Kanban) *Challenges*: • Poor customization of agile methods • Problematic coordination with other business units • Lack of stakeholder commitment *Barrier*: • Coordination of different organizational worlds
2. Agile Phase	• Institutionalization of an agile boot camp (2016) *Between-Phase Actions*: • Implementing a top-down, holistic approach for large-scale agile transformation • Restricting boot camp to suitable front-end SD • Establishing independent organizational structure *Within-Phase Actions*: • Integrating new technological development tools • Inviting more teams into the boot camp *Challenges*: • Problematic synchronization of agile initiatives • Inappropriate organizational structures • Inappropriate social structures • Fear of consequences *Barrier*: • Coordination of different organizational worlds	• Initialization of a bottom-up, agile pilot project (2013) *Between-Phase Actions*: • Establishing cross-functionality and Scrum • Realigning focus on customer groups • Including external coaching support *Within-Phase Actions*: • Integrating new collaboration tools • Building a structure for the agile teams • Hiring more agile team members *Challenges*: • Inappropriate agile implementation approach • Problematic coordination with other business units • Lack of top management engagement *Barrier*: • Coordination of different organizational worlds
3. Agile Phase	• Implementation of an agile hub in the traditional structures of the organization (2017) *Between-Phase Actions*: • Providing organizational structures for the return of the trained agile teams *Within-Phase Actions*: • Offering training beyond the agile boot camp *Challenges*: • Inappropriate IT infrastructure • Problematic coordination with other business units • Inappropriate leadership dynamics • Lack of hard skills/soft skills/agile mindset *Barriers:* • Difficult selection of the right people • Coordination of different organizational worlds	• Top-down restructuring of bottom-up agile initiative (2017) *Between-Phase Actions*: • Establishing new coordination role and structure • Providing top management commitment • Implementing strategic alignment tool *Within-Phase Actions*: • Establishing communities of practice • Initiating agile pilots beyond SD department *Challenges*: • Inappropriate application area for agile methods • Problematic coordination with other business units *Barriers:* • Suitability of agile methods • Coordination of different organizational worlds

Table 4. Results of the Cross-Case Analysis

Combined Insights

Thus far, we presented our qualitative-empirical findings through the lens of STS theory in an individual manner. By combining the insights about the process, challenges, and actions of a large-scale agile transformation and blending them with literature on socio-technical change in the context of IS, we conclude that a large-scale agile transformation appears as an *episodic* organizational change process that can be interpreted according to the *punctuated equilibrium paradigm*. In contrast to evolutionism, a punctuated equilibrium approach to organizational change posits that such a change is episodic, whereas periods of radical and incremental change alternate (Besson and Rowe 2012; Gersick 1991; Lyytinen et al. 2009). The punctuated equilibrium paradigm is constituted by three main features: deep structures, equilibrium periods and revolutionary periods (Gersick 1991). Deep structures represent, from an organizational work system perspective, the fundamental, routinized characteristics of the four socio-technical dimensions (Lyytinen and Newman 2008). Equilibrium periods are the manifestation of these deep structures, where only incremental adaptations to the organizational work system are possible. In contrast to this stand the revolutionary periods where the deep structures are broken up and a radical change in the form of a holistic upheaval is possible (Gersick 1991; Lyytinen and Newman 2008). This concept of alternating incremental and radical change fits our postulated sequence of agile waves in a large-scale agile transformation process well. An initial upheaval is necessary to break up existing deep structures and begin the transformation process. Subsequently, an equilibrium period follows where the implications of agile methods, related values, and structures become routinized and only incremental changes are possible. These new deep structures hinder the further agile transformation as we can observe by the emerging challenges and barriers between the agile phases. These deep structures, for instance, manifest in challenges of organizational and social structures, leadership dynamics and individuals' mindsets and again require an upheaval, represented by a revolutionary period that begins a new agile transformation phase. With the overall process of a large-scale agile transformation consisting of multiple agile waves, each phase encompasses a revolutionary period with radical changes and an equilibrium period with incremental changes. The end of each phase is characterized by one or multiple barriers that hinder the further process. Consequently, barriers of a large-scale agile transformation are overcome by between-phase actions that break up deep structures and facilitate radical change, whereas within-phase actions foster incremental change and the progression of a large-scale agile transformation process. In Figure 1, we depict this interpretation of our findings graphically. In addition, we derive two propositions:

