

# **Parallelism in Organizations from the Perspective of Organizational Path Theorizing**

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## **List of Abbreviations**

ICT	Information and communication technology
IT	Information technology
SAFe	Scaled Agile Framework

## **Abstract**

This doctoral thesis investigates paths from an organization theoretical perspective. The respective debate is characterized by two almost entirely separately led discussions about path dependence, or alternatively path creation. Against this background, it is the objective of this thesis to reconcile these two streams of research and inquire into the possibility of coexisting paths in the form of path dependence and path creation. Towards this end, at first a systematic review offers an overview of the field of path-related research in the social sciences. Second, building upon the deepened understanding gained from this review, an empirical inquiry is launched to explore how a novel path is created at an information and communication technology company while this is still sticking, in a path dependent fashion, to an older path. Third, the dynamics between both paths are explored. Taken as a whole, a theoretically sound and at the same time empirically substantiated theoretical framework of the coexistence of path dependence and path creation is offered.

## **Introduction**

The present doctoral thesis is anchored in research on organizational paths, which is substantially informed by the theory of path dependence. Drawing upon David's (1985) illustrative evidence of the prevailing QWERTY keyboard layout, the key idea revolves around the observation of the paradox of sticking to inferior solutions although superior alternatives do exist. Arthur (1989, 1994) takes up that idea and underpins it by developing nonlinear stochastic models to demonstrate that the most efficient solution does not necessarily prevail when multiple alternative solutions exist. In his book "Increasing Returns and Path Dependence in the Economy" (Arthur, 1994), he describes processes in the development of technologies that are self-reinforcing due to increasing returns (i.e. increasing returns to scale), and thus, can lead to path dependence. He does not formulate a general definition of path dependence, but elaborates on basic triggers and properties of self-reinforcing processes that imply later path dependence and, in this way, provides relevant assumptions for path theory.

From this point on, observations of similar phenomena of rigidified, though inefficient, situations accumulate in diverse research fields (e.g. technology related inquiries, Alexy et al., 2013; regional economy, Martin et al., 2019; or regulations and policies, Béland & Powell, 2016), all of them framing the observed phenomena under the term *path dependence*. In light of organizational theory, Sydow et al. (2009) provide a groundbreaking publication, elaborating in detail on path characteristics, on different kinds of self-reinforcing mechanisms, putting forward a three-phase model depicting path evolution and differentiating path dependence from other related conceptions such as e.g. organizational 'imprinting' (e.g. Beckman & Burton, 2008; Boeker, 1989) or 'structural inertia' (e.g. Gresov et al., 1993; Hannan et al., 2004). One of the major distinguishing features of *organizational* path dependence is its accentuation of self-reinforcing mechanisms, resulting in a narrowed scope of action within or in interactions among organizations (Schreyögg & Sydow, 2011). In

particular with regard to the organizational context, these mechanisms include coordination effects, complementary effects, learning effects and adaptive expectation effects (Sydow et al., 2009). The work of Sydow et al. (2009) significantly highlights the importance of path dependence in the organizational context, sensitizing for the potentially dangerous situation of an irreversible lock-in (Pierson, 2000) of inefficient but still repetitive action patterns within an organization.

Overall, two major debates in path theorizing have evolved in the past decades. First, while Sydow et al. (2009), among various others, refer to the evolvement of paths behind the backs of the agents and promote the idea of path dependence, Garud and Karnøe (2001) bring up the contrary notion of active *path creation* by means of mindful deviation. By today, more researchers are jumping on that bandwagon, including more scope for agency, allowing the actors involved to reflect on situations and to make self-determined strategic choices in light of actively shaping paths (Fortwengel & Keller, 2020). Lately, although Sydow et al. (2020) admit that the involvement of a certain level of agency cannot be denied, they still point out that this situation of active and mindful involvement in the evolvement of organizational paths is subject to specific boundary conditions (Sydow et al., 2020).

Second, besides the debate challenging the impossibility of mindful *agency* within the evolvement of a path (e.g. Fortwengel & Keller, 2020; Garud & Karnøe, 2001, 2013; Sydow et al., 2009, 2020) other scholars also challenge its attribute of *irreversibility*. While early publications assume that leaving a locked-in path would be almost impossible – and if, then it would mainly happen due to external shocks or crises, for instance, (Arthur, 1994) –, later studies open up room for change, though involving considerable efforts (e.g. Manning & Sydow, 2011). Newer developments of research, stemming from different research areas, come up with various kinds of change on or off a path (Bailey et al., 2010), such as path



destruction (Dawley et al., 2014), path extension (Asheim, 2019), path renewal (Cheung & Kwong, 2017), path transformation (Singh et al., 2015) or path transition (Cooke, 2012).

However, while the idea of paths is being adapted to various different research contexts and largely extended by such novel ideas of path change, a common nomination and consistent utilization of those terms is missing. Hitherto, the broad range of different but seemingly similar path terms (e.g. path transition vs. path transformation) remains undifferentiated and lacks common utilization across research areas. This makes it particularly difficult to identify explicit or implicit underlying assumptions on path parallelism regarding those novel ideas about path developments.

Although not explicitly addressed by one of the novel path terms, directly pointing to path parallelism, the phenomenon of parallel paths is already an issue in path theorizing. In the context of technological or regional paths, domains populated by multiple paths have attracted research interest for several years (e.g. Bailey et al., 2010; Bergek & Onufrey, 2013; Cooke, 2012; Sydow et al., 2012). Beyond that, studies with this theoretical anchorage already mention the need to understand interdependencies between such coexisting paths (e.g. Singh et al., 2015). In the context of recent organization theory, Bothello and Salles-Djelic (2018) as well as Sydow et al. (2020) have mentioned the potential for parallel organizational paths, but further explicit investigations have not been forthcoming so far.

Therefore, this doctoral thesis addresses the following central research questions: (1) How can the numerous different, but undifferentiated interdisciplinary path terms regarding path changes be compared and related to each other? (manuscript 1); (2) What can we learn from the interdisciplinary view on path changes for path dependence in light of organizational theorizing? (manuscript 1); (3) How does a new organizational path emerge while pursuing an existing path in parallel? (manuscript 2); (4) How do the dynamics and tensions between an

established and a new organizational path in creation unfold? (manuscript 3); (5) How do these dynamics change over the course of time? (manuscript 3). To answer these questions, this doctoral thesis is divided into three manuscripts (see Table 1 for an overview), building on each other.

**Table 1:** Overview of manuscripts within the doctoral thesis.

<b>Manuscripts</b>	<b>Authors</b>	<b>Title &amp; Research questions</b>
Manuscript 1	Ronja Schlemminger Gordon Müller-Seitz	<p><b>Path Concepts between Persistence and Renewal – Towards an Interdisciplinary Framework to Inform Research on Organizational Paths</b></p> <p><i>How can the numerous different, but undifferentiated interdisciplinary path terms regarding path changes be compared and related to each other?</i></p> <p><i>What can we learn from the interdisciplinary view on path changes for path dependence in light of organizational theorizing?</i></p>
Manuscript 2	Ronja Schlemminger Gordon Müller-Seitz	<p><b>Walking a Tightrope – Towards a Framework for Dealing with Coexisting Organizational Paths</b></p> <p><i>How does a new organizational path emerge while pursuing an existing path in parallel?</i></p>
Manuscript 3	Ronja Schlemminger	<p><b>Paralyzing Parallelism? Dynamics between Parallel Organizational Paths</b></p> <p><i>How do the dynamics and tensions between an established and a new organizational path in creation unfold?</i></p> <p><i>How do these dynamics change over the course of time?</i></p>

*Manuscript 1* “Path Concepts between Persistence and Renewal – Towards an Interdisciplinary Framework to Inform Research on Organizational Paths” comprises an interdisciplinary systematic literature review, aiming to conceptualize twelve different, but undifferentiated path terms on kinds of path change, thus to obtain a better insight into where path theorizing is heading. The elaborated overarching framework first provides an overview of path theorizing developments in different research areas and, secondly, allows for a subsequent derivation of underlying assumptions on (potential) path parallelism for each of these path terms. Since all the examined path terms entail either on-path change (i.e., changes on an existing and continuing path) or off-path change (i.e., terminating an existing path and creating a new one) and do not imply the idea of sustaining parallel paths, my further elaborations point towards this research gap and explicitly elaborate on path parallelism.

In *manuscript 2*, “Walking a Tightrope – Towards a Framework for Dealing with Coexisting Organizational Paths”, I build upon the previous insights from manuscript 1 and perform an explorative longitudinal case study at a large-scale information and communication technology (ICT) company. The ICT company has implemented an organizational transformation, introducing agile management (i.e. creating a new organizational path) for 80% of its operations, while reducing their traditional management (i.e. the existing and locked-in path) to 20% over a transitional phase of three years. After showing that both agile management and the traditional waterfall management<sup>1</sup> can be seen as (actual as well as potential) organizational paths, I have been able to elaborate further on the creation of intended organizational path parallelism.

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<sup>1</sup> Waterfall management refers to an approach breaking down projects and all their related managerial activities to linear, distinct, sequential and predefined phases. The start of each phase depends the completion of its antecedent phase.

Following on this, *manuscript 3*, “Paralyzing Parallelism? Dynamics between Parallel Organizational Paths”, also refers to the longitudinal case study at the ICT company. However, in this inquiry I shift my research focus from the process of creating a new path in parallel towards the later stages of path coexistence and, in detail, elaborate on the tense interplay of both parallel organizational paths. After identifying that the dynamics between both paths change over time, I elaborate on their chronological evolution, too.

In order to demonstrate the interrelatedness of all three doctoral thesis manuscripts as well as their areas of synergy and contribution, they will be discussed and concluded subsequent to the three manuscripts.

[References of this chapter can be found in the  
reference section of the overarching conclusion (p. VI)]

## **First manuscript of the doctoral thesis**

### **Path Concepts between Persistence and Renewal – Towards an Interdisciplinary Framework to Inform Research on Organizational Paths**

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## **Path Concepts between Persistence and Renewal –**

### **Towards an Interdisciplinary Framework to Inform Research on Organizational Paths**

To inform research on organizational paths, we review *twelve novel path terms based on a systematic literature review*, such as path renewal or path transformation. These terms relate to different kinds of *change on or off a path*, whether it be the full termination of a path, with or without creating an alternative course of action, or smaller modifications on an existing and continuing path. Within our interdisciplinary analysis, we explore the use of the path terms in different research fields, enabling a subsequent comparison in the form of a framework, clustering all path terms and underlining the overall relations among the terms.

Keywords: Organizational path, path dependence, path creation, path change, systematic literature review

**(1) Where do paths lead to? In need of guidance**

Inquiries across disciplines adopt a path dependence lens to direct attention towards the underlying mechanisms leading to potentially ineffective and persistent situations (Bothello & Salles-Djelic, 2018; Castaldi & Dosi, 2006; Garud & Karnøe, 2001; Goh & Pentland, 2019; Sydow et al., 2009, 2020). These studies mostly focus on the evolvement of a path, the self-reinforcing mechanisms that are of utmost importance for any organization-theoretically informed path dependent inquiry (Sydow et al., 2009) and the irreversible situation of being ‘locked-in’ (Pierson, 2000). Such a perspective serves to sensitize to the possibility and potential dangers of such situations.

More recent studies have built upon the idea of organizational path dependence, but extend the concept by challenging the irreversibility and introducing possibilities to break away from existing paths, such as the idea of creating new paths (Garud & Karnøe, 2001). While Sydow et al. (2009) discuss the ideas of dissolving, breaking or escaping a path, Rothmann and Koch (2014) refer to regaining its efficiency and Fortwengel and Keller (2020) suggest regaining scope for maneuvering by focusing upon the agency of actors (Emirbayer & Mische, 1998). Other contributions have incited a vigorous debate on how path evolution might unfold, allowing for path changes (e.g. Manning & Sydow, 2011) or path exhaustion (Isaksen & Jakobsen, 2017).

However, while extending path literature by such novel aspects in various scientific fields, consistent utilization of those terms is missing. On the one hand, clear distinctions between apparently similar path terms are lacking (e.g. path extension vs. path expansion; Asheim, 2019; Sydow et al., 2020). On the other hand, the exact same path terms are used in different scientific fields, but do not have the same meanings. For instance, Holmen and Fosse (2017) refer to *path* emergence when they point out how paths evolve from previously existing technologies and structures, while Asheim (2019) as well as Martin and Simmie (2008) use



the term with a considerably more radical notion, referring to the development of paths that are not related to the already existing ones at all.

Against this background, the present systematic review of the literature contributes to research by elucidating the different path terms, differentiating them from one another, and contextualizing them. Moreover, we offer a tentative framework that incorporates the different path terms, so that they can be used in a coherent manner in future research.

## **(2) On the notions of organizational path dependence and forms of path deviation**

In what follows, we start by positioning our research in the debate revolving around the idea of organizational path dependence. Whereas path dependence stresses ideas of persistence and rigidity, path breaking and path creation favor the possibility of deviation and renewal, which we explore subsequently.

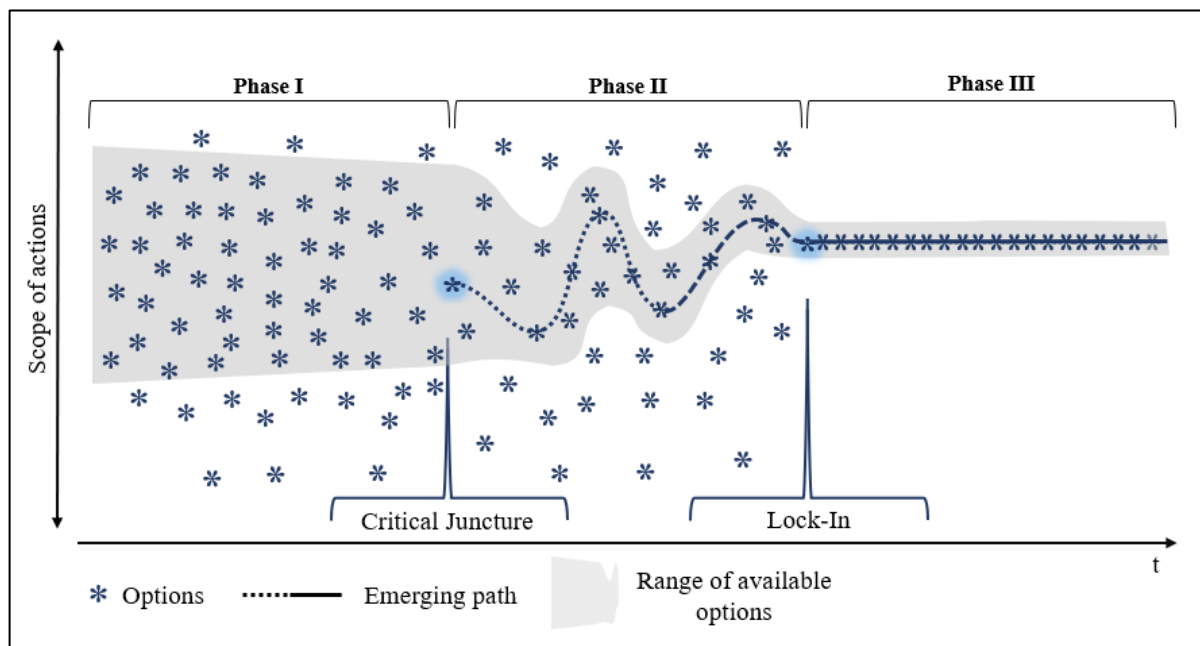
### *(2.1) Path dependence*

The concept of organizational path dependence is inspired by David (1985) and Arthur (1994) writing on technological path dependence and explains struggles related to inertia. The traditional concept has its origin in evolutionary economics and stems from David (1985), who elaborated on the evolution of the letter arrangement on typewriter keyboards. The QWERTY keyboard layout was developed 140 years ago to avoid blockages of mechanical typewriters, without giving deeper thought to improving efficiency regarding typing speed. David (1985) dealt with the question of why later alternatives to the QWERTY keyboard were rejected despite offering improved efficiency for text writing, naming the phenomenon ‘path dependence’. Later, Arthur (1994) enhanced David’s concept (1985) by detaching it from the context of technical innovations and applying it to the organizational context, arguing that organizations can become ‘locked-in’ due to increasing returns. From an organizational perspective, path dependence states that specific patterns and decisions can gain a

deterministic character and ultimately lead to the situation where other courses of action are no longer feasible (Sydow et al., 2009) and former strengths might turn into liabilities (Leonard-Barton, 1992). The process of becoming path dependent can be characterized by non-predictability (i.e. the outcome is not determined), nonergodicity (i.e. multiple outcomes are possible and history selects among them), inflexibility (i.e. state of entrapment, impossibility of shifting to other options) and inefficiency (i.e. a path leads to actions that result in an inferior solution; cf. Arthur, 1994; Pierson, 2000; Sydow et al., 2012a).

However, Sydow and colleagues (2009) already rebut the generalization of these properties and mention them instead as appearing in specific episodes of the process. They address the need for a framework that provides more insights than simply the message that past events have an impact on following actions. They point out four different mechanisms – complementarity, coordination, learning and adaptive expectation effects – contributing to the development of organizational path dependence. Those self-reinforcing mechanisms allow them specifically to contrast the notion of path dependence and other related concepts, for instance imprinting (Johnson, 2007; Marquis & Tilcsik, 2013) or escalating commitment (Ross & Staw, 1993; Staw, 1976). Self-reinforcing mechanisms turn into more and more systemic dynamics, which individual actors are no longer able to control. Complementarity effects refer to synergies resulting from interactions between two or more coherent resources, rules or practices on a general level. Coordination effects, more specifically, mean that the efficiency of organizational rules and routines increases with the number of individual actors following those operations, since their interactions and reactions can be better presaged in advance and hence coordination costs are reduced tremendously (Pierson, 2000; Stieglitz & Heine, 2007). Learning effects stand for increasing efficiencies in the conducting of practices (faster, more reliable), related to their replication for several times. Adaptive expectation effects mean that the more an individual actor is expected by his/her social environment to

follow certain rules, the more the actor is likely to adhere to those rules, hoping not to become stigmatized as an ‘outsider’ (Kulik et al., 2008; Sydow et al., 2009).



**Figure 1** Organizational path dependence (adapted from Sydow et al., 2009, p.692).

Based on David’s (1985) and Arthur’s (1989) conceptions, Sydow et al. (2009) suggest three distinct phases for organizational path dependence (see Figure 1), highlighting the importance of self-reinforcing processes triggered by small events leading to a potential lock-in, predominantly occurring ‘behind the backs’ of agents. The preformation phase (phase I) is characterized by a broad scope of possible choices in the areas of technology, management and markets. In this phase, the potential long-term consequences of the chosen actions cannot be fully predicted (Mahoney, 2000). As the preformation phase ends with the ‘critical juncture’, where at least one positive feedback mechanism is triggered (Dobusch & Schüßler, 2013), the formation phase (phase II) starts with it (Collier & Collier, 1991). In the formation phase a path is forming due to self-reinforcing processes causing increasing returns and positive feedback processes, which in turn reinforce previous patterns. From the first to the second phase, the scope of actions noticeably narrows. Subsequently, from the second to the third phase, the predominant pattern of actions is replicated so often that it finally results in a

status called ‘lock-in’. In this lock-in phase (phase III), organizations have only a few options left. Prior actions have led to an evolving path that the organization can only break away from with great difficulty or even not at all (Sydow et al., 2010). Due to this great inflexibility, a locked-in situation seems to be very undesirable for organizations. However, a locked-in situation is not necessarily negative per se. It only becomes negative when the organizational environment changes, while the organization itself is locked-in and therefore unable to adapt to that occurring transformation. The point in time at which the predominant pattern of a path remains replicated, albeit shifting from success to inefficiency, is characterized by the term ‘rationality shift’ (Rothmann & Koch, 2014).

### *(2.2) Path deviations*

Organizational path dependence is a phenomenon within which actions may happen contrary to the general economic logic, ascribing more agency and reflexivity to the actors involved (Emirbayer & Mische, 1998). Decisions are no longer based on the optimization principle, but are strongly influenced by historical decisions triggering self-reinforcing mechanisms (Dobusch & Schüßler, 2013; Fortwengel & Keller, 2020; Garud et al., 2010; Schreyögg, 2014; Sydow et al., 2009). Many researchers have investigated the concept of path dependence in general and focused solely on the evolvement of the path, whereas few have dealt with the lock-in phase itself and particularly the possible strategic activities on these paths (Rothmann & Koch, 2014). Restricted scopes of action imply fatal organizational consequences and, therefore, necessarily call for the interruption of the flow and the special dynamics of self-reinforcing patterns (Sydow et al., 2009). Several researchers have identified the locked-in path as inefficient at some point and, thus, seek for opportunities to withdraw from this fatal situation. Before discussing opportunities to break a path, it should be made clear what exactly is meant by path breaking in an organizational context. “Is it the destruction of a rigidified action pattern? Does it mean restoring the situation as depicted in phase I? Is it the broadening

of the “corridor” in phase III? Is it the realized switch to a superior alternative?” (Sydow et al., 2009, p. 702). The authors define the effective restoring of a scope of action as a minimum condition for path breaking. Schreyögg (2014) continues this conceptual inquiry to suggest more narrowly that path breaking is characterized by at least one alternative course of action, which must be a superior one at the same time, as an inferior one would not be an actually considered option.

In the context of path breaking, Sydow et al. (2009) distinguish between external and internal factors that may cause path breaking. Shocks, catastrophes and crises are one possibility to break away from a path by shaking the system, and are thus triggered through an external force (Arthur, 1994). However, there are also situations changing the state of being locked-in from the inside. Tolbert (1988) names demographical changes within an organization and incomplete socialization as reasons for dissolving an established path. By contrast, Castaldi and Dosi (2006) designate the possibility of path breaking by a coincidence, simply as a by-product of other decisions in an organization.

These perspectives have in common that the possibilities to break a path constitute an accidental process and are highly uncertain. The consideration of path deviations by referring solely to these path-breaking possibilities “has a passive flavor to it” (Sydow et al., 2009, p. 701).

In contrast, the conception of path creation (Garud & Karnøe, 2001) assumes that not only external shocks, catastrophes and crises (Arthur, 1994) or insidious coincidental processes lead to path breaking and, consequently, to a switch to new alternatives. Garud and Karnøe (2001) drastically enhance the range of possibilities to break a path by introducing path creation as “mindful deviation” (Garud & Karnøe, 2001, p. 7) from a path by collectivities or actors, assuming that organizations that are currently in the so-called lock-in phase might successfully implement their transformation from one path to another. Following Rothmann

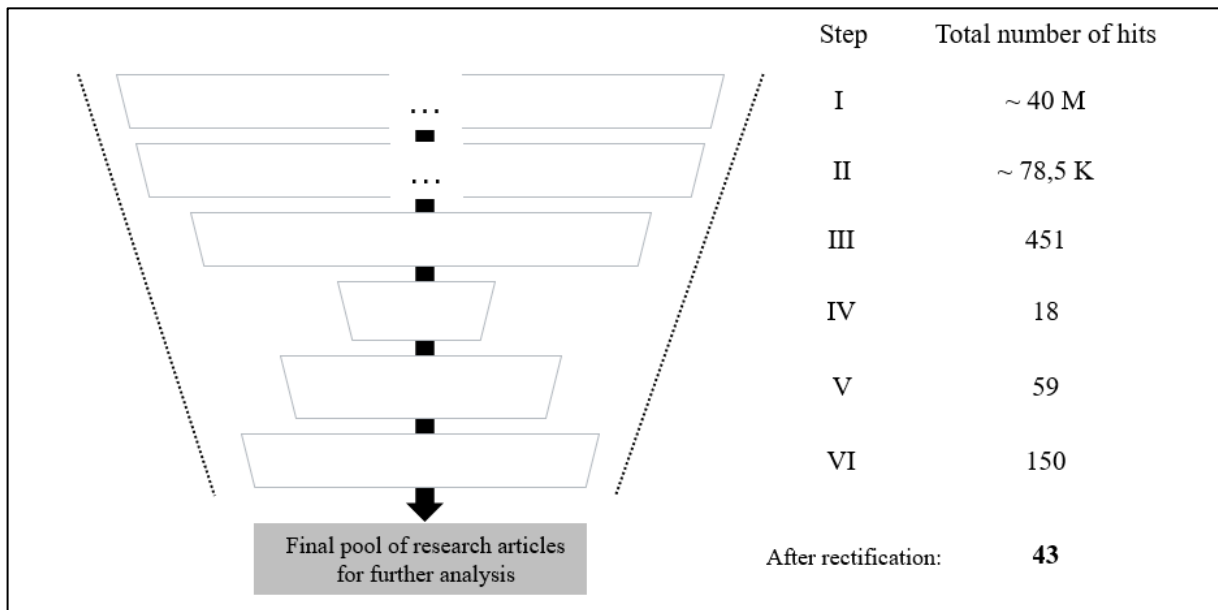
and Koch (2014), strategic alternatives cannot be taken for granted but must be created in a separate process. The ‘creation’ of new strategic alternatives is a requirement to overcome unsuccessful strategic patterns. The ‘passive flavor’ of the previously mentioned reasons for path breaking disappears in the concept of path creation by acknowledging a certain degree of agency among the actors mindfully creating a new path (Garud & Karnøe, 2001). Although Sydow and colleagues (2009) speak of becoming path-dependent as a process happening behind the backs of agents, in their publication of 2020 they clarify that this assumption seemed to be misunderstood in many further responses to their initial work (Sydow et al., 2009, 2020). They make clear that agency has always played an important role in path dependence theory, already in the first elaborations by David (1985) and Arthur (1994) and also within their conceptual framework (Sydow et al., 2009). However, it is important to note that this ‘active flavor’ does not necessarily imply full control over the entire deviation (Sydow et al., 2012a; Sydow et al., 2012b). In any case, there is terminological confusion due to a large number of different, albeit related terms, which motivates this systematic inquiry into path conceptions across disciplines, so as to inform research on organizational paths.

### **(3) Review Approach**

In the following section we will explain our systematic literature review approach in two parts. First, we elaborate on the process of filtering the huge number of research articles using particular indicators for inclusion as well as exclusion, ultimately resulting in a practicable number of articles for our final pool of literature. Second, we further formulate specific criteria that we will analyze strictly for each path term, following the exact same structure in the subsequent results section.

*(3.1) Sampling: Filtering and identifying relevant research articles*

The following review approach was inspired by previous systematic reviews (e.g. Bakker, 2010), to clarify our literature selection process transparently. Our process of literature selection consists of six consecutive search steps, gradually approaching our final pool of 43 relevant research articles (see Figure 2).



**Figure 2** Numbers of hits within the six-step literature selection process.

Initially, we started our review process from the well-established debates revolving around path dependence and path creation by using articles citing the seminal works by Sydow and colleagues (2009) and Garud and Karnøe (2001) for path dependence and creation respectively as our starting points. In doing so, we aimed at getting a first overview of what the current debate on path theorizing is like and where research is heading. Furthermore, it was important for us to remain open to varying path terms, since it was our research objective to shed light on the great number of different, though undifferentiated path terms. The identified path terms were to constitute the search items for our later systematic six-step search process.

While screening that basic literature and progressively identifying the most relevant articles, we broadened our focus by applying a backward and forward snowballing method to

the reference lists of the relevant articles. In doing so, our main driver of interest was to discover publications using novel path terms in the context of path theory, bringing up new ideas of ‘what kind of change can happen on/with a path’. At the end of the preparation phase, as a ‘conceptual saturation’ could be observed, we were able to identify twelve further novel path terms (exceeding the search items path dependency, path dependence, path breaking and path creation) with four different disciplinary anchorages, namely ‘organization related accounts’, ‘technology related inquiries’, ‘regional economy’ and ‘regulations and policies’: path change (Bailey et al., 2010), path constitution (Sydow et al., 2012a), path destruction (Dawley et al., 2014), path dissolution (Sydow et al., 2009), path emergence (Holmen & Fosse, 2017), path exhaustion (Fløysand et al., 2017), path expansion (Sydow et al., 2020), path extension (Gjelsvik & Aarstad, 2017), path generation (Broome & Seabrooke, 2015), path renewal (Coenen et al., 2015), path transformation (Singh et al., 2015) and path transition (Cooke, 2012). Those path terms represent the ultimate search items for our systematic six-step literature review.

We performed every step of the systematic review approach for each of the twelve novel path terms identified in our preparational search (see Table 1 for an overview of all search items and the respective hits in each search step). Therefore, we henceforth use ‘search item’ as a collective term for all novel path terms, for which we performed the search steps singularly. In the *first step* of our systematic literature review, we started the keyword-based search using the search engine Google Scholar, only defining the inclusion criterion of English-speaking articles, since we planned to gain a very broad overview of the range and distribution of research articles, regarding the respective search items. The date of publication was unrestricted. Since this first approach led to the very large number of almost 40 million hits and therefore an idea of the search item’s vast prevalence, we had to compress the number of hits tremendously within our next step. In our *second step*, the search engine as well as



inclusion criteria remained the same. However, we changed the search setting from a general keyword-based search to the setting requiring the path terms to appear in their exact word order. Although this restriction hugely reduced our pool of literature, still almost 80.000 articles remained. Thus, we had to restrict our research pool even further. For this step, we changed the search engine to the database EBSCOhost (<http://www.ebscohost.com/>), since it allows one to filter a lot of more specific restriction criteria than Google Scholar. In our *third step*, our first inclusion criteria were to focus on English speaking and double-blind peer-reviewed articles. Furthermore, due to the large number of articles in the path literature, we restricted the date of publication to ‘since 2009’. We chose the time span of 12 years, since in 2009 one of the major breakthroughs within organizational path dependence was achieved by Sydow et al. (2009)<sup>1</sup>. It was our main interest to see what had happened in research, since the concept of path dependence gained so much importance and popularity in the organizational context. Within that search, the following criteria for inclusion were defined: “‘search item’ in text AND (‘path dependence’ OR ‘path dependency’ OR ‘path creation’ in text)”<sup>2</sup>. By doing this, we searched for each search item within the text. To make sure, these items were not used by happenstance, we added the compelling criterion that either ‘path dependence’ or ‘path dependency’ or ‘path creation’ were mentioned in the text as well, and therefore the article dealt with path theory in some way. With that search setting our final pool of literature contained 451 articles. Thus, we aimed at further reducing the pool to a manageable number of hits. In our *fourth* step, the main inclusion criteria remained the same (English-speaking, double-blind peer-reviewed, >2009). We specified the search request as follows: “‘search item’ in title AND (‘path dependence’ OR ‘path dependency’ OR ‘path creation’ in text)”. Our aim was to filter the articles that definitely had a strong focus on our required topics, so the exact search item was to be mentioned in the title of the article. That step led to a very strong reduction in hits to a total number of 18 articles, which forced us to step back again and

broaden our search request once more. In our *fifth* step, again the main inclusion criteria remained the same. However, our search request was broadened by searching for the exact word order in the abstract instead of the title: ““search item” in abstract AND (‘path dependence’ OR ‘path dependency’ OR ‘path creation’ in text)’. When doing so, we still tried to ensure that our pool of literature had a strong focus on path theory, respectively the search item, by mentioning it in the abstract. This search request led to a total number of 59 research articles, which seemed a good number to be considered in our further literature review. However, we had to considered that this number still included doublings and other outliers, so we decided to broaden our search request one more time. In our *sixth* step, the main inclusion criteria remained the same again. The request was broadened by modulating it as follows: ““search item” in text AND (‘path dependence’ OR ‘path dependency’ OR ‘path creation’ in text)’. Through this adjustment, we made sure that our search item was mentioned in the text in the exact word order, while at the same time either ‘path dependence’ or ‘path dependency’ or ‘path creation’ were mentioned in the text as well. In our attempt to broaden the final pool of literature, it is striking that for some path terms, namely path change, path transformation and path transition, the number of articles surprisingly narrowed. This circumstance can be explained using an example: E.g. within the publication of Sebestyén (2012) the term path transition was mentioned in the abstract (therefore, it was one of our hits in step V), whereas in the body of the text, transition was only mentioned in other contexts, no longer in the context of path theory (therefore, it was no longer one of our hits in step VI). Thus, from step five to step six, this publication disappeared, although we had aimed at broadening our final pool of literature. Using this last research setting we achieved the final number of 150 hits.

This *final pool* of 150 research articles was corrected in two ways. First, by evaluating the relevance of the articles for our further investigations. We assessed an article as non-relevant when the search item was only found in the reference list and not used directly within the

article itself. After this correction, the final pool of research articles was reduced to 63. Second, we had to eliminate repeated entries of the same article, meaning articles that contained more than one of the twelve search items and, thus, were indicated as a hit more than once. Until now, those articles had been counted in the total number of hits for each search item that they contained. After screening out those doublings, our definite pool of research articles contained 43 publications (see Table 1).

**Table 1** Overview of research results in each step of the literature review.

Search item	Step I	Step II	Step III	Step IV	Step V	Step VI	eliminated by non-relevant* articles	eliminated by doubled articles
Path Change	5,86 M	16 K	191	6	15	9	4	
Path Constitution	1,89 M	417	17	3	5	16	6	
Path Destruction	1,77 M	1,7 K	6	0	0	6	1	
Path Dissolution	1,04 M	527	4	0	0	3	1	
Path Emergence	2,63 M	212	21	2	3	7	2	
Path Exhaustion	0,27 M	125	10	0	1	11	5	
Path Expansion	4,55 M	2 K	8	0	1	1	1	
Path Extension	4,95 M	4 K	47	1	11	42	24	
Path Generation	5,12 M	49 K	23	2	3	18	5	
Path Renewal	0,85 M	489	40	2	9	34	11	
Path Transformation	4,75 M	1 K	25	0	5	2	2	
Path Transition	5,35 M	3 K	59	2	6	1	1	
<b>Sum</b>	<b>~ 39 M</b>	<b>~ 78,5 K</b>	<b>451</b>	<b>18</b>	<b>59</b>	<b>150</b>	<b>63</b>	<b>43</b>

\*We assessed an article as non-relevant, when the search item was only found in the reference list and not directly used within the article itself.

*(3.2) Data analysis: Structuring the unstructured path terms*

Our systematic review of twelve different, albeit related path terms is pursued along a pre-defined structure. Every set of articles for each search item was sorted as follows: On the one hand, we distinguished between theoretical / conceptual and empirical articles. On the other hand, we also assigned all articles according to their disciplinary anchoring. Due to the broad range of different research contexts, we aggregated them into four different clusters for further analyses. First, the cluster ‘organization theoretical accounts’ includes all publications dealing with paths in an institutional or organizational way, but also regarding the evolution of

organizations as well as entrepreneurship as the process step of creating a business. Second, the cluster ‘technology related inquiries’ refers to paths in a more technological way, e.g. in the semiconductor industry or renewable energy technologies. Third, the cluster ‘regional economy’ includes all publications referring to paths in the sense of developing certain sectors or industrial activities in specific regions due to regional branching. Fourth, the cluster ‘regulations and policies’ includes all publications referring to paths in contexts subject to policy measures or related institutional affairs.

All further elaborations are in line with the distinction between those two dimensions (type of article and disciplinary anchoring). Our mapping of the state-of-the-art regarding path related terms builds upon these.

#### **(4) Results**

In this section we will first provide an initial characterization of all path terms by elaborating on their usage in the context of differing scientific perspectives. Based on that, we then compare and cluster the path terms to better understand their meaning and distinction from each other. Consequently, we come up with a preliminary framework, pointing out the relations between all the elaborated path terms. Finally, we highlight the resulting implications for further research.

##### *(4.1) Initial characterization of path terms*

In the following, we briefly describe the results for each search item in alphabetical order and consistently in line with the two previously introduced dimensions; that is, theoretical vis-à-vis empirical publications as well as disciplinary anchoring. Table 2 depicts the results.

**Table 2** Overview of literature pool regarding each search item.

Search item	Authors (year)	Empirical vs. theoretical	Context (clustered)
Path Change	Bailey et al. (2010)	empirical	organizational
	Béland & Powell (2016)	theoretical	regulations & politics
	Fornahl et al. (2012)	theoretical	organizational
	Sydow et al. (2020)	theoretical	organizational
Path Constitution	Holmen & Fosse (2017)	empirical	organizational
	Jing & Benner (2016)	empirical	organizational
	Maielli (2017)	empirical	organizational
	Singh et al. (2015)	theoretical	organizational
	Sydow et al. (2012a)	empirical	organizational
	Sydow et al. (2012b)	empirical	organizational
Path Destruction	Dawley et al. (2014)	empirical	regional economy
Path Dissolution	Sydow et al. (2009)	theoretical	organizational
Path Emergence	Asheim (2019)	theoretical	regional economy
	Holmen & Fosse (2017)	empirical	regional economy
Path Exhaustion	Aslesen et al. (2017)	empirical	regional economy
	Brekke (2015)	empirical	regional economy
	Cheung & Kwong (2017)	theoretical	organizational
	Fløysand et al. (2017)	empirical	regional economy
	Isaksen et al. (2018)	empirical	regional economy
Path Expansion	Sydow et al. (2020)	theoretical	organizational
Path Extension	Alexy et al. (2013)	theoretical	technological
	Aranguren et al. (2019)	empirical	regulations & politics
	Asheim (2019)	theoretical	organizational
	Aslesen et al. (2017)	empirical	regional economy
	Benner (2020)	theoretical	regulations & politics
	Bishop (2019)	empirical	organizational
	Brekke (2015)	empirical	regional economy
	Cheung & Kwong (2017)	theoretical	organizational
	Fløysand et al. (2017)	empirical	regional economy
	Gjelsvik (2018)	empirical	regional economy
	Gjelsvik & Aarstad (2017)	empirical	regional economy
	Hauge et al. (2017)	empirical	regulations & politics
	Isaksen (2015)	empirical	regional economy
	Isaksen et al. (2018)	empirical	regional economy
	Isaksen et al. (2019)	theoretical	regional economy
	Isaksen & Jakobsen (2017)	empirical	regional economy
Květoň & Blažek (2018)	empirical	regional economy	

	Larsen et al. (2018)	empirical	regulations & politics
	Martin et al. (2019)	theoretical	regional economy
	Nieth et al. (2018)	empirical	regional economy
	Sörvik et al. (2019)	theoretical	regional economy
	Sydow et al. (2020)	theoretical	technological
	Williams & Vorley (2017)	empirical	regional economy
	Zukauskaite & Moodysson (2016)	theoretical	regional economy
Path Generation	Broome & Seabrooke (2015)	empirical	regulations & politics
	Kang (2014)	theoretical	organizational
	Lim & Horesh (2017)	empirical	regional economy
	Onufrey (2017)	empirical	technological
	Sydow et al. (2020)	theoretical	organizational
Path Renewal	Aslesen et al. (2017)	theoretical	regional economy
	Brekke (2015)	empirical	regional economy
	Cheung & Kwong (2017)	theoretical	organizational
	Coenen et al. (2015)	empirical	regional economy
	Fløysand et al. (2017)	empirical	regional economy
	Hauge et al. (2017)	empirical	regional economy
	Isaksen & Jakobsen (2017)	theoretical	regional economy
	Nieth et al. (2018)	empirical	regional economy
	Rypestøl & Aarstad (2018)	empirical	regional economy
	Sörvik et al. (2019)	theoretical	regional economy
	Zukauskaite & Moodysson (2016)	theoretical	regional economy
Path Transformation	González-López et al. (2019)	theoretical	regional economy
	Singh et al. (2015)	empirical	technological
Path Transition	Cooke (2012)	empirical	technological

### *Path Change*

In the context of *organizational* path change, Sydow et al. (2020) relate to path-breaking change and conceptualize it as a *restoration of choices*. Referring to their publication in 2009, Sydow et al. (2020) define it as the intentional creation or restoration of *at least one viable alternative* and go on to argue that only in rare cases would a single actor be able to break a path in that sense. In contrast, Fornahl et al. (2012) describe more precisely the extent to which the change of a path occurs. Referring to Karnøe and Garud (1995), they speak of an *incremental adaptation process* over a long period of time, in which the various elements of a

path are gradually modified through the actions and experimentation of the actors. In doing so, they relate to *on-path change*, while the expressions of Sydow et al. (2020), contrastingly, pointed out path-breaking change (i.e. the termination of the old path). Bailey et al. (2010) focus instead on the requirements for path change. In doing so, they point out that path change requires a very different form of leadership to an organic leadership style, enabling actors to overcome potentially costly barriers and explore an ‘alternative path’ *co-existing alongside the dominant one*. In contrast, in the context of policies and regulations, path-breaking change is used by Béland and Powell (2016) as one of the terms for the *most radical form of policy change*. Therefore, the authors point more in the direction of Sydow et al. (2020), requiring path breaking to pursue path change.

#### *Path Constitution*

All articles focus on path constitution in light of organizational paths. The central idea behind the description of path constitution by Sydow et al. (2012a) is the call for a theoretical understanding that recognizes the *constructivist turn* in path research (e.g. Garud & Karnøe, 2001; Windeler, 2003) and applies recent concepts of path formation *without losing its ability to explain path-dependent processes*. “Path constitution [...] accounts for the recursive interplay of socially embedded strategic agency and endogenous change and of ‘external’ events, unintended consequences and unacknowledged conditions of action. Thus, it stays sensitive not only to strategic agency [...], but also to emergent properties of technological, institutional and organizational paths, — including their often subtle interplay” (Sydow et al., 2012b, p. 931). The authors note that path constitution can occur in two particular modes, namely path creation or path extension. This view stems from the application of structuration theory (cf. Giddens, 1984; Windeler, 2003) to the phenomenon of organizational path dependence (Sydow et al., 2012b). Drawing on this, Singh et al. (2015) characterize the concept of path constitution in terms of the more general idea of social construction,

emphasizing the *dualism between action and structure*. In their conceptual work, Singh et al. (2015) submit that path constitution outlines “emergent processes that are *beyond the control of actors* as well as by *active engagement* and *mindful contribution* of powerful actors” (Singh et al., 2015, p. 644). Maielli (2017) makes further use of the path constitution conception, but views it not as an overarching term for path dependence and creation, but assumes that “a phase of path creation might well be followed by a phase of path constitution” (Maielli, 2017, p. 105). Building on the study by Sydow et al. (2012a), Jing and Benner (2016) strengthen the notion of path constitution as a theoretical model, looking at path dependence and path creation as *complementary factors* within the process of organizational evolution. In their empirical study, Holmen and Fosse (2017) define the concept of path constitution as the establishment of new industry pathways, which can either be dormant or arise from an already existing path.

#### *Path Destruction*

Dawley et al. (2014) mention regional development as “a never-ending interplay of path dependence, path creation and path destruction that occurs as actors in different arenas reproduce, mindfully deviate from and transform existing structures, practices and development paths” (Dawley et al., 2014, p. 157). Therefore, path destruction is accompanied by path transformation in the sense of Dawley et al. (2014).

#### *Path Dissolution*

Within their conceptual publication, Sydow et al. (2009) relate to organizational path dissolution. They discuss the causes for path dissolution, stating that it can be triggered by unforeseen exogenous forces, meaning shocks, disasters, or crises, which can occur. These shake the system, leading organizations to break from their existing path. Furthermore, path dissolution may also happen due to a gradual change in organizational demographics or may arise due to the “incomplete” socialization of new organizational members and by that amounting to a random process (Sydow et al., 2009).



### *Path Emergence*

Within their conception of path emergence, Holmen and Fosse (2017) refer to Boschma and Frenken (2012), who argue that path emergence is related to formerly established local capabilities, routines, and institutions. Thus, new industries would emerge from existing technology and industry structures through regional branching processes. Later, Asheim (2019) defines path emergence considerably more radically in terms of the emergence and growth of *entirely new industries*, in virtue of radical new technologies and scientific discoveries, or as the result of search processes for completely new business models or innovations. Thus, both describe path emergence as the genesis of something new, regardless of their differing scope in terms of ‘disruptiveness’.

### *Path Exhaustion*

Within the organizational context, path exhaustion is characterized by Cheung and Kwong (2017) as the *continuation* of a previous path, *although* the current situation *no longer favors* the prevalent activity. More specifically, they describe this as an historically overdeveloped, excessive reliance on specific skills and resources that have become obsolete for that special purpose (Cheung & Kwong, 2017; Grabher, 1993). From the perspective of regional economy, path exhaustion represents a situation in which a region or an industrial sector is in a *negative lock-in*, with a narrowed potential for innovating. Furthermore, a regional industry can get into a situation of path exhaustion “when existing industry cannot (or is slow to) respond to emerging technologies and increasing competition, because of low resilience and adaptability” (Brekke, 2015, p. 207). Isaksen et al. (2018) mention path exhaustion in combination with a negative lock-in and a missing possibility for change. In line with that, Aslesen et al. (2017) put forward path exhaustion in the context of inertia resulting from specialization effects. Those primarily positive effects lead to such an inflexible situation that adaption is no longer possible, even when new environmental conditions require it. A case in point in this regard is

the study by Fløysand et al. (2017). In sum, path exhaustion seems to be utilized in a very homogenous manner, regardless of the respective context. In all the mentioned contexts, path exhaustion refers to inertia in a negatively locked-in situation, missing the ability to adapt or change and, therefore, constituting a later form of path dependence after the so-called rationality shift (Rothmann & Koch, 2014).

#### *Path Expansion*

Sydow et al. (2020) state that paths are not fully isolated from each other and rather tend to spread throughout an organism. Furthermore, they question what drivers strengthen the expansion of a path throughout an organization. Towards this end, path expansion would characteristically occur “through pattern and path inscription” (Sydow et al., 2020). Hence, the term ‘expansion’ in this context does not mean an expansion of a path’s scope of action, but rather the expansion of a (narrow) path throughout an organization – meaning the increasing penetration of the organization by that specific path.

#### *Path Extension*

In the context of organization related accounts, Cheung and Kwong (2017) speak about path extension as a situation in which actors intentionally decide to continue along an existing path and to spawn further products and services by *incremental developments*. In line with this assumption, Asheim (2019) and Bishop (2019) also deal with path extension as the outcome of *incremental innovations*. Asheim (2019) additionally stresses that those innovations arise based on an continuing path and the use of *existing knowledge*. Most recently, Sydow et al. (2020) define path extension as “an effortful and creative form of maintaining and further exploiting an established path” (Sydow et al., 2020, p. 730).

In the context of technology related inquiries, Alexy et al. (2013) speak about “issue spreading” and “product enhancing” (Alexy et al., 2013, p. 282) and, therefore, also emphasize *incremental development*.

In the context of regulations and policies, Hauge et al. (2017) and Larsen et al. (2018) mention policy instruments reinforcing path extension and simultaneously contrast extension to the creation of a new path; with that, they imply that path extension requires the *continuation* of an old path. In line with this, Aranguren et al. (2019) elaborate on “mechanisms [...] [building] around path extension and therefore regional innovation policy [developing] incremental changes” (Aranguren et al., 2019, p. 457). Benner (2020) defines path extension in line with Sydow et al. (2020) as “the continuation of existing trajectories, notably through incremental innovation” (Benner, 2020, p. 2429).

In the most prominent cluster with regard to path extension, namely regional economy, the concept is used in a similar manner to the previous ones, meaning that “regional institutions and investments are adapted to enable the growth of a particular dominant industry” (Aslesen et al., 2017, p. 445). In line with this definition, most researchers in this context refer to using path extension as the intentional *continuation* of an existing path, while at the same time, *incrementally* driving innovations on it (Brekke, 2015; Fløysand et al., 2017; Gjelsvik, 2018; Gjelsvik & Aarstad, 2017; Isaksen, 2015; Isaksen et al., 2018; Isaksen et al., 2019; Martin et al., 2019; Nieth et al., 2018; Sörvik et al., 2019; Zukauskaitė & Moodysson, 2016). Květoň and Blažek (2018), similar to the later publication by Aslesen et al. (2017), directly relate path extension to existing *knowledge* by defining it as the “[reinforcement of] existing regional industries based on accumulation of know-how and capacities” (Květoň & Blažek, 2018, p. 2062). Additionally, Isaksen and Jakobsen (2017) explicitly differentiate path extension from path diversification, path renewal and path creation, while Williams and Vorley (2017) contrast it to the idea of path breaking.

In sum, surprisingly, all articles dealing with path extension in different scientific contexts commonly relate to path extension as a continuation and reinforcement of an existing path, accompanied by incremental change. However, ‘incremental change’ is by nature subject to

social construction, as pointed out above and, therefore, needs to be ascertained in relation to the specific extent of change, which might vary considerably from situation to situation.

#### *Path Generation*

Kang (2014) describes path generation as an exogenous shock, leading to a transformation of an organization's interests. However, Sydow et al. (2020) touch upon Djelic and Quack's (2007) idea of path generation as the creation of a new path or a significant deviation from a path, with the particularity that this new path develops due to numerous sequential, small or even seemingly negligible steps. Hence, path generation is *not comparable to radical major changes initiated by one 'hard cut' decision, but rather evolves with the aggregation of many decision points* and critical junctures in the traditional sense (Sydow et al., 2009). From the perspective of technological paths, Onufrey (2017) emphasizes the causal relationship between an established path and the newly generated path by stressing that "a new path is a logical consequence of existing self-reinforcing mechanisms" (Onufrey, 2017, p. 1066). From the perspective of regional economy, the authors Lim and Horesh (2017) examine the socio-economic changes in post-Mao China. In this context, path generation is understood as the development of a path that significantly deviates from the national guidelines. Lastly, in the context of regulations and policies, Broome and Seabrooke (2015) understand path generation as a process for spreading policy norms and adapting them across different legal systems.

#### *Path Renewal*

Within the organizational context, Cheung and Kwong (2017) refer to path renewal as "a situation when entrepreneurs *branch out into new business sectors* based on pre-existing competencies and resources" (Cheung & Kwong, 2017, p. 906).

In the context of regional economy, path renewal "involves the growth of new activities and new industries" (Isaksen & Jakobsen, 2017, p. 356) and "appears via inter-industry learning when new possibilities emerge while combining existing resources in a new way"

(Zukauskaite & Moodysson, 2016, p. 591). There seems to be great consensus between the authors of the elaborated articles, as all of them refer to path renewal as the spread of an existing path in other related sectors (Aslesen et al., 2017; Brekke, 2015; Hauge et al., 2017; Nieth et al., 2018; Rypestøl & Aarstad, 2018; Sörvik et al., 2019). Furthermore, Coenen et al. (2015) mention that “the literature is less developed with regard to questions about whether and how regional innovation policy can in fact contribute to the unlocking and path renewal mechanisms that are needed in light of such a transition” (Coenen et al., 2015, p. 855), which entails a clear relation or even overlap between path renewal and path transition.

#### *Path Transformation*

In their conceptual work, González-López et al. (2019) use the term path transformation to refer mainly to industrial transformations, implying *most radical and disruptive* ones such as deep path diversifications or path creation. By contrast, Singh et al. (2015) use the term in the context of transforming existing artifacts, structures and practices through the assimilation of technological innovations. They do not assume such a radical meaning of transformation as González-López et al. (2019), but clearly position ‘transforming’ in a path context, directly contrasting to the notion of ‘reinforcing’ and, therefore, also clearly focusing on the push in a new direction.

#### *Path Transition*

Lastly, Cooke (2012) mentions path transition in a technological context and relates to it as the occurrence of transitions of innovations. Informed by prior theorizing, he ranks different degrees of path-dependent changes following the two dimensions ‘variety’ and ‘regional innovation’. While terms like ‘high path dependence’ or ‘incremental change’ are assigned to low variety and low regional innovation, ‘co-evolutionary transition’ represents high variety and high regional innovation and, thus, a *radical shift away from historic trajectories*.

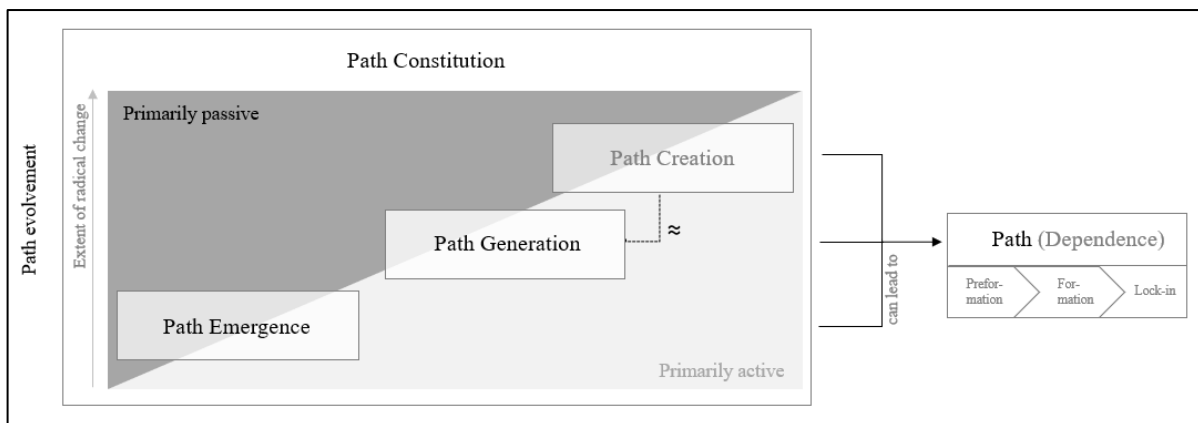
*(4.2) Comparison and clustering of previously characterized path terms*

Since the results of our analysis do not suggest an intuitively arising conception combining all path terms, we introduce a further distinction to split the full group of terms for further composition. To start, we will take a look at all path terms dealing with the question “How does a path evolve?”. Subsequently, we will focus on all path terms dealing with the question “What can happen to a path?”. To enable a more generic classification as well as delimitation of the path terms, we will characterize each term briefly on a more abstract level than before.

*How does a path evolve?*

From the twelve investigated path terms, three terms had a direct focus on the evolvement of a path: path generation, path emergence and path constitution. Those concepts can be compared with the traditional concept of path creation, since it also deals with the evolvement of a new path. As we grasp ‘path creation’ as one of the traditional path concepts besides path dependence and path breaking, we did not explicitly analyze it as one of the *novel* path terms in section 4.1. However, we still feel that path creation should be incorporated into our overall conception (Figure 3) due to higher comprehensibility regarding the interrelations of the different path terms. Furthermore, we also added ‘path’ to our conception to clarify that all of the cited path terms *can* lead to a path or even, in very special cases, to path dependence. It is important to note that neither path emergence nor path generation, path creation nor path constitution necessarily lead to a path-dependent situation.

We positioned the path terms according to their ‘strong’ or ‘weak’ understanding of agency (Fortwengel & Keller, 2020). Is a path evolving mainly unintentionally, ‘behind the back of the agents’ (Sydow et al., 2009), as the traditional concept of organizational path dependence suggests, or mainly actively, by mindfully deviating from an existing path (Garud & Karnøe, 2001)? Figure 3 depicts a summarizing classification of the path terms according to the abovementioned criteria.



**Figure 3** Conceptualization ‘How does a path evolve?’.

Path generation literally describes the emergence of a new path, emphasizing the development of a significantly different, new path in sometimes apparently inconsequential steps, leading to transformation (Djelic & Quack, 2007; Kang, 2014; Sydow et al., 2020). This high degree of deviation from an old path is not meant in the way of change accidentally happening behind the back of the agents, but rather as an active, thoughtful, and successive deviation. Therefore, path generation and the traditional concept of path creation are used in a very similar manner, standing for an active and mindful deviation from an old path, working towards a significantly different new one (Djelic & Quack, 2007; Garud & Karnøe, 2001). The degree of deviation as well as the degree of agency can differ from situation to situation.

The different authors agree that path emergence describes the formation of new industries. However, the underlying reason for the emergence of the new path remains debatable and ranges from the emergence of a new path that is directly related to an existing one to the emergence of a path based on very radical changes (Asheim, 2019; Holmen & Fosse, 2017).

Path constitution can take the shape of path creation or path extension (Sydow et al., 2012b). In the literal sense, the term describes the constitution of a new path, which means that it can be understood on the one hand as an extension of an existing path and, on the other hand, as an entirely new path. The recursive interplay of strategic agency and endogenous

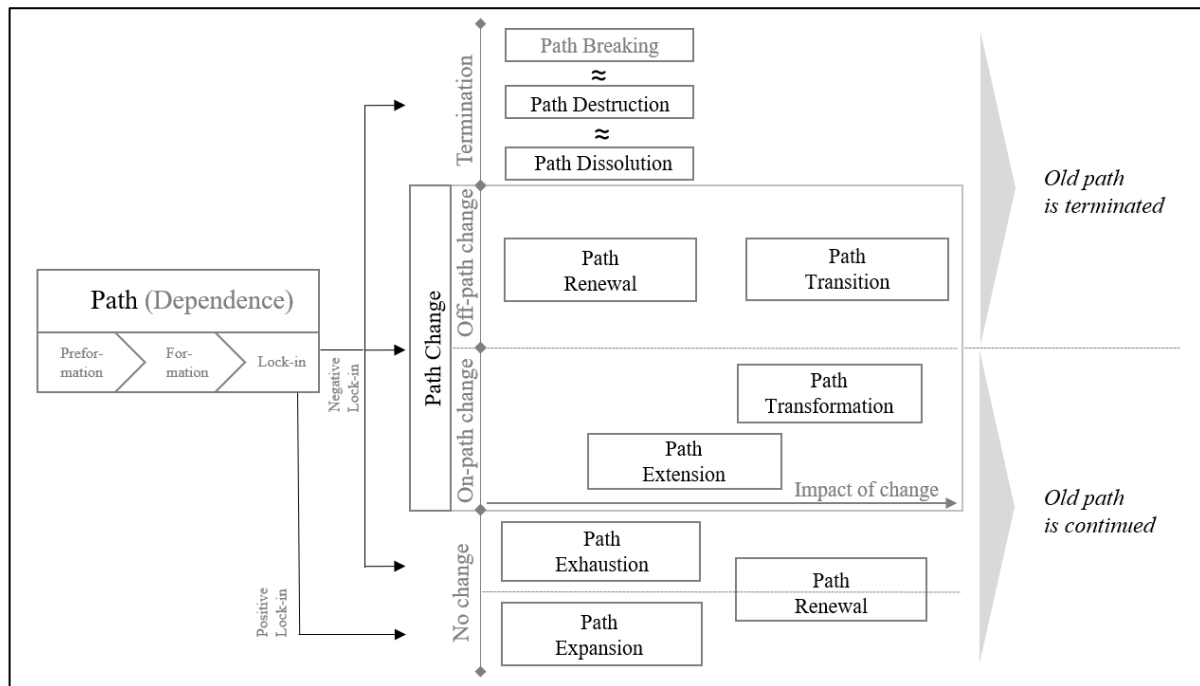
change is explicitly mentioned (Sydow et al., 2012b). Since the concept of path constitution embeds both perspectives, a very passive and a very active idea regarding agency, within the formation of a path, in our conceptualization it encompasses all the previously mentioned concepts.