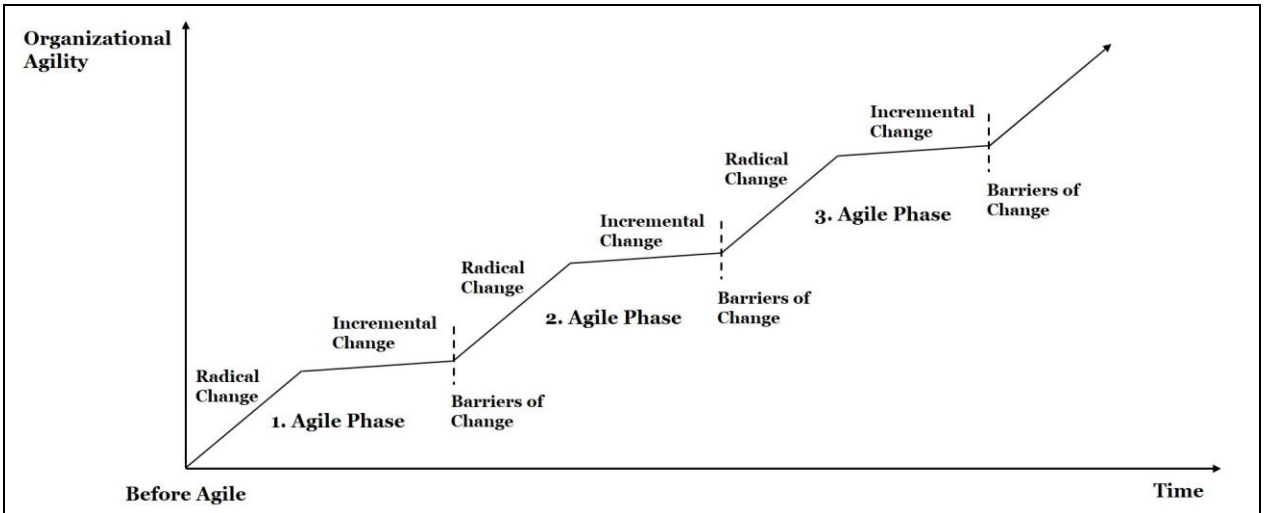

Figure 1. Large-Scale Agile Transformation Process as Episodic Change

Proposition 1: The process of a large-scale agile transformation can be characterized as an episodic, socio-technical change that can be portrayed by a sequence of transformation phases. Each phase encompasses alternating aspects of radical and incremental change, whereas each phase begins with an initial upheaval that represents a revolutionary period of the agile transformation process. Subsequently, a period of incremental adaptations follows until the point where one or more barriers of a large-scale agile transformation are encountered, again sparking the necessity of an upheaval.

Proposition 2: A large-scale agile transformation is mainly driven by two types of actions: between-phase and within-phase actions. Between-phase actions refer to actions that are required for radical change and thus needed to overcome barriers of a transformation phase and to reach the next agile transformation phase. Within-phase actions refer to the incremental adaptations of a transformation phase undertaken in the course of a large-scale agile transformation to foster the incremental progression of the process. Both actions can thereby serve coping (e.g., mitigating occurring challenges) as well as scaling purposes (e.g., advancing the overall agile approach).

Theoretical and Practical Implications

Considering our first research question – *How does the process of a large-scale agile transformation in the context of the digital transformation progress?* – we conclude that the change process of a large-scale agile transformation can be interpreted as an episodic, socio-technical change representing a sequence of multiple agile phases. These phases encompass two periods consisting of radical change (i.e., revolutionary period) and incremental change (i.e., equilibrium period) according to the punctuated equilibrium paradigm (Besson and Rowe 2012; Gersick 1991; Lyytinen and Newman 2008).

By referring to our second research question – *How do challenges of a large-scale agile transformation as well as related coping and scaling actions shape the transformation process?* – we can provide deeper insights into the large-scale agile transformation process. We can state that the interplay of challenges, barriers, as well as between- and within-phase actions majorly shape the process of a large-scale agile transformation, resulting in episodic change. Throughout the course of an agile phase, multiple challenges accumulate that collectively constitute barriers to the agile transformation. To overcome these barriers and enable a new phase beginning with a revolutionary period, an upheaval, often represented by extensive organizational actions (e.g., creating new structures) is necessary. Overall, this depiction of a large-scale agile transformation process reflects the current state of literature on the topic well. From our qualitative data, we can confirm that such a process is rarely straightforward or easy to handle (Dikert et al. 2016) and is typically approached in a stepwise manner (Paasivaara et al. 2018). Additionally, there is no perfect roadmap on how to master an agile transformation since firms encounter diverse constellations of the manifold challenges that can emerge in the course of a large-scale agile transformation process (Paasivaara et al. 2018). Consequently, the alternating periods of radical and incremental change are required to evaluate and refine the organizational approach applied in the agile transformation process.