Regarding Figure 3, it should be noted that the positioning of path creation on the far right does not mean that path creation has a significantly more active notion than path generation. Rather, the colored background of the ‘path term boxes’ suggests the degree of the underlying notion of agency within the concepts. However, the upper position of path creation, compared to path generation and path emergence, refers to the assumed extent of radical change, which is indicated by the axis on the left-hand side. Subsuming previous ideas, the blatant creation of a completely new path seems to have a slightly stronger radical nature than the concepts of ‘path generation’, sometimes consisting of many incremental, seamless process steps, finally leading to radical changes, as well.

*What can happen with a path?*

From the twelve investigated path terms, nine terms had a direct focus on the further development of an existing path: path change, path destruction, path dissolution, path exhaustion, path expansion, path extension, path renewal, path transformation and path transition. Figure 4 depicts the summarizing conception regarding those path terms.





**Figure 4** Conceptualization ‘What can happen with a path?’.

We were able to identify four different overarching scenarios regarding the questions ‘what can happen with a path?’, depending on the prevailing situation of the existing path: ‘no change’, ‘on-path change’, ‘off-path change’ and ‘termination’. First of all, thinking about an existing path, we can distinguish between a positive or negative lock-in. In the case of a positive lock-in, there is no urgent need to change. Thus, this situation leads to our first scenario ‘no change’. We assigned path expansion and path renewal to this scenario. Path expansion describes the emergence and spreading of a path. According to the theory of path dependence, these paths are constituted by self-reinforcing processes (Sydow et al., 2020). The expansion of a path is to be understood as an extension of its influence within an organization – and not as the extension of its scope of action, as initially assumed. Therefore, path expansion refers to ‘no change’ of a path, but merely to its expansion throughout an organization.

In contrast, path renewal represents the recreation of an existing path in another existing industry through diversification to related sectors (e.g. Sörvik et al., 2019). In line with that,

there are two different ways of interpreting path renewal, which is why it appears twice in Figure 4: First, as the recreation of an existing path in another related sector, while simultaneously continuing the traditional one in the initial sector, whether intentionally or not. Second, the more seldom and radical version, as the recreation of an existing path in another related sector, while terminating the traditional one in the initial sector. Path renewal in the sense of our first interpretation is part of ‘no change’ within our conception, since following this idea, the old path is remaining, be it intentionally (positive lock-in) or not (negative lock-in, but unable to change). Therefore, path renewal is positioned in the field of ‘no change’ due to a positive lock-in as well as due to a negative lock-in.

This leads us to the next phenomenon, in which a negative lock-in is present, but unfortunately, there are no feasible opportunities for any kind of change due to strong inertia –the fatal situation of path exhaustion. Path exhaustion is described by Cheung and Kwong (2017) as a path that reverts to obsolete patterns and thus becomes obsolete as a pathway itself. Thus, path exhaustion should be understood as a condition that occurs when an existing path is *followed for too long and flexibility is lost*, which can lead to the obsolescence of the path. However, this path is still continued, due to a lack of possibilities to break it.

Following up on this, we will take a look at the opposite scenario to ‘no change’, namely ‘termination’ (upper part of Figure 4). In this regard, we think of scenarios in which a locked-in situation was so fatal and destructive that e.g. an organization needs to quit all their businesses and therefore completely eliminate a path by terminating all their actions. Another example might be the complete shutdown of an entire business unit or the entire termination of a special technology’s use. Since the path breaking conception overlaps with ideas revolving around ‘path dissolution’ (Sydow et al., 2009) and ‘path destruction’ (Dawley et al., 2014), we positioned all those terms in the area of ‘termination’. However, we must admit critically that we miss an important point in our conception. In several publications, path

breaking, path destruction or path dissolution are assumed to *necessarily precede* different kinds of change (e.g. path transition, cf. Cooke, 2012), which is neglected within our conception (Figure 4).

The more complicated part of our conception is everything related to path change (the middle part of the conception in Figure 4). All path changes stem from a negative lock-in, requiring a certain degree of change to enable future success. It should be noted that path change and path-breaking change are sometimes used synonymously in the literature, which suggest that path breaking might be an inevitable condition for path change to occur. However, there are also notions, putting forward ‘*on-path change*’, contradicting the previous suggestions by implying options for change on an existing path. Bailey et al. (2010) understand path change as an *alternative* path that develops alongside the existing path. Sydow et al. (2020) agree with this understanding by referring to path-breaking change as the creation or restoration of at least one *alternative* to the existing path. In contrast, Fornahl et al. (2012) base their understanding of path change on Karnøe and Garud (1995), seeing path change as a *long-term, incremental adaptation process* that changes an existing path. Thus, path change can be seen as both a shift to an alternative path (i.e. off-path change) and continuing the existing path and pursuing incremental changes (i.e. on-path change).

Referring to Cooke (2012), path transition requires preceding path breaking to shake loose from existing structures and enable the transition to a new path, which is in line with the perception that ‘off-path change’ goes along with the entire termination of an old path and subsequently the transition to a new one. In addition, we also located ‘path renewal’ in the same area, relating to the specific scenario of recreating an initial path to another context (i.e. to another related sector), while at the same time terminating the old one – therefore, also referring to ‘off-path change’.

Lastly, the conceptions regarding on-path change are not clearly differentiable, which is indicated in Figure 4. For a clearer classification of the two remaining path terms within the context of on-path change, we took the *impact of change* into account. Following that logic, we start with path extension, ranging from associations with smaller changes to bigger, more radical, but still somehow ‘incremental’ ones (Asheim, 2019; Cheung & Kwong, 2017; Isaksen et al., 2019; Nieth et al., 2018; Sörvik et al., 2019). The more radical an innovation is, the more likely it is that a path transformation or other path phenomenon will occur. Path transformation refers to very radical, disruptive and great changes (González-López et al., 2019). Both terms, path extension as well as path transformation, have in common that their changes, no matter how radical they might be, do take place *on* an existing path, intending to *continue* it.

#### *(4.3) Towards a preliminary framework*

The two previously worked out conceptions dealing with the questions “how does a path evolve?” (Figure 3) and “what can happen with a path?” (Figure 4) can be merged within one more comprehensive framework (Figure 5), which we will explain briefly in the following.

First of all, on the left-hand side, we start with the conception relating to the evolvement of a path. As depicted in section 4.2, ‘path emergence’, ‘path generation’ and ‘path creation’ can be considered when we think of the formation of new paths. All three terms are classified according to the intentionality of action (primarily active vs. primarily passive) as well as regarding the extent of radical change. Since Sydow et al. (2012a) try to marry the traditional rather passive perspective on path dependence with a primarily active perspective on path creation by introducing the concept of path constitution, we interpreted ‘path emergence’, ‘path generation’ and ‘path creation’ as being incorporated within ‘path constitution’. All of them can lead to a path under certain circumstances, or in special cases even to path

dependence. When a path is formed, it can result in a positive or a negative lock-in. What can happen subsequently with a path, in both cases, is depicted in the right part of our conception. In the case of a positive lock-in, most likely no change will be required and is therefore not intended, either. However, the option ‘no change’ does not only relate to positive lock-ins. There are also situations where no change might happen, although a negative lock-in is prevalent, simply because no course of action is feasible anymore. Besides the scenario ‘no change’, we constitute the field of ‘path change’, which can be split into ‘on-path change’ as well as ‘off-path change’. Furthermore, in the upper part, we outline the scenario ‘termination’ as an extreme form of what can happen due to a negative lock-in, namely the full expiration of a path. For further clarifications on the specific arrangement of the path terms within those areas, see section 4.2. Lastly, in the rightmost part of the framework we labeled the common underlying idea of all path terms captured on the same horizontal level. All path terms related to ‘no change’ and ‘on-path change’ commonly refer to the continuation of the existing path. In contrast, all path terms related to ‘off-path change’ and ‘termination’ commonly refer to the expiration of the existing path.

Lastly, we want to clarify the legend of our final framework, since it was not part of the previously conceived figures. Within each ‘path term box’, we added further information in both upper corners relating to the structure of our analysis. On the left-hand side, we added the type of research by inserting a ‘T’ for theoretical/conceptual publications or an ‘E’ for empirical publications. On the right-hand side, we added ‘O’ relating to organization related accounts, ‘T’ relating to technology related inquiries, ‘RE’ relating to regional economy and ‘RP’ relating to regulations and policies. By doing so, we are now able to provide a quick overview of which path terms have been dealt with solely in a conceptual manner and which of them have also been elaborated in the context of empirical phenomena. Furthermore, we can discern which path terms have been subject to elaborations with different disciplinary

anchoring. That information enables us to deduce potential for further research and to discover which scientific areas might benefit from other ones by adapting their notions on novel path terms to their own contexts and related empirical phenomena.

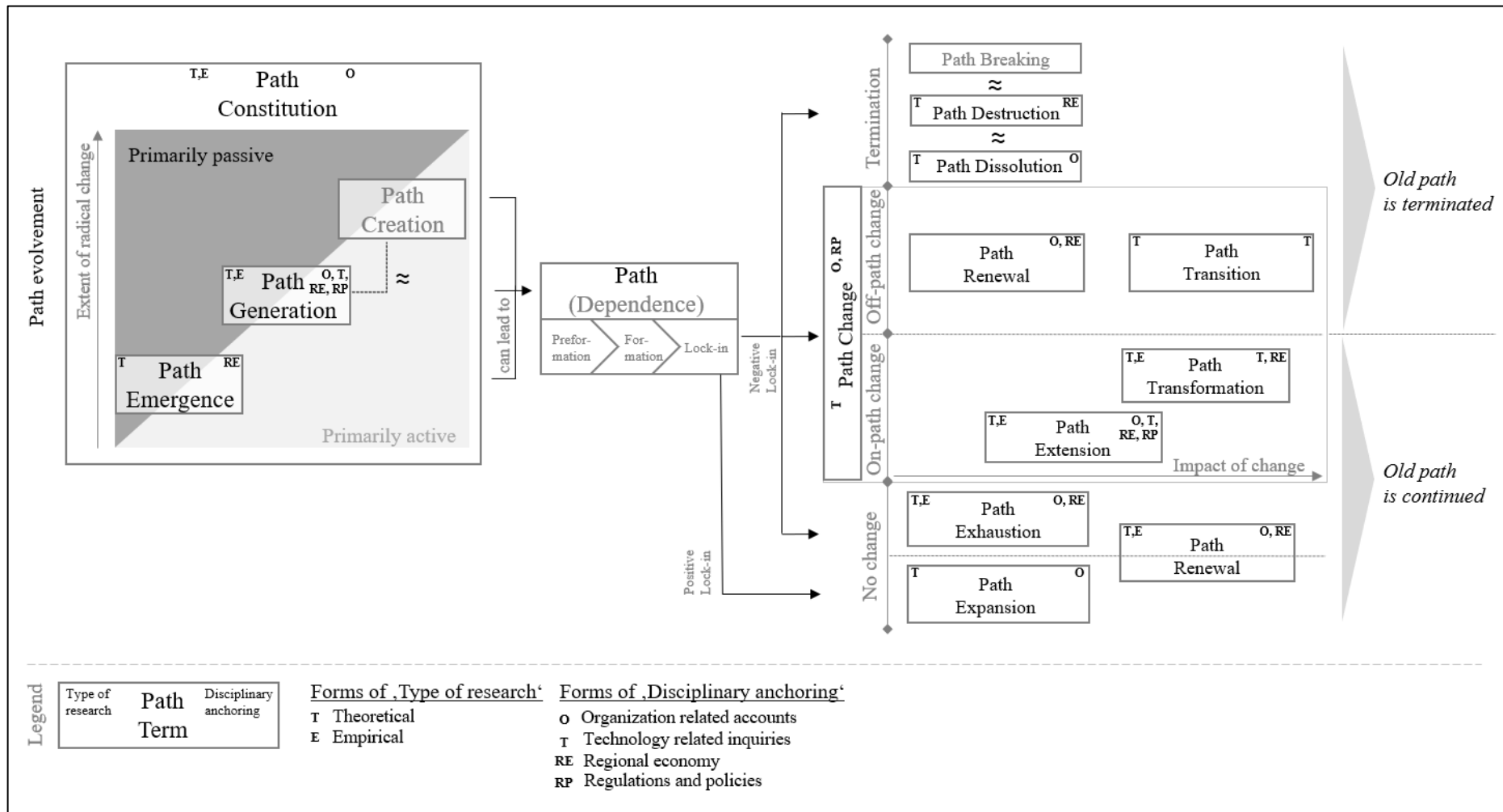


Figure 5 Overarching framework on novel path terms.

*(4.4) Implications for future research*

During our analysis, we became aware of several routes that future organization-theoretically informed path-theorizing might take, of which we would like to sketch the most appealing from our perspective. First, there were instances (e.g. Bothello & Salles-Djelic, 2018; Singh et al., 2015) indicating the possibility of parallel paths. While Singh et al. (2015) emphasize the need to understand “the interdependencies between multiple paths by focusing on how they entangle through specific organizational practices and arrangements” (Singh et al., 2015, p. 646), Bothello and Salles-Djelic (2018) also mention that “an examination of path interactions in domains populated by multiple paths [...] would represent valuable theoretical development for current debates on path dependence” (Bothello & Salles-Djelic, 2018, p. 96). However, none of all the analyzed novel path terms refers to such a situation of intended parallel paths. As depicted in Figure 5, all the examined path terms in the course of path change *either* imply continuing the existing path, intending changes *on* the path, *or* imply *quitting* the existing path, resulting in a change to a new path. However, the idea of two intentionally coexisting paths – i.e. continuing an old path and at the same time mindfully creating a new one – might be of interest for further research, as empirical phenomena allow for such coexistence (e.g. in the case of competing technological options as indicated by Sydow et al., 2012a).

Second, what are the implications for organizational and management-related theorizing? Apart from the potential coexistence of paths, the different terms sketched in our framework might offer beneficial scope for further theoretical elaboration as a conceptual ‘import’ from another field of inquiry, enabling a further nuanced understanding of path theorizing. For instance, consider the overarching observation of on- and off-path change, which might help to classify existing approaches more poignantly. For instance, from an organizational perspective, taking a look at Figure 5, one could spot all the path terms that have not been used



yet in the organizational context and elaborate on potential adaptations of these concepts to organizational phenomena.

Third, digging deeper into how the conceptions differ from one another in more detail might be helpful. One example we have in mind here is the conceptual inquiry by Fortwengel and Keller (2020), who focus explicitly on elaborating upon how organizational path dependence-related works differ in terms of their view of agency. Their elaboration results in the suggestion to make a distinction between weak and strong forms of organizational path dependence, depending upon the agency being ascribed to agents. We feel that such analyses can build fruitfully on our framework and offer a more nuanced understanding of how path conceptions relate to one another.

#### **(5) Concluding remarks**

This study set out to explore the different path-related conceptions and offer an initial comprehensive framework so as to obtain a better understanding of where path theorizing is heading and how research on organizational paths can be fruitfully informed. As with any conceptual inquiry, we lack empirical data to sustain our overarching conception. What is more, owing to our ambition to broadly screen the debates revolving around paths with different disciplinary anchoring, this comes at the cost of being unable to go into detail about the different strands of literature. We have tried to separate the terms to gain a broad overview. However, through this simplification, we have been obliged to accept losses in information quantity and quality, since many direct relations between path terms are missing. For instance, path constitution (Sydow et al., 2012a) may be viewed as an episode that leads to path transformation (Singh et al., 2015) or uphold path extension to avoid path exhaustion (Isaksen et al., 2018). Hence, the potential interconnection of such path terms could be elaborated in more detail, shifting the focus from a distinction and clustering of the path terms more towards elaborating on their commonalities, connectedness and how they might be intertwined with

each other. However, despite these limitations, we feel that they offer impulses for future research – be it empirically- or theory-driven – on this omnipresent and theoretically relevant phenomenon.

**Notes**

<sup>1</sup> In 2019 the publication received the Academy of Management Review (AMR) Decade Award, meaning that the article has been cited more than any other research within the past 10 years (2009-2019) [Page 19].

<sup>2</sup> As previously mentioned, we performed that search request for each of the twelve search items singularly, leading to the hits mentioned in Table 1 [Page 19].

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## **Second manuscript of the doctoral thesis**

### **Walking a Tightrope – Towards a Framework for Dealing with Coexisting Organizational Paths**

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## **Walking a Tightrope – Towards a Framework for Dealing with Coexisting Organizational Paths**

This study introduces an empirically grounded idea of path coexistence – understood as two or more different forms of organizational path existing in parallel – so as to refine diverging notions put forward by scholars of path dependence and different forms of path deviation. Our research is based upon a longitudinal-explorative case study at a large-scale telecommunications corporation, which tackles the challenge of introducing a new organizational path (i.e. agile management) in light of digitalization, while at the same time sticking to an older, well-established organizational path for some of its operations (i.e. managerial waterfall technique). Herein we contribute to the literature by opening up the idea of an intended coexistence of organizational paths, elaborating on the process of creating a complementary yet competing path in parallel, and touching upon approaches easing existing self-reinforcing mechanisms while creating and intensifying new ones.

Keywords: Organizational path dependence, parallel paths, path creation, path dependence

## 1. Statement of the problem

Research on path dependence (Castaldi & Dosi, 2006; Garud & Karnøe, 2001; Sydow et al., 2009) highlights the role of underlying mechanisms that lead to potentially ineffective situations for organizations. Thereby, we submit that research on organizational paths can be subdivided into two broad streams. One stream focuses on the ramifications of sticking to old paths, usually debated under the term *path dependence* (Arthur, 1994; David, 1985; Sydow et al., 2009), pointing out the benefits of exploiting existing paths, while at the same time highlighting the challenges of becoming inert and failing to acknowledge the challenges from an ever changing business environment (Greve & Seidel, 2015; Rothmann & Koch, 2014); Kodak being the prime example here, as a dominant player in the photography industry that failed to acknowledge the impact of digital photography (Lucas & Goh, 2009; see also Leonard-Barton, 1992). A second stream explores the role of intentionally breaking with existing paths to avoid the negative consequences of path dependence, which has culminated in a discussion about path creation (Castaldi & Dosi, 2006; Garud & Karnøe, 2001) and later brought forward other concepts of path deviation (e. g. path transformation; Singh et al., 2015). This debate highlights the benefits of abandoning an older path so as to pursue a new one. The prime motivation for path creation is seen in gaining and defending long-term competitive advantage due to heightened profitability and reputation by being an innovative company; think of Apple products such as the iPhone or iPad under the leadership of Steve Jobs (cf. Lampel, 2001).

While these two streams have tremendously advanced our understanding of the positive and problematic sides of existing paths (i.e. the debate about path dependence) as well as the benefits and challenges associated with engaging with new paths (i.e. the debate revolving around path creation), these contributions remain silent about how a new path is introduced while the older path is deemed to remain, resulting possibly in two or even more parallel paths. In more generic terms, such *coexistence of organizational paths* is what we feel merits attention,

as organizations do not necessarily always engage in a break away from one path to another, thereby entirely terminating the old organizational path after a transitional phase, which is at least implicitly suggested in prior research (Meyer & Schubert, 2007). Given real-life phenomena of parallel paths, a more elaborated understanding of how to marry both perspectives is needed. We feel that this challenge awaits further theoretical problematization and elaboration (Alvesson & Sandberg, 2011).

Against this background, our explorative research seeks to answer the following question: *How does a new organizational path emerge while pursuing an existing path in parallel?*

To answer these question, we gathered data from a longitudinal case study (01/2018-02/2020) at a large-scale company of the information and communication technologies (ICT) industry, which tackles the challenge of introducing a new procedure (i.e. agile management) that has the potential to develop into a new organizational path, while intentionally sticking at the same time to an older, well-established organizational path (i.e. managerial waterfall technique) for a major though decreasing part of its operations.

## **2. Theoretical positioning: Venturing beyond single path conceptions**

### ***2.1 Past path theorizing: Path dependence***

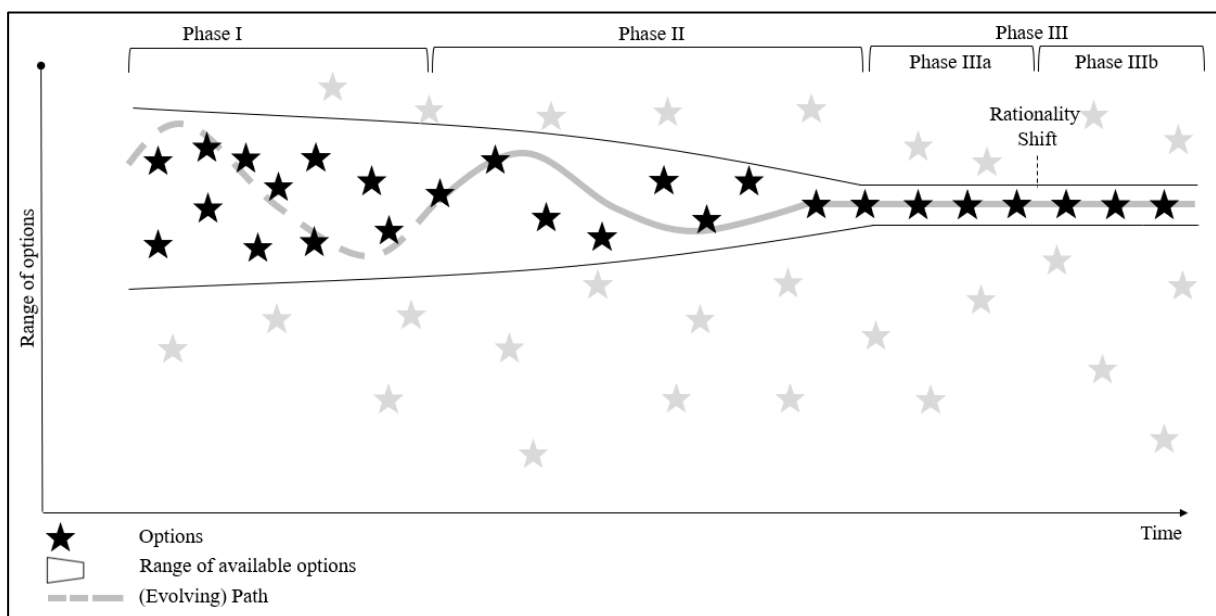
We position our study in the rich field of research on the phenomenon of *path dependence* (Arthur, 1994; David, 1985) that focuses on technological path dependence and explains struggles related to inertia. From an organizational perspective, path dependence takes the form of specific patterns and decisions that may gain an increasingly deterministic character and ultimately lead to a situation where other courses of action are no longer feasible (Sydow et al., 2009). Former strengths may in fact turn into liabilities (Leonard-Barton, 1992).

Based on David's (1985) and Arthur's (1989) conceptions, Sydow et al. (2009) suggest *three distinct phases* (see Figure 1), highlighting the importance of self-reinforcing processes being



triggered by small events leading to a potential lock-in, predominantly occurring ‘behind the backs’ of agents.

The *Preformation Phase (Phase I)* is characterized by a broad scope of possible choices in the areas of technology, management and markets. In this phase, the potential long-term consequences of the chosen actions cannot be fully predicted (Mahoney, 2000). As the preformation phase ends with the ‘critical juncture’, the *Formation Phase (Phase II)* starts (Collier & Collier, 1991).



**Figure 1** Organizational path dependence (adapted from Sydow et al., 2009, p. 692).

In the Formation Phase a path is forming due to self-reinforcing processes causing increasing returns and positive feedback processes, which in turn reinforce previous patterns. From Phase I to Phase II, the scope of actions noticeably narrows. Subsequently, from the second to the third phase, the predominant pattern of actions is replicated so often that it finally results in a status called ‘lock-in’. In this *Lock-in Phase (Phase III)*, organizations have only a few options left. Prior actions have led to an evolving path that the organization can only break away from with great difficulty or even not at all. However, the term lock-in does not necessarily imply inefficiency. Quite the contrary, locked-in paths can certainly be efficient for a certain time

span, if they uphold the alignment with current strategy. The point in time at which the predominant pattern of a path remains replicated, albeit shifting from success to inefficiency, is characterized by the term ‘rationality shift’ (Rothmann & Koch, 2014).

The process of becoming path dependent can be characterized by *non-predictability* (i.e. the outcome is not determined), being more prevalent at the beginning of an evolving path, *nonergodicity* (i.e. multiple outcomes are possible and history selects among them), *inflexibility* (i.e. state of entrapment, impossibility to shift to other options) and *inefficiency* (i.e. a path leads to actions that result in an inferior solution; cf. Arthur, 1994 and Pierson, 2000; Sydow et al., 2012), the latter three appearing more in later stages of the development of a path (Sydow et al., 2009).

Beyond that, the authors point to *four different mechanisms* – complementary, coordination, learning and adaptive expectation effects – contributing to the development of organizational path dependence<sup>1</sup>. Self-reinforcing mechanisms turn to more and more systemic dynamics, which individual and more often than not even collective actors are no longer able to control. *Complementary effects* refer to synergies resulting from interactions between two or more coherent resources, rules or practices on a general level. *Coordination effects*, more specifically, mean that the efficiency of organizational rules and routines increases with the number of individual actors following those operations, since their interactions and reactions can be presaged better in advance and hence coordination costs tremendously reduced (Pierson, 2000; Stieglitz & Heine, 2007). *Learning effects* stand for increasing efficiencies in the conduction of practices (faster, more reliable), related to their replication several times. *Adaptive expectation effects* imply that the more an individual actor is expected by his/her social environment to follow certain rules, the more likely the actor is to adhere to those rules, hoping not to become stigmatized as an ‘outsider’ (Kulik et al., 2008).

## ***2.2 Existing approaches on path evolvement and path deviations***

In contrast to the traditional idea of path dependence, the concept of *path creation* (Garud & Karnøe, 2001) assumes that not only external shocks, catastrophes and crises (Arthur, 1994) or insidious coincidental processes lead to path breaking and, consequently, a switch to new alternatives. Garud and Karnøe (2001) drastically enhance the range of possibilities to break a path by introducing path creation as ‘mindful deviation’ (Garud & Karnøe, 2001, p. 7) by (collectivities of) actors. By putting forward the possibilities of an active and intentional involvement of actors in the path development process, Garud and Karnøe (2001) opened up room for further conceptions, varying in their extent of agency during the *evolvement* of a path (e.g. path constitution, Sydow et al., 2012; path generation, Kang, 2014). Vergne and Durand (2011) agree with this notion of agency within path development processes by acknowledging an actor’s possibility to “[favor] certain self-reinforcing mechanisms over others” (Vergne & Durand, 2011, p. 347) and with that to be “able to intentionally initiate, curb, and refocus path formation processes” (Fortwengel & Keller, 2020, p. 1174).

Later studies extended the traditional phenomenon of path dependence and related concepts regarding the evolvement of an organizational path by introducing further ideas on the continuation of a path. Those ideas range from the full exploitation of an existing path or changes *on* a path to off-path changes, accompanied by its full termination (e.g. path dissolution, Sydow et al., 2009; path expansion, Sydow et al., 2020; path renewal, Cheung & Kwong, 2017). It is striking that most of the approaches still refer to a change on or off a single path, implying either a refinement or replacement of it. Hitherto, very little attention has been paid to the introduction as well as the intended sustained coexistence of different organizational paths in parallel, which motivates our empirical exploration.

### ***2.3 Towards an analysis of coexisting paths***

In other disciplines than management research, employing path theory to explain rigidity phenomena, the idea of parallel paths has already been deployed. At an early stage Djelic and Quack (2007) already speak about the “interplay between pressures for continuity and stimuli for change” (Djelic & Quack, 2007, p. 182) with regard to path generation in a societal context. However, they do not explicitly mention the intended parallelism of an existing as well as a new path. Later, Bergek and Onufrey (2013) bring forward “multiple paths and path interaction as an extension of path dependence theory [...] to explain the development of multi-technology companies and industries where several alternative technologies co-exist and interact over long periods” (Bergek & Onufrey, 2013, p. 1261). Agogué et al. (2015) also bring forward the notion of multiple paths and raise the idea of *shifting from one path to another*. At the same time, Singh et al. (2015) mention interdependencies between multiple paths “by focusing on how they entangle through specific organizational practices and arrangements” (Singh et al., 2015, p. 646). It is striking that the idea of coexisting paths and path interactions is not deemed unlikely, especially in the context of technological paths or with regard to regional economy or societal phenomena. In contrast, in an organizational context, the evolvement of coexisting paths has been mostly disregarded until now. One reason might be that the evolvement of such parallel paths is barely conceivable, thinking of centralistic, hierarchically coordinated organizations. In this regard, lately, Bothello and Salles-Djelic (2018) suggest examining on-path interactions in domains populated by multiple paths and specifying the nature of these interactions to identify mechanisms of change and reorientation. In our empirical study we take up that notion and explore the evolvement of a parallel new path in the context of a single organization.

### **3. Research setting and methods**

#### ***3.1 Research setting***

Our study is based upon a two-year in-depth case study (01/2018-03/2020; Yin, 2018) at a large-scale company of the ICT industry. The ICT company has more than 200,000 employees and is active in more than 50 countries. Products and services offered revolve around fixed-line/broadband connections, mobile communications, general internet for computers and internet TV for private customers, as well as ICT solutions for large and business customers.