Besides offering an explorative interpretation of large-scale agile transformations as episodic change processes and explaining the role of challenges and actions in shaping this process, we also provide insights on the nature of challenges and actions. In terms of the challenges of an agile transformation process, we provide contribution by initially deriving three archetypes of barriers that are formed by collectively emerging challenges: a) coordination of different organizational worlds, b) difficult selection of the right people, and c) suitability of agile methods. Especially the latter barrier may have extensive implications for organizations. Although, agile methods are increasingly applied in various contexts outside the SD units (e.g., human resources), the question remains whether agile methods are feasible for all organizational activities and thus the entire organizational work system (Cappelli and Tavis 2018; Rigby et al. 2016). Consequently, the suitability of agile methods for firms based on their individual features, such as size, industry, products and service offerings, might cap the ceiling of a large-scale agile transformation. Various types of such *natural barriers* might exist, such as legal issues (e.g., contractual regulations), processual standards (e.g., ISO norms), IS security requirements or simply a lack of performance improvement by implementing agile methods. Literature addresses some of these aspects (e.g., Gregory et al. 2015), however, since we can only initially assume the possible characteristics of natural barriers, further research is required in this regard. Additionally, it should be considered that a large-scale agile transformation is often embedded in an overarching approach to firms' digital transformation entailing a scope for the overall organizational agile transformation. In addition to the presentation of potential barriers that occur in large-scale agile transformations, we also revised our initial categorization of coping and scaling actions based on our overall empirical findings. Consequently, our proposition of between- and within-phase actions takes into account that undertaken actions of firms may not follow a sole purpose of, for instance, tackling a specific challenge, but may also serve several goals and thus scaling as well as coping purposes. This matches our interpretation that overcoming barriers can require a combination of scaling and coping actions and thus can trigger a new agile phase

starting with radical change. Since current literature mainly discusses success factors of large-scale agile transformations (e.g., Dikert et al. 2016) and does not distinguish types of coping actions (e.g., Paasivaara et al. 2018), we offer an initial classification of actions to advance large-scale agile transformations.

Our research also offers relevant practical implications. Our proposition of an agile transformation as episodic change supports managers in comprehending and structuring the change process in their firms. Additionally, practitioners should be aware that a large-scale agile transformation can lead to a division within the firms into agile and non-agile worlds. Although agile methods may not be applied throughout the entire firm, transparency about the agile world including practices, principles, and mindsets should be fostered and spread throughout the organization. Additionally, potential organizational interfaces require feasible coordination. This can be achieved by dedicated organizational roles. In addition, coordination can be supported by strategic alignment tools, such as in the case of EventCom, where the tool is applied to summarize overall organizational goals and break them down into measurable key figures for the units involved (agile and non-agile). These figures can also foster the transparency and visibility of the agile approaches in a firm. Agile initiatives may start as bottom-up approaches instigated by individuals. However, if firms aim at becoming holistically agile, such bottom-up approaches need to be supported and at some point transferred into more extensive top-down approaches that are backed by the TM. Otherwise, these bottom-up initiatives will lack long-term tenacity and eventually rather hinder a large-scale agile transformation as in the case of InsureTech. Overall, as there is no perfect guideline on large-scale agile transformations, managers are best advised to follow an "experimental transformation approach" (Paasivaara et al. 2018, p. 36) that not only fits the agile mindset but also enables the continuous evaluation of the change process and a rapid reaction to challenges and barriers.

Conclusion, Limitations, and Areas for Future Research

Based on the empirical findings of our study, we propose that a large-scale agile transformation can be interpreted as an episodic, socio-technical change process according to the punctuated equilibrium paradigm that includes a sequence of agile phases. We also identify barriers to an agile transformation that are formed by the challenges of the change process and that hinder the continuous flow and transfer from one phase to the next. In an effort to overcome these barriers, firms engage in specific actions that trigger radical change. These between-phase actions stand in contrast to within-phase actions that advance the agile transformation by incremental adaptations. Overall, by means of our study, we provide initial insights into a large-scale agile transformation process as part of the organizational digital transformation and thus take up a current call for research (Dikert et al. 2016; Paasivaara et al. 2018).

Nonetheless, we acknowledge the limitations of our study. First of all, our results stem from qualitative-empirical research and thus might be of limited generalizability. Nonetheless, processual insights require an in-depth understanding of the research topic, which is best facilitated by qualitative research approaches such as case studies (Myers 2009). Since we only observed stepwise approaches to large-scale agile transformations in our case studies, we cannot generalize our findings on the second option of such a transformation, the big bang approach, where the entire change process is performed at once. However, firms are typically advised to undertake radical transformations, such as a large-scale agile transformation, stepwise (Paasivaara et al. 2018). In addition, we acknowledge that we do not offer best practices or a guide on how to respond effectively to specific challenges and barriers since we are of the opinion that a generalization of "best reactions" is not appropriate given that a large-scale agile transformation is a highly complex change process impacted by various aspects as well as the interplay of diverse firm features, emerging challenges, and performed actions. The derivation of such best reactions would be a promising direction for future research. We also call for further research on large-scale agile transformations in the context of the digital transformation to deepen the understanding of the change processes as well as validate or revise our findings and test our propositions in comparable organizational settings. Finally, our study raised the topic of possible natural barriers to an agile transformation that cap the ceiling of the process and thus also limit the potential increase in the organizational agility of firms. Therefore, we call for research on this topic since it may not only spark intriguing theoretical insights but also pertinent practical implications, which are especially relevant for a fast-changing, digital world.

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