Our *sampling strategy* was opportunistic (due to being contacted by a representative of the ICT company) and theory-driven, as we were able to choose from three different research settings with the ICT company being the theoretically most inspiring case (Patton, 1990). The main reason for choosing the ICT company was its bureaucratic and centralistic heritage and path-dependent engagement with waterfall management techniques, while at the same time trying to establish agile methodologies (e.g. Scrum or Kanban) for some parts of its operations (i.e. exhibiting elements we would argue are potential indicators for mindfully pursuing path creation).

We gained access to a major subsidiary of the ICT company, which primarily works with nearly 10,000 IT specialists in seven countries to provide internal IT infrastructure for the other subsidiaries of the ICT company. Prior to our engagement with the company, which was triggered by a high-level manager approaching the second author for research purposes, the company had already started trying, in a change management process, to introduce agile management approaches in 2017. The team of authors got in contact with the company by the end of 2017. With the start of a new transformation program on January 1<sup>st</sup>, 2018, the first author spent time collecting data for more than two years, directly participating in a team planning and conducting the transformation process. While first contacts remained sensitive and short-lived, over the course of time the first author gained more intimate access, spending

extensive periods of time at the ICT company. Thereby, the first author's role changed from being a mere participant observer to becoming a source of critical reflection, partially consulted by the staff with regard to the introduction of agile management approaches. In particular, the reflection started from the development of self-assessment for agile teams via its implementation in several interviews with scrum masters<sup>2</sup> to subsequent individual feedback on how to break with old habits and to deal with difficulties evolving with the transformation.

### ***3.2 Data collection***

Our data collection had two different foci. First, we collected *retrospective data* to analyze sources as well as evidence for potential path dependence regarding the prevalent waterfall-driven management. Second, we collected *real-time data* for more than two years, tracking the efforts to break away from old organizational structures and habits, while building up new ones in parallel. We were continuously able to experience achievements as well as setbacks during the transformation process on different organizational levels and seized the opportunity to understand motivations and inhibiting factors by participating in innumerable meetings of the transformation teams<sup>3</sup> and of currently transforming teams, and conducting several formal interviews in three different waves on different organizational levels.

For *triangulation* purposes, we collected data from *three different sources*, namely, archival data, formal interviews and participant observations, including informal interviews (Yin, 2018): In total, *29 structured interviews* with an average length of about 60 minutes and *34 semi-structured interviews* with an average length of 44 minutes across all hierarchical levels and across functions were conducted. What is more, *539 hours participant observation* (189 hours on the premises, 350 hours by means of telephone conferences or web-based exchanges) accompanied by *224 pages of notes* taken in the course of observations as well as *455 internal documents with 4,711 pages* (see Table 1 for an overview) and *2,572 e-mails* represent the basis of our case study data base.

**Table 1** Field documents.

Type of documents	Number of documents	Content of documents
Blog entries	271	Posted blog entries within the intranet with relation to agile methodologies, transformation ambitions, inhibiting factors as well as internally posted comments by supervisors, colleagues and employees
Company agreement	1	Company agreement on flexible organization
Presentation slides	126	Presentations regarding the transformation kickoffs as well as more specific target pictures, milestones, and ‘how-tos’ across organizational levels from an individual level to enterprise level
Status reports	2	Status quo of current application environment
Working paper	29	Instructions or handouts on agile methodologies and the introduction of agile working on different levels of the organization
Others	26	Newsletters, screenshots of shared graphics, excel-files, docx-files and questionnaires mediately or immediately related to the transformation process and agile working

Our *interview data* was collected during three overlapping waves (see Table 2 for an overview).

**Table 2** Data collection via formal interviews through three partly overlapping waves.

Wave #	Time frame	Number of interviews	Kind of interviews	Purpose of interviews
Wave 1	24/01/2018 - 29/01/2018	9	Structured	Gaining a first overall understanding of the current situation in the company and the broad transformation ambitions <i>within and beyond</i> teams
Wave 2	07/02/2019 - 19/12/2019	20	Structured	In-depth understanding of progress and maturity of the transformation <i>within teams</i> . Identification of prevalent success factors and inhibiting factors of current transformation situation.
Wave 3	14/06/2019 - 20/03/2020	34	Semi-structured	In-depth understanding of transformation phases <i>beyond teams and across different organizational levels</i> . Grasping the prevailing areas of tension and mutual dynamics between the traditional parts of the organization and the new ones from various perspectives (ranging over different hierarchical levels and functions throughout the company).

Within the first wave, we conducted nine interviews with scrum masters and members of software development teams who were in a transformation process themselves, shifting from waterfall methodologies to scrum teams. The interviews were held personally, using a full-structured questionnaire containing closed and open questions regarding the current

transformation status, next steps, and current barriers. Those interviews gave us an understanding of the current situation within development teams as well as their immediate working environment and of their ambitions to transform towards a more agile way of working. Furthermore, they raised first ideas of why teams were struggling within their transformation and what organizational factors inhibited their shifting pretensions. These insights initiated the further development of our interview guideline and its adaptation more in the direction of an in-depth understanding of the maturity of the team's new way of working. We interviewed 20 more scrum masters (different to the first nine) using a refined full-structured questionnaire, and elaborated in more detail on their current transformation situation within their teams, grasping concrete success factors as well as inhibiting factors for shifting. Within the third wave, we immersed ourselves in an in-depth conception of the transformation process throughout the company on a higher (organizational) level of analysis. Our interview guideline comprised two main topics. While the first block of questions aimed at the perceived sequences of the transformation process, both on an organizational level as well as with regards to the interviewee's immediate working environment, the second block focused on predominant tensions and the search for their sources. An immediate retrospective reflection of each interview led to a continuous improvement of the questionnaire, sharpening its focus with regard to our research objective. To gain a broad and representative understanding from a variety of different perspectives, we conducted those interviews with interviewees from different hierarchical levels and functions throughout the company.

In line with this, we also aimed at gaining very broad insights into the company and its current situation from the perspective of an observer. Therefore, we conducted observations in various different types of meetings, starting with occasional kick-off- or information events, and beyond that, ranging from participating in daily meetings within the transformation team



we accompanied during the whole data collection period, to visiting daily meetings of different software development teams and up to meetings of the management board.

As the name already suggests, meetings within the *transformation team* had a very strong focus on the planning and implementation of transformation ambitions throughout the organisation. By accompanying this team during the whole period of data collection, we were able to experience at first hand how the transformation was planned right from the beginning, and also how the company tried to convince and motivate different parts of the organization to accept and adopt the transformation, and finally what struggles arose throughout the transformation process and how the organization tried to tackle these issues.

In contrast, the visited meetings of *software development teams* that were already in their transformation phase or were about to start their transformation soon, had a very strong operational focus and were more about ‘everyday business’ within the IT environment. Those meetings were very important for us to obtain a distanced view of the previously ‘planned transformation measures’ and to reflect on their feasibility. Furthermore, we were able to witness upcoming struggles regarding the implementation of agile working, right at their origin.

Lastly, the meetings of the *management board* focused on a very high level of strategic choices within the organization. By accompanying those meetings, we were able to gain a deeper understanding of the “higher level” intentions of the transformation measures, which were not obvious throughout all parts of the organization.

Besides accompanying the transformation team over a very long period of time and therefore gaining an intense understanding of the transformation *procedure*, the contrasting perspectives from a very operational level to a highly strategic level constituted a very fruitful source for understanding the organizational structures and especially *underlying dynamics*.

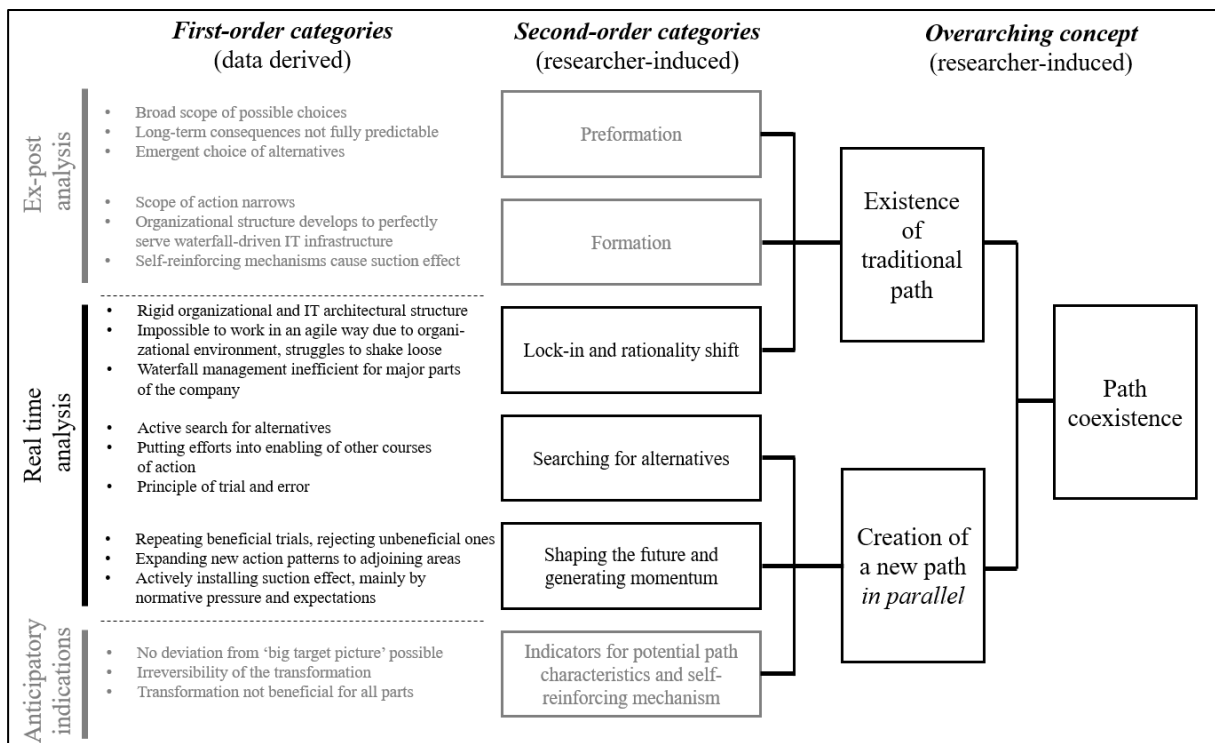
### ***3.3 Data analysis***

In terms of *data analysis*, we present the findings in a coherent manner. However, the data analysis was by nature fuzzy and not linear but rather iterative at times, jumping between theoretical insights gained from the data (Yin, 2018), although we conducted the analysis roughly along three stages: (1) We gathered all data in a case study database to heighten reliability. The ‘raw data’ was based upon 224 pages of field notes, 98 pages of filled out questionnaires (wave 1 and 2), 495 pages of interview transcripts (wave 3), 4,671 pages of archival data and 2,572 e-mails. (2) We condensed all the descriptions of waterfall and agile management working techniques and teams to which we gained access. We pictured the overarching transformation process and its progress *over time*, starting on an organizational level of analysis. Furthermore, we dived into the transformation phases and progress on a team level to gain a more thorough understanding of sources for supporting as well as hindering factors. (3) We condensed our empirical data, as is common practice in longitudinal and in-depth case study research, by constructing different categories to come up with the construct of path coexistence. We employed MAXQDA software, which allows the import of all collected data (archival data, field notes, interview transcripts) and supports the subsequent coding process. We checked the reliability of the constructed category framework by using co-analysts from the ICT company. Our 29 structured interviews from wave 1 and wave 2 were discussed and reflected on with two independent members of the transformation team, who participated in the interviews as silent listeners. Additionally, the coding of our qualitative semi-structured interviews was reflected on, questioned, discussed and finally validated separately by three independent team members of the transformation team as well as by a scrum master and agile coach, with whom we worked together very intensively (for an overview, see Table 3).

**Table 3** Measures to heighten reliability and validity.

Criterion (Yin, 2018)	Research phase			
	Design	Sampling	Data collection	Data analysis
Reliability	Case study protocol over real-time development of transformation process	Purposive sampling	Systematic usage of internal documents as well as observation notes; purposeful conduction of interviews in different hierarchical levels and functions	Feedback from professionals in the field of organization science, in particular path dependence; feedback from peers in the field of management; matching with transformation studies and experiences across cases
Construct validity	Adapting research constructs from previous research on transformation processes as well as research on path breaking and path creation efforts	-	Data triangulation by usage of archival data, interviews and participant observation	Researcher triangulation in the course of data analysis: Wave 1 & 2: Structured interviews were discussed and reflected structurally by two independent members of the transformation team Wave 3: Semi-structured interviews were analyzed and coded by in total five researchers, for each interview a minimum of two different perspectives Archival data was analyzed and coded by two independent researchers as well
External validity	Theory-driven description of sampling criteria	Purposive sampling over different hierarchical levels and functions throughout the whole company, taking in various perspectives	-	-

Figure 2 depicts the emergent data structure related to our research focus, implying the construction of different categories, upon which we will elaborate later.



**Figure 2** Emergent data structure regarding path coexistence.

#### 4. Preliminary Findings: Coexisting Paths in an ICT Company

In what follows, we present our findings. First, we show that it is suitable to look at the predominant waterfall method as well as the introduction of an agile management framework as coexisting paths from the perspective of path theory (4.1). Second, we delineate the genesis of the established waterfall path and the potential novel agile management path from a process perspective (4.2). Third, we scrutinize the underlying approaches enabling the development of a parallel organizational path, hindering any continuous reversion to old patterns (4.3).

##### 4.1 Waterfall method and agile management as (potential) organizational paths

Our analysis suggests that *two different potential organizational paths coexist in the large-scale company of the ICT industry we observed*. We found evidence that the managerial waterfall

technique can be understood as an organizational path due to detected self-reinforcing mechanisms in the past, leading to present path characteristics. Although it is not possible to state with full confidence that agile management *will* become a separate organizational path in the future, self-reinforcing dynamics as well as path characteristics are already observable for agile management, too, which is why we argue that agile management is a potential organizational path-in-the-making, currently in the mode of path shaping.

To substantiate our claim, in the following we show prevailing path characteristics (non-predictability, non-ergodicity, inflexibility and (potential) inefficiency) and self-reinforcing mechanisms (coordination, complementary, learning and adaptive expectation effects), revealing both organizational paths.

#### *The still well-established waterfall path*

Right from the start of our observation period, when analyzing the company's status quo, two issues were omnipresent: the *inflexibility* and the *inefficiency* of the current organization in general and with regard to software/IT development in particular. The kick-off event of the transformation program in December 2017 literally started with a picture of a burning oil-platform, serving as a metaphor for 'the burning platform' of the company, indicating the inevitable need for change (field notes, 2017-12-14), put bluntly in the presenter's words: "or we will no longer exist in five years" (field notes, 2017-12-14). Apparently, they had major struggles in shifting to an agile working environment at that time, so they initiated a far-reaching and profound transformation program, including eight different workstreams to set up and enable agile working from the team level up to the enterprise level. Those internal struggles became manifest in our first wave of structured interviews. Inefficiency and inflexibility of the company confirmed, we started our retrospective analysis to elaborate on other path characteristics, mainly by participating in meetings of the transformation team, by having several informal interviews between those meetings, and by scouring archival data from the

intranet. From formal and informal interviews with long-time employees as well as archival data, we found that a broad set of competing IT development methodologies (V-model, spiral model, extreme programming, etc.) had been applied by the organization in the last decades, applied in different projects depending on their context (I<sub>3</sub>1<sup>4</sup>; I<sub>3</sub>10; archival data, 2013-10-01; field notes, 2019-10-25). In the earlier stages it was not foreseeable that the company would finally stick to waterfall methodologies, instead it “could have developed in any direction [...]” (field notes, 2018-02-13), but the processes of handling waterfall projects “emerged over time and [back then] turned out to be the most promising way for us – which held true for many years, but today the situation is more complicated” (field notes, 2018-02-13). Therefore, while *inflexibility* and *inefficiency* were predominant and undoubtedly present at the beginning of our investigations, actually being the core sources for the transformation ambitions, *non-predictability* and *non-ergodicity* were observable ex post in a retrospective analysis.

Regarding self-reinforcing mechanisms, we were able to find *coordination effects* and *complementarity effects* still at work in the organization. As mentioned before, the waterfall methodology emerged as the most promising development and management method for the company over the last decades and “the whole organizational complex interplay of today developed over history” (field notes, 2018-01-15). According to this development, the processual and technological environment within the company also developed in the same direction, promoting and at the same time requiring the waterfall phases in a project, starting with budgeting processes<sup>5</sup> up to final release processes<sup>6</sup>. Those processes were still so dominant during our research period that “when you are talking about [only] single touchpoints [of agile teams] with [...] other waterfall projects [...] you are back in the waterfall [logic]” (I<sub>3</sub>38). The whole intraorganizational environment is complementary to waterfall logic, which makes it so “difficult, because the boundary conditions are still pretty classic, in terms of budget and timeline, reporting and so on. You can still see that the people are quite classical” (I<sub>3</sub>6). Those

mechanisms were still very dominant and still pulling efforts at agile working back into the waterfall environment. In addition, *learning effects* could be traced back to previous years, imprinting the organization up to the present day and then “all of a sudden [...] [you] have to think agile and evaluate agile. And from what wealth of experience should [you] do that? And then, of course, you take the old familiar and tried and tested, because you don’t know how to do it differently” (I39). Regarding *adaptive expectation effects*, we have to admit that we could no longer find any evidence for the waterfall path, which might have two reasons: First, due to the overload of internal information regarding agile working and transformation efforts, trying to move many people into a new agile direction, sticking to waterfall methodologies fell behind in terms of organizational attention. The pushes into the direction of agile methodologies, and away from the waterfall path became so proactive in all communication channels that employees started to complain in intranet entries titled “why I don’t want to hear waterfall and agile anymore” (archival data, 2018-02-15), pointing out the dominance of the intended shift in communication. Second, since waterfall methodologies are still dominant in the organization and well-established, there is no need to ‘convince’ anybody to work in a waterfall manner, because that is the way of working, meanwhile established as everyday business.

#### *The newly emergent path*

Since agile management is considered *the* new way of organizing, one might imagine that in such early steps of the creation process, only characteristics of early path phases could be identified. Especially *non-predictability* and *non-ergodicity* are prevalent, since “of course people wonder where the journey is going” (I37). “The [overall] target and vision [...] are the constants. But the journey is dynamic” (archival data, 2019-08-30).

In contrast, characteristics like *inflexibility* or *inefficiency* are rather unlikely to be present in such an early phase of the introduction of agile management. However, there are first indicators for both, even in this early stage. First, inflexibility becomes obvious when interviewees talk

about the “irreversibility” (I331) of the current development regarding agility, culminating in remarks like “we put a lot of effort into the initiating energy, starting to turn the wheel. But once the wheel is turning, it continues turning” (field notes, 2018-02-12). Our experiences throughout the whole observation period are in line with this statement. First, starting with the kick-off event and the first months of the transformation program (i.e. the first months of 2018), it was remarkable how many high-level managers were involved in those transformation ambitions, some of them even delegated full-time as the leaders of the transformation program, spending their valuable time forming clear visions about the future agile organization and spreading this vision with fervor. On the one hand, during big kick-off and informing events, on the other hand wherever we came across them in smaller and personal formats. They seemed to develop increasingly precise and optimistic ideas of where the future organization is heading and actually seemed to live for this vision.

By the time that the transformation program started operating, every one of its eight workstreams contained two to seven team members, engaging more or less full-time in planning and operating the transformation. We spent most of our observation time within the workstream developing the future delivery model. At the beginning of 2018, this workstream had four team members. During the first year of the transformation program, the content-related scope became so wide-ranging and complex that at the end of 2018 the team already ended up containing fourteen team members and direct contact persons within the organization, due to content-related touchpoints. This trend also held true for the other workstreams as well. Starting with a total of about 30 transformation team members included in all eight work streams, at the end of 2018 it was no longer even possible to bring together all the directly or indirectly involved people. The transformation ambitions were rising so fast and demanded so many parts *across the whole organization* that breaking with the transformation and quitting the efforts on agile working had become inconceivable for us and did not seem to be an option for all parties at all.



Second, (potential) inefficiency already started looming to some extent, since several employees rebutted the idea that agile methodologies were appropriate for some of their operations. More precisely, they “just do not make sense for parts of the operations” (I<sub>310</sub>), since they are “too expensive for those requirements” (I<sub>315</sub>).

Self-reinforcing mechanisms became even more evident when respondents aired that “there is a suction effect developing” (I<sub>331</sub>). Agile projects demand “chang[ing] the way of working within projects [...] [which in turn results in the need] to change our organizational structure into a model that enables and supports [the *coordination* of agile projects]” (I<sub>327</sub>). Furthermore, there is the conviction that when the *complementarity* to the intraorganizational environment increases and the company learns to “really deliver in an agile way, it will be faster and better, so that we would not want to go back anymore, in any case” (I<sub>331</sub>). Then you have “a really cool *learning curve*” (I<sub>37</sub>). It is conspicuous that evolving *adaptive expectation effects* were the most dominant self-reinforcing mechanisms during the introduction of agile management. Those normative pressures ranged from ‘soft’ versions like “of course it is seen as [...] voluntary, but by the intensity of the information alone, one or other person feels pressure, I can imagine” (I<sub>37</sub>) to ‘hard’ ones like “if the organization says you are going to make an agile project out of it, then that’s the way it is” (I<sub>32</sub>).

Tables 4 and 5 provide illustrative evidence of path characteristics as well as self-reinforcing mechanisms for both the established waterfall path and the emergent agile management path, combining interview data, archival data and field notes.

**Table 4** Identifying path characteristics for both waterfall management and agile management.

Characteristic	Data Source	Waterfall Management	Agile Management
Non-predictability	Interview data	"Yes, it was about rapid prototyping [other ways]. Once upon a time there was this green world that we came from [with the original organization from the 1990s], which was actually very, indeed rather pragmatic, and [our] world, which was [the] very process-oriented [...] waterfall." (I310)	"It is hard work for everyone involved. For the leadership team, for the employees, it is a difficult cultural change, [...] and I would say, we are 2,5 years on our way now, and I cannot see the end of our journey." (I320)
	Archival data	-	"Especially in the beginning it was not foreseeable which dependencies will come up in the systems and processes [...] there was flexibility necessary." (Archival data, 2019-08-30)
	Field notes	"There is not this one big roadmap, but the people in the lower parts of the hierarchy do not see that." (Field notes, 2019-11-28)	"I cannot see the end of all this here. The transformation is planned to end in 2021, but I don't see that. By far not. There are too many uncertainties." (Field notes, 2019-05-08)
Non-ergodicity	Interview data	"Exactly. We did not know it in the beginning, [...] which way of working together it will be." (I312)	"And if that doesn't work, then after nine months, and this is clearly decided, there is the possibility to scrap it or to correct it significantly." (I316)
	Archival data	-	"The video also shows that this ideal conception does not entirely meet reality and that it is quite ok, when the structures adapt flexibly according to the current circumstances." (Archival data, 2016-06-20)
	Field notes	"Back then they also had agile methodologies in the 90s. Like extreme programming. That is nothing new. But over time waterfall methodologies [were] beneficial [...] [and further] developed." (Field notes, 2018-01-12)	"We have an idea of what we are creating, what is our target, but somehow, the process of going there will be very dynamic. Obviously, the development will be dependent on the circumstances on our way." (Field notes, 2018-03-09)
Inefficiency	Interview data	"Because I say let's not fool ourselves, even in the old world, even in the waterfall world all these release processes have rather disturbed us. All these formal yes, [...] procedures, works council approvals, you have to go to the IT committee with every piece of information." (I37)	"Well, I now know, for example, from a team that doesn't really do development, that they try to be agile forcefully, so outside of us yes, that's a completely different track. But there you try to be agile forcefully, although it doesn't really fit at all." (I36)
	Archival data	"Since the implementation cycles of waterfall teams are usually significantly longer, there it typically lacks the capacity to work on unscheduled issues." (Archival data, 2018-11-07)	"If we want to get agile, we need the corresponding basics and not even more complicated ways to use tools, which we first have to get used to [like it is now]." (Archival data, 2019-02-11)
	Field notes	"In the classical waterfall models, we had to write descriptions over 3 quarters of a year, wait for half a year, until everyone was ready developing software [...]." (Field notes, 2019-11-28)	"It is not possible to transform the whole organization [...]. There are several [...] tasks, which are predestined for waterfall methodologies. Agile methodologies would be way too expensive here." (Field notes, 2018-01-17)
Inflexibility	Interview data	"Let me put it this way: There is a lot of talk about agile and yet still classical work. As I have just said, we have colleagues who are trained to be agile but do not get out of the classical world." (I314)	"That's why I now find [person X's] message a bit contradictory, I'll say. Because he simply says: I press everything into one hub, but today we already know that not all business fits into one hub." (I37)
	Archival data	"With the introduction of cloud-solutions 3 years ago, it got obvious very fast that the fix small major releases with a development phase of nine months in average and only three release dates per year, were not sufficient to be competitive in a dynamic market." (Archival data, 2018-10-22)	"In addition, for agile methodologies, to some extent an uncertainty of planning is inherent in the system, many perceive that as unstructured working, but it is far away from that." (Archival data, 2019-08-30)
	Field notes	"The architecture clearly limits our flexibility in what we do and how we do things." (Field notes, 2019-08-08)	"We cannot flexibly do whatever we want, just because we think, we are self-organized now." (Field notes, 19-12-13)

**Table 5** Self-reinforcing mechanisms for both waterfall management and agile management.

Self-reinforcing mechanisms	Data Source	Waterfall Management	Agile Management
Coordination effects	Interview data	"Of course, we have complicated software implementation processes [...]. And as soon as you leave the edge of your project, you have an enormous need for coordination. When you step over the edge, you need coordination." (I32)	"The one part is that we change the way of working within projects [...] the other part is [...] to change our organizational structure [...], which enables and supports [the coordination]." (I336)
	Archival data	"Highly interwoven process landscape." (Archival data, 2018-11-02)	"I think it's really great when Scrum Masters refer to their role, which is clearly described. Things fall down that used to be the responsibility of project managers [...] [Who] does the rest." (Archival data, 2019-02-15)
	Field notes	"The whole organizational complex interplay of today developed over history." (Field notes, 2018-01-15).	"Like here, the processes and structures get adjusted to enable smoother agile working in the future." (Field notes, 2018-01-08)
Complementarity effects	Interview data	"Yes, it's difficult, because the boundary conditions are still pretty classic, in terms of budget and timeline, reporting and so on. You can still see that the people are quite classical, I'd say." (I36)	"We do not only try to become agile but with that also try to standardize so that employees can change between teams without having to learn new methodologies or tools of methodologies." (I317)
	Archival data	-	"The interlinking of the development teams of a [...] hub with outwards is defined [due to synergy effects]." (Archival data, 2019-06-12)
	Field notes	"Teams would like to work agile, however are not able to [...], because those methodologies are [...] not complementary to their direct working environment, forcing them to stay in the waterfall logic." (Field notes, 2018-02-08)	"[We] adapt our processes, to make them complementary to agile working, e.g. agile budgeting, free release line. The more compatible [they] are, the more teams will [...] work agile." (Field notes, 2019-03-01)
Learning effects	Interview data	"Because of this classical world, I have made my career. And now all of a sudden, [...], I have to think agile and evaluate agile. And from what wealth of experience should I do that. And then of course you take the old familiar and tried and tested, because you don't know how to do it differently." (I39)	"So to speak, almost nobody learns about agile methods and somehow says the more he takes away from them the more he rejects them, but the approval increases." (I312)
	Archival data	"Historically grown organizational structures." (Archival data, 2017-12-19)	"It is not sufficient, if we all hurry to some trainings. [...] You learn working agile by doing it." (Archival data, 2019-06-27)
	Field notes	"The prevailing highly complex processes (including budgeting, release processes etc.) developed and improved over decades into a highly complex process landscape, perfectly adapted to waterfall methodologies." (Field notes, 2018-01-23)	"When the first pilot projects were successful and we know how to proceed, more and more agile teams will follow." (Field notes, 2018-01-23)
Adaptive expectation effects	Interview data	"In history it always was like that. That a [chosen] circle of executives [and] deciders thought about, how [the company] has to look like tomorrow [and] then they follow." (I318)	"The individual must certainly participate, if let's say the team decides: we're going to be agile. Then the individual cannot say: I do not want to. If the organization says you are going to make an agile project out of it, then that's the way it is. Then I can't say [...]: I don't want that." (I32)
	Archival data	-	"We need to move to secure our future [...]. The direction is clear, even if not in detail. The targets are demanding, however reachable, if we move "how" and "what" and if we all move within [our company]. Then our work will stay interesting and fun." (Archival data, 2018-09-24)
	Field notes	-	"I feel that here exists kind of a normative pressure. Of course, it is our own choice, if we want to work agile, but if you would have to leave your team, if you do not work agile with them, what kind of choice is that?" (Field notes, 2019-06-07)

Finally, it is remarkable that we had difficulties finding specific and tangible indications for all path characteristics and self-reinforcing mechanisms for both waterfall management and agile management. While some path characteristics and self-reinforcing mechanisms might show up more at the beginning of an evolving path, others might be prevalent at later stages. Our findings suggest, unsurprisingly, that the waterfall path is in a comparatively mature state of path dependence, while the introduction of agile management proves itself to be still at an early stage of a path creation process. Nevertheless, with regard to the agile path-in-the-making it seems clear already that the enacted pattern of practices cannot easily be reversed. Those insights bring us to the conception of six phases for introducing a new path while intentionally sticking to an old one, as we show in 4.2.

#### ***4.2 Creation of a parallel organizational path***

After identifying the waterfall method as an established path in the organization under scrutiny, we will now document, based upon a temporal bracketing strategy, how agile management takes shape as a path-in-the-making. The coexistence of paths was repeatedly assumed by staff, as “they will not merge. They will exist in parallel” (I319). Analyzing the company’s history as well as current situation (as of 03/2020), five different phases are identifiable – (I) Preformation, (II) Formation, (III) Lock-in and Rationality Shift, (IV) Searching for Alternatives and (V) Shaping the Future. Furthermore, there are indications for one more phase, which might potentially evolve in the future, namely (VI) Initial indicators for Inflexibility and Inefficiency.

##### *(I) Preformation, (II) Formation and (III) Lock-in and Rationality Shift*

Until agile management was introduced, almost every IT-project was processed in waterfall steps and even supporting service activities (e.g., budgeting, release management) followed the waterfall logic. Although overall the processes shaped up smoothly over time, at each point the prevailing process had to be strictly adhered to. For instance, the teams “[had] to apply for their

budget every quarter of the financial period again” (I313) and the “potential time slots for software releases were restricted to three dates (release containers) each year, which the teams had to adhere to” (field notes, 2018-02-13). To enable an exactly timed process flow, all related projects were expected and even forced to follow those strict timetables and requirements, as a former long-standing project manager in waterfall projects confirmed (I315): “The same logic was valid over the whole company, to be able to integrate the work of business and IT in one construct across all value chains” (I317). Overall, the process steps and supporting activities within the company were optimized over the years, resulting in an interwoven, highly stable and reliable construct.

The company was able to present itself as a market leader for several years, due to its stability and high-quality solutions. Resting on this success and continuously optimizing complex IT and process structures, over time the stability and predictability turned into “rigidity” (archival data, 2019-06-05). Besides various lucid specifications from many interview partners on the inflexibility of the company in general and the IT unit in particular, in the course of our observation when participating in workshops it was also visible where the organization’s past exerted a key influence, e.g. culminating in remarks that “the organization has developed over the last decades to a – ‘tough lump’” (I327). Moreover, during participant observation we were able to witness myriads of struggles to shake loose from traditional processes, hierarchies and mindsets. For instance, regarding processes in one situation, one of the development teams already had recently developed, working software available, but was not able to release it, since they had to fill out several documents first and then were allowed to *queue* for their approval, which again took several months (field notes, 2019-07-15). With regard to hierarchies and mindset, one team leader was speaking about the new agile mindset, low hierarchies and a so-called open error culture within the learning organization, while at the same time postulating that “the mindset comes later” (I3) and talking about ordering the employees to follow agile

methodologies (field notes, 2019-07-03). Lastly, we found indications for issues and inefficiencies in the way of working at that time, such as a long time to market and decreasing market shares due to fast-growing competitors having a closer and more dynamic interaction with their customers (I<sub>316</sub>; field notes, 2018-01-31). As was mentioned in a blog entry by a business partner manager, “it is unacceptable that the implementation of most requirements needs a minimum of 12-18 months” (archival data, 2017-04-03). Furthermore, the CIO of the company emphasized that “already now we no longer meet our customers’ requests for more speed and flexibility, not to mention tomorrow.” (archival data, 2017-09-10). Another high-level manager confirmed: “the pace of change in the market is so high and requires such flexibility that [the company] with their classical working model is often simply not fast and flexible enough to react” (I<sub>327</sub>). Furthermore, our participation in internal meetings revealed low customer satisfaction due to increasingly fast changing customer needs and the long time to market, motivating the organization to engage with path creation to alleviate the aforementioned shortcomings (field notes, 2017-12-14).

#### *(IV) Searching for Alternatives – Trial and Error*

To overcome a declining number of customers and the continuously increasing pressure from competitors, the company decided to radically change their way of working and considered several operations in the direction of agile methodologies. Although this decision was communicated as very radical and strongly supported by the management of the unit and the top management (e.g. I<sub>35</sub>; I<sub>318</sub>; I<sub>331</sub>), it resulted in a longstanding transformation process, due to historically grown complex IT- and organizational structures (I<sub>35</sub>). The company initially planned to transform their IT-development from using 80% waterfall and 20% agile methodologies over three years to 20% waterfall and 80% agile methodologies (field notes, 2018-01-31). However, soon those ambitions were withdrawn, since such a complete rollout of the new method seemed unsuitable and not even feasible (I<sub>4</sub>). “The transition from waterfall

technologies to agile working is a very big deal, especially because our processes are completely in line with the waterfall methodologies” (archival data, 2018-10-08). “Sure, by far not everything works in an agile way in the current organization, [...] so to speak, we are still in the waterfall logic. Step by step, we have to figure out how to build [agile parts of the organization] and how to allocate resources” (I<sub>3</sub>13). Some employees assume that the transformation will take no less than seven to ten years, or even longer (I<sub>3</sub>15). The introduction of agile methodologies was applied in a mixed top-down as well as bottom-up approach. Especially the starting phase, however, was very fuzzy and vague. Several teams started as pilot projects using agile methodologies like Scrum or Kanban (I<sub>3</sub>12). It was obvious that such teams and projects started, “which were more or less isolated from the rest of the company and not strongly dependent on the existing monolithic IT architecture”, as one of the first scrum masters, and by that time the agile coach for many transforming agile teams, pointed out (field notes, 2019-12-19). However, those teams still faced a deceleration due to dependencies on traditional organizational structures (I<sub>3</sub>31). Even though product increments were completed in a two-week-rhythm, some teams were not able to release their software, since there were still only three release containers available each year, booked out many months in advance (field notes, 2018-02-13). Therefore, an adaptation of several processes was needed to enable the teams to benefit from their new way of working. With the introduction of six minor releases per year, agile teams started to benefit from their transition to agile methodologies, because they were able to release their finished product increments significantly faster and easier than before. As published in an intranet document, lately, the number of projects delivering their demands in small increments “continuously increases with the implementation of that new deployment procedure” (archival data, 2019-03-05). The reduction of paralyzing barriers is what incited more encapsulated teams to start agile working and make use of the management’s support.

*(V) Shaping the Future – Mindfully Reducing the Scope of Action*

With time, projects and teams with more dependencies also started shifting to agile working. While agility is assumed to enable more flexible dealing with fast changing customer needs, agile methods per se are highly structured in detail. It was observable that “the more points of contact an agile team still had with waterfall teams and processes, the more the structure and flow of agile rituals got disturbed” (field notes, 2019-11-15). Therefore, the so called Scaled Agile Framework (SAFe) was introduced to coordinate various agile teams, to enable smooth collaboration among them, and to reduce and coordinate contact points to waterfall teams and processes. Initiated by high-level engineers, the employees of the transformation program started structuring the situation and building up the idea of the “future organization” (I37). It was the aim of the top and middle management to convince many employees of agile methodologies and to incite their intrinsic motivation to start working with SAFe. As one of the middle managers put it, they “actively created a *pull mechanism*” (I331) in two ways: first, by forging a shortage: “And then [they] say “Oops, we have 1,500 project leaders in the company, but for now only 150 will get a spot in our [digital hub]”. And immediately the 150 spots were occupied, so fast did they apply” (I331). And second, simply by breaking off manpower while more or less stagnating demands in the traditional projects. “And then they ask themselves, ‘are we the fools? Now we have one and a half times the workload we had before!’ That means a painful pressure to switch to the future organization as soon as possible evolves” (I331). Hence, they enabled alternatives for action, convinced colleagues and employees to move in that direction, and actively and mindfully created mechanisms to pull employees further in that direction. “And [this pull effect] really increases like black holes in the universe. The more planets get absorbed into that black hole, the more it’s mass increases, and the more this ‘magnet’ is pulling” (I331). Besides using the word ‘pull mechanism’, several interviewees referred to ‘using the momentum’. As one of the high-level managers put it, the organization



should utilize this momentum and become significantly more efficient in development and operations at the same time (I316). As the program leader of the transformation program put it, the pulling momentum in the direction of agile management basically has two sources. A maximum of 20% of the employees have the intention “cool, here we can really take something forward” (I327) while the rest of employees fears being “the last one standing [in the traditional world]” (I327). “And you try to use this momentum” (I37).

*(VI) Initial indicators for Inefficiency and Inflexibility*

After less than a year, very high pressure already prevailed in the company to put almost every unit/team of the organization into “digital hubs” (I315), which consist of five to twelve agile teams operating with synchronous clocking and collectively working on a joint solution (I315). Those strict, self-defined guidelines intensified with time and currently (as of 03/2020) do not allow deviations from those transformation ambitions anymore. Although a cultural movement is observable, allowing bottom up impulses to shape the future in detail, the overarching target and transformation plan is fixed (field notes, 2018-02-13). The pull effect has led to the current situation, where the transformation is “no longer reversible. The wheel has turned too far. If [one] did not want to work in an agile way, [s/he] would have to change the department” (I328). “The process of reversing everything back to the traditional world would be a process as long as it has been transforming in the direction of agile working up until now. And we would definitely lose many people in that way” (I327). There is not much ‘variety’ in the range of action left. Either people follow in the direction of agile working, or stick to their traditional way of working. But even without this move, they may necessarily have to change their working environment to some extent. What is most interesting is that, at the same time, the potential inefficiency of the agile management path had already been clearly communicated. For some parts of the organization are getting pushed in the direction of agile management although the traditional waterfall approach might be more applicable in specific circumstances, e.g. as one

interviewee put it: “There are several cases, in which it just does not make sense for us to work in an agile way” (I39). In sum, by the end of our observation period (as of 03/2020), the observed company was right in the middle of its agile transformation and, therefore, it is not possible to determine a potential new lock-in on agile methodologies already. Rather, they are still in the demanding process of shaking loose from traditional, rigid ways of working in order to shape a totally contradictory approach for the future and at the same time to establish a complementary collaboration between both coexisting concepts.

#### ***4.3 Easing self-reinforcing mechanism of the old path, while reinforcing still lax dynamics of the new path.***

As shown before, the observed organization followed two different organizational paths at the same time. One path (waterfall methodology) had been prevailing for a long period of time, while the contradicting new path (agile management) was still shaping. Subsequently, the organization had to tackle the issue of mutually balancing the respective self-reinforcing mechanisms, since self-reinforcing mechanisms are a core element in the development of every path. To meet this great challenge of easing the existing self-reinforcing mechanisms while at the same time initiating and intensifying upcoming ones, the organization took different approaches.

In the following, we briefly illustrate the prevalent situation of self-reinforcing mechanisms during our observation period for both the existing and the new path, and also subsume their interplay.

In the context of the traditional waterfall path, learning effects were still at work, which could be observed at some points in a ‘fallback’ to tried and true ways of working, in cases where major uncertainties and troubles came up during the first trials of agile working. However, those fallbacks were not only explained by learning effects at work, but also by persisting coordination and complementarity effects. Since the whole organizational and

processual structure was geared towards waterfall methodologies, at many points the modern, agile way of working ran against its limits, which suggested a step back to the *comfort zone* where everything was still working more or less smoothly, as it had always done before. Adaptive expectation effects for waterfall methodologies were not observable.

We were unable to observe concrete measures actively breaking those self-reinforcing mechanisms at work. For learning effects, this might have been due to the fact that it simply seems impossible to extrude know-how, experience and practice. Instead, it is necessary to overlay them with other (better) experiences, to prospectively favor new activities over proven habits. With regard to coordination and complementarity effects, it seems potentially achievable to break those mechanisms by actively creating such differing and conflicting boundary conditions that the existing path (i.e. waterfall methodology) is not compatible with those conditions and processes anymore and it becomes uncomfortable or even impossible to continue pursuing the waterfall methodology. However, this option would be, first, very time- and resource consuming and second, would fully destroy all activities according to the waterfall methodology, which is not a feasible and desired option, since both paths should be pursued in parallel in the future. Therefore, *an intended and direct easing of existing self-reinforcing mechanisms could not be observed*. However, *indirect* easing through the creation of new (contradicting) self-reinforcing mechanisms was observable.

Newly created self-reinforcing mechanisms rather overlaid existing ones or even withdrew power from them. For instance, with regard to adaptive expectation effects, agile working was communicated and pushed so hard, emphasizing that “[the organization] [has] to become agile” (field notes, 2017-12-14) and this would be its only chance for survival (field notes, 2017-12-14). With time, such *hype* spread throughout the organization, so that a “*two-class society*” (I<sub>3</sub>10) developed as employees coined it poignantly at times, declaring agile methodologies to be “the cool way of working” (field notes, 2019-08-14) and waterfall methodologies “old and

sluggish” (field notes, 2019-08-14). Even though the organization’s communication allowed waterfall methodologies to be sustained for some parts of their operations, the ‘call for agility’ became so strong and prominent that the overall expectation clearly disavowed waterfall methodologies and envisaged the predominantly agile organization.

With regard to learning effects, countless possibilities from workshops to training courses, certifications, online webinars, tutorial videos, wiki articles, and team coaching and even to individual tutors were offered, aiming to train the staff and become accustomed to the new ways of working. Furthermore, several pilot projects were started, following a ‘trial and error’ principle, allowing the organization to learn how to adapt agile management measures, but also serving as a role model for other teams, learning from success stories. By continuing several pilot projects, more and more teams dared to work in an agile way and continuously improved their maturity in agile methodologies, which additionally motivated more teams to start agile working, too. Due to that, coordination and complementarity effects started to unfold, since the rising number of interdependent teams working synchronously significantly improved their ease of working, reducing friction losses, as a high-level manager reported in a retrospective conversation after our observation period (field notes, 2020-06-02).

We were able to observe that the organization tried to eliminate all hindering boundary conditions for agile working (e.g. budgeting processes, release processes) by generating an ‘agile alternative’ in parallel. For instance, in addition to the traditional release line (allowing software releases at rare fixed dates each year, fully booked two to three years in advance), a new ‘free release line’ was built up, allowing agile teams to pursue smaller software releases self-sufficiently. Similarly, the budgeting processes constituted a major struggle in the transformation ambitions, since apart from few minor exceptions, there was no chance of obtaining approval for the demand of an agile team. To solve this issue, the organization attempted to establish a separate budget allocation, only dealing with agile teams and their

demands. Since agile teams have a completely contrary way of defining demanded budget than traditional waterfall teams<sup>7</sup>, two different budget allocation systems were required in parallel to allow both waterfall teams and agile teams to continue their work.

In sum, for most parts, where divisions working with the waterfall methodology were confronted with divisions working in an agile way (as in our concrete example, agile development teams being dependent on traditional complex budgeting or release processes), we were able to observe tense situations or even severe conflicts resulting in friction losses. In most cases, the only way to avoid those losses was the *strict separation* of both worlds, trying to enable their autarkic development and execution.

## 5. Discussion

By answering our guiding research questions, we *contribute to existing research* as follows: First, we introduce the *empirically grounded theoretical idea of path coexistence* on the organizational level of analysis; a level where you would expect such coexistence less than on the regional or industry (field) level. We submit that this is novel, insofar as prior research mainly focused on the existence of only one organizational path at one time (Sydow et al., 2020). Hitherto, research on organizational paths tends to focus on two rather exclusive scenarios: On the one hand, being locked-in beneficially before the rationality shift occurs (Rothmann & Koch, 2014), therefore having no good reason for breaking the path. On the other hand, being locked-in negatively after the rationality shift, assuming that there is a need to change on a path or to break the path and subsequently create a new one mindfully (Garud & Karnøe, 2001) while terminating the old path. Hence, the consideration of path coexistence in an organizational context was hardly viewed as reasonable to date.

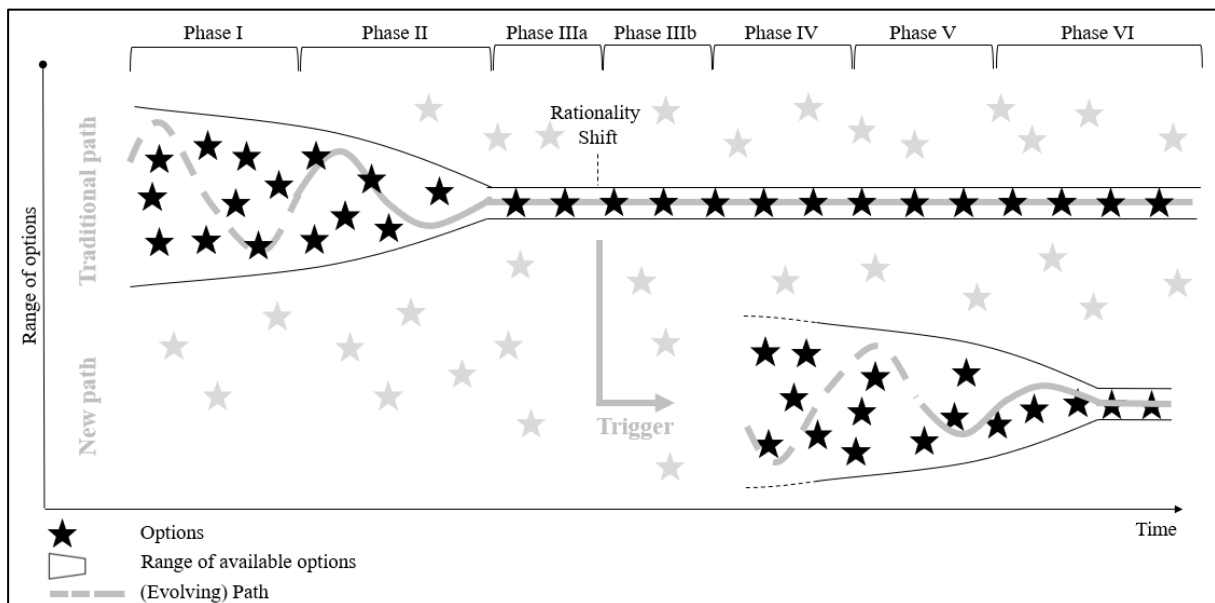
Our empirical case, by contrast, suggests that the rationality shift (Rothmann & Koch, 2014) for the waterfall approach of the ICT company has already happened, resulting in their strong and intensive ambitions to set up agile methodologies and, by that means, induce *off-path*

*change* (Deeg, 2001). However, as demonstrated by the case, the rationality shift has not yet happened for all parts of the overall fairly centralized organization. There are parts where it is still beneficial or even only possible to work following the waterfall logic, which is why the company ends up targeting both the continuation of the old path (i.e. waterfall management) and simultaneously creating a new one (i.e. agile management) for other parts of its operations. Therefore, the prevailing situation goes beyond previous studies on off-path change (e.g. Meyer & Schubert, 2007; Hirsch & Gillespie, 2001; Sydow et al., 2009; Sydow et al., 2012), since no complete termination of the old path is intended. Hence, we tentatively suggest that *two different organizational paths might coexist in parallel, although in tense interplay*.

With this, we discovered that the intention to stick to an old path (here: waterfall approach) while at the same time creating a new one (here: agile management) cannot only be traced back to exploiting the old path as a backbone. Rather, although the potential new path is superior for several parts of the organization, the *old path might still be predominant for other operations*. Hence, it is not only about ‘exploiting’ the ‘old’ while ‘exploring’ the ‘new’, until the new potential path is mature enough to finally quit the old one, as has been a common mantra in previous studies (March, 1991). Instead, it can be seen as *opening up the opportunity to choose between those paths and, thereby, trying to benefit from the advantages of both alternatives* (cf. Figure 4), which, however, continue to be in tension with each other.

Towards this end, we refine Sydow and colleagues’ phase conception (2009) in combination with the rationality shift (Rothmann & Koch, 2014), as well as the extension by Garud and Karnøe (2001) bringing forward the notion of path creation. Based on those theoretical concepts and reviving our identified phases of introducing agile management in parallel (cf. 4.2), we suggest a *six-phase concept*. It is important to recognize that in our conception those parallel paths are not independent from each other, evolving in parallel by chance, as one might assume with regards to multi-technology companies, where members of the organization, not to

mention a region or industry, can choose quite freely between those technologies (Agogu e et al., 2015; Bergek & Onufrey, 2013). We focus on a mindful deviation (Garud & Karn oe, 2001) from the traditional path (i.e. waterfall management), *triggered by the rationality shift* (cf. Figure 3), actively searching for alternatives for action.

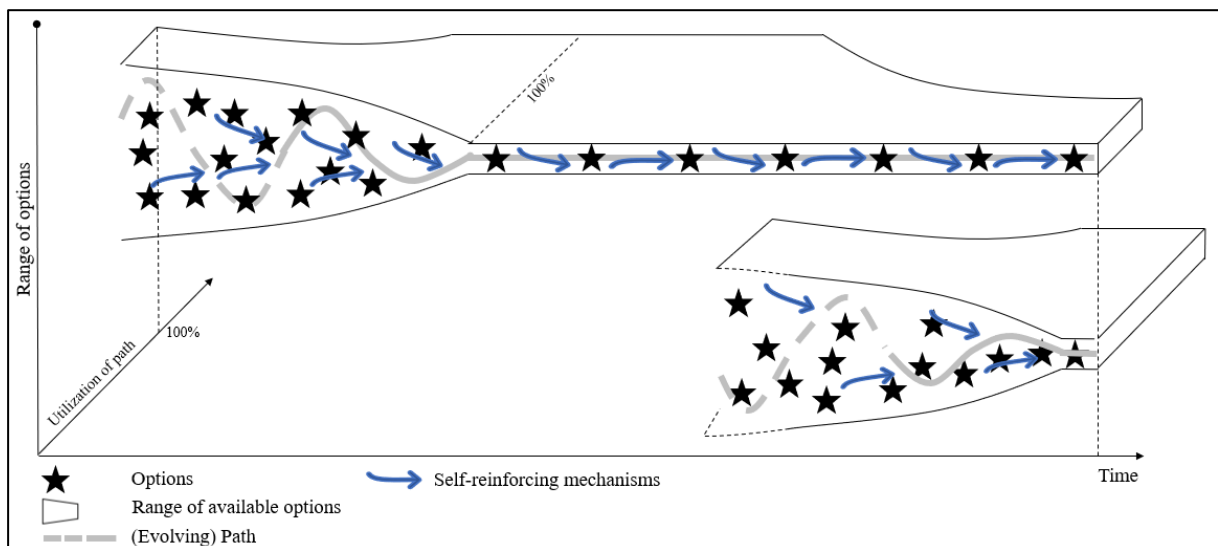


**Figure 3** Extension of the traditional path model by introducing the coexistence of path creation and path dependence. (adapted from Rothmann & Koch, 2014, p. 68; Sydow et al., 2009, p. 692).

Second, coexisting organizational paths can be seen as *opening up the opportunity to choose between paths* and, by opening the scope of “strategic choice” (Child, 1972), enabling protagonists to benefit from the advantage of both alternatives, while potentially also facing additional disadvantages. This second contribution was inspired to some extent by Agogu e et al. (2015), who raised the idea of shifting from one path to another. Furthermore, our research has brought the insight that both paths are more or less competing with each other, which motivated our further elaboration on switching from one path to the other. Therefore, our second contribution emerged mainly from our previous investigations and hence it is empirically rather than theoretically driven.

Our data suggests that both paths cannot be seen as two alternatives between which one could select freely at any time, as one could imagine, for example, when introducing a new tool

in a company, where employees could freely choose which tool to use for the same task. Regarding organizational paths, the coexistence turned out to be considerably more complex than just thinking about which tool to use. The appropriate path to choose is dependent on different factors such as complementarity and coordination with other teams and solutions in the direct working environment. Both (potential) paths might have their reason for existence and each might be beneficial for different circumstances. However, the *switch* to the new path is associated with hard work, and once self-reinforcing mechanisms start engaging, they cause a suction effect and the path creation process starts to become irreversible. Therefore, in a sense, both paths start competing with each other and start pulling off resources (physical capital as well as human capital) from each other, resulting in tense interplay (see Figure 4). By creating and strengthening a new path, the old one, which used to serve as a stable backbone, is automatically weakened at the same time. With our model, we suggest demonstrating the transition of resources and power from one competing path to another by introducing a third dimension in our original phase model – the utilization of a path.



**Figure 4** Extension of the traditional path model by introducing a graphical third dimension representing the utilization of a (potential) path (adapted from Rothmann & Koch, 2014, p. 68, 2; Sydow et al., 2009, p. 692).



Third, the very traditional perspective on path theory remains very skeptical towards centralistic, hierarchically coordinated organizations pursuing multiple organizational paths in parallel. Strictly speaking, the traditional concept of organizational path dependence does not allow the idea of parallel organizational paths by defining paths as “[gaining] a deterministic character, [where] *alternative* courses of action are *no longer feasible*” (Sydow et al., 2009, p. 694). Hence, it seems counterintuitive to find parallel paths in organizations, driven by decision-making processes controlled and dominated by high-level authorities. However, the counterintuitive notion shrinks when we take a closer look at the approaches creating self-reinforcing mechanisms (4.3). Due to the strong frictions at most observed touchpoints between the two contradicting paths, the observed organization tried to separate them organizationally and operationally wherever necessary to eliminate as many friction losses as possible. Therefore, the organization cannot be viewed as a centralistic organization in its ‘pure form’, but rather seems to be ‘pseudo-decentralized’. This ‘pseudo-decentralization’ enables the increasing unfolding of counteracting self-reinforcing mechanisms in parallel, without actively destroying each other, and therefore enabling two parallel paths, even in an actually centralistic organization.

## **6. Concluding remarks**

Summing up, our study suggests that organizational paths can coexist and interact with one another. Though we are able to refine theorizing on organizational paths (Garud & Karnøe, 2001; Sydow et al., 2009), as with any qualitative-explorative research inquiry there remain several limitations. First, though our study benefits from a prolonged engagement in the field by the first author, we cannot forecast whether agile management will actually become path dependent, resulting in a lock-in, as it represents preliminary evidence. This leaves room for future research to explore the question of the foreseeability of path creation efforts.

What is more, we feel that future research might profit from comparing across cases and employing theory-testing approaches (e.g. surveys) to make our inductively generated ideas more generalizable. By nature, we do not seek for representativeness in terms of the findings, but even for argumentative generalizations of our findings, taking a look at comparative settings to identify similarities and differences might prove beneficial for further theory building. What is more, although we suggest agile management exhibits features of going on to become a full-blown organizational path and, thus, making the organization path-dependent in this regard, only future developments within the respective organization will tell whether we are right or wrong. Nonetheless, we feel it is worth inquiring, as it represents a path ‘in the making’ and the challenge of not being able to predict the future holds true for any such inquiries, of course.

Closely related, several managerial and empirical challenges remain to be explored. For instance, how can the dynamics between paths unfold? How can an organization balance the measures, weakening self-reinforcing mechanisms at work (of an old path), without disturbing it too much, since it is intended to be sustained in parallel? This represents a key challenge, in particular when it comes to distinguishing between the ‘value’ of the novel emerging paths per se and also in relation to the established paths. Another intriguing inquiry relates to the question of what a non-competitive paths scenario might look like. How do paths coexist in such a context? In any case, we feel that future research should further explore this timely and managerially relevant phenomenon of the intended long-term coexistence of parallel paths.

## Notes

<sup>1</sup> In particular, those self-reinforcing mechanisms allow us to contrast the notion of path dependence and other related concepts, such as imprinting (Johnson, 2007; Marquis & Tilcsik, 2013) or escalating commitment (Ross & Staw, 1993; Staw, 1976).

<sup>2</sup> Scrum is one of the most popular agile methodologies. A scrum master is the team member of a scrum team whose only task is to enable his/her team to work uninterruptedly and effectively.

<sup>3</sup> 'Transformation team' refers to a team that has the task to plan and pursue the organizational transformation.

<sup>4</sup> I<sub>31</sub> indicating the first interview of the third wave. (This numbering is used consistently throughout the whole manuscript.)

<sup>5</sup> Budgeting processes requiring full ex ante calculations, implying the exact demand for resources, budget and at the same time evincing the target outcome by a fixed date, to enable budget releases.

<sup>6</sup> Release processes planning the releases (in terms of 'go-live') of developed software by three previously confirmed dates each year and by that means guiding and managing the development processes exactly, due to those dates.

<sup>7</sup> Within the budget planning of traditional waterfall projects it was usual to calculate very precisely the demanded budget over the targeted project time, predicting the exact outcome after that project time. In contrast, agile teams can name their required budget in a certain time frame (e.g. required budget per week), but cannot predict when a project will end exactly and what the exact outcome of the project will be, due to their iterative, cyclical way of working, fulfilling continuously reprioritized customer needs.

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## **Third manuscript of the doctoral thesis**

### **Paralyzing Parallelism? Dynamics between Parallel Organizational Paths**

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## **Paralyzing Parallelism?**

### **Dynamics between Parallel Organizational Paths**

#### **Abstract**

This study introduces an empirically grounded conception of the dynamic interplay between two coexisting organizational paths, one path persisting albeit in decline and one emergent path. Drawing on 63 interviews since 2018, an observation period of more than two years, and extensive archival data, I conduct a qualitative, longitudinal case analysis at a large-scale telecommunications corporation implementing the creation of a new organizational path (i.e., agile management), while persisting on a locked-in path (i.e., managerial waterfall technique) in parallel. During the transitional period, I focus on the tense interplay of both paths. Besides classifying the different tendencies and realms of the evolving interaction dynamics, I come up with a tentative framework, giving an idea of the development and replacement of these dynamics over time. Herein, I contribute to the literature not only by opening up the notion of an intended, competitive coexistence of organizational paths, but also by investigating upcoming tensions in the scenario of parallel organizational paths.

Keywords: Organizational path, organizational path dependence, path creation, path dependence, parallel organizational paths, path interactions

## 1 Statement of the problem

Research on path dependence, established by David (1985) and Arthur (1994), deals with phenomena of rigidified, although potentially inefficient situations culminating in inertia. By doing so, the approach contradicts the prevailing neoclassical way of thinking, assuming that the most efficient technologies always prevail due to the effect of market forces (Meyer & Schubert, 2007). The theory of path dependence offers a theoretical framework that helps us to understand better *why* certain decisions and executed action patterns can gain an increasingly resolute character and subsequently lead to a situation where alternative courses of action are no longer possible, known now as a *lock-in* (Arthur, 1994; David, 1985). Sydow et al. (2009) transfer the initial concept of path dependence, mainly focusing on rigidified technologies, to the organizational context and stipulate a three-phase model, depicting the process of becoming path dependent. Additionally, referring to Arthur (1994), they specify four characteristics of path dependent situations and work out in detail the primary underlying dynamics that lead to such path dependent situations. By today, the theory of path dependence has gained much attention in various different exploratory fields and is applied to research areas anchored, for example, in organization related accounts (e.g. Sydow et al., 2020), technology related inquiries (e.g. Singh et al., 2015), in the context of regional economy (e.g. Asheim, 2019) or exploring the evolvement and persistence of certain regulations and policies (e.g. Béland & Powell, 2016).

In other disciplines than organizational research, the notion of *parallel paths* has already been brought up. At an early stage, Bergek and Onufrey (2013) elaborated on multi-technology companies, which offer different alternative technologies at the same time. The authors not only mention the possibility of parallel technological paths, but already identify *path interactions* “both between co-existing paths and when new, radically different paths are created” (Bergek & Onufrey, 2013, p. 1261). Agogué et al. (2015) agree on the coexistence of multiple paths and even aggravate the idea by opening up the possibility of shifting from one path to another.

However, their elaborations revolve around the area of technology entrepreneurship and, thus, are not primarily geared towards refining organizational theorizing. Along similar lines, Singh et al. (2015) take up the ideas put forward by Agogué et al. (2015) and mention interdependencies between multiple technology-driven paths.

However, the main ideas of path coexistence and path interactions evolve in the context of technological paths, which seems plausible, since it appears easier to allow for different coexisting technologies within an organization than enabling different *organizational* paths to prevail at the same time within *one* (centralistic) organization. Still, Bothello and Salles-Djelic (2018) suggest examining path interactions in organizational settings populated by multiple paths and begin to elaborate on the nature of these interactions to identify mechanisms of change and reorientation.

I seek to respond to this call by answering the following explorative guiding research questions: *How do the dynamics and tensions between an established and a new organizational path (in creation) unfold? How do these dynamics change in the course of time?*

To answer these questions, I gathered data from a longitudinal case study (01/2018-02/2020) at a large-scale information and communication technologies (ICT) company. I accompanied a transformation program within the company, planning and implementing the steady introduction of agile methodologies for a major part of the company (i.e. the new path in the making), while intentionally sticking to traditional methodologies for some of its operations at the same time (i.e. the persisting traditional path). My experiences of the long-winded and strenuous transformation efforts enable a very detailed analysis of upcoming tensions in such situations of coexisting and competing organizational paths.

Herein, I contribute to the literature in two different ways. First, I explore the notion of an intended, competitive coexistence of organizational paths. Second, I investigate tensions in the

scenario of parallel organizational paths and carve out their evolvement and development in the course of time.

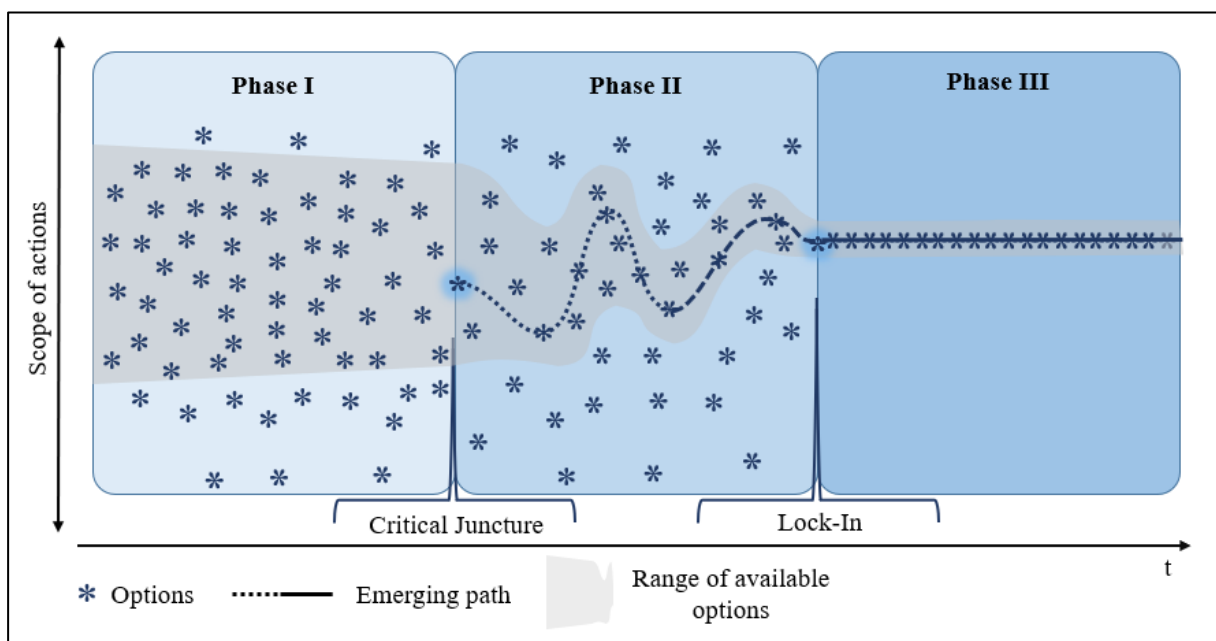
## **2 Theoretical positioning: Towards the notion of coexisting paths**

In order to later elaborate on the coexistence of an established organizational path and a new one during its path creation process, I start by clarifying the traditional notion of path dependence and path creation. Thereupon, I introduce studies stemming from different research areas (e.g., technology-related accounts or regional economy) that already put forward the idea of parallel paths and path interactions, followed by investigations on the status quo regarding initial approaches to coexisting paths in organizational research. Lastly, I come up with other examples of parallelism in organizational contexts, in order to point out the relevance of considering parallelism with regard to organizational paths.

### ***2.1 On the traditional concepts of path dependence and path creation***

Following the conceptions of David (1985) and Arthur (1989, 1994), the phenomenon of path dependence has gained increasing popularity in different scientific arenas. In addition to technology research, it has found its way into economics and social sciences, in particular into organizational research (e.g. Sydow et al., 2009). The spread into diverse research areas has been accompanied by the use of the term *path* in very different ways. The various interpretations range from equating paths with emerging (organizational) action patterns to using it for new (technological) innovations (e.g. the example of post-its; Garud & Karnøe, 2001). In general, an increasingly inflationary use of the term for diverse phenomena of stability and resilience can be observed. Hence, no uniformly fielded definition has been provided so far, and the diverse adaptation of path dependence to various phenomena makes it still difficult to identify the distinguishing characteristics of a path (Sydow et al., 2020).

In order to use the theory of path dependence meaningfully, I draw upon Sydow et al. (2009) who, among others, convey the need to clearly delineate it and apply it in a strict sense. Based on the approaches of David (1985) and Arthur (1989, 1994), they develop a *three-phase-model*, which has received much attention in research on organizational path dependence. Their model defines and delineates three different phases, separated by a critical juncture and the lock-in, in the emergence of paths, in each of which different framework conditions apply with regard to the actors' freedom of action and decision-making (Sydow et al., 2009) (cf. Figure 1).



**Figure 1** Organizational path dependence (adapted from Sydow et al., 2009, p. 692).

The first phase of path emergence is characterized by high degrees of freedom for decision making. However, even in phase I no completely free choice of options is available, but a broad decision space still exists, which is shown in Figure 1 (the grey shadow depicts the range of available options). Options outside this space cannot be chosen due to previous events, decisions and external conditions. Nonetheless, at this early stage, further developments are *unpredictable* and *non-ergodic*. A certain decision or event within phase I may unintentionally, and unnoticed, set in motion a *positive feedback process*, initiating increasing underlying dynamics, which prospectively influence further decision making. Arthur (1994) refers to these

events, which at first glance seem insignificant, as "small events" (Arthur, 1994, p. 14); in later literature the term "critical juncture" (e.g. Sydow et al., 2009, p. 691) is applied to such small events with a subsequently major effect on further developments. Within the three-phase model, the *critical juncture* is understood as the triggering point in time at which a path starts emerging and so constitutes the transition point from phase I to phase II (Sydow et al., 2009).

While no clear path is yet discernible in phase I, it becomes increasingly discernible in phase II, where the decision space is significantly narrowed, approaching the evolving path. Triggered by the critical juncture, positive feedback processes set in motion and increasingly dominate further decision making. Although the actors in the second phase still have the possibility to choose between different alternative options and development in the direction of an upcoming path dependence is not yet inevitable at this stage, positive feedback processes tempt them to replicate similar decisions again and again and to reproduce previous action patterns. Drivers behind this path formation process are so-called *self-reinforcing mechanisms* (David, 1985, 1986; Sydow et al., 2009). While e.g. Aranguren et al. (2019) elaborate on the reinforcement in light of regional studies, with reference to Arthur (1989, 1994), the following mechanisms are highlighted as significant for *organizational* path formation processes: Adaptive expectation effects, complementarity effects, coordination effects and learning effects (Sydow et al., 2009, 2020). With the increasing reproduction of similar action patterns within phase II, a path starts forming. The unpredictability and non-ergodicity thus start vanishing and the evolving path gains an increasingly deterministic character. The end of phase II is characterized by the status called *lock-in*. From then on, all decisions and further developments seem to be predetermined by previous courses of actions and deviations are not possible or feasible anymore. The state of being locked-in is characterized by *inflexibility* and potential *inefficiency*.

With regard to phase III, Sydow et al. (2009) slightly modify the traditional concept of path theory. To do justice to the social dimension of *organizational* contexts, they assume that the

organizational path within phase III is not completely determined, but is a kind of corridor, characterized by a very strongly restricted scope of action (Sydow et al., 2009). This strongly restricted scope of action is called *path dependence*. Path dependence should not be equated with inefficiency and negative consequences. Quite the contrary, dependence on a successful path can turn out to be very fruitful. The point in time at which the environment changes and the locked-in path turns from efficiency to inefficiency is called the “rationality shift” (Rothmann & Koch, 2014). In such situations of changing boundary conditions, path dependence becomes harmful, due to great difficulties in freeing the development from inefficient entrenched action patterns.

The central point of criticism of the traditional notion of path dependence concerns the agency of the actors involved and has been very frequently addressed in recent literature (e.g. Fortwengel & Keller, 2020). According to the basic concept of path dependence, the process of becoming path dependent happens behind the backs of the agents. Subsequently, only external shocks, catastrophes, crises or internal coincidental processes result in path breaking change (Arthur, 1994). Thereby, a shift to new alternatives was assumed to happen by chance and to be unacknowledged (i.e., behind the backs of the agents). However, more recent approaches from path research increasingly propose the contradictory idea of active path creation by ‘mindful deviation’ from previous action patterns (Garud & Karnøe, 2001) and assume that actors (e.g. entrepreneurs) can reflect on situations and actions, act in a self-determined way and, thus, shape paths actively and intentionally (Fortwengel & Keller, 2020; Meyer & Schubert, 2007). This assumption opens up new fields of inquiry in path research, since it allows for locked-in organizations to successfully implement an intended transformation from one path to another.

## 2.2 *Towards an analysis of coexisting paths*

Taking a look at the *traditional* conceptualizations on path dependence, regardless of their disciplinary anchoring they have a common focus on the development of a *single path*, be it evolvement behind the backs of the agents (e.g. Sydow et al., 2009) or intended creation by the actors involved (e.g. Garud & Karnøe, 2001). To overcome this initial *single path perspective*, which has been criticized repeatedly (e.g. Hassink et al., 2019; MacKinnon et al., 2019; Steen & Hansen, 2018), scholars within different research areas started raising the idea of *multiple paths* and even elaborate on their reciprocal *interactions*.

Very early, Sydow et al. (2012) brought forward the notion of parallel *technological paths* within their elaborations on path dependence in the semiconductor industry. They captured active involvement endeavoring for an extension of optical lithography (i.e. the current technological path), while at the same time aiming towards the creation of an alternative novel technological path (i.e. creating new path) and so witnessed the intended development of two technological paths in parallel. The authors touch upon the topic of the *interplay between* different technological, institutional and organizational paths, but fall short of further exploring the topic. Along similar lines, Bergeck and Onufrey (2013) clearly indicate that technological path dependence is not limited to single path patterns. They show in their study that “different technologies that have co-existed over long periods, can be conceptualized as *multiple technological paths* rather than a unitary cumulative progression (as the path notion is most commonly used in the existing literature)” (Bergeck & Onufrey, 2013, p. 1289). Referring to technological innovations in the lighting industry, they mention *cumulative progression* as a driver for innovation and explicitly state that in this case, the coexistence of some earlier properties and some later properties is inevitable. Later, Onufrey (2017) highlights *path interactions*, however, mainly focusing on their positive impact on each other. Referring to her prior work (Onufrey & Bergeck, 2015), she states that “co-existing paths can interact in a



positive way due to self-reinforcing mechanisms in the form of positive externalities, which can be reproduced not only in their original path, but also in co-existing paths” (Onufrey, 2017, p. 1064). With their conception of multiple paths, Bergek and Onufrey (2013) also refine the traditional view on *radical innovations* in the light of path creation. They perceive the traditional concept of path theory as allowing for two different scenarios: First, the development to an inevitable lock-in (Vergne & Durand, 2010) and second, the replacement of old paths by the creation of new ones (Araujo & Harrison, 2002; Garud et al., 2010). None of these perspectives allows for continuity between a previously existing path and a new one. Instead, radical, technological change is seen as discontinuous and mainly driven by exogenous forces. Conversely, Bergek and Onufrey (2013) assert that even radically new technological innovations can be partially based on old paths.

While in the context of technology entrepreneurship, Agogué et al. (2015) raise the idea of multiple paths and speak about the possibility to *shift from one path to another*, with regard to technological innovations, Singh et al. (2015) stress the notion of *interdependencies between multiple paths* “by focusing on how they entangle through specific organizational practices and arrangements” (Singh et al., 2015, p. 646).

With regard to the *organizational context*, Maielli (2017) states that “if we accept that flexible and stable operations *coexist within the same organization*, then the differentiation between path creation and path dependence might well reflect different equilibria between the more conservative and innovative parts of an organization at different points in time, where a phase of path creation might well be followed by a phase of path constitution and consolidation” (Maielli, 2017, p. 104). Thus, he implicitly allows for the possibility of contradictory operations coexisting within one organization at the same time. Singh et al. (2015) go even further by explicitly addressing the need to understand the *interdependencies between multiple paths* and to elaborate on how they become entangled into one and another through certain *organizational*

*practices and arrangements*. In line with that, Bothello and Salles-Djelic (2018) also stress the need to examine path interactions in realms characterized by multiple organizational paths. Furthermore, they address the need to clearly characterize these interactions in order to identify mechanisms of change and reorientation for the future.

Sydow et al. (2020) point out that they still adhere to their initial idea of path dependence (Sydow et al., 2009) and, thus, basically suggest that an organization is dominated by a *single* organizational path. However, their conception is theoretically open to multiple paths in parallel, as they stress the assumption that *if* such parallel organizational paths existed, this scenario would be more likely to happen in an organization with different strategic units and decentralized organizational structures. This set-up would allow different parts of the organization to act with a certain degree of autonomy and enable them to follow their own strategic directions simultaneously. This freedom of choice would be even more blatant in collectivities of organizations (e.g. strategic alliances or networks), which are polycentric systems by their very nature (Sydow et al., 2016; Sydow et al., 2020).

In sum, the idea of parallel paths has already been addressed in different scientific fields, ranging from a very technological view, through regional economies to an organizational context. However, I have highlighted studies from the technological and organizational context, due to their proximity to my own research questions. Most publications within the organizational context still focus on technological trajectories (within an organization) and, therefore, again bring forward the idea of multiple technologies instead of parallel paths operating by means of organizational structures and patterns. Hence, I follow the call by Bothello and Salles-Djelic (2018), who point out emphatically the need to elaborate on that topic and to examine interactions between parallel organizational paths as well.

### **2.3 Existing approaches to coexistence in an organizational context**

While the idea of ‘parallelism’ is comparatively young in relation to path dependence theory, it is not novel in reference to organizational and management research at all. For several decades, the phenomenon of coexistence has caught the interest of scholars and accompanied research on organizations. One of the fundamental works in this regard is the seminal work by March (1991). He elaborates on the linkage between exploring new potentials for organizations on the one hand and exploiting old certainties on the other. In line with this idea, organizations successfully handling the challenge of simultaneously pursuing “both incremental and discontinuous innovation [...] from hosting multiple contradictory structures, processes and cultures within the same firm” (Tushman & O'Reilly, 1996, p. 24) are called ‘ambidextrous’ (cf. Tushman & O'Reilly, 1996). Levinthal and March (1993) point out the main problem confronting an organization in this situation. The challenge is to balance both *coexisting exploration and exploitation* optimally, since putting too much effort into the current exploitation would withdraw necessary energy from exploration ambitions and fail with regard to an organization’s long-term successes. Likewise, putting too much effort into the exploration of future potentials would withdraw necessary energy from exploitation ambitions and fail with respect to an organization’s short-term successes. Primarily, “the difficulty in achieving this balance is that there is a bias in favor of exploitation with its greater certainty of short-term success. Exploration, by its nature, is inefficient [...] Yet, without some effort toward exploration, firms, in the face of change, are likely to fail” (O'Reilly & Tushman, 2013, p. 328). These explanations already illustrate the *close relatedness to path dependence phenomena*, where such biases in favoring an existing path as opposed to a new path in creation also seem to be prevalent. Path theory adds value when offering explanations for the underlying dynamics resulting in such situations.

Closely related to this same phenomenon, other researchers have come up with different designations and approaches to explanations, e.g. *balancing search and stability* (Rivkin & Siggelkow, 2003) or *strategic renewal* (Albert et al., 2015; Binns et al., 2015; Crossan & Berdrow, 2003). Agarwal and Helfat (2009) propose a definition of *strategic renewal* as “[including] the process, content, and outcome of refreshment or replacement of attributes of an organization that have the potential to substantially affect its long-term prospects” (Agarwal & Helfat, 2009, p. 282). Due to great difficulties in performing major transformations within complex organizations, they may favor continuously and incrementally renewing themselves, and in doing so attempting to keep up with external changes of the environment. This ambition is in line with, and one important lesson of *ambidexterity* (O’Reilly & Tushman, 2004, 2008; Tushman & O’Reilly, 1996).

In sum, all the approaches mentioned rely on organizational coexistence, which seems to be a very prominent and important phenomenon in the organizational context. This insight further motivates my extensive elaborations on organizational parallelism from the perspective of path dependence theory.

### **3 Research setting and methods**

In what follows, I set out the sampling strategy and empirical setting of my study, an ICT company. Thereafter, I elaborate upon my case study in terms of how I collected and analyzed the qualitative-explorative data.

#### ***3.1 Sampling strategy and research setting***

The ICT (a pseudonym of the company used for anonymization purposes) was chosen opportunistically (Patton 1990), as my research team and I were contacted by one of the leading directors of the organization, who was interested in collaborating with academia so as to reflect critically on the company’s activities. Using this contact as a starting point, I launched a two-year, in-depth case study (01/2018-03/2020; Yin, 2018) at ICT, a large-scale company of the

information and communication technology industry with more than 200,000 employees around the globe and customers in more than 50 countries. The company's main business involves mobile communications, fixed-line broadband connections, general internet for computers, and internet TV, as well as complex ICT solutions in all customer segments ranging from private consumers through mid-size companies to large business customers.

My particular point of contact was one of the ICT company's subsidiaries, namely the internal information technology (IT) provider, with about 10,000 IT specialists in seven countries. The main business of this subsidiary was the design, development and operation of IT applications and the provision of a high-performance IT infrastructure. During the whole observation period, the IT provider implemented a major business transformation. The transformation program, planning its wide-ranging transformation ambitions and implementing the related transformation measures, started on January 1, 2018: the first day of my data collection period.

The transformation program aimed at the introduction and expansion of agile methodologies with related changes in the managerial environment within the company. The overall target was a transformation from 80% waterfall management and 20% agile management to 20% waterfall management and 80% agile management over a transitional phase of three years. Hence, the transformation program was not about a replacement of waterfall methodologies by agile working, but about the *intended introduction of a parallel contradictory way of working* and its related managerial operations.

During the whole period of data collection, I participated in one of eight different 'workstreams' of the transformation program. At the beginning of the observation period, contact to other members of the eight workstreams was sensitive and rather loose, due to targeted fact-based collaboration. However, over the course of time I became increasingly involved in every meeting of the workstream and frequently had opportunities to socialize

during work and afterwards, which resulted in a more intense and conversant connection to the ICT staff. Soon my role as a listener and a source of critical reflection became valued, sometimes consulting the staff and teams (being in their transitional phase) with regard to overcoming impediments to their transformation approaches.

The ICT company's bureaucratic heritage and longstanding, historically grown and inert engagement in waterfall-driven management techniques indicated a present *path dependence* on its traditional way of working. At the same time, the company was putting very much effort and resources into the implementation and expansion of agile working, indicating a process of *path creation*. Hence, the ICT company constituted a prime example of intended parallelism of organizational paths. Furthermore, I had the remarkable opportunity to participate in the transformation program from its very first kick-off meeting over a time period of more than two years, which offered me comprehensive insights into the transformation, the arising interactions across both paths, and their development over time.

### **3.2 Data collection**

The data collection had two different targets. First, I wanted to find evidence of an actually present path dependence with respect to the traditional waterfall management. Towards this end, I collected mainly *retrospective data*. Moreover, I also wanted to find evidence of an actual path 'in creation' with respect to the introduction of agile management. In order to do so, I collected *real time data*, mainly in the early part of my observation period.

Second, after being able to confirm the presence of a prevalent traditional path and a new path in its creation process, the focus of data collection quickly shifted from a mere 'stock taking' towards gathering extensive data on the transformation process and its development over time. Thereby, I was able to track achievements as well as setbacks during the transformation process and to witness intense dynamics between the traditional waterfall management and the new agile management.

I collected data from three different sources, namely archival data, formal interviews and participant observations, including informal interviews (Yin, 2018): In sum, I conducted 63 interviews across all hierarchical levels and different functions, 29 of which were structured with an average length of approx. 60 minutes, and 34 were semi-structured with an average length of approx. 46 minutes. In addition, I gathered 539 hours of participant observations, consisting of 189 hours on the premises and 350 hours participation in telephone and video conferences, resulting in 224 pages of observation notes. Lastly, 455 internal documents (blog entries, company agreements, presentation slides, status reports, working papers and others) comprising 4,711 pages and 2,572 e-mails represent the data base of my case study.

### **3.3 Data analysis**

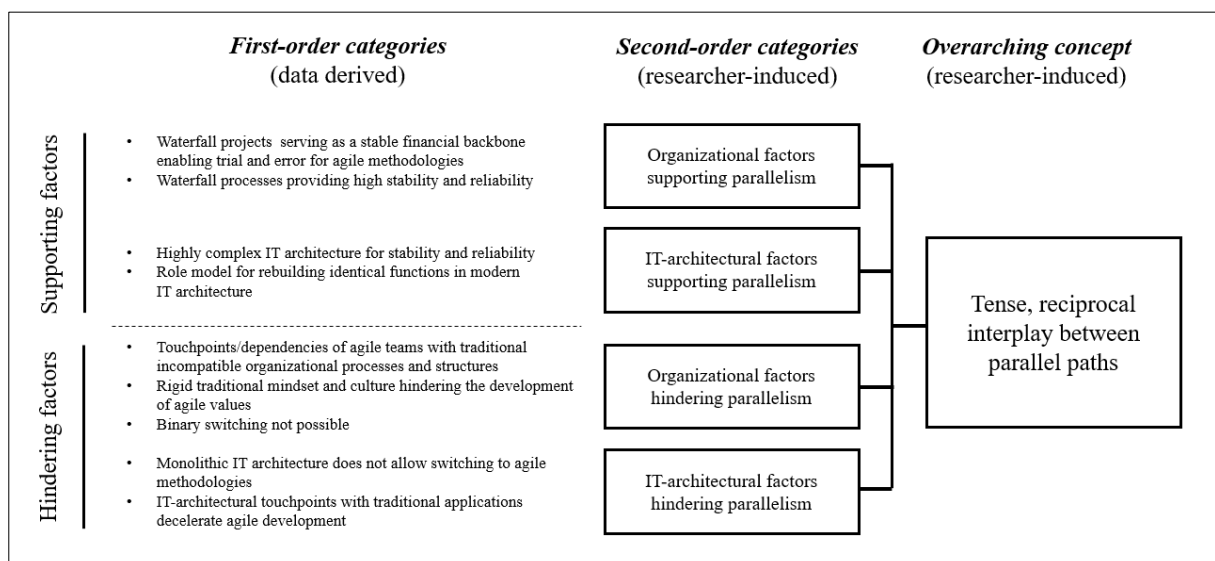
Drawing on 63 interviews since 2018, an observation period of more than two years and extensive archival data, I conducted a qualitative, longitudinal case analysis. Although data analysis was by nature fuzzy (Yin, 2018), I present my findings in a coherent manner. To heighten reliability, I collected all the ‘raw data’, finally comprising 224 pages of field notes, 98 pages of filled-out questionnaires from structured interviews, 495 pages of interview transcripts, 4,671 pages of archival data and 2,572 e-mails, in a case study data base.

In line with my two different targets of data collection, my data analysis was also divided into two steps for the present purposes. In a first step, it was crucial to justify the adaptation of path theory to the selected empirical setting. To do so, I needed to identify both waterfall management and agile management as a path in the sense of traditional path theorizing. Hence, I analyzed data with a post-hoc approach, identifying path characteristics and self-reinforcing mechanisms for waterfall management. After that, I analyzed data with an ad-hoc approach, identifying the very same path characteristics and self-reinforcing mechanisms for agile management, too. After successfully confirming both waterfall management and agile management as being identifiable as *organizational paths*, I was able to immerse myself in the

analysis of interactions between these two parallel organizational paths. In the second step, I plumbed the ongoing transformation process, particularly focusing on the ambitions to actively break with the waterfall management path and simultaneous ambitions to engage in the creation of an agile management path. In doing so, I was able to identify dynamics supporting and hindering the ambitions in both directions (from the waterfall management to the agile management and vice versa). After noting that they changed over time, I further investigated, in detail, the temporal component within the tense interplay of these two paths.

My empirical data was condensed, as is common practice in longitudinal and in-depth case study research, by constructing different categories. To outline the results and in particular the interaction dynamics, I made use of the Gioia methodology (Gioia et al., 2013). I employed MAXQDA software, importing all the raw data collected and starting the subsequent coding process.

Figure 2 depicts the emergent data structure relating to my first research question, namely the dynamics and tensions detected between the waterfall management and the agile management, which will be elaborated on in the next chapter.



**Figure 2** Data structure regarding tense interplay between parallel paths.



#### **4 Tense interplay of coexisting paths in the ICT Company**

In what follows, I present my findings. I start by taking a quick look at waterfall management and agile management from the perspective of path theory in order to clarify that both can in fact be seen as a path at work or a path in creation respectively (4.1). Second, I illustrate how the introduction of agile management is promoted and point out how ICT is trying to break with or ease back the present waterfall management to enable the parallel creation of agile management (4.2). Third, I depict the concrete interplay between the waterfall management (at work) and the agile management (in creation) and elaborate on its development over time (4.3). Fourth, after highlighting the negative and paralyzing dynamics between waterfall management and agile management, I seek for explanations why parallelism is still forced and inevitable in an organizational context (4.4).

##### ***4.1 Coexistence of parallel paths in the ICT Company***

I was able to carve out indications for the waterfall methodology being a case of path dependence and agile management being a path in creation. According to the statements of the interviewees, the currently predominant path characteristics of the *waterfall management* are inefficiency and inflexibility. The *inefficiency* stems from the ever-increasing approval processes, control mechanisms, and security procedures of the waterfall world (e.g. I2; I7; I9; I10). The requirements in the individual process steps have become more and more complex over time. The resulting dependencies are a hindrance to software development and have led the waterfall method into inefficiency (e.g., I2; I7; I9; I10). Another interviewee states that classic tools of the waterfall method, such as setting milestones, are inefficient, since they are not achieved in 90% of cases and thus the planning focus only serves as an end in itself. This leads to dissatisfaction both within the project team and on the customer side (I13). With increasing time, the way of working has also brought *inflexibility*. The rigid structures, processes and hierarchies have led to a "*layer of clay*" (I7; field notes, 2019-08-07), in which a

lot of information and change processes get lost between top management and the operative units. This makes the company inflexible in its reactions to change (I1). However, even outside the management level, employees who have spent a very long time working the way they work tend to reject the introduction of innovations and new ways of working; they "don't really have this willingness to change or do not have that much interest in changing the entire way of working here" (I1). The broad interplay of rigid waterfall processes, which are complicated and lengthy but work together and complement each other, limits the flexibility to deviate from these certain processes when necessary (I6; field notes, 2019-09-02).

I was also able to confirm positive feedback processes for waterfall management. In particular, coordination, complementarity and learning effects were repeatedly mentioned and observable. The fact that other areas or external cooperation partners 'live and breathe' the waterfall method leads to the fact that it is more worthwhile and/or simpler to maintain processes according to the waterfall principle in order to avoid the need for exceptional coordination (I2). Over the years, processes have been developed that correspond to the classic waterfall approach, and "can be poorly transferred into more flexible ways of working" (field notes, 2018-06-20). The experience gained over many years in waterfall projects has made this way of working reliable and has also strongly influenced the mindset of those at the current management level. They tend to make decisions according to the classic principles instead of daring to break new ground (I9).

The trigger for transformation in the direction of more agility was mentioned in many meetings and by most of employees interviewed. The majority of the interviewees named ICT's management team, which was quite new at that time (I1; I10; I12). It provided the impetus for the change and clearly communicated its expectations top-down (*adaptive expectation*), while promoting the further development and implementation of agile working in a bottom up approach (field notes, 2019-07-03). This led to a "kind of pendulum movement between bottom

up ideas and suggestions as well as top down guidance, direction and framework conditions evolved” (I27). Thus, various movements emerged within ICT as pilot projects, their aim being to test feasible ways of working increasingly (I1; I2; I9; I12). At that time, however, no final target picture was yet predictable (*unpredictability*). Regarding agile working, the potential inefficiency was also addressed. At several points, criticism was raised that, due to the company-wide changeover, projects and organizational forms are being set up in an agile way, where it may not be at all suitable (I6; I7). In other cases, customers demand an agile way of working, but they themselves "don't really want to collaborate, as is envisaged in [agile methods]" (I6). But positive feedback effects can also be gleaned from the data. The transformation process itself is perceived initially by the employees as voluntary (archival data, 2019-02-18). The thematic focus within the company and the team decisions to change the way they work mean it is becoming increasingly rewarding for the individual employees to adapt as well (I2). It was noticeable that the more experience employees gained in agile working, the stronger was their approval (I12; *learning effects*). There is a constant process of improvement in the handling of agile processes (I13). The increasing expectations, both in international competition and within the company, have led to a greater awareness of the agile way of working. Many large companies are currently introducing agile working methods (I1), so that they appear increasingly attractive and are also progressively demanded by customers (I9) as well (*adaptive expectation*). In sum, I am able to confirm that path dependence (waterfall management) and path creation (agile management) are at work at the same time within ICT (cf. manuscript 2 for further details). Therefore, it is possible to examine the prevailing phenomenon of the transformation program from the perspective of path theory and subsequently elaborate on the coexistence of parallel organizational paths.

#### **4.2 On breaking with waterfall management while reinforcing agile management**

As mentioned before, ICT planned its transformation from 80% waterfall management and 20% agile management to 20% waterfall management and 80% agile management within three years (field notes, 2018-01-31). Hence, it seems obvious that the aim was to ease and reduce waterfall management while at the same time introducing and strengthening agile management. In what follows, I intend to elaborate on the concrete approaches to both, first introducing and strengthening agile methodologies and second, easing the engagement in waterfall methodologies.

It emerges that the core of introducing agile management and progressively strengthening it throughout the company, has drawn upon actively and expensively creating self-reinforcing mechanisms. First of all, throughout all communication channels, the target picture of 80% agile management and 20% waterfall management within three years was communicated (field notes, 2018-01-31). There was a clear *expectation* for almost each and every employee to be willing to work in the agile way in future, or “there might be no place for him/her [in the future] anymore” (I5). As one manager pointed out clearly, the company “has two to three mechanisms to actively create a suction effect into the direction of [agile working] and make the employees want to work agilely. E.g., team leaders and department leaders are officially prohibited to staff gaps arising from employees outflowing to agile teams. Therefore, the remaining employees have to back up the work left undone and, hence, soon seek to migrate to a more attractive working environment, namely, to agile teams. Additionally, [ICT] intentionally pretended an artificial shortage of agile positions, especially at the beginning of the transformation process, in order to trigger the perceived need of employees to ‘get one of the spots’” (field notes, 2019-09-04; *adaptive expectation effects*). Although the current organization and with that its management levels are locked in the waterfall logic, they actively make decisions deviating from the classic principles, since the expectation effects lead them forcefully.

Furthermore, ICT has invested in innumerable workshops, lectures and educational material, training the employees in agile methodologies and related skills, enabling their smooth collaboration in agile teams, and motivating them by successfully employing agile methodologies. In addition to offering many opportunities to get familiar with agile methodologies, ICT has opened up space for very diverse pilot projects, refining concrete agile measures, and giving them a stage to share their experiences, whether best practices or reasons for failure, so that other agile teams have been able to *learn* from them (archival data, 2018-08-13; *learning effects*).

In the first part of the transformation process, agile teams seemed to be separate enclaves in ICT. By the time ICT started to increase the number of agile teams and to scale agile methodologies, the need to concatenate the teams with relevant related operations (e.g. release management) was inevitable. In line with their prevalent principle “fail early, fail often”, the complex structures and processes within the future collaboration were not predefined in every detail. “Nobody said, in the end we will have 84 [working units] here. Look at them and think about which of those might be your new home [...] That is not possible” (I28). Instead, when an agile team became bogged down in some of its operations, the concrete hurdles were analyzed and, if possible, restructured, sometimes in a lengthy complex process, to enable the smooth *coordination* of agile teams in the future (I28; *coordination effects*).

As mentioned above, ICT put many resources and time into flawless coordination between different agile teams (I8). However, ICT even went further than this and actively started shaping an organizational environment in regard to reducing touchpoints between agile teams and traditional waterfall processes (e.g. starting from budgeting processes, up to final release management) and hence, creating a ‘pseudo-decentralization’. The overall target of this broad engagement is to shape an environment that no longer contradicts agile working but will *complement* it in the future (field notes, 2019-12-18).

The decisive intention behind these measures (i.e., initiating expectation effects, learning effects, coordination effects and complementarity effects) was to introduce agile working and in particular to quickly strengthen its position in ICT (I15). Furthermore, as the term self-reinforcing mechanism already suggests, the biggest advantage of installing those mechanisms is that they reinforce themselves. As one manager put it in a private conversation: “You know what, we initially need very, very much energy. You can compare this to a huge and heavy flywheel. We need immense energy to bump this wheel. But you know what, when we start with our first [successful] agile teams and the flywheel slowly starts turning, then it develops momentum and turns and will always go on turning” (field notes, 2018-02-21). After initially putting very much effort into the installation of self-reinforcing mechanisms, they do develop a certain momentum and continue increasing without demanding any great additional effort in the future.

While the active creation of all four self-reinforcing mechanisms could be observed with regard to the introduction of agile management, the active breaking of those mechanisms regarding waterfall management turned out to be more difficult. There were no measures separately focusing on breaking with waterfall management to be observed. It seems rather that ‘easing self-reinforcing mechanisms’ always came along with the creation of new self-reinforcing mechanisms superimposing the traditional ones.

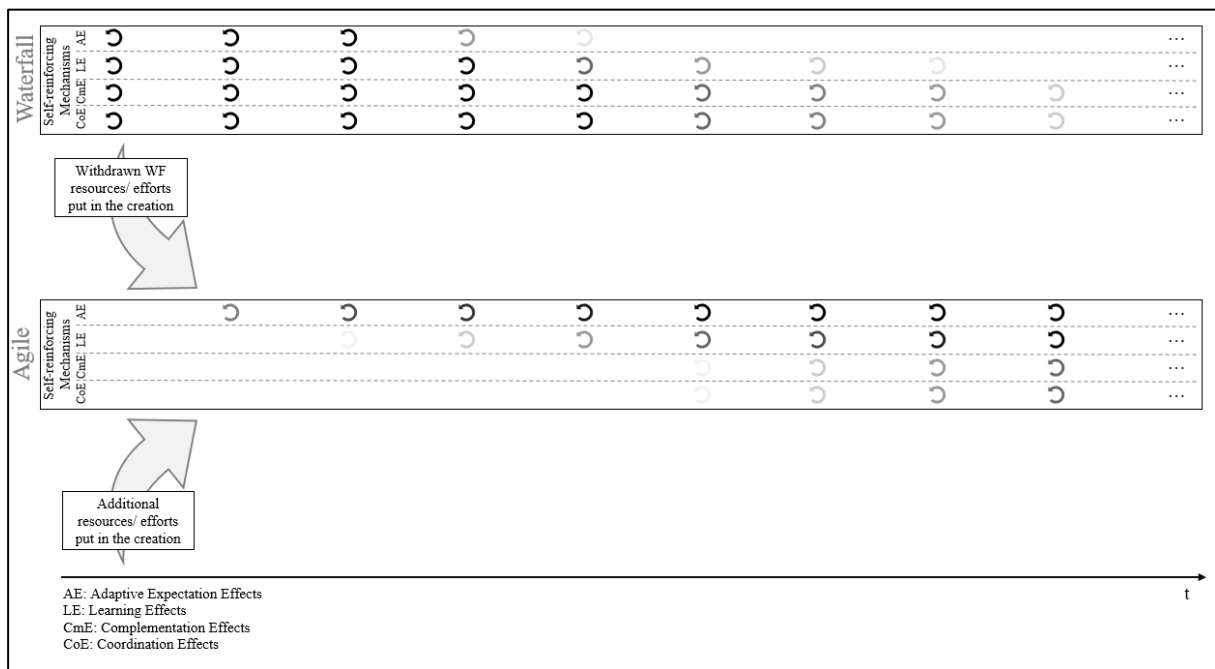
For instance, the *expectation* of engaging in waterfall methodologies was prevalent until the vision of agile working had been distilled. There was nobody communicating ‘we expect you to stop the waterfall methods’ without alluding to the alternative. Once this vision and the expectation in the direction of agile working had taken shape, the expectation of engaging with waterfall management decreased simultaneously (field notes, 2019-04-26). The expectation effect was *superseded*.

With regard to *learning effects*, I was unable to observe a clear reduction of learning effects. Instead, those effects remained during the whole transformation period, repeatedly ‘pulling back’ agile teams after experiences of failure, as one interviewee pointed out, “and what does every human being do under pressure? Fall back into old patterns” (I5). However, this ‘pull’ in the direction of traditional waterfall management slowly started decreasing along with the increasing development of learning effects in agile working. The more successful agile teams were in their way of working and the more pilot projects were successful, the more they tended to become more mature in agile methodologies and consequently drifted away from waterfall methodologies (field notes, 2019-12-19). However, an active measure of breaking with traditional learning effects could not be observed.

Relating to *coordination effects* and *complementarity effects*, the same holds true. There were apparently no measures actively trying to disturb and hinder the coordination and complementarity within waterfall teams and their related operations. Instead, hurdles to the coordination and complementarity of agile working were bypassed and by doing so, the pull in the direction of agile working increased, resulting in a withdrawal from waterfall management (archival data, 2018-06-25).

Hence, an active creation of self-reinforcing mechanisms was observable, the aim being to increasingly strengthen the engagement in agile methodologies within ICT. It is important to note that the actively created self-reinforcing mechanisms already started to gain momentum and to increase beyond the control of the actors (field notes, 2020-02-06). However, breaking/easing existing self-reinforcing mechanisms was not as obviously identifiable. Rather, those breaking mechanisms relied on the creation of substituting self-reinforcing mechanisms in agile management and therefore *replaced* the initial self-reinforcing mechanisms instead of actively breaking them.

Figure 3 gives a qualitative overview of the development of self-reinforcing mechanisms, the core of existing paths, for both waterfall management and agile management and points out how the actively created self-reinforcing mechanisms in agile management continuously replaced the ones in waterfall management.



**Figure 3** Overview of development of self-reinforcing mechanisms with regard to waterfall management and agile management over the course of time (own representation).

### 4.3 On the interplay between waterfall method and agile management

The introduction of agile management in parallel to existing waterfall management is very demanding for the organization observed. I noticed different dynamics supporting and hindering the transformation, which led me to extend my research focus on prevailing dynamics between parallel paths. Based on the empirical data, I suggest *two dimensions of dynamics between the traditional waterfall approach and the introduction of agile working*. For one, there is the *tendency of the dynamics*, i.e., relating to positive or negative consequences. Moreover, I suggest a distinction should be made in terms of the *realm* (i.e., where those dynamics unfold) between organizational and IT-architectural settings (see Table 1).



**Table 1** Dynamics between waterfall management and agile management.

Scope of dynamics	Tendency of dynamics	Data source	Illustrative evidence
Organizational scope	Positive	Archival data	"For changing needs, it is recommended to work with contingents, that means a previously reserved part of the waterfall capacity can be retrieved [...] by agile teams." (Archival data, 2018-11-07)
		Interview data	"We graft to earn the companies daily bread" (I21)
		Field notes	"And we need this green field. It is good that we have the 'all day business', backing up, so we can invent our further steps. That is very important in our fail early fail often mentality" (Field notes, 2019-03-22)
	Negative	Archival data	"And in a big organization (the 'monster') you have many things to do besides your normal work, since the organization requires it. [...] Here it is important to 'feed the monster smartly' [...] so the monster does not eat you one day." (Archival data, 2017-04-03)
		Interview data	"Well, where we have most tensions is where [the traditional parts] do not have a space in the pure [big picture of the future]." (I5)
		Field notes	"The biggest issue really lies in the organizational structure and the boundary conditions that we have." (Field notes, 2019-01-20)
IT-architectural scope	Positive	Archival data	"Architecture needs coherence, not a 'fail fast' mentality" (Archival data, 2018-01-22)
		Interview data	"And what was clear the whole time and they all said it, that the IT at this point was able itself to steer the transformation and also provided freedom to invest." (I16)
		Field notes	"[The application] will completely stay running, until [we are able to replace it]. Then [...] [it] will get retired." (Field notes, 2019-09-13)
	Negative	Archival data	"How can we get rid of the system dinosaur? [...] One of the largest large computer systems. [...] [The company] has been trying to switch to more modern systems for 25 years. With the current planning, this will be achieved by mid-2021" (Archival data, 2020-02-17)
		Interview data	"We have very many old systems, many big monolithically systems [which do not allow agile development]" (I12)
		Field notes	"In several parts, the customer needs are changing very fast, therefore, requiring agile working, however, the IT architecture is too complex and interwoven for agile working." (Field notes, 2018-02-08)

In the following I will highlight both the organizational as well as the IT architectural scope, each regarding positive and negative dynamics. As for *positive dynamics*, I observed that sticking to the waterfall approach regarding certain operations, paradoxically, can support the introduction of agile management. The traditional well-structured processes convey great reliability, while an overarching agile collaboration is still being developed and still in a so-called “finding phase” (I1). Analogous to the organizational and IT architectural settings, in the field of the mindset as well, the coexistence allows a feeling of reliability. While reinventing their personalities, the employees still have the secure feeling of “having a position and having a function” (field notes, 2019-11-12) in the traditional world, which will back them up in case of failure (I19; I27). Although none of the interviewees could confirm any positive dynamics regarding the traditional IT architecture supporting agile software development, I could at least observe that the IT architecture also provides a certain level of security and stability. Several applications are currently getting replicated in a modularized way so that they can be developed agilely in the future (intranet document, 2019-03-06; I27). The old systems stay running, ensuring stable business, until the new ones are fully ready to operate (field notes, 2019-09-13). As one respondent puts it, “we graft to earn the company’s daily bread” (I21). However, in this context, one interviewee mentioned an important concern. In his eyes, the company has got “split into a two-class society. The lower class crafting in the traditional manner, upholding the whole business and enabling the upper class to play around in that game and fun world, reinventing their personalities” (I14), culminating in a complex, oftentimes tense, but also fruitful way.

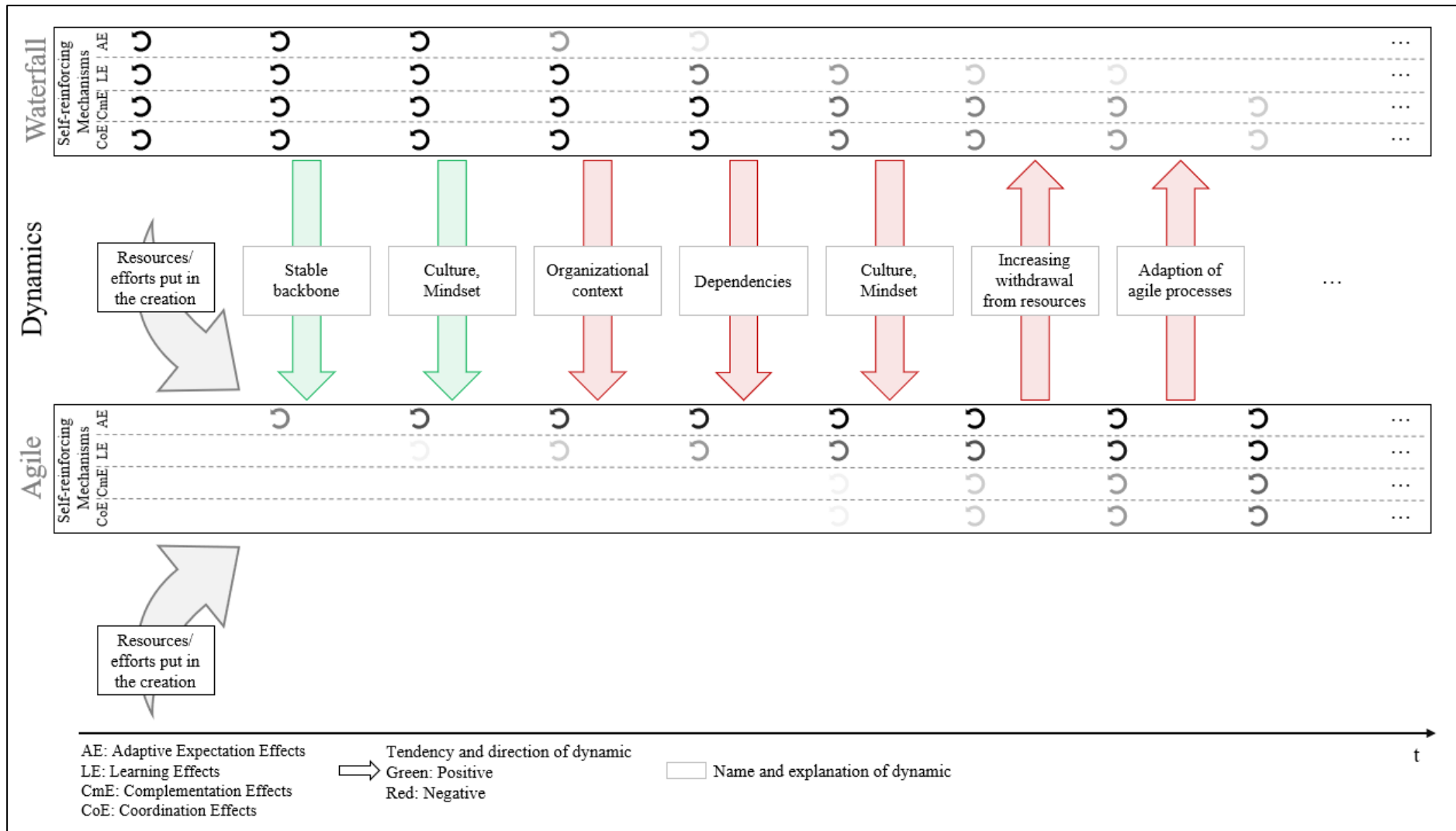
As for *negative dynamics*, the very structured and complex traditional procedures within the company, such as budget planning or software releases, often prevented agile teams from finishing their tasks because at several points they were still dependent on those wide-ranging, paralyzing, yet inevitable, approvals (I1; I10). Furthermore, crucial tensions were identified in

terms of cognitive changes. Sticking to a very ‘old’, hierarchically driven mindset was perceived as the main obstacle in developing an agile company culture (I3; I4; I9; I10). This concern seems to be exacerbated by the fact that the mindset stemming from the traditional waterfall approach *contradicts* the agile one. Thus, this tension requires not only a transition in managerial technique, but also a change with regard to corporate culture – making the transformation ambitions even more complicated and demanding, as pointed out in chapter 4.2, which elaborates on the concrete measures to ease waterfall management and to strengthen agile management. From a technological point of view, the software has evolved over decades into an interwoven monolithic IT architecture, which is not only very hard to maintain but impedes agile software development due to countless interfaces (I1; I6), in effect significantly decelerating the implementation of scaled agile working (archival data, 2019-06-28).

Beyond the aforementioned two dimensions (tendency and realm of dynamics), it was also possible to differentiate clearly between the directions of the dynamics. Did the traditional waterfall management hinder the introduction of agile management, or did the new agile management hinder the flawless continuation of waterfall management? The above-named dynamics focuses on the influence by the existing waterfall management on the introduction of agile management. However, as both ways of working are to some extent competing with each other, dynamics in the direction from agile management to waterfall management were also observable, although only with negative tendencies. First, as one can imagine, the withdrawal of resources and working capacity from waterfall teams to agile teams eases the traditional way of working tremendously. In some cases, employees were not fully exempted by their waterfall teams to be able to focus on agile methodologies. They were dedicated to working in a waterfall manner and in an agile manner at the same time, splitting their working capacity. This approach was criticized very often, since it distracted employees from both ways of working, confusing them and causing transitional costs, repeatedly shifting from one working environment to the

other. One respondent clearly illustrated her struggle to serve ‘both worlds’, since her first supervisor in her waterfall team did not agree with her attendance at mandatory meetings within her new agile team, which constantly caused her trouble and dissatisfaction, since she was not able to fulfill her tasks in either team adequately (field notes, 2019-11-14).

In sum, Figure 4 depicts an overview of the different dynamics within the tense interplay between waterfall management and agile management over time, indicating their tendency, realm and direction.



**Figure 4** Development of inter-path dynamics over time (own representation).

Due to my extended engagement with ICT, I have also been able to explore the *development of the path dynamics over time*, which I will outline in the following. Right at the beginning of the introduction of agile management, supported in part by withdrawn waterfall resources and in part by additional resources, positive dynamics were present in the main. The ‘waterfall world’ provided the necessary monetary and human resources to enable ICT to gradually approach the first small entities working in an agile manner. Despite *providing resources*, waterfall management also served as a *stable backbone*, backing up failures in the ‘trial and error’ phase and grafting “to earn the company’s daily bread” (I21). Closely related, the traditional waterfall management also served as a stable backbone with regard to the *organizational culture*, giving employees a feeling of stability in their working environment, of knowing themselves ‘to have a place and a task’ within that environment, of belonging and personal importance (field notes, 2019-05-14). However, the major, historically grown, complex and stable *organizational context*, namely ICT, is both a blessing and a curse. It’s complex and interwoven operational structures come along with strong *dependencies* on various existing long-winded processes (e.g., approvals) and, therefore, lower the autarchy of innovating subunits and thus their scope of innovation. Analogously, the IT-architectural structures are similarly complex, interwoven and interdependent, complicating any deviations from the existing monolithic structure and hardly allowing people to work in an agile manner (archival data, 2019-02-01). Moreover, the *traditional mindset* and *organizational culture* within the company lead to a negative dynamic, hindering agile working as well. While the organizational culture on the one hand provides a feeling of stability, on the other hand it is perceived as being the strongest aversion against change and as the most robust hindrance during the whole transitional phase of ICT (I20).

However, as soon as the first self-reinforcing mechanisms started to evolve with regard to agile management, self-reinforcing mechanisms in waterfall management automatically started decreasing and getting weaker. The increasing *pull in* the direction of agile working came along

with an analogous *pull out* of the traditional way of working and an *increasing withdrawal* from waterfall management, weakening it significantly further.

As depicted in 4.2, after adaptive expectation effects and learning effects had come into force slowly, coordination and complementarity effects were also set up to serve an agile management. At this point in time, the negative dynamics from agile management regarding waterfall management changed from being indirect in nature (i.e. weakening due to withdrawal) to being direct (i.e., actively disturbing and unbalancing existing and important processes), for example the budgeting processes (field notes, 2020-02-13).

In sum, except from the very beginning of the introduction of agile management, the coexistence of waterfall management and agile management within one centralistic organization was very tense and paralyzing. However, there was a ‘critical’ point in time, which cannot be explicitly determined per se, when the dominant direction of dynamics changed. While the traditional waterfall world initially hindered the introduction of agile management, in the end it turned out vice versa. It is remarkable that the negative dynamics did not vanish over time, but changed their direction. Hence, the interplay between the two parallel paths was always tense, even after, or possibly because the new path had become mature.

#### ***4.4 Paralyzing parallelism – why parallelism is still targeted***

The previous insights suggest that negative organizational dynamics were unexpectedly dominant. This is grounded in the conviction of many respondents, who strongly emphasized that the traditional world should not be vilified and that there were certain reasons for its existence. However, it was conspicuous that it was often perceived as an “inherited burden” (I1), culminating in remarks like “the [traditional] budgeting and release processes are a permanent brake in the gear” (archival data, 2017-04-03). The teams are subject to certain constraints in the traditional organizational structure. “I mean, [regarding the processes] our legs and arms are tied and then [they say] now run 100 m as fast as you can” (I16). Since the

traditional working environment did not support agile working, the company not only established agile methodologies, but furthermore tried to set up a whole new organizational structure enabling and supporting agile working (I36). However, this turned out to be very complicated due to their development over decades. “If we were a young start-up that had been able to start on a green field [...] it would most likely look way different [today]. But we have *inherited burdens*” (I1). As one of the agile coaches, consulting teams on their way to agile working, also put it, “it is still difficult, due to our dependencies on the waterfall world, especially at the beginning” (I7). The more points of contact an agile team still has with waterfall teams and processes, the more the structure and flow of agile rituals gets disturbed (field notes, 2019-11-15). At the latest, when it comes to problems, “you have to pull the classical mechanisms out of the hat somewhere” (I6) and the first way to get out of trouble is to rely on classical habits and exit mechanisms, stemming from the traditional world. This mechanism seems comprehensible but fatal at the same time, since relying on classical processes of the organization hinders the evolvement and establishment of new and modern coping mechanisms, supporting the agile progress.

As I discovered that parallelism was one of the core sources for decelerating progress, I sought for reasons *why this parallelism is forced in the prevailing situation of ICT* and identified three different reasons for the intended and prevailing parallelism, despite it entailing impediments. First, the aforementioned traditional operations and structures within the ICT company still serve as a *stable backbone*, continuing current everyday business and “earning the money for the colorful game and fun world, inventing agile working” (field notes, 2019-04-03). While doing so, some interviewees felt that the company was split into a “two class society” (I1), one class reinventing the organizational structure and a new way of working, while the other one “did the rest” (archival data, 2019-02-15).



Second, various respondents pointed out that agile working might not be the panacea for all parts of the organization and for all customers. There are *good reasons for working in the waterfall logic*, with it still being beneficial for some parts of the organization (I12). As the CEO of the organization announced at the beginning of the transformation process, he aspired to develop 80% of the projects in the traditional waterfall logic and 20% in an agile manner by 2021 (I21). As one software developer put it, “the glorious idea of the agile manifest from [2001] does not work everywhere. You cannot permanently tinker with all the people in daily sprints on some [software] versions, because that all costs money” (I19). He also described how one had to fulfill his/her operative task, because daily business often did not offer a possibility for agile working. There are certain tasks that are highly standardized and need to be done as soon as possible in a certain chronological order. For instance, when one receives an error signal, immediately the relevant people have to be informed, the error signal needs to be analyzed, fixed and confirmed. “What should I do there, with post-its?” (I19). Obviously, there are still parts in the organization sticking to their traditional way of working, since it is simply not sensible to work in an agile way in those specific areas.

Third, I found evidence to indicate the difficulty of switching from the traditional world to the new world due to organizational conditions, being very closely related to my idea of paralyzing parallelism. The leader of the transformation program confirmed in our interview: “you cannot shift to ‘agile’ overnight” (I27) and the way of working “cannot be switched as such” (archival data, 2019-09-25). That kind of *sudden switch* might be possible in the technological environment, albeit still requiring many resources and very intensive preparation there, as I spotted in an internal newsletter, asking the question: “how can we get rid of the system dinosaur?”, talking about an internal application that was created in 1979 – at that time one of the largest computer systems. The company “has been trying to *switch* to more modern systems for 25 years. With the current planning, this will be achieved by mid-2021” (archival

data, 2020-02-17). A software developer confirmed this approach of ‘prepare and switch’ by telling us that his team was working on building up a new application in a completely modularized way (hence, supporting agile methodologies), duplicating all the relevant functions of a monolithic traditional one “until [the new application] is running. Then we will switch [to our new one] and [the old application] will be retired” (field notes, 2019-09-13). In this kind of technological circumstances, it might be possible to intensively prepare something new in parallel, until it is ready for usage, and then completely switch over.

However, this logic is not adaptable to organizational changes. The more complex an organizational structure is, which holds especially true for big traditional companies, where structures and processes have evolved over decades, the more difficult it is to prepare and perform such a switch. “Since organizational structures change way slower [than a team suddenly using a new methodology], you still continue to work in the waterfall manner” (I19). This can be traced back to the complexity of interconnected processes, hierarchies, highly different individuals, an evolved organizational culture and lastly, the dynamics arising between all of those factors. In this context, it is not possible to retire the traditional organizational world by “pushing a button” (field notes, 2019-09-13), as might hold true for an old application that can be turned off. This difficulty gets even more complicated when the old system is supposed to keep running in parallel. That repeatedly triggers a pull-effect back towards the traditional world, as one high-level manager mentioned very impressively in retrospect: “And now there is this impressive new green world, and it is impressive and green and new, but when it circumambulates core processes, then we get down to the nitty-gritty. Nobody has told us how to shift. It all remains traditional. Regarding this, [by now] everything related to responsibility stays exactly where it was before” (field notes, retrospective informal interview, 20-06-02).

## 5 Discussion

With regard to waterfall management, I have been able to identify path characteristics, in particular current inflexibility and inefficiency, as well as self-reinforcing mechanisms at work, and, therefore, have discovered a prevailing organizational path dependence (Sydow et al., 2009). At the same time, I have been able to identify certain path characteristics and self-reinforcing mechanisms for agile management, too, indicating a path creation in progress (Garud & Karnøe, 2001). Under these two premises, I am able to take a further look at their coexistence and dynamic interplay from the perspective of path theory and, therefore, overcome the repeatedly criticized single path perspective (Hassink et al., 2019; MacKinnon et al., 2019; Steen & Hansen, 2018). In what follows, I elaborate upon the three major implications for theorizing on organizational path dependence in light of my findings.

First, I was able to observe *how* ICT created a new competing organizational path (Garud & Karnøe, 2001), while at the same time sticking to but easing the traditional one. Elementary studies on path dependence already highlight the central role of self-reinforcement during the evolvement of a path (David, 1985, 1986). Later studies also build on that idea and point out the major importance of increasing returns (Arthur, 1994) and “increasingly systemic forces, beyond the control of the individual actor” (Sydow et al., 2009, p. 691). These *self-reinforcing mechanisms* turn out to be a core element of both creating a new path and easing/destroying an existing one. This finding does not seem very surprising per se, since self-reinforcing mechanisms are the key idea and driving force behind the evolvement and strength of a path (Arthur, 1989, 1994; David, 1985; Sydow et al., 2009). However, it is intriguing to take a look at the particular techniques and their temporal development, as employed to deviate from existing structures and operations (Garud & Karnøe, 2001) and to set up a new organizational path from scratch.

In contrast to prior studies, mainly elaborating on the origin of self-reinforcing mechanisms, their emergence or different types of self-reinforcement effects (e.g. Agogué et al., 2012; Aranguren et al., 2019; Sydow et al., 2009), my data shows the *development of intentionally initiated self-reinforcing mechanisms over time* in light of path creation (Garud & Karnøe, 2001). In what follows, I refer to four different self-reinforcing mechanisms: adaptive expectation effects, learning effects, and coordination and complementarity effects (Sydow et al., 2009, 2020).

The first approaches to introducing agile working in ICT started with very clear and frequent communication about the targeted picture of the future company and detailed *expectations* regarding the employees and their future way of working. ICT tried to encourage each individual's mindset of openness and willingness to change and thus to initiate an overarching culture of transformation. It is remarkable that the communication measures were well thought-out in detail, indicating which employees would get informed via which communication channels in what frequency, to ensure the *omnipresence* of the targeted picture of ICT, including the employees and their future way of working, without overstraining the individuals from the very beginning. Still, ICT aimed towards clearly pointing out their visions and expectations and spreading them throughout the whole organization. Thereby, individuals could also expect their colleagues, other teams and whole departments to follow ICT's visions and, therefore, tended to follow as well, so they would not end up stigmatized as 'left behind' or 'outsiders' (Kulik et al., 2008).

Shortly after initiating adaptive expectation effects, ICT started putting very much effort into *learning effects* by setting up various different workshops regarding agile working as well as encouraging and supporting diverse pilot projects, testing the new ways of working, defining their own rituals and schedules, reporting about their experiences, giving advice regarding success factors and sources of failure, and so motivating and supporting more teams to work in

an agile way, too. Soon, these measures led to a strong network of knowledge sharing and started generating momentum (Garud & Karnøe, 2001).

Later, as soon as agile teams left the ‘green field’ and started embedding their own operations into the overarching traditional organizational structures, many obstacles arose with regard to *coordination and complementarity*. In line with the agile ‘trial and error’-mentality, these upcoming obstacles showed up the related needs for change in the organizational environment in order to enable agile working in the future. ICT therefore started a successive but very cumbersome and expensive breakup and adaptation of current organizational structures to allow for better coordination and complementarity within agile working. In line with Sydow et al. (2009), my data shows that not all self-reinforcing mechanisms have to occur in parallel – at least one self-reinforcing mechanism is required to support the evolvement or creation of a path. Instead, they occur sequentially, but not by any means free of overlaps or in a clearly separable manner (Dobusch & Schüßler, 2013).

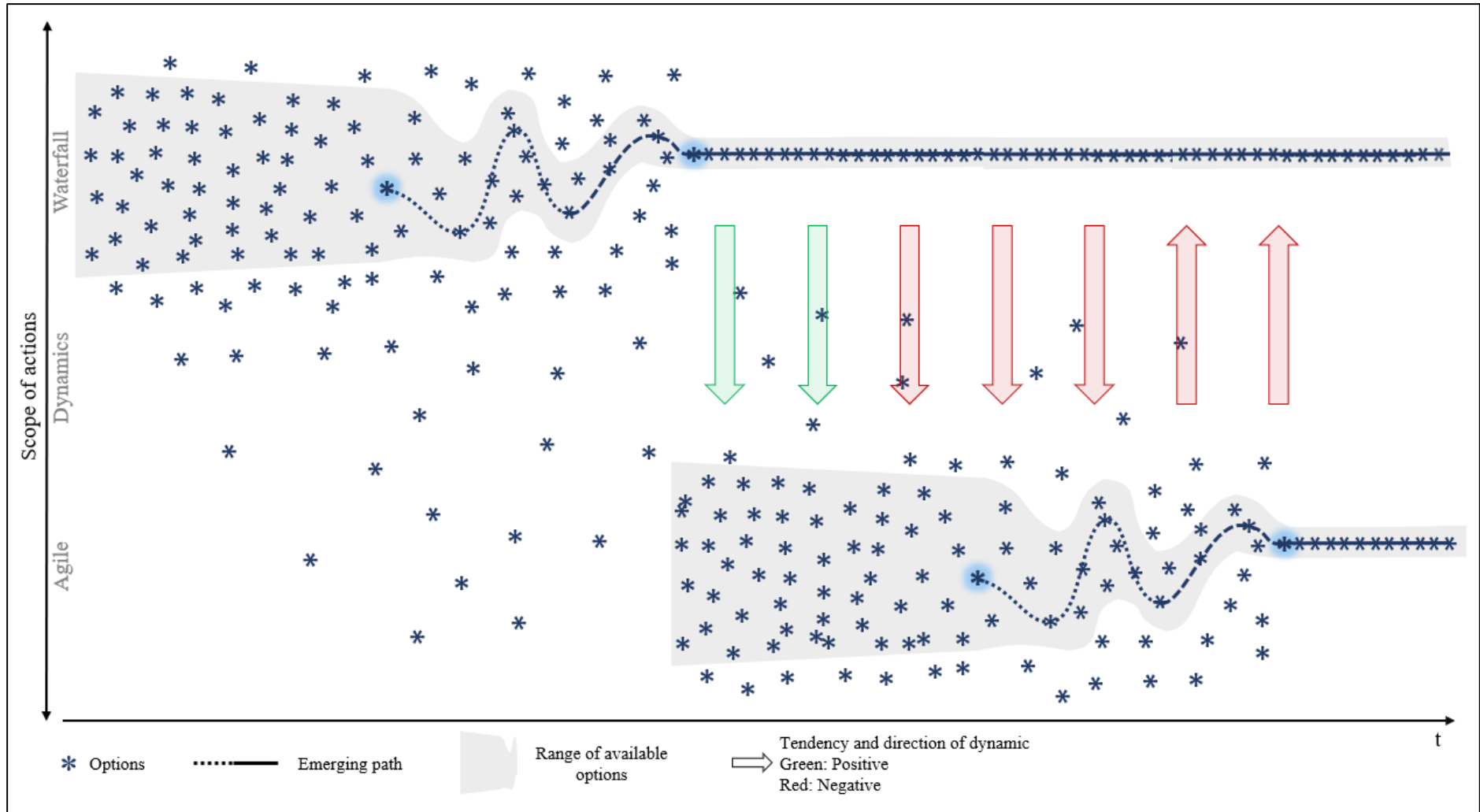
While the new path of agile management was in creation, it was the aim of ICT to ease the traditional waterfall path as well. However, as Sydow et al. (2009) already point out in their prior work, it is very difficult to stop self-reinforcing processes at work in an organization and special techniques are required to do so. Further studies elaborate on possibilities to “lockout” (Schilling, 2002, p. 390), a “de-locking” (Aslesen et al., 2017, p. 457) or other strategies for overcoming self-reinforcing mechanisms (Agogué et al., 2012; McIntyre & Subramaniam, 2009). However, ICT did not want to *fully stop* self-reinforcing processes within their organization, since they *did not intend to completely break* the traditional path as brought forward by Araujo and Harrison (2002) or Garud et al. (2010), who – in contrast – document the replacement of an old path while creating a new path. Instead, they needed measures to ease self-reinforcing mechanisms, allowing the evolvement of a parallel path but at the same time enabling the continuation of a laxer traditional path as well. Due to this situation, ICT did not

apply certain breaking measures to disturb waterfall management. Their ‘technique’ to create agile management while easing but continuing waterfall management was the *successive replacement of self-reinforcing mechanisms*. Easing the traditional path could be considered as a *by-product* of the creation of a competing alternative path (Law, 2018). Moreover, I observed that *creation and easing were to a certain extent complementary* (cf. Figure 3). While self-reinforcing mechanisms developed with regard to agile management, analogously the same self-reinforcing mechanisms decreased with regard to waterfall management (e.g. as adaptive expectation effects started to increase in the context of agile management, analogously they started to decrease with regard to waterfall management). Therefore, my data goes beyond traditional ideas on path breaking or overcoming path dependence (Agogué et al., 2012; Aslesen et al., 2017; McIntyre & Subramaniam, 2009; Schilling, 2002) and depicts the process of softly replacing a traditional path by a new one with the intention of following both coexisting paths in the future.

In sum, the introduction of a parallel, competing organizational path within a centralistic organization comes along with a replacement of self-reinforcing mechanisms. In contrast to the assumptions regarding evolving path dependence (Sydow et al., 2009), the self-reinforcing mechanisms relating to path creation do develop *under the control* of the individual actors, who thus actively shape the new path intentionally (Fortwengel & Keller, 2020). However, Garud et al. (2010) already make a call not to underestimate *unintentional* consequences of *intentional* actions, indicating “the power of hidden self-reinforcing processes” (Sydow et al., 2012, p. 910). In line with this assumption, my data also depicts how the risk of losing control over the *mindfully initiated* self-reinforcing mechanisms should not be ignored. As shown before, the employee talking about the flywheel pointed out how much energy ICT needed to push the ‘flywheel’. But when the “flywheel slowly starts turning, then it develops momentum and turns and will always further turn” (field notes, 2018-02-21). From this point on, the organization

might lose control over the previously self-initiated self-reinforcing mechanism and might subsequently fall into a dependency that they may no longer intend at that point in time (Garud et al., 2010; Sydow et al., 2012).

Second, it could be seen that both the established path (i.e. waterfall management) and the developing path (i.e. agile management) had a strong impact on each other's evolution, as intimated for the organizational context by Singh et al. (2015) and Bothello and Salles-Djelic (2018). However, up until now, concrete elaborations on the interplay between different organizational paths had fallen short. I have discovered how positive, but mainly negative dynamics influenced how self-reinforcing mechanisms unfold in the respective other (potential) path (cf. Figure 5), creating at least some measure of what I term "*paralyzing parallelism*".



**Figure 5** Introducing positive and negative dynamics between an established organizational path and a (potentially) new path in the making (adapted from Sydow et al., 2009, p. 692).



In contrast to Onufrey (2017), who focuses mainly on the positive impact of two coexisting paths on each other, my findings depict predominantly negative dynamics. Building on her prior study (Onufrey & Bergek, 2015), she states that “co-existing paths can interact in a positive way due to self-reinforcing mechanisms in the form of positive externalities, which can be reproduced not only in their original path, but also in co-existing paths” (Onufrey, 2017, p. 1064). However, Onufrey (2017) is referring to a multi-technology industry and elaborating on new technological paths benefitting from prior self-reinforcing mechanisms of the already existing, locked-in technologies. Hence, her work pertains to a setting where coexisting paths are able to benefit from the reproduction of the same self-reinforcing mechanisms, which contrasts considerably to my explorative context. I investigate the parallel introduction of a completely contrary way of working (waterfall methodologies vs. agile methodologies). Therefore, the new path in creation is not complementary to the traditional one at all. Rather, it opposes the previous organizational structures and processes and, therefore, increasingly disturbs them, the more points of contact between the two paths arise.

I have identified how the introduction of agile methodologies was especially successful where the relevant working entity did not have any touchpoints with the waterfall management, i.e., working in parallel in complete isolation from each other, which is in line with Sydow et al. (2020), who suggest that *if* parallel organizational paths existed, they would be more likely to arise in organizations with decentralized organizational structures. Although I have found parallel organizational paths in an organization with very centralized organizational structures, and therefore contradict Sydow et al.’s (2020) suggestion, at the same time, I admit that their coexistence is very tense and both paths disturb each other. Therefore, the fears of Sydow et al. (2020) prove true, and a smooth, undisturbed coexistence of parallel organizational paths may be possible in organizations with different strategic units, able to act independently from each other.

Third, as pointed out before, the parallel coexistence of two competing organizational paths within one centralistic organization, serving both parts with one common organizational environment, results in a very tense interplay of the two paths. However, not only the ‘final situation’ of two fully developed coexisting paths may culminate in a paralyzing parallelism. The whole process of introducing a parallel organizational path is very wide-ranging, lengthy and expensive, coming along with a very fraught transitional phase as well. Therefore, it is important to understand why organizations would initiate parallelism, although fully aware of the challenging situation they are launching themselves into.

On the one hand, the traditional path is necessary to serve as a *stable backbone*, enabling the development of a new path in parallel. This idea can be traced back to March (1991), who speaks already about exploiting old certainties while exploring new potentials for the organization at the same time, making the organization ‘ambidextrous’ (Tushman & O’Reilly, 1996). Although bringing the organization into a fatal, ‘life-threatening’ situation due to a negative lock-in, dominated by inefficiency and inflexibility, ironically, the traditional path is still essential for the survival of the organization as well. Without backing up the daily business during the lengthy transitional phase, an organization will not be able to provide resources for path creation and a comfort zone ensuring stability, while some trials of the explorative phase of path creation may end in failure. However, the challenge confronting organizations in this regard is the optimal balance (Rivkin & Siggelkow, 2003) of both paths, providing enough energy to successfully explore the future path, while at the same time not withdrawing too much energy from the traditional path to back up explorations and to be able to continue in parallel in the long term (cf. Levinthal & March, 1993; O’Reilly & Tushman, 2013), culminating in a challenging situation like walking a tightrope.

Relatedly, another reason for intended parallelism is that a *sudden switch* from one path to another one simply *is not possible*. Breaking an old path requires immense effort and resources,

especially in large-scale companies with historically grown, long-standing processes and structures (Sydow et al., 2009, 2020). In addition, the creation of new path, of setting up a managerial system serving more than 10,000 employees, suddenly enabling a completely new way of working is also impossible without any phase of preparation or stable trial and error (Rivkin & Siggelkow, 2003). The introduction of an organizational path, setting up a managerial system, business processes and structures serving thousands of employees, is not comparable with the introduction of a new technology, for example, which might ‘go live’ on a fixed date and then be used from that point in time. The creation of a new organizational path is way more cumbersome and dependent on various unpredictable factors. Similarly to studies on strategic renewal (Agarwal & Helfat, 2009; Albert et al., 2015), the preparation of a whole new way of working needs a certain period of preparation until it is mature enough to be self-sustaining or even successful.

On the other hand, the continuation of a traditional path cannot only be seen as a stable ‘backup’ for worst case scenarios or as the inability to switch to a new path. A negative overall lock-in for an organization need not be true for all its operations. While some operations may slide towards disaster on a certain path, other operations may not have passed the rationality shift (Rothmann & Koch, 2014) and may *still be efficient on that specific path*. Therefore, the parallel availability of two differing paths may open up the chance of “strategic choice” (Child, 1972, p. 1), so that an organization would have the freedom to choose between two paths and so select preferred benefits of both alternative options. Agogué et al. (2015) open up a similar idea by raising the possibility of shifting from one path to another. In such a situation, the preferred organizational context is dependent on various factors, e.g., coordination and complementarity with other teams, units or the necessary processual steps in the direct working environment. Different circumstances may require different organizational environments and therefore different organizational paths.

## 6 Concluding remarks

My study suggests the possibility for two competing organizational paths to coexist within a centralistic organization. As for ICT, a new organizational path is created, while a traditional one is eased, although the intention is to continue it in parallel in the long term. After ensuring that path theory provides an appropriate perspective on the observed scenario within ICT, I elaborate in detail on the mechanisms creating a parallel organizational path and easing the traditional one at the same time. Subsequently, I depict the tense interplay between both organizational paths and examine the evolvement of upcoming dynamics over the course of time. After identifying that the intended parallelism goes along with a considerable paralysis, I finally investigate the reasons why such fraught parallelism may still be intended.

Although I am able to expand traditional theorizing on path dependence (Sydow et al., 2009) and path creation (Garud & Karnøe, 2001) by introducing organizational path parallelism and pointing out upcoming dynamics between the two paths, several limitations remain, as with any qualitative-explorative study.

First, although I have conducted a qualitative, longitudinal case analysis with an observation period of more than two years, I lack data indicating whether agile management will finally develop into a locked-in path beyond the control of the individual actors and – if so – how the dynamics between the two paths will unfold in later stages of coexistence. Instead, my data draws on the early stages of evolving coexistence between two organizational paths. Therefore, future research might explore the forms of inter-path dynamics between *long-term coexisting organizational paths*.

Second, I have focused on two organizational paths in the transitional phase of creating and strengthening a new path, while at the same time easing the old one. This leaves room for future research to elaborate on cases of *multiple organizational paths* in parallel (as research on multiple technological paths; e.g. Agogué et al., 2015; Bergek & Onufrey, 2013; Singh et al.,

2015). How would the dynamics unfold in such cases, and how would the creation of self-reinforcing mechanisms of two or more newly created paths unfold?

Lastly, I have drawn on the *specific case* of *competing* organizational paths within a very *centralistic, hierarchically driven* organization. It might be of interest to see how my results would vary if the two organizational paths were not competing with each other, or if they coexisted in a rather decentralized organizational structure, enabling them to coexist in a more autarkic manner, rather than having various points of contact with each other.

Certainly, I suggest that the intended long-term parallelism of paths is a relevant phenomenon for numerous, especially large-scale organizations. Thus, I submit that in future it is worth engaging further in in-depth explorations of the parallelism of organizational paths and their dynamic interplay.

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## Discussion

The present doctoral thesis is positioned in the debate revolving around the idea of organizational path dependence and includes three consecutive manuscripts. Starting with an interdisciplinary, comprehensive analysis of twelve different novel path terms (e.g. Alexy et al., 2013; Béland & Powell, 2016; Cooke, 2012; Dawley et al., 2014) to foster our understanding of where path theorizing is heading to, I come up with a tentative framework, pointing out differences and relations between those novel path terms. While establishing the framework, I discovered the *lack of considering coexisting paths*, especially with regard to organizational path dependence theorizing (Sydow et al., 2009, 2020). Therefore, my further research focus is on an investigation of coexisting paths in the context of organizational path dependence and creation. To do this, I perform a longitudinal case study at a large-scale ICT company introducing a new path while at the same time intentionally sticking to a locked-in path for some of its operations, as well. I extend the three-phase model of Sydow et al. (2009) by adding three additional phases initiating the *sustained coexistence of two parallel organizational paths*. Finally, I elaborate further on the *tense interplay* between those parallel paths, as suggested by Bothello and Salles-Djelic (2018) and carve out its development over the course of time. Table 2 briefly summarizes the main contributions made by each of the three manuscripts.

**Table 2:** Overview of manuscripts and respective contributions.

<b>Manuscripts</b>	<b>Authors</b>	<b>Title &amp; Research Questions</b>	<b>Contributions</b>
Manuscript 1	Ronja Schlemminger Gordon Müller-Seitz	<b>Path Concepts between Persistence and Renewal – Towards an Interdisciplinary Framework to Inform Research on Organizational Paths</b>  <i>How can the numerous different, but undifferentiated interdisciplinary path terms regarding path changes be compared and related to each other?</i>  <i>What can we learn from the interdisciplinary view on path changes for path dependence in light of organizational theorizing?</i>	<ul style="list-style-type: none"> <li>• Conceptualization ‘How does a path evolve?’</li> <li>• Conceptualization ‘What can happen with a path?’</li> <li>• Comprising framework, no term for parallel paths</li> </ul>
Manuscript 2	Ronja Schlemminger Gordon Müller-Seitz	<b>Walking a Tightrope – Towards a Framework for Dealing with Coexisting Organizational Paths</b>  <i>How does a new organizational path emerge while pursuing an existing path in parallel?</i>	<ul style="list-style-type: none"> <li>• Introduction of empirically grounded theoretical idea of organizational path coexistence (6 phase model)</li> <li>• Parallelism opens up opportunity to choose between paths and opens up scope of strategic choice (introducing third dimension ‘utilization’)</li> <li>• ‘Pseudo-decentralized’ organization, which allows for parallel paths</li> </ul>
Manuscript 3	Ronja Schlemminger	<b>Paralyzing Parallelism? Dynamics between Parallel Organizational Paths</b>  <i>How do the dynamics and tensions between an established and a new organizational path in creation unfold?</i>  <i>How do these dynamics change over the course of time?</i>	<ul style="list-style-type: none"> <li>• Self-reinforcing mechanisms are at the heart of creating a new organizational path as well as of easing an existing path, which is initiated to continue in the future, and do vary over the course of time</li> <li>• Two parallel competing organizational paths culminate in a tense interplay, creating what I term ‘paralyzing parallelism’</li> <li>• There are still diverse reasons for the coexistence of two parallel paths, although it is accompanied by challenging dynamics and tensions</li> </ul>

This doctoral thesis addresses both previously mentioned debates within path theory and, beyond that, opens up an entirely new field of research with regard to organizational path theory in particular. The first debate addresses the importance of considering *agency* with regard to the evolvement of path dependence (Fortwengel & Keller, 2020; Garud & Karnøe, 2001; Sydow et al., 2020). While traditional notions on path dependence refer to increasing rigidities and inertia, evolving behind the backs of the agents, path creation revolutionizes this idea by introducing agents who renew existing structures and processes by means of mindful deviation (Garud & Karnøe, 2001) and, therefore, assumes a significantly greater degree of agency within path theory (Fortwengel & Keller, 2020). My doctoral thesis empirically introduces the active creation (Garud & Karnøe, 2001) of a new path, intended to be sustained *in parallel* to a locked-in path that developed behind the backs of the agents over the last decades. In doing so, the doctoral thesis also addresses the second key debate within path theorizing, namely the challenged *irreversibility* of a locked-in path (Arthur, 1994; Manning & Sydow, 2011). Based on investigations into path changes (Béland & Powell, 2016; Sydow et al., 2020), I introduce the parallel existence of both on-path change (e.g. Singh et al., 2015), referring to slight changes in the continuing traditional management, enabling the introduction of agile management, and off-path change (e.g. Bailey et al., 2010), setting up a completely new way of working, at the same time.

Beyond that and at the heart of my dissertation, I introduce a theoretically sound and empirically grounded conception of parallel paths in the context of organizational path theorizing. Hitherto, the idea of parallel paths has been raised, for instance, in the context of technological paths (Bergek & Onufrey, 2013; Sydow et al., 2012) or regional paths (Asheim, 2019). In both contexts, researchers also draw upon evolving inter-path dynamics. However, up until now, similar elaborations in the context of organizational paths have fallen short. Recently, Bothello and Salles-Djelic (2018) first raised the need for investigations into

domains populated by multiple organizational paths and investigate reciprocal interdependencies, which I address directly within this doctoral thesis.

## **Conclusion**

This doctoral thesis set out to explore the different streams of research on paths and in particular on the possibility of parallel paths in the social sciences, with a focus on organization-theoretical debates. Starting with a comprehensive systematic literature review, I first carve out the lack of consideration of parallelism in the context of organizational path theory. Afterwards, I empirically introduce the notion of parallel paths in an organizational context while drawing upon a longitudinal case-study in a large-scale company of the ICT industry. Drawing on extensive data collection by means of interviews, field notes and archival data over more than two years, I have been able to depict the phenomenon of path creation in parallel to sustaining path dependence. The process of path creation in parallel to a continuing locked-in path turns out to be particularly cumbersome, due to evolving dynamics between the established path and the newly coexisting path. Over the course of time, these dynamics gain an increasingly paralyzing character, leading to a situation that I term paralyzing parallelism.

As with any doctoral thesis, this research is not without limitations, four of which I set out below. First, from a theoretical perspective, it might have been fruitful to attempt theoretical triangulation (Yin, 2018) or to adopt entirely different theoretical routes. For instance, in organization theory, debates such as that on ambidexterity (March, 1991; Tushman & O'Reilly, 1996) might also offer fruitful insights. The present case study could have served as a prime example with regard to elaborating on ambidexterity as well. While sticking to the protractedly, historically developed waterfall management would relate to 'exploitation', investigations into implementing agile management as a future source of the company's success would relate to 'exploration'. As the ICT company was trying to engage in both simultaneously (i.e., being ambidextrous), it faced various challenges emerging from this

initiated parallelism. Since waterfall management and agile management in the present case are very contradictory and competing in nature, it might have been of great interest to elaborate on that specific situation from the perspective of ambidexterity. For instance, certain environmental conditions leading to a beneficial ambidextrous situation or, in contrast, to a paralyzing situation, could have been revealed. Furthermore, certain measures or mechanisms could have been developed, suggesting how to handle this special situation of competition and yet still enable an organization to choose between and draw on benefits from both sides, and indicating how to reduce the paralyzing dynamics. However, this perspective would fail to understand the *source of these dynamics* and to consider the evolving pull-effects within exploitation and exploration respectively. Furthermore, it would fall short regarding additional reinforcement, which might develop even beyond the control of actors, and potentially lead to subsequent inflexibility and inefficiency, which might be a key point with regard to the organization's future success.

Second, although performing a longitudinal case analysis over more than two years and gaining an extensive set of data, I still lack evidence whether agile management finally turned into a 'mature' path. Although I was able to prove clearly that agile management is a path in the creation process, by the end of my observation period, it was not a fully developed path at all. It might be particularly interesting to observe how both coexisting paths develop further, when both paths exist to a certain level of maturity and parallel prevalent self-reinforcing mechanisms. It would be interesting to investigate whether the tense interplay might balance itself out over a longer period of coexistence.

Third, although the large-scale ICT company turned out to be a prime example of path dependence due to long-standing, hierarchically driven, rigid organizational structures, other organizational research contexts might be of interest, as well. While changing the size and structure of the company observed might result in different path dependent behavior, it would



also be of interest to change the working environment analyzed. As I performed my study in a very IT-driven setting, the major part of organizational activities had a strong focus on processes, coordination and approvals. A different, laxer setting could have changed the path dependent behavior as well as arising self-reinforcing mechanisms significantly. In addition, the elaboration of two competing paths within one centralistic organization is a very special organizational setting. Elaboration on non-competing paths and/or elaboration on decentralistic organizations might both enrich further research on parallel organizational paths.

Finally, I made use of qualitative-explorative methods. The chosen design comprising ethnographical and case study-based elements has its merits when it comes to theory-building. However, it might have been worth considering a quantitative-deductive approach (e.g., using surveys) to substantiate and actually test the observations subsequent to my two manuscripts, either within the ICT company albeit in other settings I delved into or, alternatively, to test the ideas in different organizations so as to substantiate my theoretical assumptions. Ultimately, the ICT industry and the large-scale corporation chosen are particularly suitable for exploring my research questions. However, organizations in other settings, and in particular small and medium-sized enterprises, might exhibit different mechanisms of path parallelism, which await further exploration.

Future research might profit from further investigation into organizational path parallelism and from addressing the aforementioned limitations. Since intended long-term parallelism seems to be a relevant phenomenon for the majority of organizations, it appears to be a relevant topic for both organization-theoretically informed research and managerial practice. Beyond that, more detailed elaborations on inter-path dynamics might be of particular interest, since organizations need to understand their predominantly paralyzing character and, as a result, need further guidance on how to reduce the paralysis and so enable long-term success for

organizations performing the transition to an intended coexistence of parallel organizational paths.

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